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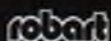
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ON THE COVER

We've seen several nice examples of the Goldberg Models Sukhoi Su-26M, but none have equalled this beauty turned out by Hugh Cravens of Panama City, Florida. Hugh, an Air Force man who became interested in RC while on a remote tour of duty in Turkey, sent this photo along with a few others for our "Plane Talk" column, and from the way he writes about the airplane (see page 8), it's obvious he's totally in love with it. Inset: Not all of the awards at the '94 Tournament of Champions went to the pilots; this huge Extra, pictured here with Miss TOC, Debbie Ellis, was presented to Mr. Bill Bennett in recognition for his service to the RC hobby. Eloy Marex' full report on the TOC begins on page 36.

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Italian modeler Domenico Bruschi is a guy who has participated in all sorts of outdoor athletic sports. He's flown FF, CL, and RC, competing in pattern and pylon and most recently, precision scale, winning the Italy Cup in 1989 and 2nd in F4C (FAI Scale) in 1991 and '92. He started flying Old Timers in '93, finishing 6th at the Italian SAM Champs with a Taibi Powerhouse. In '94 he took 1st with the New Ruler pictured here; it's powered by an Irvine .40 diesel and is covered in colored silk. Future plans include a Megow Ranger, a Blitzkrieg and a Comet Sailplane. Domenico concludes: "Building and flying my O.T. models makes me go back to my old days and truly I find more pleasure in flying these models than any of my others."

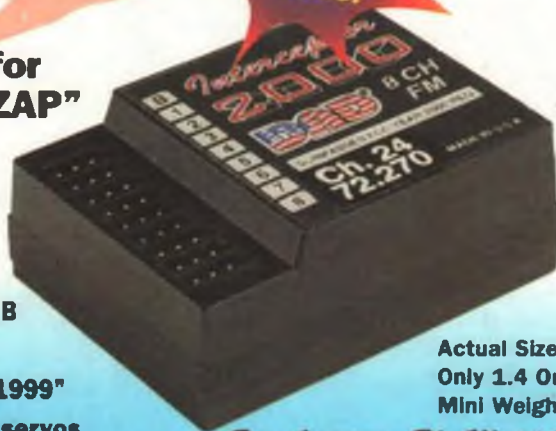
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Building the Easy Sport goes as smoothly as flying it. Thanks to precise CAD engineering, the interlocking, self-aligning, die-cut wood parts fit together exactly as shown in the plans and instructions.

You'll assemble the fuselage and tail from thick, 1/8" balsa and ply. So this is one *stout* airplane. It can handle stress.

Several new twists in the assembly process simplify typically challenging steps. To mount the wing, for example, you'll first build the fairing as part of the fuselage—then remove it for permanent attachment to the wing. The result: a perfect wing-to-fuselage match.

A vacuum-formed canopy and other styling features add to the Easy Sport's good looks. It's far more realistic than most other sport trainers—and you can reproduce the trim scheme pictured here with just two rolls of Top Flite® Jet White MonoKote® and the Easy Sport Trim Package (GPMQ0405), available separately.



"If you want to move up from your basic trainer, the Easy Sport 40 is for you. This model teaches you the skills for performing more advanced maneuvers and provides excellent low speed stability...to keep your next step virtually risk-free."

Don Anderson

Don Anderson
President and Founder,
Great Planes Model Manufacturing

The Easy Sport 40 kit comes complete with an Adjustable Engine Mount and all the top-quality hardware you'll need to build a tricycle model. Instructions for an optional taildragger version are included.

Wingspan: 59.2 in (1505 mm)
Wing Area: 750 sq in (48.4 sq dm)
Weight: 5.5-6.5 lb (2500-2950 g)
Wing Loading: 18-21 oz/sq ft (55-64 g/sq dm)
Fuselage Length: 50 in (1270 mm)
Requires: 2-stroke 35-48 cu in (8.0-7.5 cc) or 4-stroke 45-80 cu in (8.0-13 cc) engine & 4-channel radio w/4 servos



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Florida modeler Hugh Cravens couldn't be happier with his new Goldberg Sukhoi Su-26M. "It's really a great flying machine," Hugh writes. "With a YS 1.20 four-stroke swinging a 16x8 APC prop and burning 25 percent Cool Power, the airplane has tremendous vertical and is capable of outrageous aerobatics, including knife-edge loops. I added a TME Simple Smoke Pump (and simple it is!) for even more fun. Guidance is via a Futaba Super 7 PCM system using seven servos. All-up weight ready to fly is 10 pounds. It's finished in white and Circus pink MonoKote, and the painted parts are painted with PPG auto paints. The cowl and belly pan are aftermarket fiberglass parts from RC City. I love it!" *Hugh Cravens, 218 Hannover Circle, Panama City, FL 32404.*



"Stick-and-tissue has always been my first love in model building," writes Texas modeler Wayne Ison. "The Guillow's Cessna 172 Skyhawk was one of my first projects after about a 15-year absence from the hobby." Dave evidently hasn't lost his touch, as the finished model looks to be an excellent piece of workmanship. Covering is white Japanese tissue, and the trim was purposely kept to a minimum to highlight the construction and avoid excess weight. Nice job, Dave, and welcome back to the hobby! *Dave Ison, 3004 Kings Way, Plano, TX 75074.*

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One of Tom Roland's latest projects is this very nicely done SE-5A, scratch built from Rich Uravitch's "Dawn Patrol" series of .40-size WWI scale model plans. Tom modified the drawings to sport scale standards and installed an ASP .65 four-stroke; the finish is Chevron Perfect Paint over Sig Koverall. He adds that he's been a member of AMA for the past 45 years and flies actively with the LIRCS club (Long Island Radio Control Society). Tom Roland, 106 Prince Rd., Rocky Point, NY 11778.

Among an inch-thick stack of photos of some of his many free flight scale projects, Jake Larson included this one of his complex and intricately detailed Vickers Wildebeeste, which he reduced to 18-inch span from Ken Hamilton's excellent drawings. Jake says there are about 125 individual parts in that dummy Pegasus engine alone! The tiny generator prop spins in flight, and Jake reports the torpedo occasionally drops off in flight (It's just a press fit to the fuselage). Jake Larson, 12412 Lagoon Ln., Apt. #2, Treasure Island, FL 33706.



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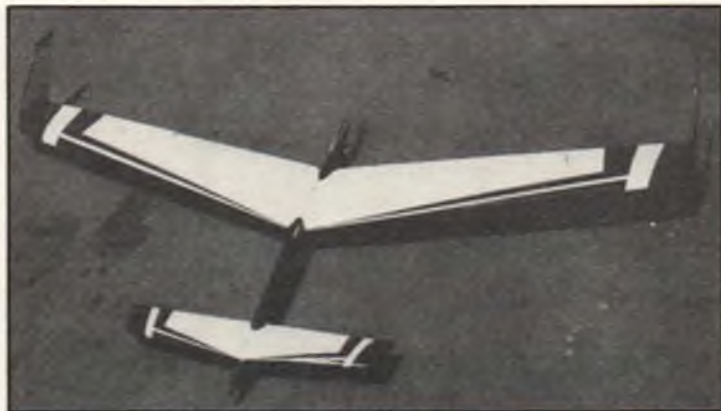
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MODEL DESIGN & TECHNICAL STUFF

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- Folding Props on Pushers
- Folding Props on Glow Engines
- Shear Webs
- I-Beams vs. [-Beams



Chuck Hollinger's original design electric pusher canard had an unusual problem—see text.

One of the beauties of modeling is that there's no end of new things to learn . . . especially if we stray from the beaten path a bit.

Chuck Hollinger, a modeling friend of mine since 1940, told me about something he experienced recently. Chuck has built and flown all types of models, but these days he favors innovative electrics. His latest is an electric-powered canard pusher with a folding prop. He'd used folding props on a number of conventional (tractor) electrics with complete success, but this time there was a problem.

Because of the prop in the rear, which might bite a launching hand as it went by, he hand-launched this model before turning on the power. Usually it worked well, but occasionally there would be a tremendous vibration and noise as soon as he turned it on, forcing him to cut power immediately after launch. On two occasions the vibration was so bad it broke the wing loose. Later examination always seemed to show nothing wrong.

A little detective work plus some creative thinking finally provided the answer to the mystery. In a conventional model the fuselage holds the folded prop blades out slightly. This gives the blades a little moment arm for centrifugal force to work on, so they freely swing out to operating position. Thrust also helps deploy them and then holds them against their stops.

In Chuck's pusher, with no fuselage behind the prop, the aft-folded blades could go clear in to the center of rotation. In fact, the center of gravity of a blade could even go past center, and centrifugal force would lock it in the folded position instead of deploying it. If one folded blade happened to be past center (perhaps due to its own weight), and therefore had a negative moment arm about the shaft axis, it pushed the other blade out to where it had a positive moment. When the motor was started, centrifugal force swung the slightly-out blade into working position in the normal manner; but the overcenter blade was held in so it could not extend.

Single-bladed props require a counterbalance, and Chuck's occasional one-blader wasn't so equipped. So sometimes it would put up one hell of a racket and scare him good until he could get it shut off.

Like many problems, the fix was easy once the problem was understood. Chuck simply built stops into the prop to prevent the blades from folding clear to the center. It works.

FOLDING PROPS ON GLOW ENGINES?

Folding props are great where gliding endurance is the goal. They are used extensively on electrics these days, as well as on rubber-powered free flight models. Folding props on internal combustion engines are much more rare.

Rubber and electric motors provide smooth torque. Inter-

nal combustion engines provide *pulses* of torque. In a single-cylinder two-stroke engine the effective power stroke is less than half of the total cycle. In single-cylinder four-stroke engines the power generating period is less than a quarter of the total cycle.

During the rest of the cycle, in whichever type we have, friction is using up part of the power. Also, pumping the air/fuel mixture in and the exhaust gases out is taking power. Worst of all, the compression stroke on both types re-

quires considerable power. All of these internal power requirements must be provided by kinetic energy from flywheel action—either from an actual flywheel in the case of cars and boats, or from an airplane propeller, which has weight and diameter—and appear as negative torque pulses. The engine speeds up during each power stroke and slows down during all of the rest of the cycle.

The folding props now used on electrics could probably start and run on a glow or diesel engine—briefly. I say "briefly" because the alternating positive and negative torque pulses would rapidly beat up the blade bearings; they weren't designed for that kind of abuse. Any initial lateral play in the bearings would rapidly increase due to the pounding on them. The more these loose blades could swing back and forth in the plane of the prop disk, the less effective they would become as flywheel elements, and the greater the bearing-pounding forces would become. We're talking in the range of 10,000 pounding strokes per minute here. Very quickly, one or both blade bearings would probably fail completely, and a blade or two would come sailing off. This wouldn't be good for the engine, airplane, operator or passersby.

The blade bearings on a folding prop for IC engine use would have to be designed for that purpose. They would need

continued on page 14

over the counter

MORE BHPS FROM MODEL TECH

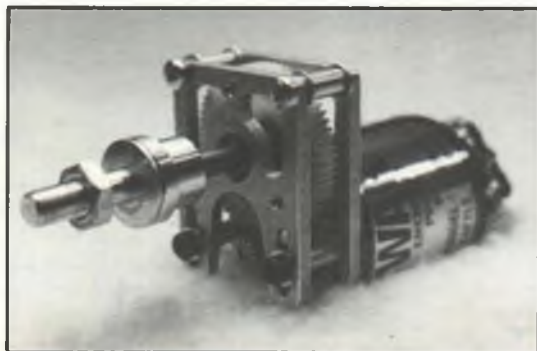
Two additions to Global's line of Model Tech BHPs (Built-up, Handcrafted Planes) are a couple of fully aerobatic low-wingers: the 52-inch span Dragon Lady 40 (.40-.53 two-stroke, .60 four-stroke) and a 59-inch sport scale version of the French CAP 21 (.40-.60 two-stroke, .60-.90 four-stroke).



Both feature Model Tech's usual excellent workmanship, balsa sheeted foam core wings, and come with extensive hardware packages and photo illustrated instructions. As with the others in the model Tech BHP line, the Dragon Lady 40 and CAP 21 are supplied as pre-built, uncovered airframes, requiring only equipment installation and covering. They're distributed by Global Hobby Distributors, 10725 Ellis Ave., Fountain Valley, CA 92728-8610; (714) 963-0133.

IT'S WAR!

New from Model Electronics are the new "War" series Turbo 10 electric motors and "Superbox" speed reduction gear drives, available in ratios of from 1.3:1 to 8.0:1. According to the manufacturer, this lightweight 05-size package



can put out 4 pounds of thrust without a whimper. Reliable,

high power levels are the result of large 5mm square brushes, 10mm commutator, welded armature wires and special magnets for maximum rpm. A complete catalog of motors, models and other products can be yours by sending \$3 to Model Electronics Corp., 6500 6th Ave. N.W., Seattle, WA 98117.

GRAUPNER'S TRIMOTOR JU 52

As expected, some of the more interesting new kits introduced at the RCHTA show in Chicago a few months ago were seen in the Hobby Lobby booth. One example was Graupner's 1/20-scale kit of an old favorite, the Junkers JU 52 trimotor, designed for three small

Speed 400 direct-drive electric motors all running from a single six- or seven-cell pack. The



model spans 59 inches, weighs 3-1/2 pounds ready to fly and is of all-wood construction with molded ABS cowls and nacelles. True to scale, the ailerons (and dummy flaps) are detached surfaces hanging just below the wing trailing edge.

To complement the JU 52, Graupner has put together

a special drive package with three of everything—motors,

mounts, really neat 6-1/2x4 scale props, prop adapters, wiring, connectors, etc. The JU 52 kit and drive package are both described in greater detail in Hobby Lobby's new Catalog 25, available free from Hobby Lobby, 5614 Franklin Pike Circle, Brentwood, TN 37027; (615) 373-1444.

PATTERN FLIERS, TAKE NOTE!



The new O.S. .61 RF Hanno Special II is based on the original long-stroke Hanno Special, but has been updated to reproduce the even higher performance modified engine that Hanno Prettnner used to win the 1993 F3A World Champs in Austria. Changes include an improved metering valve for more consistent throttle response from idle to top end; a redesigned cylinder head for improved combustion and greater power; a redesigned connecting rod that reduces friction against the backplate; and a stainless steel main ball bearing and web/disc type crankshaft counterbalance for increased strength and less disruption of the crankcase airflow. Serious pattern fliers who favor two-strokes for F3A competition would do well to take a close look at this new O.S. powerhouse. From Great Planes Model Distributors, 2904 Research Rd., Champaign, IL 61826-9021.

RUBBER SCALE RYAN S-T

It seems like Tom Herr is coming out with rubber free flight kits faster than we can write 'em up. His latest is a gorgeous 30-inch span, 1"=1' scale replica of the classic Ryan S-T of the 1930s. Like the other kits in the series, this one fea-

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THE ACCENTOR CL STUNTER

In addition to the Buster CL kit we told you about last month, Brodak's Manufacturing and

tures ultra-precise laser-cut parts, excellent quality stripwood, plastic prop, rubber, hardware, tissue, computer-drawn plans, decals and complete instructions. Going price is \$34.95 plus \$4 S&H, direct from Herr Engineering Corp., 5648 Kingman Ave., Portage, IN 46368; (219) 759-1940. A full line catalog is available separately for \$2 but is included free with each order.

REQUIRED READING

If you have any interest at all in vintage models, you've got to get a copy of the SAM 35 Yearbook. SAM 35 is one of the more prominent British Old Timer groups and puts out these yearbooks on an annual basis,



this latest being #8 of the lot. There's some great stuff in here, some of it technically useful and some of it simply good, entertaining reading, plus there are a number of Zaic-type model plans for you to study. Copies of the SAM 35 Yearbook can be ordered from Ronald S. Knight, 14A Enmore Gardens, East Sheen, London SW14 8RF, England. The cost for each book is £6 (about US\$10), which includes postage; personal checks or international money orders must be made out to SAM 35 and must be in sterling.

Distributing is also kitting a high-performance, full-fuselage stunter called the Accentor, designed for .35-.46 engines. Span is 52 inches, wing area 571 square inches. The kit features die-cut parts, full-size plans, illustrated instructions and full hardware, for a going price of \$79.95. Accentor kits are available through hobby



shops or direct from Brodak's Manufacturing and Distributing, 100 Park Ave., Carmichaels, PA 15320.

L.E. TRIMMING MADE EASY

To complement its handy E/Z Trimmer covering trimming tool, Du-Bro has come out with an accessory item, the Leading Edge Trim Guide, a clear, molded plastic V-channel attachment for the E/Z Trimmer that automatically centers itself on your wing's leading edge and allows quick and accurate trimming of excess covering material. The new Leading



Edge Trim Guide is available by itself or as part of Du-Bro's E/Z Trimmer Master Set, which also includes an E/Z Trimmer, #2 X-Acto handle and four #19 X-Acto blades. From Du-Bro Products, Inc., 480 Bonner Rd., Wauconda, IL 60084.

QUARTER-SCALE GEE BEE

Modelers who are turned on by Byron's big 1/4-scale Gee Bee R-2 but who prefer a more conventional wood structure are in for a treat. Wendell Hostetter, in cooperation with Byron Originals and project engineer Ken Bryan, has come out with plans for just such a beast, featuring Hostetter's traditional balsa, ply and basswood construction. Like the Byron design, the plans deviate a bit from exact scale to produce a better flying model. Accessory items can be purchased from Byron Originals. Drawings are priced at \$32.50 plus \$3.50 S&H (add \$2.50 if you want them rolled), from Wendell Hostetter Plans, 1041



Heatherwood Lane, Orrville, OH 44667; (216) 682-8896.

ATLANTIC'S REMOTE MIXTURE VALVE

Atlantic R/C Products has come out with an interesting gizmo—a remote mixture control valve that lets you make engine mixture adjustments while keeping well away from the prop, and also lets you hook up a servo for in-flight mixture adjustment. (If used strictly as a remote mixture valve, the lever arm and internal cam are not used.) The valve body has two sets of at-



and prop nut/spinner is priced at \$75 plus another \$5 S&H. Bob hopes to be able to offer laser-cut wing ribs and other parts in the near future. More details from Bob Holman Plans, P.O. Box 741, San Bernadino, CA 92402; (909) 885-3959. MB.



tachment points to accommodate virtually any mounting setup. While not mentioned in the press release, it seems to us that with the lever arm and cam installed, the valve could also be used to good advantage in smoke systems and also as a fuel cutoff valve in glow-powered Old Timer models, which normally are given a very limited run time in competition. For ordering information, contact Atlantic R/C Products, P.O. Box 523007, Springfield, VA 22152; (703) 913-7278.

BRIAN TAYLOR'S P-47

Bob Holman is handling the newest plans set from noted English RC scale expert Brian Taylor, a 76-inch span P-47D Thunderbolt with which Brian placed 3rd in FAI scale at the 1994 British Nationals. Engine requirements call for a 1.20-1.50 four-stroke, and the plans include details for operating flaps and retracts.

Plans go for \$49 plus \$5 S&H; an accessory package consisting of canopy, fiberglass cowl

to have low play, and be quite rigid in the plane of the prop disk. One design approach would be to extend the roots of the blades inward from the blade bearings toward the shaft, and let these inner blade extensions engage the hub, or each other, in such a way as to stabilize and lock them, and take the fluctuating torque load off the blade bearings.

THE SELIG SHEAR WEB

The name Selig will be familiar to most of you. There are many Selig airfoils, which are especially popular with sailplane modelers. Dr. Michael Selig is a professor of Aeronautical Engineering at the University of Illinois at Urbana-Champaign, and is also a sailplane modeler.

I received a letter from Michael in response to my discussion of shear webs in the September 1993 column. Michael reminds us that whether we put the grain of the shear webs horizontal or vertical, the shear stresses are actually neither horizontal or vertical, but on the diagonal.

Imagine a wing panel under flight load. You can visualize that the shear webs will be in tension on the diagonal from the lower inboard to the upper outboard of each rib bay. Likewise, the webs will be in compression diagonally from the upper inboard to the lower outboard of each bay.

This fact is well known and easily understood. It's best to have shear webs which will take both tension and compression, but either alone might take the shear loads on a wing spar fairly well, depending upon the design. To build a very light wing for normal flight only, one could put diagonal line rigging between the spar caps from lower inboard to upper outboard of each rib bay, serving the same purpose and in the same orientation as the "flying wires" rigging between the wings of a biplane. To stress this super-light wing for inverted flight and for rough landings, we would also have to put

lines on the opposite diagonals, the "landing wires." All of these lines would have to be securely tied to the spar caps.

Balsa sticks on the diagonals wouldn't be as effective as lines, because the glue joints would tend to fail in tension. Balsa itself is fair in tension, but thin sticks are poor in compression because they tend to buckle.

Another fair and very light shear web is MonoKote or other covering material. It takes tension in all directions, and it can be securely bonded to the spar caps. Better than MonoKote or other plastic films for light shear webs is tissue or Micafilm. The plastic films stretch somewhat; paper materials are much more rigid in tension. A little stretching in a shear web will defeat its purpose.

When we talk about whether the grain of balsa shear webs should be vertical or horizontal, we're debating which is the best of two compromises. Vertical grain won the argument in this column over a year ago, but neither is as good as shear webs designed to optimally resist diagonal forces in both tension and compression. Bridge girders usually have diagonal truss members in lieu of shear webs. Large full-scale airplanes may have either sheet-metal shear webs or diagonal trusswork, or both, in their wing spars.

Quoting Dr. Selig: "I believe the best



With no stops on the pusher's blades, they were free to fold over-center; fold a blade too far and it won't open on motor start-up, making for one startled pilot and a possibly damaged airplane.

shear web is one made of two-ply balsa with the plies at 90 degrees, and placed between the spars at 45 degrees." I agree, this has to be one of the best. A couple of disadvantages from a practical standpoint is that they will take longer to build and will waste a little balsa.

But where the best possible structure *continued on page 80*

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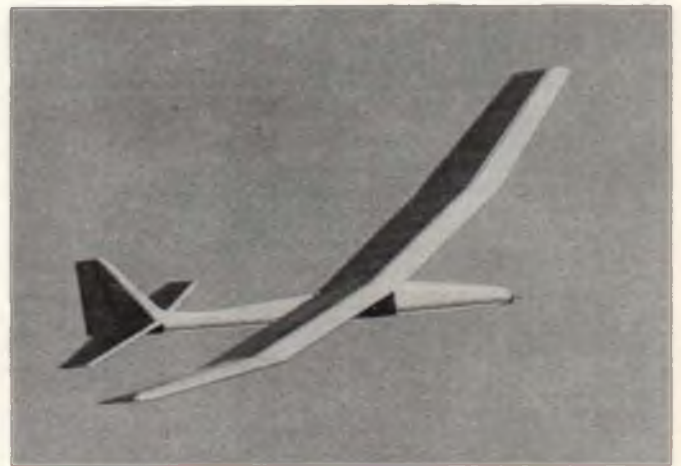
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Soup Up That Super Tigre!

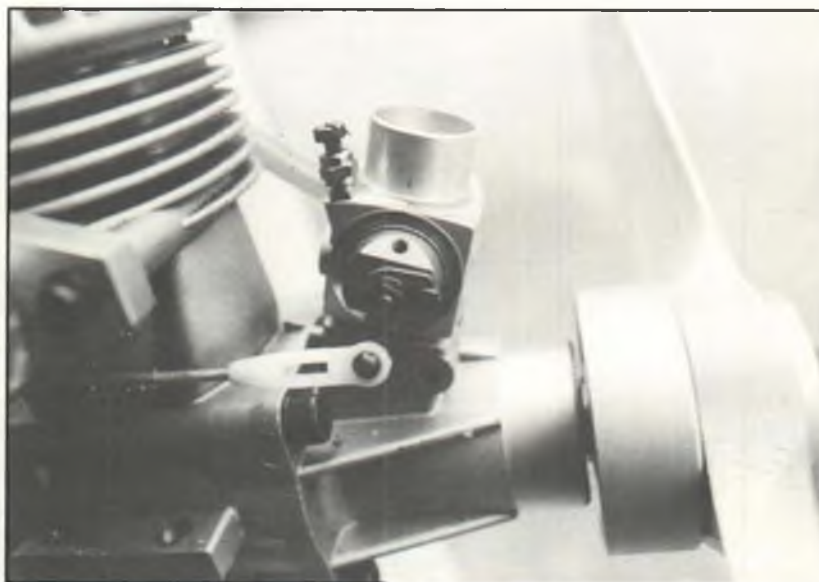
As Bruce discovered, simply substituting an O.S. carb can make the big S.T. glow engines really come to life.

Super Tigre's big two-stroke glow engines certainly are popular with a good number of Big Bird pilots. I've had an S.T. 3000 for some time but have only bench run it for break-in and muffler testing purposes. I plan to use the engine in an 8-Ball Special currently under construction for an upcoming review.

There's been a lot of talk lately about using an O.S. 7D carburetor on the S.T. 3000 to increase its performance. One sage at a recent flying site bull session observed that all Super Tigre engines use the same carburetor and the same 8.8mm hole in the carburetor barrel. I decided to run my own test to see if the O.S. carb made a discernible difference in performance.

I used a fuel that contained 15 percent lubricant and 10 percent nitromethane. Throughout the test the engine consistently idled at 1,850 rpm

An O.S. 7D carb as installed on our columnist's Super Tigre 3000. This combination was tested with three different props, and in each case the rpm was higher than with the stock carb. Performance figures in text.



Bruce's backyard test setup included a Davis Model Products S.M.T. muffler to keep the neighbors happy.

regardless of the propeller or carburetor used. All tests were run with muffler pressure coming from a pressure fitting installed about 2 inches aft of the exhaust header on the Davis muffler.

With the original carb installed, I ran the engine with Windsor Classic 20x6, Zinger 18x6x10 and Zinger 18x8x14 props; the Tigre maxed out at 7,500, 6800 and 6,100 rpm respectively. The Zinger 18x6x10 appeared to be the optimum of the three props used.

The next step was to remove the Super Tigre carb and install the O.S. 7D unit, which had the removable carb throat restrictor still in place. The O.S. carb is a drop-in fit in the S.T. case.

I then ran the engine with the Windsor 20x6 and got 7,600 rpm; the Zinger 18x6x10 spun at 7,100 and the Zinger 18x8x14 turned at 6,250. Sure enough, the O.S. carb did give a measurable increase in rpm.

Next I removed the O.S. carb, carefully disassembled it and removed the restrictor,

increasing the hole diameter to 10.2mm. With the Windsor 20x6 prop the engine now ran at 7,800 rpm—300 rpm better than with the S.T. carb. Similarly, the Zinger 18x6x10 ran at 7,200 and the Zinger 18x8x14 ran at 6,500.

By the way, the Davis S.M.T. muffler and SM-HDR-ST header worked perfectly. I didn't run each test very long, so I didn't use my ear protectors during the test runs. I could have talked with a partner easily even when the engine was at full throttle.

The Davis muffler certainly did nothing to inhibit the Super Tigre's performance. If you're having noise problems at your local flying site, call Davis Model Products or see your local hobby dealer for some mufflers that *really* work.

NEW BIG BIRD PROPS

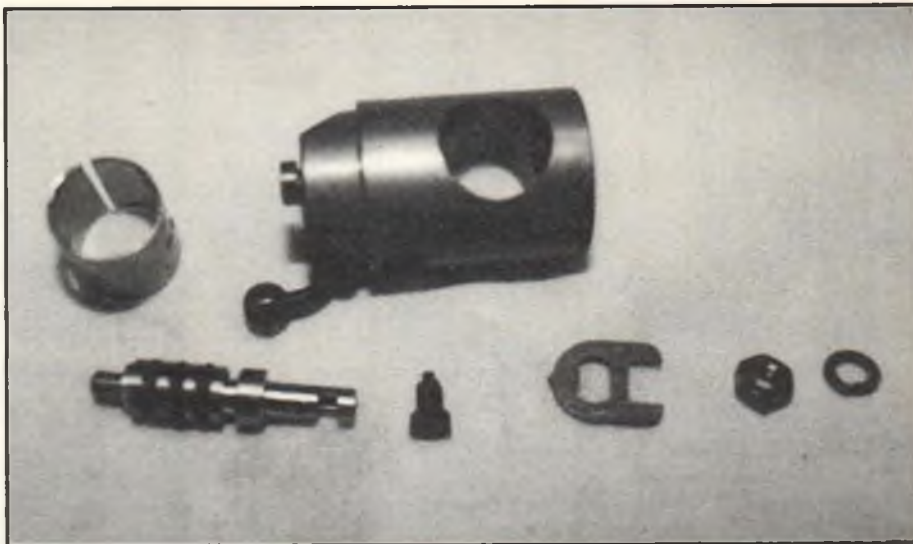
My friend Walt Wyrick has been trying various propellers on his Walker Sachs 5.8. Several of the ones he used were Forte propellers purchased from Colorado Hobby Products. Walt liked their performance and felt I should try them out myself.

I'd been wanting to try a 16x10 on the Irvine 1.20 in my Ultra Sport 1000 to see if it would improve the vertical performance. I called CHP and spoke with Zdenek Stejskal, the owner. Zdenek explained that he imports both the Forte and JAS line of propellers from the Czech Republic. Both types are manufactured from beechwood and feature high-tech shapes and airfoils.

I ordered two Forte propellers, a 16x10 and a 22x18, and found them to be very good quality, both in material and fuelproof epoxy finish. The 16x10 required very little balancing. The Irvine turned the Forte 16x10 at 7,000 rpm, compared to 7,200 rpm with the Zinger 16x8 I had been using.

Acceleration during takeoff was somewhat slower with the Forte prop, but vertical climbs seemed to go another 75 to 100 feet. I also tried a Zinger 16x10; the rpm dropped to 6,800 but the takeoff and vertical climb performance seemed to be equal to the Forte.

The Irvine seems to maintain better rpm in a dive with the 16x10 prop; it really winds up with a 16x8. The Irvine instruction book encourages the use of higher pitched propellers, so I think the engine is



Removing the brass restrictor (upper left) from the O.S. 70 carb barrel opens up the throat to 10.2mm diameter, giving still greater top-end rpm.

One of the several magnificent Big Birds that showed up at the 1994 Festival of Giants last July in Arlington, Washington, was this unusual French trimotor called the Arc-en-ciel, which translates to "Rainbow." Builder Ed Hees had not had a chance to test-fly the plane prior to the meet, so it was relegated to static display. Model is 1/8 scale, spans 12 feet 3 inches and is powered by three Saito .96 four-strokes.



Colorado Hobby Products can supply you with some very nice propellers imported from the Czech Republic. Bruce tried a Forte 16x10 on the Irvine 1.20 in his Ultra Sport 1000 and found it to be an excellent performer.





Harb Brice has a ball flying his Waco VMF-5. It spans 90 inches, weighs 30 pounds and is powered by an A&M Sachs 3.2.



Big Bird pioneer Bert Baker is perhaps best known for his Vultee BT-13, which he used to offer as a kit. Model is a great flier, and Bert always puts on a good show with it.

now operating in its best torque and rpm range.

The Forte and JAS propellers are available from Colorado Hobby Products, 4635 Park Vista Blvd. Unit C, Colorado Springs, CO 80918; (719) 522-0935.

READERS WRITE (AND CALL)

Hardy Menagh wrote me from Medusa, New York, where he flies with the Greene County Aeromodelers. Hardy expressed his concern about the aileron flutter I experienced on the last flight of my Stinger.

Hardy felt it was possible that the broken servo output shaft could have been caused by bubbles in the plastic. He related that he had used some cast metal control arms that broke because of air bubbles or voids in the casting. Apparently

the flaw was not visible on the surface of the arm.

It was a good thought, Hardy, and thanks for your input on the subject. I did examine the ends of the broken servo shaft with a magnifying glass and could find no voids or bubbles in the composite plastic material they were made from.

I've given a lot of thought to the servo output shaft failure and the ensuing flutter, and I think the shaft may have been cracked in a previous hard flat crash when I landed short of the runway. I had examined the servos carefully, but a hairline crack on the output shaft would have gone unnoticed.

• • •

The other day I got a call from a fellow who had converted a weedeater engine to power his Ace 4-120 biplane. Apparently he had successfully converted his engine

and bench-ran it. However, when he ran the engine in the plane, he experienced very erratic radio operation. As we talked I learned he wasn't using a resistor spark plug on his engine, and strongly advised him to do so. He hasn't called back, so I guess that must have solved his problem.

I hope you old-timers won't mind me again mentioning the use of resistor spark plugs. We have new people getting into Big Birds all the time, and a lot of the knowledge we take for granted is always going to be new and helpful to someone.

If you're new to Big Birds, Dario Brisighella's book, *From the Firewall Forward*, is still an excellent source of knowledge about big engines. The book can be purchased from VIP Aero Publishers, Inc., P.O. Box 16103, Colorado Springs, CO 80935. MB



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Surface Treatment	A	F	F	F	F	F	F
Delamination Strength	A	D	D	C+	D	C+	D
Slots or Holes	A	A	A	A	A	D	D
Glue Action: Wicking	A	A	B	F	F	F	F
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The Olympics of Control Line Model Aviation

This past October the elite of the CL world gathered in Shanghai, China to decide who would stand atop the CL modeling world in 1994. A mini-report on what took place at the recent Control Line World Championships.



The Chinese pilots made a clean sweep of the F2B precision aerobatics event. Pictured holding their models, from left: Wang Jian Zhong (2nd), Han Xin Ping (1st) and Niu An Lin (3rd). Photo by Chen Xia.

It happens every two years. Those who participate spend years—sometimes their entire modeling lives—preparing for it.

These are the specialists, most of whom fly only a single competitive event. Out of the thousands across the world who try, only one in each of the four categories becomes the world champion. The conclusion in 1994:

- Speed: Peter Halman, Great Britain; 302.7 kph.

- Aerobatics: Han Xin Ping, China; 6,653.5 points.

- Racing: Heiner Borer and Cesare Saccavino, Switzerland; 6:46.0 200-lap final.

- Combat: Mervyn Jones, Great Britain; nine wins, one loss.

In addition to the individual glory, the contestants worked together to bring home team championships. After a week of competition, the top teams were:

- Speed: Great Britain—Peter Halman, Ian Mander and Gordon Isles (1st, 11th and 18th places).

- Aerobatics: China—Han Xin Ping, Wang Jian Zhong and Niu An Lin (1st, 2nd

and 3rd places.).

- Racing: Russia—Vladimir Titov/Victor Yugov, Yuri Nazin/Oleg Vorobjov and Yuri Shabashov/Vladimir Ivanov (2nd, 5th and 9th places).

- Combat: Russia—Nikolai Netchoukhini, Boris Faizov and Vadim Arifov (3rd and tie for 6th places); defending champion

Viatsheslav Baliaev, whose score does not count for the team, finished 2nd).

For a glimpse of the future, junior champions also were crowned:

- Speed: Eddy Billon, France.

- Aerobatics: Igor Cheprasov, Ukraine.

- Racing: Zhou Jun Jie/Wang Yi Chuan, China.

- Combat: Mark Rudner, USA.

The story of a World Championships is also a story of preparation, practice, travel, shipping of equipment, eating strange food, surviving in a strange city and competing under unusual and sometimes adverse conditions, of language and cultural differences and a spectacle beyond that normally associated with even the largest model contests.

U.S. team members and observers brought home a bittersweet mixture of feelings. Impressed as they were at the elaborate Olympic-style preparations, particularly in regard to the opening and closing ceremonies, there was a sense of frustration at placing lower than they had hoped. Questions about the contest logistics and judging, which some felt provided an advantage for the home team (particularly in

aerobatics), left some fliers asking “what if?” questions.

Clearly the Chinese and their Aero Sports Federation of China take the CL World Championships seriously, providing government support for their fliers and producing a world-class extravaganza to introduce the event to the public.

Awards were given out on the field at the conclusion of each category, with the winners mounting the traditional pedestals, flags being raised and national anthems played. Fliers were surprised, however, when the banquet concluding the championships left no time for model-related speeches and recognitions; it turned out to be more of a gala for local politicians and VIPs, with sumptuous food and entertainment and the contestants as something of an afterthought.



A familiar face to American aerobatics competition, Kaz Mizuo of the 2nd placing Japanese team shows his Blue Max. He lived in the United States for several years.

The flying site was in an urban area, surrounded by buildings and other facilities. Very little practice was available to teams other than the Chinese, who were housed at the site. Other teams were housed in two fine hotels on the opposite side of the city, an eight-mile distance that involved a bus ride of nearly two hours through hectic Shanghai traffic. As the contest progressed, the host organization arranged for a police escort that cut the trip down to about 40 minutes. However, with all teams sharing the same practice facilities, there was little opportunity for fine-tuning.

Entry in the speed competition was up about 25 percent from the 1992 World Champs. Official flights began at 6:30 a.m. Observers reported increased use of commercially available ready-to-fly speed equipment; a number of teams were using excellent (and expensive) equipment produced in Russia and the Ukraine. The trend toward this type of equipment also resulted in a trend toward a higher standard of performance, even though the winning speed was slightly slower than in 1992.

The speed competition took place in three rounds. Peter Halman started off with his winning flight of 302.7 kph as the second flight of the first day. He followed up in Rounds 2 and 3 with speeds of 295.2 and 296, showing good consistency.

American Tommy Brown, a late replacement on the team for Will Naemura, who was unable to attend, turned in his best



Mark Rudner was the youngest member of the U.S. contingent, but he didn't let his youth stand in the way of his becoming the new Junior World Champion in F2D combat. Photo by Chen Xia.

flight in the first round, at 288.8 kph. John Newton hit 280.2.

Speeds were up for many fliers in the second round. Carl Dodge checked in at 288.6 kph and John Newton hit 293.8 for the best U.S. score. Unfortunately, Newton's model crashed after the flight was official, in a mishap that occurred when he disengaged from the pylon.

Carl Dodge hit 288.3 as the only American to get in an official flight in the third round.

In the end, Newton was the top American, in 10th place. Brown finished 20th and Dodge 21st. The U.S. team finished 4th behind Great Britain, Russia and Spain.

The U.S. delegates who returned the



Typical of modern F2A speed models is this long-wing asymmetrical ship flown by Gordon Isles of Great Britain. Gordon's best flight was 289.2 kph—not enough to win, but good enough to put the British team in 1st place. Chen Xia photo.

most disappointed were the aerobatics fliers, who had expected to be in the hunt for both the team and individual titles. In spite of the Chinese reputation as one of the world's top teams, their sweep of the top three places as well as the team title was considered remarkable.

"The entire Chinese team scored consistently higher than the best of their competition by approximately 5 percent," Ted Fancher reported in *Stunt News*. "This in an event where the separation between the top 10 fliers is often not that much. In the finals, every Chinese flier posted at least one score in the high 3,200s to mid 3,300s (a total of five judges minus the high and low)."

By contrast, the highest scoring American, defending champion Paul Walker, flying in a style described by Fancher as "consistently exceptional,"

barely cracked 3,200 in the qualifying and, flying "typically terrific" in the finals (Fancher's description again), scored in the mid-3,100 level, a distant 4th.

Frustrations piled up for the U.S. aerobatics team even before the start of competition. They were troubled by the grueling commute to the flying site, the requirement that their aircraft be stored at the site, and the very limited practice time (due to the number of competitors—73—and the irregular weather). Some felt that the Chinese were at an advantage in that they could practice at the site be-

fore and after other fliers arrived and were able to retire to their nearby quarters for meals and rests at any time. All of this came into play aside from the disparity in the scores, which raised a number of questions about the judging and recordkeeping that could not be answered.

Chief judge Art Adamisin, writing in *Stunt News*, concluded: "The Americans flew very well but it just wasn't good enough. The Chinese are very good. They were flying in their backyard and were used to the wind conditions and the points the judges would lock in on."

The stunt flying involved long days starting at 6:30 a.m., with all flights on the same circle. The Chinese fliers started out strong, taking 1st, 2nd and 5th places after the first round, with Walker at that time in 3rd.

Chinese fliers gained ground in the second qualifying round, along with the Japanese team, which finished 2nd overall. David Fitzgerald made the largest improvement of the Americans in the second round, offset by Fancher's loss of power during the four-leaf clover for a poor score in that round. In the finals, the Chinese domination continued.

Behind Walker in 4th place, U.S. fliers finished 5th (Fancher), 8th (Bob Hunt) and 9th (Fitzgerald). As a team, the U.S. finished 3rd behind China and Japan.

The U.S. had its best racing delegation in years and was able to capture 3rd place—a good showing. All three U.S. racing pairs used engines and models from kits produced by Oleg Vorobiev of Russia. The 36 teams started right off in practice running at high speeds.

The first preliminary round was described by observers as a series of near-disasters, with races being stopped and reflown because of various mishaps. However, the day did produce the fastest time ever for an American team in World Championships competition, with Stew Willoughby and Bob Oge turning a 3:27.8. By contrast, Lenard and Aaron Ascher turned a 3:34.8 in their reflay heat, and things went poorly for Dave Braun and Jed

continued on page 76



All members of the U.S. F2D combat team flew Czech-built Faizev 1s, which are supplied built and covered and otherwise ready to go. These are Mike Wilcox's ships, powered by Doroshenko .15s. Chen Xia photo.

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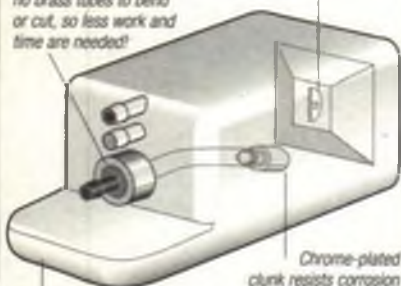
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DEAR JAKE

Advice For The Propworn

DEAR JAKE:

I fly RC models in aerobatic competition. In the summer, there's a contest within driving distance almost every weekend. Usually I fly very well and place fairly high in the standings, but some weekends my timing or my hand-eye coordination is off and I stink up the joint.

My girlfriend says it all has to do with biorhythms, and if I charted mine, I'd be able to predict when I was going to fly well and when I wasn't.

Do you put any stock in this biorhythm stuff?

Rick in Richfield, OH

Dear Rick:

Absolutely not. Biorhythms is a load of hogwash dreamed up by some con artist with a personal computer and a strip chart recorder.

What you do want to keep track of are your airplanes aerorhythms.

Aircraft, whether full-size or models, go through cyclic swings in three areas: lift, power and controllability. Collectively, these patterns are called aerorhythms. When all three are high, your airplane will perform great, and your wins at competitions will mount up. When one or two of the three are low, precision aerobatics will be off and you won't fare as well. If all three are down, it's a good day to stay home and watch Oprah interview balloon animal groomers.

Aerorhythms can be charted from the day your airplane left the workbench and made its first flight. They tend to be sinusoidal with constant periods, and therefore can be projected forward to any future date.

Aerorhythms tracking software is available from many sources and is well worth the average price of roughly \$200. It empowers you to pick and choose the contests to attend where success is likely, while skipping the ones that occur during an aerorhythmic ebb.

So, if your lady friend wants to go to the mall because her biorhythms say her bargain hunting skills will be at a peak, humor her and go with her. But while you're there, buy yourself a five-year calendar and

continued on page 50

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HANNAN'S HANGAR

BY BILL HANNAN

"Airplane people are different in a very positive way."

Our lead-in quotation, by Steve Remington, proprietor of CollectAIR aviation art gallery in San Jose, California, makes an important point. Certainly most of us are well aware of how special aviation people are, whether model builders, pilots, artists, writers, photographers, historians or just enthusiasts. Too many of these wonderful people "checked out" last year, and we must remind ourselves to truly appreciate each other while we can.

YEAR'S END

While you will be reading this in early 1995, the words were composed during late 1994, a time for reflection and review. We continue to be grateful to you readers for your



Winning the 1994 Flying Aces Club Achievement Award was Terry Pittman's remarkable Farman F.60 Goliath, which later vanished O.O.S. in a thermal. Spanned 24 inches, power came from two Keweenaw electric motors running on three 70-mAH NiCd cells.

whereas an item photographed by itself offers few clues. Holding a model aloft is a good way to achieve an uncluttered back-

THE WRIGHT WAY

Seeing Jiro Sugimoto's exquisite Wright Flyer reminded us of a passage from a letter Orville wrote to fellow experimenter George Spratt in 1903: "Well, our propellers are so different from any that have been used before, they will have to be a good deal better or a good deal worse." Quoted in the book *Wind and Sand, the Story of the Wright Brothers at Kitty Hawk*.

So here we are these many years later, still experimenting with propellers!

About that term "Flyer" employed by the Wrights for their early aircraft. It may be of interest to review how aviation terminology in the United States has evolved over the years. Many pioneering words came here from France, of course, such as "fuselage," "empennage," "aileron" and "nacelle." Although the French word "avion" has been credited to Clement Ader, circa 1890, it did not gain recognition in America, where almost every sort of craft was known simply as a "flying machine," even though most of them didn't.

During the late 1890s in the United States, Samuel Pierpont Langley came up with the term "aerodrome" for his inventions. The word was later applied to airfields, rather than to the aircraft which took off and landed there.



Terry Pittman with one that didn't get away. He says his rubber-powered 1924 Aero A.18 has somewhat limited duration but is a joy to see in flight. Photo by Tom Schmitt.

enthusiastic support, and to the *Model Builder* staff for allowing this column to appear.

HANDS, HANDS, HANDS

Our theme this month seems to be hands holding projects! Note that this is a great way to establish an object's size at a glance,

and in the case of small models, can sometimes be accomplished without assistance, holding the model in one hand and the camera in the other.

The variety of our readers' subjects is amazing, showing a wide range of interests. We hope these photos may help inspire some exciting New Year's project in *your* hands!

Another FF scale ship that went west; Jiro Sugimoto's Brown Jr. CO¹ powered Poncelet flew O.D.S. in Japan.

The name "Aéroplane," adopted from the British, came into use next, however U.S. publications seldom employed the umlaut (double dots over the e). The British word "airship" replaced "dirigible balloon" in America about 1917, although some writers refused to accept the idea.

During 1918, the NACA (later called NASA) adopted the simpler term "airplane." Also accepted about that time was "biplane," replacing the earlier "bi-plane," although some people persist in using that long-obsolete name today!

INCREASE YOUR MODEL BUILDING PRODUCTIVITY

The best tips of the year for increasing hobby efficiency come from *The Winding*



Stooge free flight newsletter, edited by R.D. Hawes: "Don't rake those leaves! Run over them with a lawn mulcher with the bag blocked off to mulch them, then do it again with the bag on. The first pass grinds them fine, the second trip picks

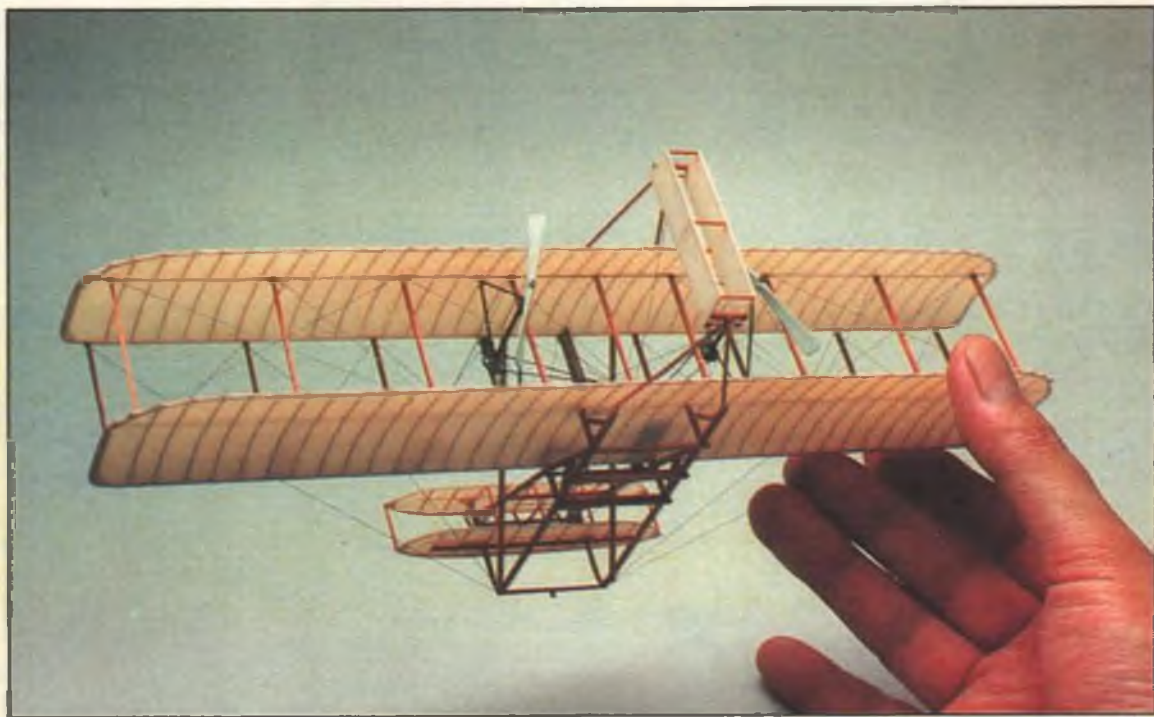
them up. Takes less than half the time of raking, and only one-fourth the bags.

"Gotta wash windows? Go to an outfit that sells to industrial cleaners. Get a window mop and tub plus a good squeegee. Use warm water, a

little ammonia, and a couple drops of dishwasher detergent.

"What has all of this to do with model building? Well, the more time you spend on household chores, the less time you have for airplanes!" Amen to that.

Here's one that CAN'T fly away; Jiro Sugimoto built this beautiful Wright Flyer for static display in a museum.



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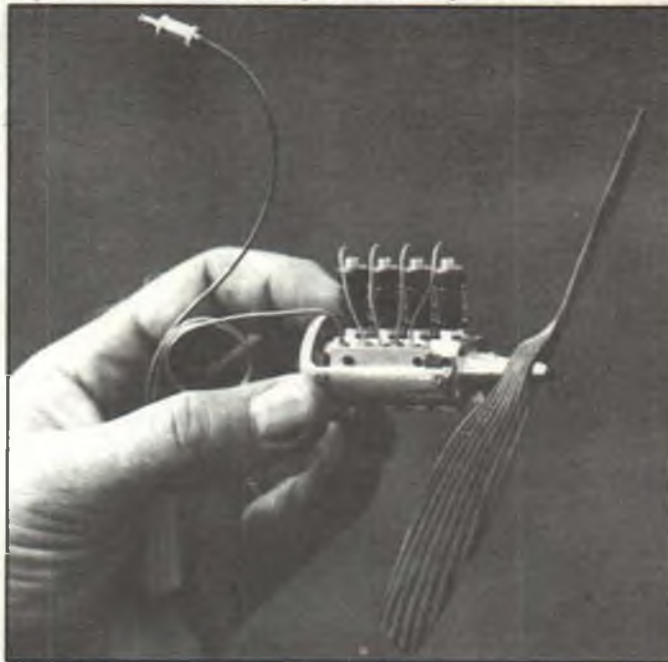
HANNAN'S HANGAR

PLUGS

Because of the quantity, our coverage must be brief. For more detailed information about any of the following, please send a business-size SASE to the mentioned firms or individuals, and kindly tell them *Model Builder* sent you!



Pistachio size Thomas Morse 34C, by Robert Cok of the Czech Republic, is powered by a 6.3 ccm Gasparin 6 CO² system. Photo by Michael Gasparin. ■ BELOW: Stefan Gasparin's latest CO² project is this delightful four-cylinder in-line G63L4 (four 63 ccm cylinders), complete with aluminum mount. The individual cylinders appear to tap into a plenum on the side of the engine, which is fed by the CO² tank.



•Dave Linstrum, 1109 36th Ave. W., Brandon, FL 34205, is offering his 1995 Scale Flier Calendar. Similar in style to his 1994 production, it features reduced-size model plans, three-view drawings and sketches in Dave's distinctive architectural style; \$5 will bring a copy. Dave also still offers the *Best of the Hangar Pilot* compilations, Volumes 1 through 5, described in earlier columns, at special combination prices. Write for his price list or more information.

•Bob Banka recently published his updated *Scale Aircraft Documentation and Resource Guide*, which has evolved into almost a book. The 168-page catalog lists 5,500 different proof-of-scale photo packs, 30,000 three-view line drawings, plus 13 articles by well-known scale model builders. The *Resource Guide* is priced at \$8 postpaid (Canada \$9; elsewhere \$14 by air mail) from Bob Banka, 3114 Yukon Ave., Costa Mesa, CA 92626.

•Leonard E. Opdycke offers subscriptions to two different enthusiast publications. *World War I Aero* caters to WWI aircraft specialists, however it also devotes extensive coverage to pre-WWI types seldom documented elsewhere. Featured are historical articles, photographs, three-views and other drawings, models, book and magazine reviews, plus "wants" and "disposals" classified advertisements.

continued on page 79

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PLUG SPARKS

BY JOHN POND
Photos by
ART WATKINS

•Old Timers "Across The Pond"

Following last month's write-up on the 1994 SAM Champs comes a report from Art Watkins, who, as part of a large contingent of U.S. modelers, journeyed to England to participate in the O.T. fun-fly staged at Old Warden on August 13-14 and the European SAM Champs held the following week at Middle Wallop, August 19-21.

Not enough credit can be given to Dave Baker, who not only organizes the meet but arranges to put up numerous visiting modelers at his home. One also cannot say enough for Baker's efforts to obtain use of the British Army Helicopter Museum's field at Middle Wallop, located north of Southampton. The British modelers are indeed fortunate to have a fellow like Baker with his drive and fortunate connections with the military for use



Photo No. 1. Who else but Col. C.E. Bowden could have designed such a, uh, distinctive looking model as the Kanga Cub, circa 1938. This is actually a popular subject for English O.T. enthusiasts. Pond has the plans if you're enticed to build one of these beauties.

The model flying at Old Warden is an experience itself. There's no particular discipline or arrangement of flying; modelers simply select a clear spot and set up. This requires keeping a sharp lookout as the mod-

designs up to 1937 were of this type.

By far the most popular English design is the Kiel-Kraft "Junior 60" as seen in Photo No. 2. Matter of fact, the Junior has been scaled to all sizes, this particular shot showing a slight enlargement of the original.

Also pictured is another English design known as the Roamer 90. A lovely reproduction is seen in Photo No. 3, complete with inverted engine and streamlined cowl. This is one advantage of building slow, easy flying models; you can put a nice finish on your creation and be reasonably certain that it will survive several seasons of flying. Who cares if it's not competitive with a fast-climbing but lightly built and therefore probably short-lived model?

These two meets attract numerous out-of-country entrants. This year, for the first time, the Americans were outnumbered 35 to 25 by the Italians. Their main attraction is the Wakefield events, pre-1935 and later. Most of the Americans enter many of the other events, making a definite dent in the prizes.

Sal Taibi is one of the Americans who invariably makes the yearly trip. Photo No. 4 shows Taibi autographing one of his designs, the Powerhouse, for an English enthusiast and admirer. Watkins reports that even



Photo No. 2. This is more like it! Without question the most popular English design is Kiel-Kraft's Junior 60, the one pictured being a scaled-up version for RC. Note the Lanzo Record Breaker in the immediate background. Photo taken at Old Warden.

of their fields.

Watkins observes the Old Warden get-together is more of a "warm-up" to the more competitive events held at Middle Wallop. To illustrate how popular the Old Warden fun-fly has become, better than 1,200 cars were seen parked in the Old Warden lot, which is part of the famous Shuttleworth Museum of full-size antique aircraft.

els are generally hand launched from that very spot.

With very little emphasis on competition, most modelers fly what they like best. This is reflected in Photo No. 1 showing a rather angular looking design, the Kanga Cub, designed by Colonel C.E. Bowden. Many British modelers find a certain beauty in this crude looking contraption. Most of Bowden's

when Sal was relaxing, he still placed 4th in the Power Cabin event. Quite a few of the U.S. boys also did quite well at Middle Wallop, notably Mik Mikkelson, who won Jumbo Scale. Art Watkins himself, in addition to taking photos, managed a 2nd place in the 4-ounce Wakefield event, which drew 22 entries. Regardless of the event, all flights were limited to 2-1/2 minute maxes.



Photo No. 3. Another good-looking English cabin ship, called the Roamer 90. Unlike most U.S. SAM modelers, the Brits don't pick their O.T. subjects based solely on contest performance, leading to a much wider variety of designs seen at English meets.

With over 400 entries, they had to keep the flights short!

One of the big surprises was that three 10-foot Goldberg Valkyries were entered. One, flown by Englishman David Noakes, weighed in at a remarkably light 3-1/2 pounds! Art says it had an incredible glide—as expected.

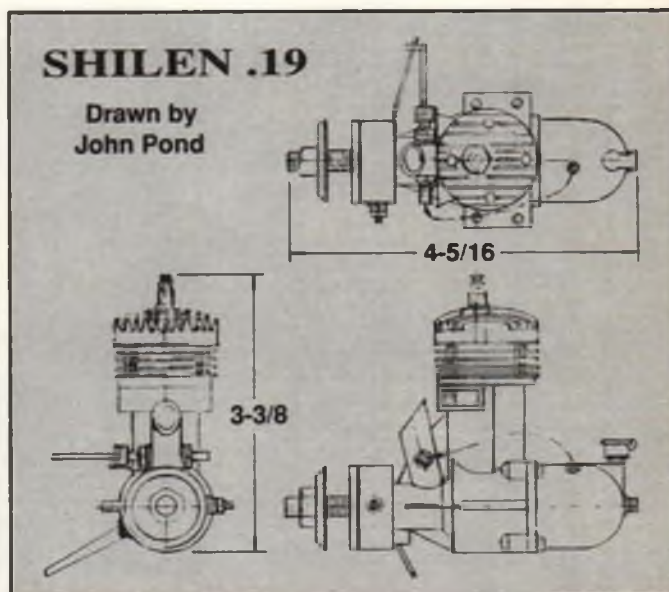
The biggest turnout was for the 8-ounce Wakefield event, with no less than 60 entries! The first four contestants all maxed out, the fly-off producing a winning time of 9:58 by S. Willis.

The Italian contingent fielded two teams, several of them employing geared rubber motors. Seen in Photo No. 5 is Calligari's version of the 1950 "Elilia" Wakefield winner. Of the six entrants who maxed out and qualified for the flyoff, three were Italians, George

Pelizza placing 3rd with a 5:07 flyoff flight. Tough competition!

ENGINE OF THE MONTH

Jim Perssons, chairman of the SAM Engine Committee, reports that a brand new spark ignition engine, the Shilen .19, has been approved as an antique for the purposes of SAM competition. The philosophy of the committee is that if an en-



ENGINE OF THE MONTH

gine meets the criteria of an Antique/Old Timer engine and shows no noticeable improvement in performance, it should be allowed to compete.

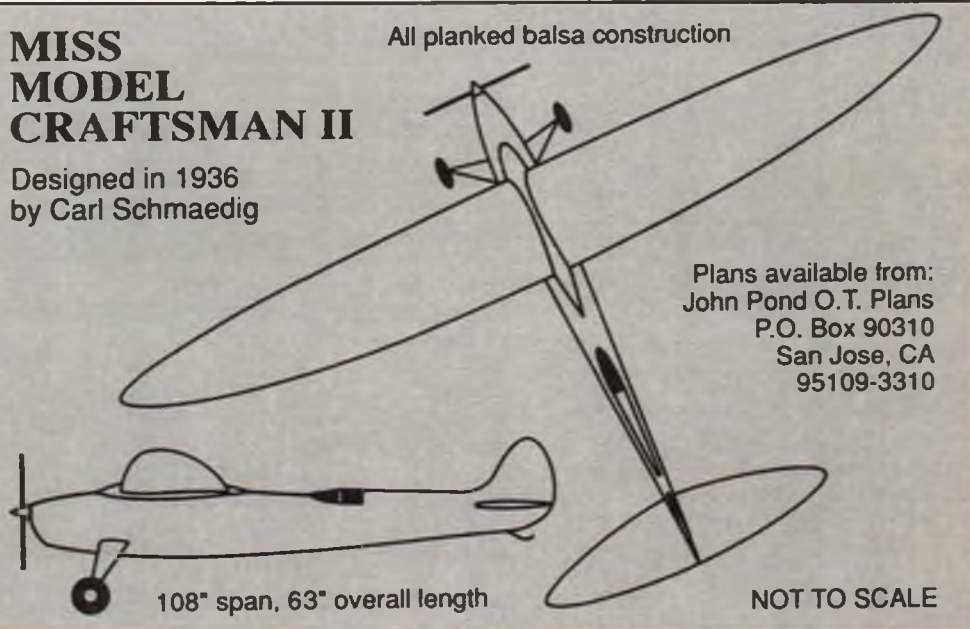
The Shilen .19 is such an engine. It was developed by Ed Shilen who produces the Torpedo .24, .29 and .32. Specifications: bore, .633 inch; stroke, .628 inch; displacement, .199 cubic inch; weight

with tank, 6.5 ounces; .21 horsepower at 11,200 rpm using a 9x5 APC prop.

Shilen reports the engine was first designed and built in early 1993. The prototype was sent to the SAM Engine Committee for evaluation and approved in August 1993. Production was initiated immediately with production engines being delivered in June 1994.

MISS MODEL CRAFTSMAN II

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MODEL OF THE MONTH

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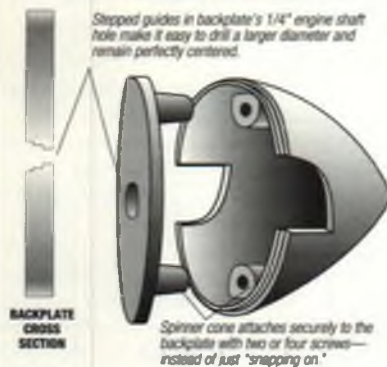
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PLUG SPARKS



Photo No. 4. Sal Taibi (right), part of the U.S. contingent who traveled to the U.K., autographs the stab of an English admirer's Powerhouse.

Engines are presently in stock, priced at \$225 from Shilen Aero Sports, P.O. Box 1300, Ennis, TX 75120; (214) 875-1442.

MODEL OF THE MONTH

This month's model designer, Carl Schmaedig, needs no introduction to modelers old or new. Carl is one of those who has bridged the old free flight designs to the latest models of today.

Most of our readers are familiar with Schmaedig's first cabin design, known variously as the CJ-7, the "Zaic," and finally the Miss Model Craftsman. We did a write-up on this model in the April '94 issue. This design, on which the Miss America was based, turned out to be extremely popular on the West Coast, particularly in the San Francisco Bay area. This columnist has built three himself and still has one hanging up, ready to go.

With the success of the cabin model still ringing in his ears, Schmaedig decided to try for the National Champs Texaco Trophy. In attacking this problem, Carl noted that the really successful designs were streamlined, elliptical fuselage models—the Cavalier, Aristocrat, Tluth's 1936 Texaco Winner, etc.

The resulting design, the Miss Model Craftsman II, was cooked up early in 1936

with Schmaedig contracting it out for construction. Only two model builders were available, hence construction was slow, due both to time and the finishing of the construction plans. As it turned out, the model was delivered only a day or two before the start of the Nats.

The model had therefore not been test flown before being brought out on the field to make an official flight. After several hair-raising hand glides, the engine was started, set at a rich throttle and the model was launched. At that moment the engine

leaned out; the model nosed up, stalled and dove into the ground. The impact split the fuselage planking and broke the motor mounts. That did it for that day, as field repairs to a fully planked model were tough to do. If CA glue had been available in those days, quick repairs might have been effected.

As it was, the days of the big model were numbered, as the fuel allotment events were being supplemented by limited engine events which required smaller and faster climbing models. However, this model would be an excellent choice for today's SAM Texaco events. **MB**



Photo No. 5. The Italians have always been strong in Wakefield and had two teams competing at Middle Wallop. Look closely and you might be able to make out the twin geared rubber motors in Mr. Calligari's 1950 "Eilina" Wakefield winner.

COMING NEXT MONTH

MODEL BUILDER

reviews the Monarch Concept Hand-Launch Glider from Northeast Sailplane Products. ▼ ▼ ▼ ▼ ▼

The May 1995 issue goes on sale nationwide April 6. To ensure you don't miss it, use the subscription blank on page 75.

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THE SIG STORY

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

By Jack Lewis

INTRODUCTION

It's purely by coincidence that Model Builder's publisher, Jack Lewis, who authored this piece, goes a long way back with Glen and Hazel Sigafoose—long before anyone even thought of there being such a company as Sig Manufacturing.

As a teenager, Jack worked after school on the weekly newspaper in North English, Iowa. The newspaper's printer and Glen Sigafoose were friends, and Glen would stop in once in awhile to visit. That was how Jack and Glen came to know each other.

"In those days, Glen's only mode of travel was a big Indian motorcycle, and he had this red-headed girlfriend who rode on it with him, blasting around the country in a hail of flying gravel," Lewis recalls. "They were later married, and the girlfriend became Hazel Sig. Soon thereafter she got her own Indian bike. All of this took place more than 50 years ago!"



Sig Mfg. Co. has sure come a long way from its humble beginnings in the Sigafoose basement in 1951! The company now occupies these buildings on the southern outskirts of Montezuma, Iowa, and has 90 full-time employees, making it one of the city's largest industries.

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Here's the ad that started it all, clipped from a 1952 issue of M.A.N. When they first got started, the Sigs bought and processed 120 board feet of balsa; today the company processes just under half a million board feet! When it comes to quality, Sig balsa is second to none.

Situated in the small town of Montezuma, Iowa (population 1,500) is one of the world's largest producers of flying model aircraft and accessories. Sig Manufacturing Company was founded in 1951 by Glen and Hazel Sigafoose in the basement of their home. At the time, both were full-time employees of a local newspaper and also managed a small Indian motorcycle distributorship; the model airplane business was started as a sideline.

Glen was the youngest of three sons. During his early years, a great deal of time was spent in his father's automotive garage learning mechanics, welding and other trades. Glen's father was intensely interested in anything mechanical, including aviation, and had experimented with hang gliders as early as 1910. His enthusiasm for machinery was a big influence on young Glen.

Glen took up building model airplanes at a young age and was always quite resourceful. In fact, he first started selling plans for his model designs through the mail when he was only 12 years old. Later, he and a friend sold a completely ready-to-fly free flight model through the mail for \$2.

Shortly after graduating from high school, Glen started work for the hometown newspaper as an apprentice printer and linotype operator. He eventually left the little weekly newspaper and went to work in the city of Ottumwa on a daily paper. When World War II broke out, Glen attempted to enlist, but was not accepted

because of a minor physical defect. He was disappointed, and when a friend of his invited him to go out to California to work, he quit his job and went along.

Glen soon discovered that he didn't care for the California lifestyle and returned to Iowa to resume work as a linotype operator. This was in the winter, and although he came home via a southern route, he still had to pass through some bitterly cold weather on his motorcycle. By the time Glen arrived home he was so chilled that his hands were stiff and had permanently lost some of their speed. He found he could no longer operate the linotype fast enough to get a job. Searching the want ads in the Des Moines paper, he found a job opening in Montezuma on a weekly paper, the *Republican*, applied and was hired.

Shortly after his move to Montezuma, Glen met Hazel Hicks,

per someday."

It wasn't long before Glen had Hazel riding her own Indian motorcycle. For a few years, it was their only mode of transportation. "We both rode motorcycles and didn't even own a car until 1958," Hazel recalls. "My first driver's license was restricted to motorcycles, and I didn't get a license to drive a car until after I had my private pilot's license!"

Love for motorcycles led to their first business venture. Hazel states: "To supplement our income we got a dealership for Indian motorcycles. We ran this for several years while continuing to work at the newspaper. Glen made some nice spun aluminum wheel discs for our machines, and other riders liked them so much that we started making them for sale. We sold hundreds of sets until the Korean War broke out and aluminum supplies for most businesses were cut in half. Unfortunately, we didn't count, and our supply was cut—period! We were out of business!"

Glen never had lost his love of model airplanes, and decided to get back into the

hobby. But buying supplies was a problem; the nearest hobby shop was in Des Moines, 60 miles away, and no one was selling pre-cut balsa sheets and sticks by mail order. A lot of shops didn't sell balsa at all. The Sigs reasoned that there must be hundreds of other modelers out there who would be interested in buying balsa by mail.

Since Glen had a rather complete machine shop in the basement, they decided to buy and process 120 board feet of raw balsa and attempt to fill this void in the market. They printed up a list of sizes and prices and placed a small ad in *Model Airplane News*. That was the start of Sig Manufacturing Company.

Hazel recalls those early days: "We worked six days a week at the newspaper, then came home and filled orders. Glen



One of Glen Sig's father's many interests was aviation; this classic photo of him flying a biplane hang glider, circa 1910, was used in a Sig ad in the mid-1980s. The elder Sigafoose's knowledge of machinery was not lost on young Glen, who inherited his father's mechanical savvy and ability to make things work.

a dental assistant working in the local dentist's office—right across the street from the newspaper. A lifelong Montezuma resident, Hazel clearly remembers the day in 1941 when Glen came to town:

"There had been a very light snow, and the only track on the street was a single motorcycle track, coming from the east and making a U-turn. There, parked against the curb across the street, was a pretty little red-and-yellow Indian motorcycle. I saw Glen walking between the newspaper building and the local restaurant, but it was two months later before we met.

"We married the following year, and I ended up with the job of linotype operator and Glen became the shop foreman. We dreamed then of owning our own newspa-



Glen and Hazel Sig shared a passion for motorcycles, and shortly after they were married in 1942, they ran a distributorship for Indian bikes—this in addition to working full-time for the local newspaper, the *Montezuma Republican*.

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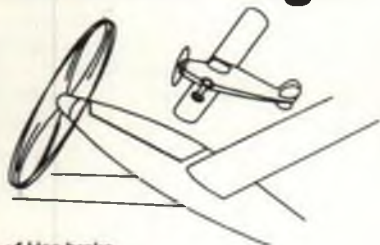
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cut the wood in the basement and I packed the orders in a second-story room off of our bedroom. The next day, we would tote the packed orders to the post office, then go to work.

"This went on and grew. We hired first one moonlighter to help cut wood, then a second. My mother came to work for us full-time, packing the orders during the day while we worked at the newspaper. Eventually we put our wages from the newspaper jobs into the savings account and lived entirely off the balsa business. Four years later we quit the *Republican* and contracted to build our first building. That was in 1955.

"When we first started in our home, we couldn't get any hobby shops or hobby distributors interested in our balsa. We stuck in there and sold directly to the modelers. After a while, enough modelers were asking for Sig balsa at their hobby shops that we were able to start selling directly to the shops.

"Attempts were made to sell balsa to hobby distributors, but at that time the business was dominated by the Testor Chemical Co., and most distributors didn't want to handle a second line of balsa. As a



How many of you remember Sig Air-Modeler magazine? This was a bimonthly publication sponsored by Sig and edited by Larry Conover; first issue was June/July 1966. Heavy emphasis was placed on entry-level and sport FF and CL construction projects. Sadly, only six issues were published before lack of industry support brought it to a halt.



An example of Glen Sig's mechanical prowess is this one-of-a-kind machine he designed and built; it automatically files, holds and crimps Sig-Ment glue tubes at the rate of 15 per minute.

sand at the same time. It was unheard-of at the time. We had the best surface on balsa

continued on page 78

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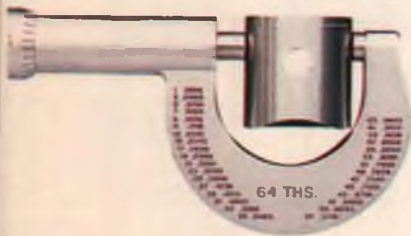
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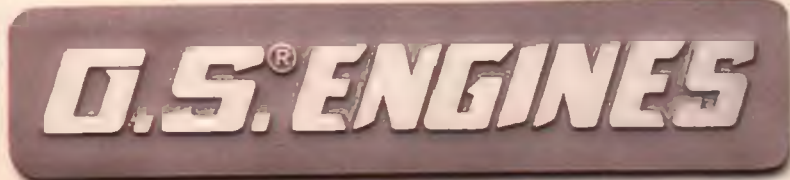
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The 12th International

TOURNAMENT OF CHAMPIONS



Last year marked the 20th anniversary of the "World Cup" of RC Precision Aerobatics. Nineteen of the world's best pilots competed for their share of the \$133,500 purse.



■ TOP: The flightline and surrounding activities are all presided over by the Circus Circus Clown, who peers down on the 100x700-foot leveled and paved runway. ■ ABOVE LEFT: These TOC airplanes are BIG! Miss TOC, Debbie Ellis, is dwarfed by this Dave Scully/Wayne Ulery designed Extra, presented to Bill Bennett in recognition of his service to the RC hobby. The pilot is an exact, easily recognizable replica of Mr. Circus Circus himself. ■ ABOVE RIGHT: Fifth place winner Dave Von Liesowe (far right) waits patiently as his crew fires up the 140cc 3W engine in his Extra 300. Extras were flown by 11 of the 19 1994 entrants. ■ LEFT: The 1994 TOC winner, Argentina's Quique Somenzini, with his strongest supporters, his mother and father. Mr. Somenzini is Quique's partner in everything but the flying, a very important part of the team.



If RC flying has a World Cup, it has to be the Tournament of Champions. Like soccer's World Cup, the TOC draws competitors and spectators from all around the globe. Like the World Cup, it takes a lot of preparation and training, sometimes for years before the first whistle blows. And like the last soccer World Cup, Team Argentina was considered one of the top ranking, definitely one of the ones to watch. The rest is history

The 1994 Tournament of Champions took place October 27-30, in Las Vegas, Nevada. As in the past, the primary sponsor was Circus Circus Hotel & Casino, in the person of RC flier Bill Bennett, the Circus Circus Hotel being headquarters for the participants and for as many supporters as were able to get reservations. Las Vegas must have more hotel rooms than a lot of countries, yet it's almost impossible to get one at certain times of the year!

The first TOC took place in 1974, the brainchild of Bill Bennett and the late Walt Schroder. It's held every two years and is flown with large scale model aircraft. Full-scale aerobatic competition rules are followed as much as possible. Chief judge was again James "Doc" Edwards, himself a veteran full-scale and RC aerobatics flier. Contest director was Steve Rojecki, a USAF and airline pilot and winner of the 1984 TOC.

Canada's Dave Patrick, 16th place, with what appeared to be the largest airplane at the contest, this beautifully built and decorated Bücker Jungmann. Infinity 8.8 engine swings a huge 30x12 prop.

■ ABOVE: Chip Hyde's pink Ultimate, or one just like it, is a familiar sight at West Coast events. Winner of the TOC in 1990 and '92, Chip was in 2nd place going into the finals, but engine problems on his second to last flight knocked him down to a 4th place finish. ■ RIGHT: VIPs indeed! "Doc" Edwards (left) has been chief judge at every TOC; Miss TOC 1994, Debbie Ellis; and contest director Steve Rojecki, the 1984 TOC winner.



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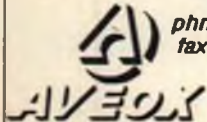
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The flight program is divided into three categories: the Known Program, the Unknown Program (a sort of scrambled Known Program made known to the flier just before takeoff), and the spectators' favorite, the Four-Minute Free Program, a sort of show-off, let-it-all-hang-out flight during which each pilot tries to out-perform the others with extremely difficult, seldom seen maneuvers, some of their own invention. I swear, some of the flying seen during the Free Program is impossible—I don't care how many people saw it, it's just *impossible* for an airplane, large or small, to do such things!

All 20 contestants fly the first three days. Only the top five fly on the last day, making six flights, two in each category. This is it—the go for broke, the last hurrah—the last chance to make that cup-winning goal!

Money talks, probably more so in Las Vegas where games of chance and high-rollers are a way of life. The TOC contestants share \$133,500, 1st place money being \$25,000. I've often wondered how the last place contestant explains to his non-modeling friends: "I flew in a contest last weekend, placed last and won \$4,000"!

After three days of flying, the results were as listed at right. The points and winnings for the last 15 are final; the first five would go on to the fourth day of flying to determine their final placing.

1. Somenzini	83,315.435	
2. Hyde	83,163.205	
3. Stricker	82,310.384	
4. Paysant-Le Roux	80,572.220	
5. Von Linsowe	80,469.276	
6. Shulman	76,790.507	\$6,500
7. Goldsmith	72,091.705	\$6,000
8. McConville	71,784.780	\$5,500
9. Marsden	70,248.280	\$5,000
10. Lakin	69,639.163	\$4,500
11. Klein	68,019.347	\$4,000
12. Erang	66,796.401	\$4,000
13. Wessel	66,586.473	\$4,000
14. Koger	66,426.518	\$4,000
15. Combs	65,902.463	\$4,000
16. Patrick	65,873.197	\$4,000
17. Rodgers	41,431.659	\$4,000
18. Cunningham	31,237.958	\$4,000
19. Campbell	12,871.358	\$4,000

WHAT THEY FLEW

Campbell, Colin (Canada)	Extra 300/Dern
Combs, Geoff (Pickerington, OH)	Extra 300S/3W
Cunningham, Bill (Tulsa, OK)	Extra 260/A ³ 8.8
Erang, Peter (Germany)	Extra 300/Titan 7G 62
Goldsmith, Peter (Australia)	CAP 231X/Eagle 5.8
Hyde, Chip (Henderson, NV)	Ultimate/Eagle
Klein, Mike (Bedford, OH)	Ultimate/3W 7.0 61
Koger, Dean (Xenia, OH)	Laser 200/A 140 belted twin
Lakin, Chris (Springfield, MO)	Sukhoi Su-26/Aykes
Marsden, Greg (Canada)	Extra 300/Eagle
McConville, Mike (Hobart, IN)	Extra 300S/3W 120
Patrick, Dave (Canada)	Bücker Jungmann/Infinity 8.8
Paysant-Le Roux, Christophe (France)	CAP 231/Sachs
Rodgers, Gene (Ft. Worth, TX)	Sukhoi Su-29/3W 120C
Shulman, Jason (Winter Garden, FL)	Extra 300S/3W 7.0C Twin
Somenzini, Quique (Argentina)	Extra 300S/3W 7.2
Stricker, Steve (Baltimore, MD)	Extra 300S/3W 7.0
Von Linsowe, David (Mt. Morris, MI)	Extra 300S/3W 140cc
Wessels, Peter (Germany)	Extra 300S/Zenoah 62

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The last day's flying called for two flights in each category. With the exception of the Free Program, the last rounds were difficult for the untrained eye to judge—they were all 10s to me. The judges, however, thought differently, and awarded the following points and prize money:

1. Somenzini	84,982.665	\$25,000
2. Stricker	80,820.080	\$15,000
3. Paysant-La Roux	80,188.944	\$10,000
4. Hyde	78,443.979	\$8,500
5. Von Linsow	77,908.830	\$7,500



■ ABOVE: Chris Lakin, of Springfield, Missouri, flew his impeccable Sukhoi Su-26 to 10th place. There were two Sukhois at the '94 TOC; this one sported an Aykos engine, APC prop and JR radio. ■ BELOW: Probably the most colorful airplanes seen at the '94 TOC were the CAP 231s flown to an excellent 3rd place finish by France's Christophe Paysant-La Roux. His airplanes also seemed to be the smallest at 1601 square inches, 20 pounds.



At the start of Sunday's flying, most of us, who were naturally all experts by this point, felt that 3rd through 5th places were pretty much cast in stone; the contest was for 1st and 2nd. And most of the big money was already on Somenzini, as, from a purely spectator's viewpoint, Quique had been outflying Chip in the Four-Minute Free Program. As it turned out, Chip's engine went sour during his second Known flight. He landed, accepting a most un-Hyde-like score, and was unable to continue, which

took him out of contention and dropped him to his final 4th place position.

What if? Always a question. Nevertheless, unless some similar unfortunate event had happened to Somenzini, and the scoring proceeded in the same vein, he would still have wound up number one. Counting only the programs they both flew, Quique was still ahead by 9116.660 points. There's no doubt that the RC World Cup went to Argentina.

Who then is Quique Somenzini, and how did he arrive at this prestigious position? Quique is a nine-time and current South American champion, and 13-time and current Argentine Champion. Quique won the Freestyle and placed 7th in the 1990 TOC, and placed 3rd overall and 2nd in Freestyle at the '92 TOC. Additionally, he has won many international events, and at 13 set a still-unbroken record of being the youngest contestant in a World Championship. His home is in Rio Cuarto, in the state of Cordoba, some 350 miles northwest of Buenos Aires. He's 27 years old, and girls, he is single! He's a likable, unassuming, clean-cut young man, no shaggy hair, no ponytail, no earring. Obviously, he lives and breathes RC airplanes.

A word about places No 18 and 19. The low scores were due to airplane failure, not poor flying. Both Bill Cunningham's and Colin Campbell's airplanes came apart in the air. One can only guess why, but in any event, it's a most unpleasant sight to witness an aircraft of this caliber shed a wing and plummet to earth!

This I can't resist! Readers of some of

my previous material know that I'm a proponent of the Mode One transmitter as being superior to "the way real airplanes fly." Need I say more? Right, Quique Somenzini flies Mode One! So does Hanno Pretner. Ha!

This report is humbly presented in honor of Maurice Franklin, RC technician and TOC announcer, and Lou Proctor, RC designer and TOC processor, who were no doubt watching from their favorite cloud in RC heaven. **MB**

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

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

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ERNST UDET'S

U-12A FLAMINGO

Still considered one of the best light aerobatic aircraft ever built, the Flamingo was the brainchild of Ernst Udet, the legendary WWI German ace and top aerobatic pilot of the '20s and '30s. Reprinted from the October '76 *Model Builder*.

■ BY WALT MOONEY



The plans show sheet balsa wing and tail tips, however, the prototype model has laminated basswood tips on the wings and vertical tail. The fuselage luffdeck could also be covered with bond paper instead of the 1/64 sheet balsa shown. Keep the weight to a minimum for best flight performance.

On page 112 of *Aircraft Profile 257* is a view of the U-12a that this Peanut is meant to depict. A-113 was a BFW-produced aircraft belonging to the OLAG Flying School in 1932. This profile gives a lot of detail on the many variants of the Flamingo, and I picked A-113 for its yellow covering, black numbers, and red and white candystriped struts.

The original model flies quite well, but being a biplane, will probably do less than 30 seconds unless built very light. The model in the photographs weighs 3/4 of an ounce ready to fly. It has plastic wheels, propeller, thrust bearing and cylinders, all of which make it slightly nose heavy. Replacing all the plastic with wooden items would save some weight.

Structurally, the model is a classic biplane. Balsa is used almost everywhere. The cabane struts supporting the upper wing center section and the interplane struts between the wingtips are 1/64 plywood. The landing gear struts are basswood.

The engine uses Williams Bros. cylinders. For cylinder heads, we used dress snaps. They're not exact scale, but they do give a nice appearance. (I stole this idea from John Oldenkamp. I was impressed by how good they looked on one of his models.) The exhaust collector ring was simulated with 1/8-inch diameter plastic wire insulation. A strand of thin copper wire was used to tie the loop and extends back along the single exhaust pipe between the two bottom cylinders.

All flying wires are 2-pound test monofilament fishing leader. Make a hole in the struts at the appropriate places before assembly to make installing the wires easier. A small drop of cement at each intersection of wire and surface makes the installation permanent. Painting the dried cement silver makes it resemble a metal end fitting.

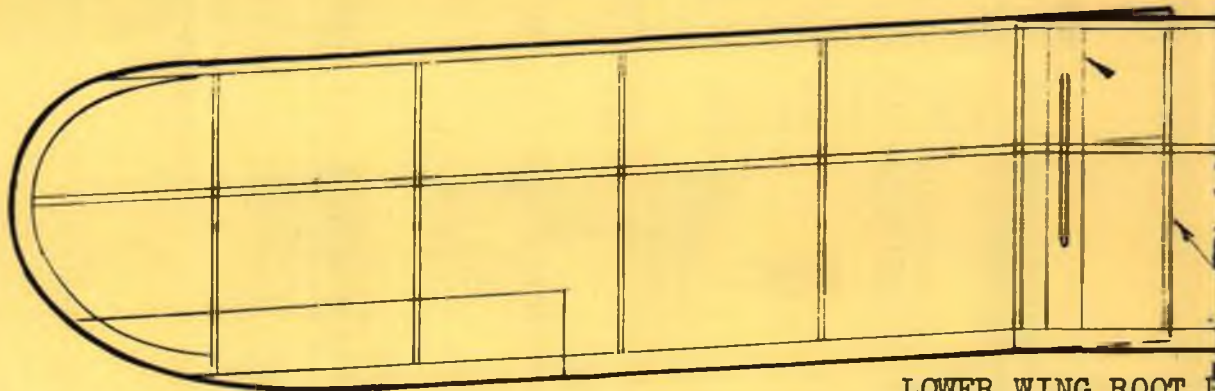
The ailerons, movable tail surfaces, and baggage hatch are simulated with India ink. This can only be done after doping the model, otherwise it will run in the tissue.

The entire model is covered in yellow tissue. The struts and rudder are painted red and white. The wing numbers are 7/8-inch tall; the fuselage numbers are 9/16-inch tall. These are cut from black tissue and doped in place over the yellow tissue with very thin dope after the covering has been shrunk and doped once.

The model in the photo requires about a 1/32-inch of downthrust and flies in left circles under power. *MB*

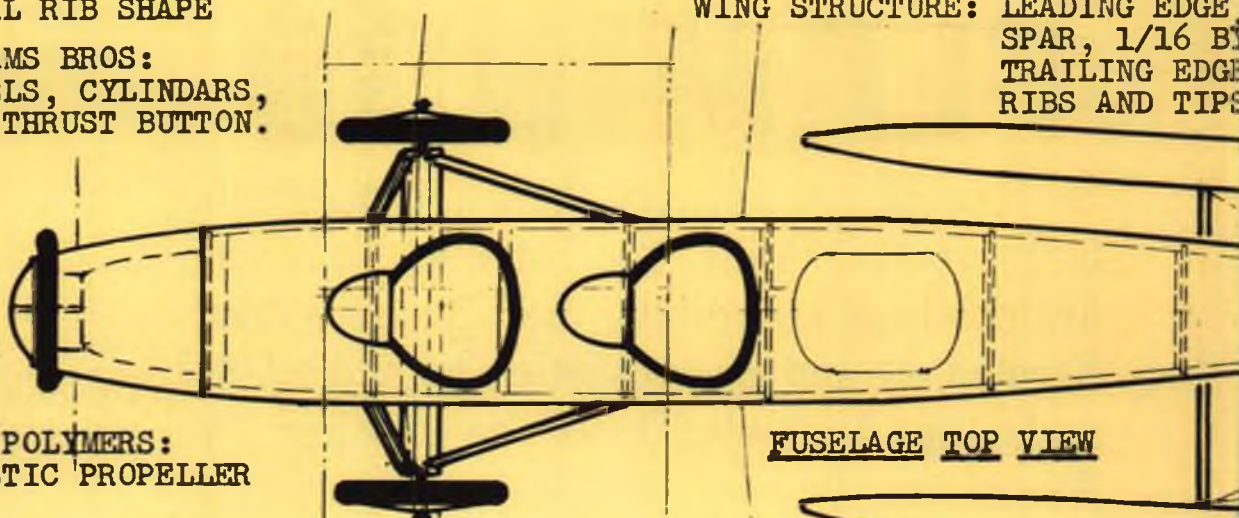


TYPICAL RIB SHAPE



WING STRUCTURE: LOWER WING ROOT
LEADING EDGE
SPAR, 1/16 BY
TRAILING EDGE
RIBS AND TIPS

WILLIAMS BROS:
WHEELS, CYLINDARS,
AND THRUST BUTTON.



FUSELAGE TOP VIEW

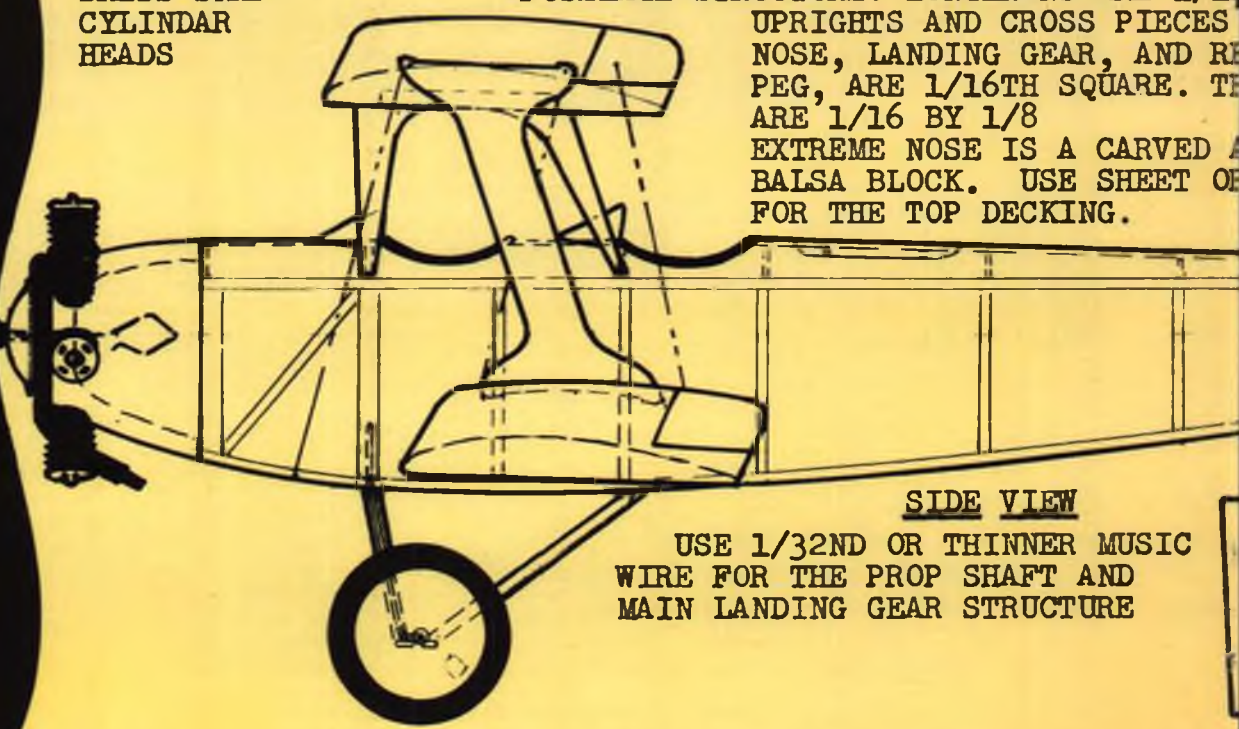
PECK POLYMERS:
PLASTIC PROPELLER

DIHEDRAL



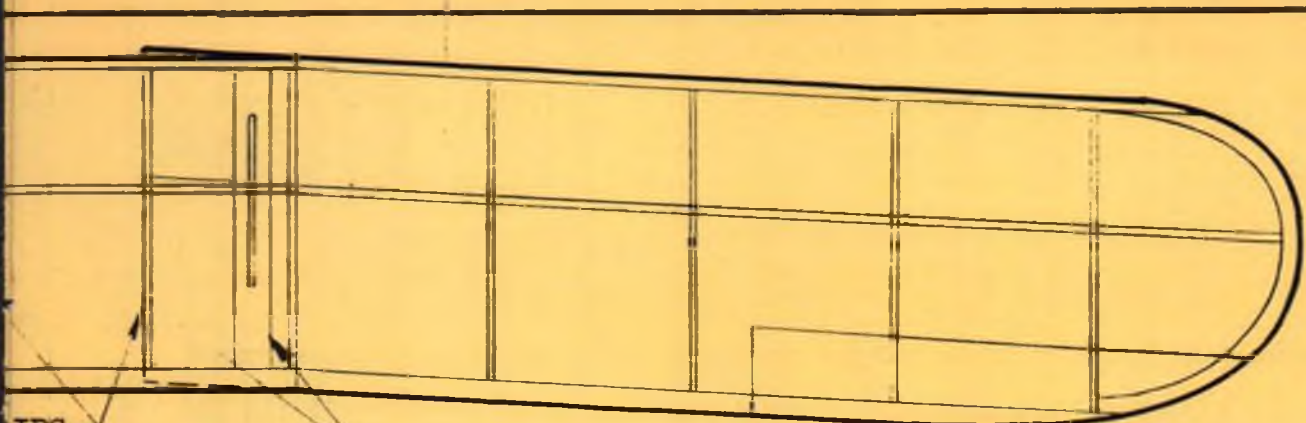
DRESS SNAP
CYLINDAR
HEADS

FUSELAGE STRUCTURE: LONGERONS ARE 1/16
UPRIGHTS AND CROSS PIECES
NOSE, LANDING GEAR, AND RE
PEG, ARE 1/16TH SQUARE. TH
ARE 1/16 BY 1/8
EXTREME NOSE IS A CARVED
BALSA BLOCK. USE SHEET OF
FOR THE TOP DECKING.



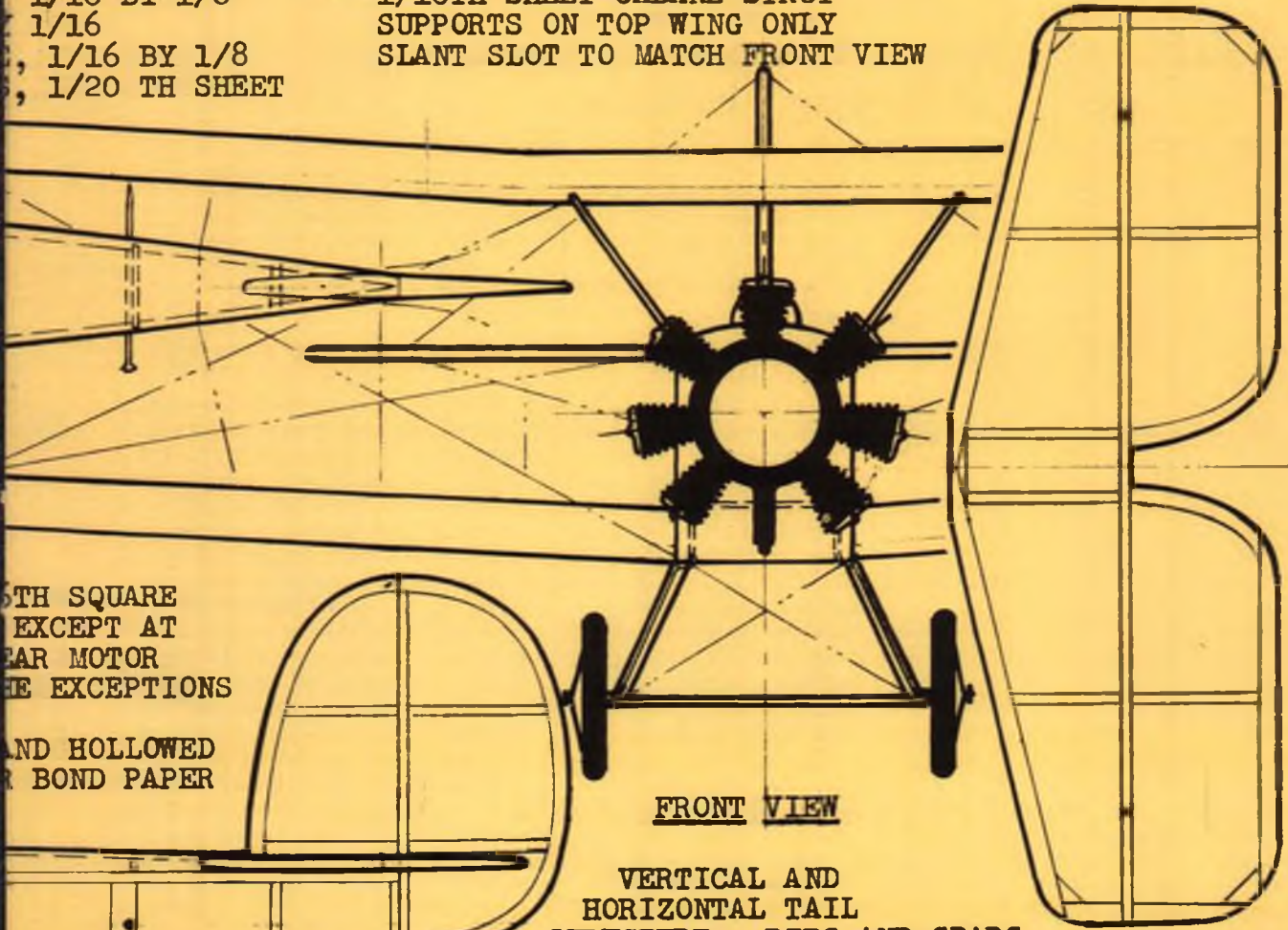
SIDE VIEW

USE 1/32ND OR THINNER MUSIC
WIRE FOR THE PROP SHAFT AND
MAIN LANDING GEAR STRUCTURE



RIBS
 1/16 BY 1/8
 1/16
 1/16 BY 1/8
 1/20 TH SHEET

1/16TH SHEET CABANE STRUT
 SUPPORTS ON TOP WING ONLY
 SLANT SLOT TO MATCH FRONT VIEW



1/16TH SQUARE
 EXCEPT AT
 REAR MOTOR
 AND OTHER EXCEPTIONS

AND HOLLOWED
 WITH BOND PAPER

FRONT VIEW

VERTICAL AND
 HORIZONTAL TAIL
 STRUCTURE: RIBS AND SPARS
 1/16TH SQUARE. OUTLINES FROM 1/16 BY 1/8
 OR CUT FROM 1/16TH SHEET

MAKE FORMERS FROM 1/32ND SHEET

CABANE STRUT TRUE SHAPE AND SIZE

MAKE ALL STRUTS FROM
 THIN PLYWOOD

Udet U-12a

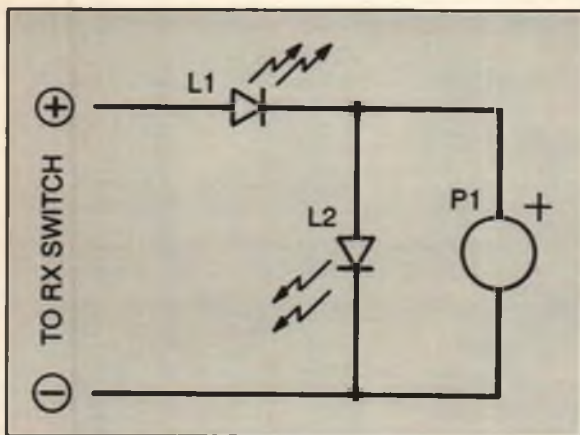
PEANUT SCALE
 BY *Walt Mooney*

08-05-76

BUILD YOUR OWN RECEIVER STATUS MONITOR

This little electronic gizmo can prevent the embarrassing and potentially dangerous scenario of a runaway electric airplane.

**Also discussed:
Reflex or "burp" charging, and the advantages
of keeping a logbook.**



Because of an electric's "instant-on" capability, a model with the receiver inadvertently left on can suddenly come to life and go charging through the pines. To guard against this, Dick Miller came up with this simple receiver monitor, which provides both visible and audible warning that the receiver is on. Radio Shack part numbers for the three components are as follows: L1—Blinking LED, #276-030 or -036; L2—High Intensity LED, #276-086; P1—Piezo Buzzer, #273-074. Total cost should be less than \$6.

"An inexpensive device that provides both audible and visual indications of receiver status can be readily assembled as shown in the accompanying diagram. It consists of a high-intensity LED, mounted on the aircraft at some conspicuous place, and

ish use the other, more attention-getting term. Here's how it works:

During the charge cycle the charger turns off the charge current and applies a very short (1 millisecond) high discharge current to the battery—the "burp." According to Allan, during a fast-charging cycle, the battery's internal pressure increases due to the chemical reactions taking place inside each cell. In addition, small crystals and impurities form in the cell over time. The "burp" destroys the crystals and relieves the internal pressure in the cell, thereby increasing cell life. Although it doesn't appear you'll be able to pack more power in the cell than you would with other charging techniques, the cell should last longer and you may be able to restore old cells back to full capacity. After you charge a pack to capacity, you should let it rest, then top it off using a standard peak charge method.

Allan also sent me an article from issue number eight of *Modeller's World* magazine that gives a description of the many types of charging techniques. The article focuses on uses other than electric flight, but it is well written and informative and includes a description of reflex charging. At the time of the article, no commercial manufacturers were producing reflex chargers, however, Allan also included information about the new Tekin BC 112A charger that incorporates reflex charging in its charging algorithm.

Now for the disclaimer! This is the first I've heard of reflex charging—it's a new technique to me. This admission may show that I've been living under a rock when it

continued on page 66

Dick Miller of Wernersville, Pennsylvania sent me a nice write-up on how to build a receiver status monitor. It fits in the plane, weighs a mere 1.5 grams and consumes only about 3.5 mA of power from the receiver battery. Here's what he says:

"A major advantage of electric-powered aircraft can also be a major safety concern: they start at the touch of a button. I'm sure we all have, at one time or another, inadvertently left our receiver on after completing a flight. This is not a particular problem for an I.C. engine as after it has stopped; it cannot be started again without the usual procedure of refueling, spinning and swearing until it's finally airborne again. Electrics, however, have the innate ability to come alive if their receivers have not been turned off.

"This fact was brought to my attention at a recent meet when a pilot had retrieved his plane from the field, returned his transmitter to the impound area and left. A few minutes later, the plane came to life and headed toward a group of spectators. Fortunately, it was captured and its receiver turned off. The channel pin had been properly procured by another pilot, but unbeknownst to him, he was controlling more than one plane.

a Piezo-electric transducer, located inside where it can be made audible without being irritating. Either indicator may be eliminated from the unit without affecting operation. A blinking LED provides inexpensive circuitry that causes the high-intensity LED to blink and the Piezo transducer to beep.

"The schematic diagram is very straightforward and you should have no trouble wiring it up. You can connect the power directly to the receiver switch or you can plug into an unused receiver channel. The three components are available from Radio Shack for less than \$6."

Maybe if I'd had this unit a few years ago, I wouldn't have hand-launched my .049 powered glider into never-never land with the receiver switched off!

BURP CHARGING

Via the Internet (part of the ever-growing "information superhighway"), Allan Teo brought to my attention a charging technique with a goofy name. As we all know, there are many different methods to charge our NiCd batteries, the most popular being peak charging and timed charging. Allan sent me some interesting articles about "burp charging"—actually the official name is "reflex" charging, but the Brit-

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-20588 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-42588*	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-60588 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-70088 HS-705MG	Giant scale Metal gear	133 oz/in 181 oz/in	.22 sec .27 sec	TOP BALL BEARING	2.3x1.1x2.0	3.5 oz 4.0 oz	RCD915 3+1 servos
HS-7588	Retract servo	90 oz/in	.50 sec	TOP BB	1.7x0.9x1.0	1.3 oz	none
HS-72588	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



Chopper Chatter

This month James takes a look at some new items of interest to RC helicopter fliers, and offers a couple of hints for making sure your heli's engine keeps running smoothly.

There's a new top-of-the-line heli radio in town: JR's PCM-10SX. It's basically a PCM-10S with expanded software. The new 10SX provides seven flight modes (the 10S has five). The new flight modes are stunt 3 and stunt 4. Separate stunt trims and five-point tail rotor mix are available for each of the four stunt modes. Programmable mixing has been increased from five to eight. Of course, there are some other minor improvements as well. What's more, the PCM-10S can be upgraded to PCM-10SX standards for around \$200. Contact Horizon at (217) 355-9511 for more details.

Futaba's S-148 is one of my favorite no-frills, inexpensive servos. S-148s are reasonably fast, cost only about \$15 apiece,

put shaft. The performance of bushed servos is noticeably improved. To get more info on the conversion kit, contact LDM Industries at (813) 991-4277.

I also recently tried the machined aluminum, gold anodized servo output wheels from Horizon Hobby Distributors' Hangar 9 accessory line. They come in three sizes and are pre-drilled and tapped for mounting the steel ball for ball links. The metal wheels are supposed to eliminate the flexing of ordinary plastic servo arms. Are they really necessary for sport flying? I don't think so. But they certainly look impressive on my X-Cell Pro. If you've already spent a grand on your favorite helicopter you may want to spend another few dollars for these beautiful servo



James finds the .30-.40 Ninja Pro canopy fits his .60-size GMP Legend very well. Has a Hirobo DDF rotor head, O.S. .81 RFM engine and Magna U-pipe—a great flying combination. Canopy is painted from the inside using RC car spray paint.

and seem to stand up to all kinds of abuse. Recently I equipped my S-148s with the ball bearing upgrade kit from LDM Industries. For \$7.95, you get a shielded ball bearing and a new upper case for the Futaba S-148 or Airtronics 94102. Or, for \$5.95, you can get a ball bearing that's a drop-in replacement for the nylon bushing in JR's 501/507 and Tower/Hobbico servos. The LDM ball bearing upgrade eliminates any slop in the servo out-



Among other excellent custom aftermarket helicopter accessories, Hel-x offers a complete line of unpainted and wildly painted canopies to fit a variety of different machines. James took this photo at a recent trade show.

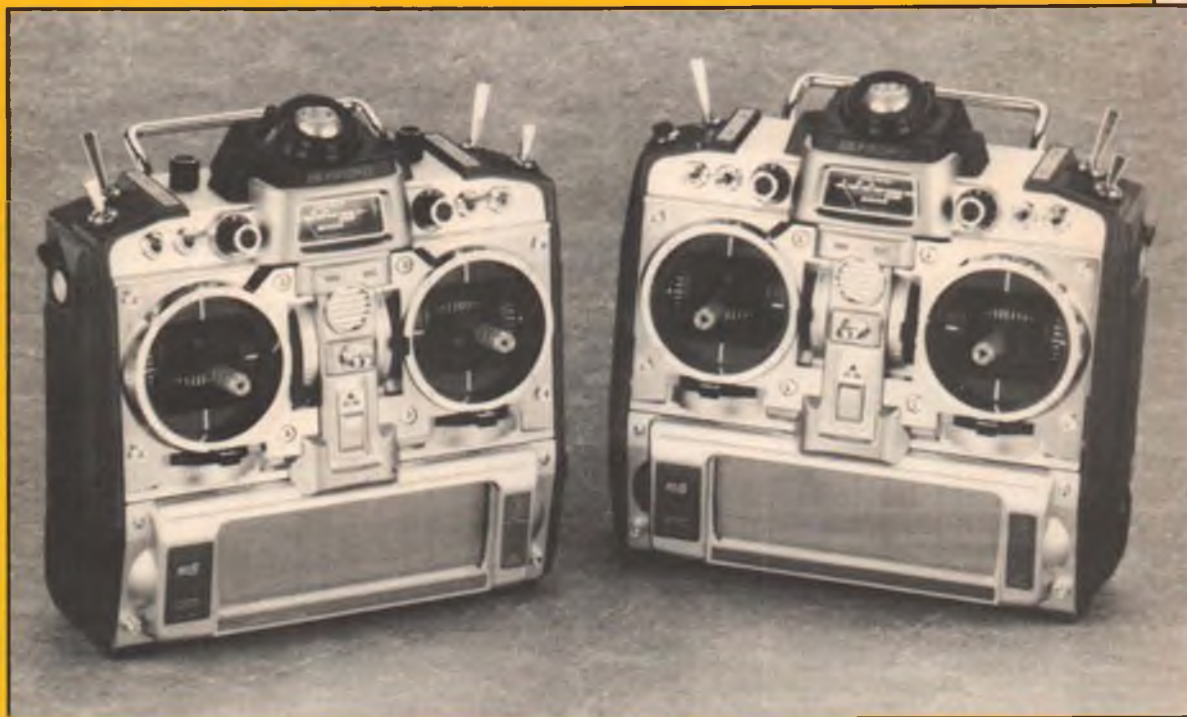
arms. They'll make your model the envy of others.

More practical for the typical .30-size flier are the new wood rotor blades from Horizon's Revolution line. They're available in four lengths: 500mm for the Enforcer, Concept DX and SE; 515mm for the Concept SR; 530mm for the Enforcer ZR; and 550mm for the Shuttle ZX, Enforcer ZR with Kalt S-30 rotor head, and Ninja Pro. They retail for \$27.95 a pair. The leading edges

Helicopter World



JR's new top-of-the-line RC system is the PCM-10SX, available in both airplane and helicopter versions. Basically an expanded 10S with a few more features thrown in. Happily, 10S owners can have their systems upgraded to 10SX standards for a nominal charge—see text.



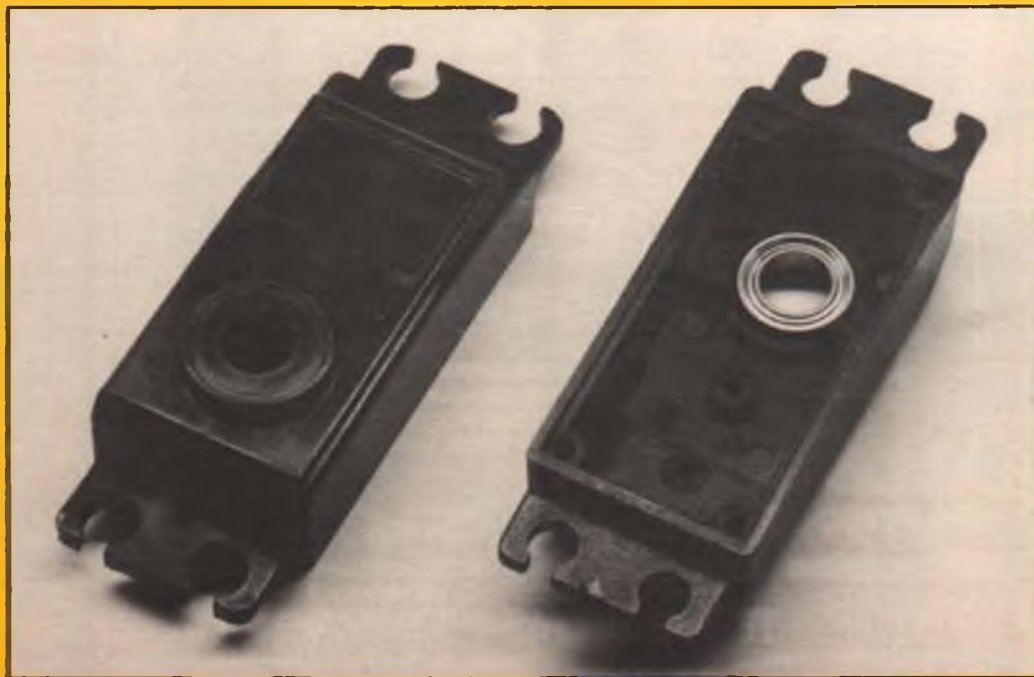
are pre-slotted for epoxying in the included lead weight. Each blade weighs about 100 grams. I tried the 550mm blades on my Ninja Pro and they fly very well, with good hover and forward flight stability.

Over the last few months I've been using a new .30-size muffler from KSJ. It's machined from barstock aluminum and threaded together. This lightweight muffler bolts directly onto most .30 engines. The muffler itself can be rotated to point the exhaust in any direction. It's quiet and causes minimal power loss. I use mine on a Concept 30 and like it very much.

Another neat new JR product is a support that helps prevent

servo output shaft flexing. As shown in the photo, it's simply a pushrod with a ball link on each end. One end is attached to a standoff on a metal tray that comes with the unit; the other is attached to a ball link at the center of the output shaft. The unit sells for \$13.95. It fits JR 507, 501, 527, 4131, 4721, 4735 and 4000 servos, but may fit some other brands of servos as well. Horizon conducted a test and reports that this unit reduces the endplay of a servo from .008 inch to .0005 inch. Very impressive! I'd like to put this unit on all of my .60-size models!

The Kalt Excalibur and Alpha II molded landing gear set (Kalt #06030518) works very well on the X-Cell and other .60-size helicopters. I use it on my X-Cell 60 because it provides a higher ground clearance, which helps prevent the header on my rear exhaust O.S. .61 from touching the ground. As an alternate to buying the entire landing gear set, you can order just the molded



LDM Industries offers inexpensive ball bearing upgrade kits for several brands of standard hushid servos. James tried them on his Futaba S-148s, says the overall performance is indeed improved.

Helicopter World



For those who demand absolute precision in their control systems, JR produces this metal servo tray and ball system to eliminate any flexing of the servo output shaft.



The new Revolution line of Supersport wood rotor blades for .30-size helicopters. They're made in four different lengths and feature hardwood leading and trailing edges plus a plywood spar.

struts (Kalt #06030517); they fit X-Cell aluminum skids.

Call Boca Bearing at (407) 998-0004 for a bearing catalog. They have bearings for almost all model engines, as well as bearings for control bellcranks and metric size rotor shafts. Boca also has a special tail rotor gearbox grease that I use and highly recommend.

If you don't have time to paint your own canopy, pick up one of the pre-painted canopies from Hel-x in New Jersey; (201) 744-4962. Hel-x makes replacement canopies for most of the helicopters on the market. The canopies are painted from the inside; this automatically gives a glistening finish, and the paint can't be scratched from the outside. I painted the Ninja canopy on my GMP Legend via this method, with excellent results.

Century Helicopter Products (408-942-9525) has just released two new .60-size helicopter mufflers. These are similar in design to the Hatori 666 and 669, but at half the price. The internal baffles make the Century mufflers very quiet. The muffler is attached to the header via a silicone tube. The muffler body can rotate. The rear part of the muffler must be supported by a bracket.

HINTS OF THE MONTH

If your engine has begun to run erratically, the carburetor may have some dirt inside. A quick way to flush it clean at the field is to connect your electric fuel pump hose directly to the fuel intake nipple. Remove the main needle valve and set the throttle at full open, then turn on the pump. Fuel will spray out of the carburetor from everywhere. Now reinstall the needle valve, but leave it four or five turns open and turn on the pump again. This will flush out any dirt in the spray bar hole.

Another hint: After the last flight of the day, stop the engine by pulling off the fuel line and letting the engine run out fuel. Otherwise, depending on where the model is stored, the bearings and other steel parts in the engine may begin to rust. To make sure it's *completely* dry inside, connect the battery and start the engine again with the fuel line disconnected; the engine will run for another two or three seconds. This actually makes the engine easier to start the next time you go flying. *MB*



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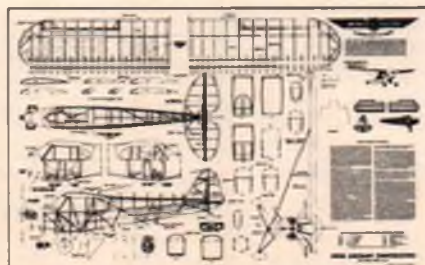
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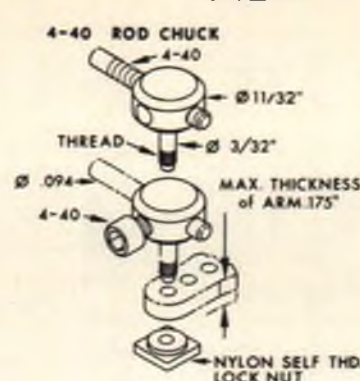


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DEAR JAKE cont. from page 22
start planning your contest schedule. Jake

DEAR JAKE:
Modeler: Is the advice columnist in?
Receptionist: Walk this way.
Modeler: If I walk that way, I'll get arrested.
Receptionist: The advice columnist will see you now.
Modeler: Jake, Jake! My airplane crashes when I do this.
Vaught Villieon in N.Y.C.

Dear Vaught:
Advice columnist: Don't do that! Jake

DEAR JAKE:
Modeler: I want a second opinion.
Vaught Villieon Again.

Dear Vaught Again:
Advice columnist: That was a second opinion. My first opinion was that you're ugly. Jake.

DEAR JAKE:
Modeler: I may be ugly, but I'll be sober in the morning.
Vaught Villieon Yet Again

Dear Vaught Yet Again:

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SIZE	USE PRICE	SIZE	USE PRICE	SIZE	USE PRICE	SIZE	USE PRICE	SIZE	USE PRICE	SIZE	USE PRICE	SIZE	USE PRICE	SIZE	USE PRICE
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5.7 X 3	1.159	8.5 X 7.5	5.395	11 X 5	2.49	12.5 X 12	7.795	14.4 X 10.5	10.1295	20 X 8	12.2500	22 X 16	45.00	2	15 Combat
6 X 2	1.159	8.75 X 7.0	5.395	11 X 6	2.49	12.5 X 12.5	7.795	14.4 X 12	10.1295	20 X 10	25.00	24 X 10	55.00	3	10-15 Pylon
6.3 X 4	2.395	8.75 X 7.5	5.395	11 X 7	2.49	12.5 X 13	7.795	14.4 X 13	10.1295	20 X 12	25.00	24 X 12	55.00	4	25 Pylon
6.5 X 2.9	2.395	8.75 X 8.0	5.395	11 X 8	2.49	13 X 6	4.25	14.5 X 14N	10.1295	20 X 14	25.00	24 X 14	55.00	5	40 Pyton
6.5 X 3.7	2.395	8.75 X 8.25	5.395	11 X 9	2.49	13 X 7	4.25	14.5 X 14.5N	10.1295	20 X 16	25.00	24 X 16	55.00	6	36 Combat
6.5 X 5.0	3.395	8.75 X 8.5	5.395	12 X 6	2.89	13 X 8	4.25	15 X 8	10.1295	21 X 12	25.00	3 Blade Hub 17 - 19	54.00	7	80 Pattern
6.5 X 5.5	3.395	9 X 4	16.199	12 X 7	2.89	13 X 9	7.795	15 X 10	10.1295	22 X 8	31.00	3 Blade Hub 20 - 21	66.00	8	CL Stunt
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7 X 5	1.59	9 X 9	1.99	11 X 12W	7.795	13 X 13.5N	9.795	15 X 14N	10.1295	24 X 10	38.00				
7 X 6	1.59	9 X 10	1.99	11 X 13	7.795	13.5 X 9	7.1295	16 X 8	12.95	24 X 12	38.00				
7 X 7	1.59	9.5 X 6.5N	5.395	11 X 14	7.795	13.5 X 10	7.1295	16 X 10	12.95	24 X 14	38.00				
7 X 8	1.59	9.5 X 7.0N	5.395	11.5 X 4	8.289	13.5 X 11.5N	7.1295	16 X 12	12.95	24 X 16	38.00				
7 X 9	1.59	9.5 X 7.5N	5.395	12.25 X 3.75	8.349	13.5 X 12.5	10.1295	16 X 13N	10.1295	2 Blade Hub 18 - 19	30.00				
7 X 10	1.59	9.5 X 8.0N	5.395	12 X 9	7.795	13.5 X 13.3	10.1295	16 X 14	12.95	2 Blade Hub 20 - 21	35.00				
7.625 X 3.25	1.4	9.5 X 8.5N	5.395	12 X 9W	7.795	13.5 X 13.5	10.1295	16 X 16	12.95	2 Blade Hub 22	40.00				
7.8 X 4	3.95	9 X 6.5	5.395	12 X 10	7.795	13.5 X 14	10.1295	9 X 6P	Pusher 3.95	2 Blade Hub 24	60.00				
7.8 X 6	6.395	9 X 7.5	5.395	12 X 10W	7.795	14 X 5N	12.95	10X 6P	Pusher 3.95						
7.8 X 7	6.395	9 X 8.5	5.395	12 X 11	7.795	14 X 6N	12.95	10 X 7P	Pusher 3.95						
8 X 4	1.79	10 X 4	2.29	12 X 11N	7.795	14 X 7N	12.95	10 X 8P	Pusher 3.95						
8 X 5	1.79	10 X 3	2.29	12 X 12	7.795	14 X 8	12.95	11 X 6P	Pusher 3.95						
8 X 6	1.79	10 X 4	2.29	12 X 12.5	7.795	14 X 10	12.95	11 X 7P	Pusher 3.95						
8 X 7	1.79	10 X 5	2.29	12 X 12.5	7.795	14 X 11	17.1295	14 X 6P	Pusher 12.95						
8 X 8	1.79	10 X 6	2.29	12 X 13	7.795	14 X 12	10.1295								
8 X 9	1.79	10 X 7	2.29	12 X 13N	7.795	14 X 12N	10.1295								
8 X 10	1.79	10 X 8	2.29	12 X 14	7.795	14 X 13	10.1295								
8.5 X 5	4.395	10 X 9	2.29	12 X 14	7.795	14 X 13N	10.1295								
8.5 X 5.5	4.395	10 X 10	2.29	12.5 X 9	7.795	14 X 13.5	10.1295								
8.5 X 6.5	5.395	10.5 X 4.5	11.395	12.5 X 10	7.795	14 X 13.5N	10.1295								
8.5 X 7.0	5.395	11 X 3	2.49	12.5 X 11	7.795	14 X 14	10.1295								

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1	049 Free Flight
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3	10-15 Pylon
4	25 Pylon
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6	36 Combat
7	80 Pattern
8	CL Stunt
9	120 Warbird
10	120 Pattern
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15	15 Free Flight
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You blew your last line! Now we have to start over. But what do you say, for our readers' sake, we just drop it?

Jake

DEAR JAKE:

When I was at a loss for gift ideas this past Christmas, I let my local hobby shop proprietor talk me into buying my son a plastic model kit of a U.S. Navy battleship. What with the turrets, guns, antennas, etc., it had about a thousand parts.

The kit was a big hit on Christmas morning and my son couldn't wait to start working on it. Poor Jerry did his best to assemble it, but he lost interest after several days of not much more than parts cataloging. Because he had opened the plastic bags and removed some parts from their trees, the retailer wouldn't take it back.

It was expensive and I don't want to just throw it away. I tried the garage sales but there were no takers. My only choice seems to be to build it myself, but I'm not a modeler and wouldn't even know where to begin.

Can you help me?
Frustrated Dad in Fresno, CA

Dear Dad:

The objective of building any plastic kit is to achieve full-scale realism with a sub-scale model.

Find the largest parts in your son's kit. That would be the hull halves and the deck. Glue them together. Now, if you have a shotgun, shoot the assembly from close range. If not, back your car over it. Take the shattered hulk and place it at the bottom of your fish tank. Scatter all the unused smaller parts around the wreckage on the bottom.

Voila! You have a detailed and authentic model of a sunken ship. To add realism, do some research at the library. You can then identify the ship and tell your friends and relatives the story of how it went down.

JAKE
MB

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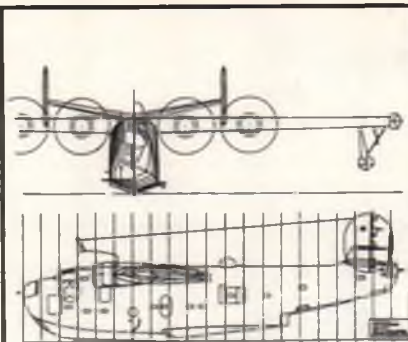
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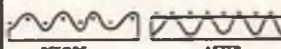
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FREE FLIGHT

BY BOB STALICK

•Stalick's Top Ten Building Tips

•Bruce Augustus' Top Gun F1J

•New FF Goodies



First place in 1/2A Nostalgia at the Northwest Free Flight Championships went to Wes Funk and his Cox Medallion powered Greene Hornet. Full-size Greene Hornet plans are available from Model Builder Plans Service (#6932, \$7.50).

Everybody's doing it. TV personalities. Radio guys. Newspaper editors. You name it, they do it. The Top Ten. So, why not free flight columnists? Here are my 1995 FF Top Ten Building Tips:

Number 10: Mount your timers to the fuselage using 2-56 screws threaded into short sections of yellow Nyrod tub-

ing. Just CA the tubes in place. The screws will self-tap.

Number 9: Clip a 1/4 chunk out of several sizes of flat washers and keep these C-shaped pieces handy. When making thrust adjustments, just loosen the mounting bolt and slip a C-washer between the mount and the firewall and tighten it up.

Number 8: Epoxy a thin

piece of aluminum or magnesium to the front of the firewall. Your engine will be mounted against a hard surface, and any washers used for thrust adjustments will remain in place over time.

Number 7: Choose model designs and sizes to fit the engines you have available. A properly matched engine and model will perform competitively with the hottest (and most expensive) ship on the field.

Number 6: Always use a covering material that adds to the structural strength of the model.

Number 5: Use the lightest covering material that you can for your flying conditions.

Number 4: Reduce the size of T.E. stock to eliminate useless weight. For all but the largest ships, 1/8x1/2 T.E. stock is adequate.

Number 3: Choose wood and hardware that just does the job. Don't overbuild or add unnecessary weight. All other conditions being equal, the lighter model will win every time.

Number 2: Never use metal tubing to route your DT or VIT lines. It's impossible to detect the sharp edges in metal until the line snaps in flight. Always use plastic tubing. Even so, check your lines often for wear.

Number 1: Try something different and new as you choose your next project. You could be very pleasantly surprised, and at least you won't be flying the same thing as everyone else on the field.

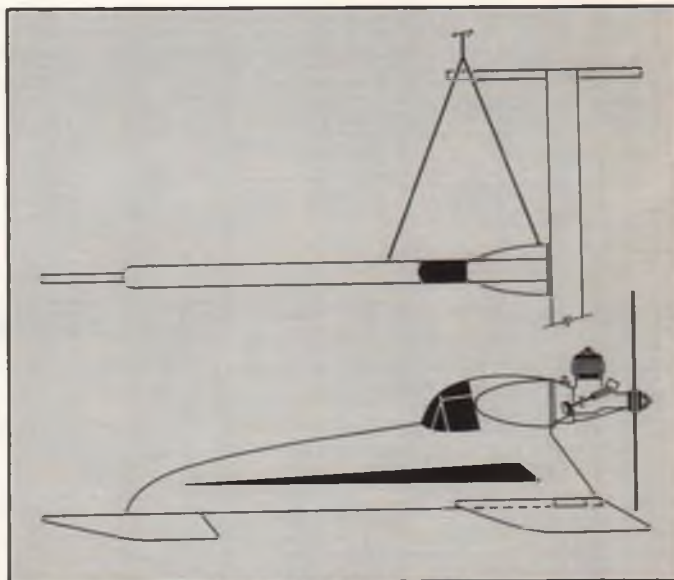
There you have it. Not as funny as that guy who comes on late night TV, but more useful to the free flighters among us.

Next month, stay tuned for the Top Ten Flying Tips.

PLAN OF THE MONTH: TOP GUN

F1J models have started to look like miniature versions of their larger F1C cousins. By contrast, Bruce Augustus' Top Gun looks more like a post-Nostalgia AMA gas ship. You may recall that Bruce also designed the NFFS F1J Model of The Year, the Northern Light. Bruce's Northern Light suffered some terminal re-entry problems last summer. The Top Gun was sitting around unused, so Bruce pressed it into service.

Lo and behold, Top Gun performed exceptionally well, placing 1st in A Gas at the annual Northwest Free Flight Champs and winning F1J at the



APRIL MYSTERY MODEL



USFFC at Lost Hills. Bruce notes that the model would be an excellent performer in 1/2A with a Stels engine.

According to Bruce, "Top Gun was conceived as a very simple, high-performance F1J airplane. It was designed at the same time as Northern Light for the purpose of testing the two concepts (high thrust vs. pylon) as alternatives to mini-F1C models. Its performance is equal, if not superior, to Northern Light. It's also simpler to build and fly, not having elliptical surfaces, or a multifunction timer or autorudder."


Full-size plans plus a set of detailed building instructions are available for \$12 postpaid from Bruce Augustus, P.O. Box 450, Sun Valley, ID 83353.

APRIL MYSTERY MODEL

Every once in awhile I like to toss in a ringer to send even the most cavalier Mystery Model contestant to the old magazine collection. This

Ross Thompson has been successful in the Early Nostalgia event with this 1/2A Zeek, powered by an original OK Cub .049. A good flying combo.

FREE FLIGHT



TOP GUN
An F1J Design by
Bruce Augustus

Wing Area: 340 sq. in.
Stab Area: 103 sq. in.
Weight: 220 gr.
Engine: AD .06

Wing & stab ribs

Full-size plans available from:
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month's design is *not* your typical run-of-the-mill free flight. Originally powered by a Wasp .049, the article claims this model can be either tethered or "free flight." Full-size plans were provided in the magazine.

Think you know the name of the model? If so, just jot it down on a card or letter with your name and address and forward it to *Model Builder*

Florida's Jake Larson sent this photo of his Peanutt Scale Noorduyn Norseman on floats, built from Peter Wank's ScienText plans. A good flier, although he says the scale speed would make a P-51 envious.

magazine. If you've got the name right, you have a chance at winning a year's free subscription. Good deal!

JANUARY MYSTERY MODEL WINNER

Ed Bellinger's Class C GYSOB, an acronym for "Go You Sweet Old Bird" (yeah, right—blame that one on Paul Grabski of Florida), was published as a construction article here in *Model Builder*, in July of 1976. It went on to establish an enviable contest record and was chosen as one of the NFFS Top Ten Models of the Year in the 1978 NFFS Symposium. Of the 18 entries received, the name drawn as the winner of the free one-year MB sub is Mitch Post of Chicago, Illinois.

THE 1995 NATS

Latest word is that the AMA Executive Council has voted to hold the 1995 Nats

outdoor FF events at Muncie, probably in late June. The indoor Nats are scheduled to be held at the Kibbie Dome in Moscow, Idaho; the date is still to be set. The likely dates will be sometime between July 12 through July 18 and could include the FAI Indoor Team Selection and the Northwest Indoor Championships. If so, this would make a grand week of indoor flying. More info as it develops.

AMA RULES PROPOSALS

A couple of months ago, I previewed two rules change proposals submitted by Jean Paillet. Since then, the full slate of rules changes has been published and await the vote of your district's Free Flight Contest Board member. If you read the AMA section in *Model Aviation*, you have some idea of the content of those proposals.

By now, your Contest Board member will have made his first vote. The proposals that survive the first vote will be considered for a final vote in the spring. Please pay attention to these proposals, as they can affect your enjoyment of our hobby. Contact your local FF Contest Board member and voice your opinion. Make the proposals an agenda item at an upcoming club meeting. Your comments to your Contest Board member could be the only ones he receives.



Dave Vincent gets his Class C Pillared Pearl ready to go at the 1994 Northwest Free Flight Champs. Model is powered by a K&B 6.5.

DOMEDUSTER PLANS PACKET

Stan Fink has released his Domeduster Plans Packet Number 3, which features 12 full-size indoor model plans from some of the best designers in the U.S. Featured are models by Dave Linstrum, Andrew Tagliafico, Chuck Markos and Dave Aronstein. All are presented on 11x17-inch sheets for easy copying and building. The plan packet is available from Stan Fink, 1810 Pine St., Philadelphia, PA 19103. The cost is \$8.00 postpaid.

AMA NAME TAGS

Several years ago, I reprinted some of the old AMA name tags that we used to receive with our membership. These tags had space for your name, address, phone number and some information about the model. I recently sold most of my remaining supply to John Targos, who does business as ARGO USA. John is making them available for a modest fee. They're printed on lightweight white paper, and the print is not affected by water, dope or epoxy.

ARGO-USA also produces and sells quite a number of SAM and O.T. related parts and products, including replica Elfin diesel engines. While ordering the tags, request a new ARGO USA catalog. Send a couple of dollars to ARGO USA, 3229 Dianora Dr., Palos Verdes, CA 90274, or call (310) 377-6186. MB

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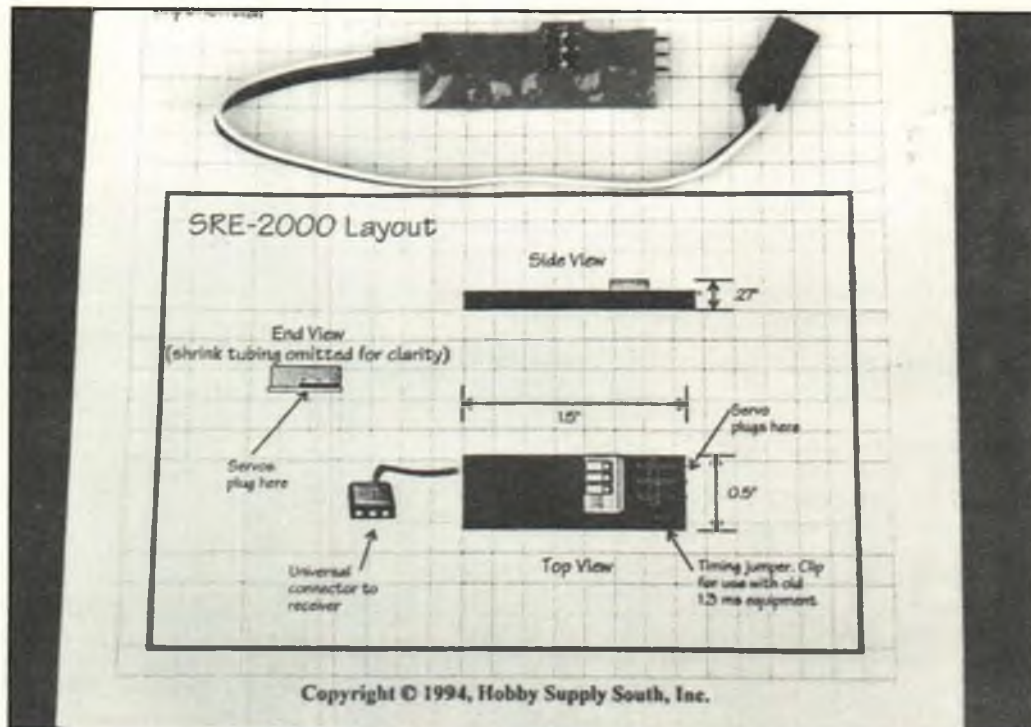
ELECTRONICS CORNER

BY ELOY MAREZ

• BECs Revisited

• Hobby Supply South's SRE-2000

• Safe Flite's "Switch Lock"



The SRE-2000 looks much like any other servo extension, but offers both servo reversing and/or exponential control in the same small package. Described in text.

The New Year's issue—January, that is—started off with a mistake on my part, which I hope is not an indication of what all of 1995 is going to be like. In that column, I told you about the retirement of Bob Boomer, Mr. Multiplex USA, who was folding up the Beemer R/C Multiplex operation in Arizona. At the time, the information, which I had obtained from Herr Boomer himself, was correct. However, since then, some re-negotiations or maybe arm-twisting took place, and Bob's retirement is postponed. It's back to business as usual for Beemer R/C at the same location: 13827 N. Wendover Dr., Fountain Hills, AZ 85268; (602) 837-0311.

BEC'S REVISITED

Elmar Meuker, of New York City, writes:

"I enjoy electric flying, but am at a loss with the following. I want to use a receiver with BEC circuit, running off the motor battery. I am using a fuse and arming switch plus, of course, the radio switch. What

I would like is to have the battery run the motor until the BEC circuit senses minimal battery capacity and stops the motor, leaving enough juice to bring the plane in. I thought that is what a BEC circuit does.

"Also, please suggest some books that could help me understand your great diagrams and translate them into an actual product. Also a few of the electronics suppliers who are willing to ship small quantities of parts."

Well, BECs and motor cutoff can be confusing, and unfortunately is not a subject that we see much of in either the product brochures or the model press. I've discussed this here before, but there are always newcomers, and for them and for Elmar, here goes.

First of all, BEC (Battery Eliminator Circuit) and motor cutoff circuitry are completely separate and different things. I've always felt that many RC-related subjects would be easier to understand if the nomenclature was more aircraft and/or electronics related and

less of a sales pitch. For example, if BEC was referred to as a voltage regulator, which is all it is, one could not possibly confuse it with shutting off a motor!

A BEC only regulates voltage. It adjusts the too-high voltage of the flight battery down to a safe level for the receiver. There are different such regulators, some in a single IC package, and some made up of individual components. Regardless of their makeup, they all have one thing in common: the input voltage must be higher than the output. When the input drops below the critical level, the output of the regulator drops, and whatever it is providing power for—i.e., your radio—will cease to operate.

I've included a diagram for a simple BEC using a regulator available from Radio Shack. Note again that it will provide power to your radio, but it will *not* cut off the motor at any time.

Cutting the motor off at a given voltage level requires different circuitry, one that senses

voltage. This circuitry reacts to a preset voltage level in order to turn off a relay or a solid state equivalent which in turn opens the battery supply to the motor.

You can have one, or the other, or you can have both. You can have them in receivers, in speed controls, or in motor control units. They may appear to be the same, as they come in the same package and are made up of the same electronic gizmos, but except for being powered from the same source, they have nothing else in common.

I haven't included a circuit for a motor cutoff unit, as I don't have one in my files. I'll try to share one with you sometime in the future.

Radio-operated on-off motor controls with automatic motor cutoff are available commercially, and are not really expensive. One readily available maker is Hitec/RCD, which has two units of interest. First is the SP-1002, intended for systems in which the BEC is already incorporated into the receiver. The SP-1003 is similar but has its own built-in BEC, obviously for use with non-BEC equipped receivers. Both include a brake function to stop the propeller. The 1002 is about \$20, the more complex 1003 a bit more at about \$30.

Going now to Elmar's second question, my recommendation for an electronics learning text is an old friend of the electronics tinkerer, the Heath Company. They have a number of well-written courses. EE-3103-B, DC Electronics, teaches you to understand current, voltage, resistance and power, their relationship to each other, and the purpose and use of all related components. There's even a video, EV-3101-A, to help you along. Call (800) 253-0570 for a catalog which includes further details, pricing and ordering informa-



The Safe Filte "Switch Lock" keeps you from burning on the transmitter before removal, effectively reminding you of the importance of frequency control. Fits on all popular transmitters.

tion.

As for suppliers, for mail order I generally depend on:

- Digi-Key, in Thief River Falls, MN; (800) 344-4539.
- Jameco, Belmont, CA; (800) 831-4242.
- Mouser Electronics, with locations in CA, TX and NJ; (800) 346-6073.

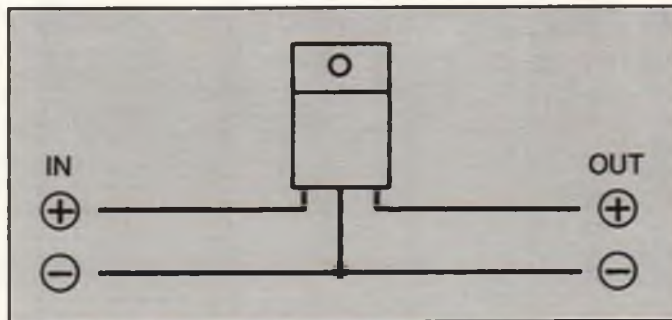
HOBBY SUPPLY SOUTH'S SRE-2000

The full name is SRE-2000 Servo Reverser/Exponential Control add-on harness. Somewhat of a long title for such a little item, but it takes that much to describe it. In one respect, the SRE-2000 is like other servo reversers that you might have seen or read about. It

looks like a servo extension, except that on the servo end, there's a small 1.5x.5-inch shrink tubing covered component board; total weight is 0.2 ounce. The lead is installed between the receiver and servo,

which will now rotate in the opposite direction. This feature is handy in dual servo installations where it's desirable for the two servos to operate in opposite directions.

However, in addition to servo reversing, the SRE-2000 can also introduce exponential control at that channel. That is, it softens the servo-to-stick ratio at center, increasing with stick movement until the same full throw is reached as would be done without exponential.



The BEC, a voltage regulator with a confusing name, couldn't be simpler, as it involves the use of only one IC. Use a 7805T or LM-340T-5 for 5 volts, 7808T or LM-340T-8 for 8 volts, connected as shown.

The SRE-2000 is designed to introduce three different ratios of exponential—0, 35, 65 or 100 percent as selected by positioning three small switches on the body. Charts are furnished with the instructions de-

pecting graphically the action of the different settings, so that one can see the effect rather than launching the aircraft and hoping for the best.

The SRE-2000 is configured for use with Futaba, Hitec and JR systems. The instructions also include instructions on how to change the plugs to make the unit compatible with Airtronics. Priced at \$22.95 plus \$3 S&H, from Hobby Supply South, Inc., 5060 Glade Rd., Acworth, GA 30101; (404) 974-0843.

A 1/4-SCALE MERLIN?

One that runs! To refresh your memory, the Rolls Royce V-12 was used in Spitfires, Hurricanes, Mosquitoes, Lancasters, and later Mustangs. My personal experience was behind one in a two-place Cavalier Mustang, and I can assure you that it makes sweeter music than any jet ever did. Not as well known is that the Canadians flew a version of the DC-4/C-54 called a "Northstar," which sported four Merlins and sounded like four Spitfires in close formation. Also a great sound!

A true running Merlin is the project of Richard Maheu of San Diego, California. It's a reality, and it runs, and throttles, and leaves you mumbling to yourself. It's intended for you machinists out there, as prints, instructions and castings, and is available in sequential parts packages that you obtain

as your personal project progresses. Though the prop shown in the photo does not appear to variable pitch or constant speed, I'm sure the mind that conceived this remarkable project has already thought

ahead to one. Call Richard at (619) 268-8867 for an update and pricing.

FREQUENCY CONTROL

This is something that's important to all of us, and all systems have the same weak link: the fliers! However, a new item has appeared that helps us help ourselves. When used properly and religiously, it prevents the transmitter from being turned on without reminding us that we don't have an exclusive channel to fly on.

It's called the "Switch Lock" and is produced by Safe Flite R/C Products, 100 E. 11000 S., Sandy, UT 84070; (801) 576-0942. In use, the Switch Lock is clearly identified with your name and channel number, and then attached to the transmitter in such a way that the switch cannot be moved from "off" until the Safe Flite is removed. The Safe Flite is priced at \$7.95; dealer discounts are available.

Safe Flite also offers custom frequency boards, printed on vinyl with your field or club name, attached to painted and weatherproofed 1/2-inch plywood. Another version is available that includes the rules in effect at your field. Though intended pri-



Here's a real challenge for you machinist types: a working replica of the Rolls Royce V-12 Merlin, offered as a castings kit by Richard Mahoe—see text. Total displacement is 25.75 cubic inches, weight is 18.5 pounds, rated at 15 horsepower at 4,000 rpm.

marily for the "Switch Lock," it is also usable with clothespins or whatever devices your group prefers.

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

FCC SPECTRUM RE-FARMING UPDATE

The following was faxed to us by RCMA president Steve Helms:

"The Radio Control Manufacturers Association (RCMA) would like to provide the following update concerning the FCC Spectrum Re-Farming Proceeding PR Docket 92-235.

"In a memorandum from Ellen Block (legal counsel for RCMA), RCMA has been advised that the Federal Communication Commission's Private Radio Bureau is now very unlikely to act on the 1992 proposal to 're-farm' the radio spectrum in the 72-76 MHz range. Citing congressional and FCC priorities, the new Wireless Bureau, which assumes the functions formerly carried out by the Private Radio Bureau, simply does not have the time to address the re-farming issue. The Bureau stopped short of issuing an order to withdraw the proposal, however.

"It would appear from the memorandum that current regulations governing the airwaves allocated to the RC industry will be unaffected for the foreseeable future. However, because this issue has not been withdrawn from consideration and because of other issues that are still pending before the Commission, RCMA will continue its efforts to monitor FCC activity as it relates to the RC industry."

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If you still think you need more power, both servos come in metal gear versions for even more torque and greater durability. So...if you are one of those special people who truly believe that bigger is better, Hitec RCD has the servo you need. See for yourself at a dealer near you. For more information contact:

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HS-605BB & HS-605MG

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HS-615MG

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THE WINTER SOARING FESTIVAL

A report on the first of what will be an annual West Coast event for RC scale sailplanes, sponsored by the Desert Union of Soaring Thermalists and the Vintage Sailplane RC Association.



For the last six to eight years there has been a steadily growing interest in scale model sailplanes across the U.S., especially in the far western states. Wil Byer's biannual slope scale fun-fly at Eagle Butte (in the eastern Washington tri-cities area of Pasco, Richland and Kennewick) was the first major indication of scale soaring's popularity and potential for growth.

The latest evidence of this exciting growth is the Winter Soaring Festival, a new meet devoted to the promotion of vintage and modern scale sailplanes, held in the Coachella Valley of California. For its inaugural assembly on December 10-11, 1994, it drew close to a hundred models, more than half of them scale models.

This new meet has the potential of becoming the west's biggest scale sailplane

continued on page 62

■ ABOVE: A look down pit row reveals some of the 90+ models and 500 spectators that showed up—an excellent turnout for a first-time contest. Next year's event is already taking shape—an event not to be missed! ■ BELOW: Former MB Soaring columnist Dr. Larry Fogel measures his son Gary's spot landing. In addition to the 1/4-scale WWII-vintage Schweitzer TG-3 training glider pictured, the Fogels also brought a 1/4-scale SG-38 primary glider, 1/4-scale DG-600, 1/5-scale DG-600 and a 1/4-scale Dieces. ■ BELOW RIGHT: Taking the Best Vintage/Antique Model trophy was DUST member H. Greg Weatherford; his Minima was scratch built by Jack McLain from RCM&E plans (available in the U.S. from Bob Holman: 714-885-3858). The other vintage subjects are a Reiber (left foreground) and a Bob Holman Plans Rhönbessard with fiberglass fuselage.





■ LEFT: Charles Norrako and his son Jason scratch built these beautiful all-wood 1/5-scale Jantar Standard and Jantar 1 models from Mike Truw plans (Bob Holman sells them in the U.S.). Jason's plane won 3rd place in the Best Scratch Built category. ■ ABOVE: Four of the bigger names involved with the organization of the first annual Winter Searing Festival were, from left: Gary Fogal (VSRCA), Rex Powell (DUST), John Robinson (VSA) holding the Perpetual Trophy for best Vintage Glider, and contest director Buzz Waltz (DUST). Smiles were indicative of the success of the first meet.



■ ABOVE: The takeoff roll never takes as long for the sailplane as it does for the towplane. Here Bill Liscomb takes the controls of a friend's Ka-6 as it gets a tow from Dale Tomlinson's highly modified Bud Nosen Trainer.



■ LEFT: Milliseconds before impact, Bill Liscomb's beautiful AS-W 20L heads toward exhibition, the only crash of the contest. Ship mysteriously went out of control just after takeoff while under aerobin w. Bill took the crash with an admirably good attitude.

■ RIGHT: Bill Liscomb is completing the final engineering and testing of this really neat retractable modular engine pod, using an O.S. .40 FP and special carb. Does not require RC assistance; when the engine quits it retracts by wind and gravity. No in-air restarts! Bill is also the source for those neat 1/5, 1/4 and 1/3 scale retractable landing gears that a lot of the scale glider guys use. Contact him at Scale Glider Components, 7834 Fern Pl., Carlsbad, CA 92008; (619) 931-1438.



meet—if it isn't already. This is due, I believe, to the good time of year (early December), good weather (mostly clear and sunny), good location (close to two major U.S. cities), good organization (the DUST and VSRCA clubs), and one of the very finest flying sites in all of America.

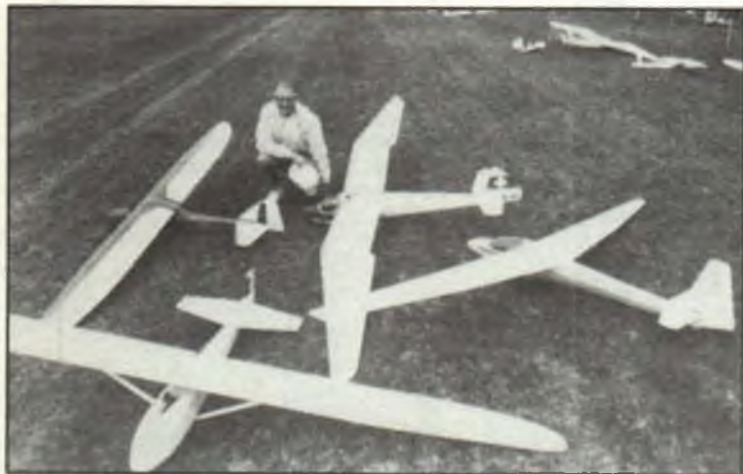
The principal host club, the Desert Union of Soaring Thermalists (DUST), pays an annual lease to fly at the Empire Polo Club a mile or two south of the town of Indio. The polo ground is a gigantic, impressive, perfectly flat, closely mowed playing field for equine sports. Winter-dormant Bermuda grass and freshly sprouted winter rye grass make the field a lush green win-

ter carpet. You can fly over a third of a mile east-to-west or north-to-south before you risk hitting the row of tall palm trees that line two of the four sides of the field—a field big enough to land a full-size sailplane with no problems. (In fact, were it not for a last-minute insurance headache, a handful of full-size vintage sailplanes—among them the only remaining flyable Bowlus Baby Albatross—would have flown in from Hemet and landed at this field! Be there next year when it actually happens!)

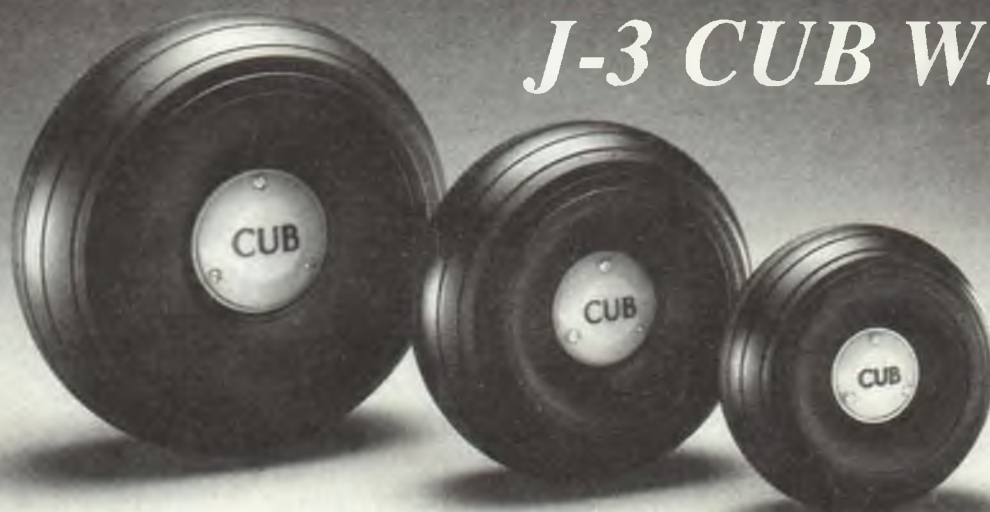
The real attraction, of course, is the meet itself. It has a decidedly friendly and laid-back atmosphere. Totally open flight order

continued on page 74

■ LEFT: Ron Gastin won the John Robinson Perpetual Trophy with his Minimoa. Plane was scratch built from RCM&E plans and has a 1/32 rolled plywood tail boom and 1/16 balsa planked forward fuselage. Other models brought and built by Ron, clockwise from right: an ASK-18, Gruman Baby 2b (2nd place in Best Scratch Build), and a Gruman Baby 2a. ■ BELOW: Christopher Knowles drove all the way from Omaha, Nebraska, "staying just ahead of an ice storm all the way," then took the award for having come the greatest distance to fly at the Winter Soaring Fest. Knowles' Astro Flight AS-W 17, built in 1973, came brought back great memories for our columnist, having built one himself back in 1977!



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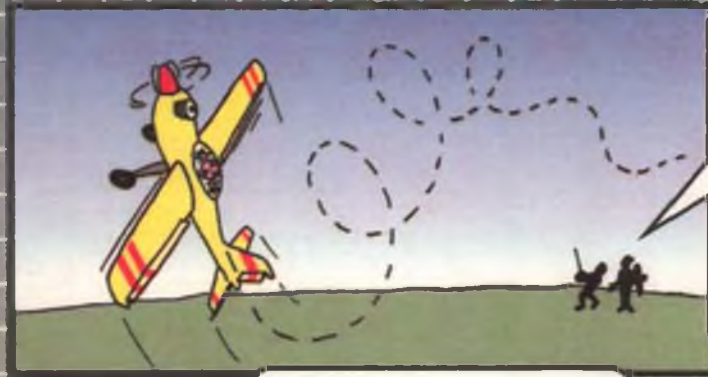


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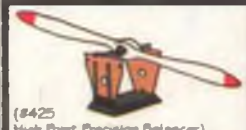
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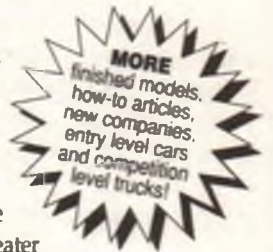
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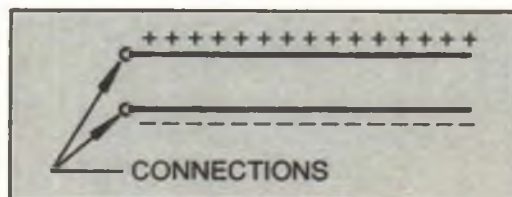
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By Eloy Marez

It's cold and wintry as I write this, but as you'll be reading it in the spring, it's time to give some serious thought to spring flying. And now there's a new challenge for you—read on!

Bill Hannan's column in the January *MB* starts with the following quote: "When you happen to have a fantastic idea, you soon find out that two or three other guys had the same original idea at the same time." How very true! In the same column, Bill goes on to describe an application of something I have been experimenting with for months: using a capacitor instead of a battery to store energy for powering electric airplanes. The



In its simplest form, a capacitor consists of two metal plates facing each other. Its value is determined by the area of the plates and their spacing; in high-voltage units the dielectric spacer is an insulator, for lower voltages it is merely a spacer.

model Bill describes is somewhat humble; a 16-gram, stick-and-foam design with flight times of 20 seconds. My goals are higher: 5-minute flight times, large enough

for RC and light enough to have acceptable performance. Think about it—an electric power system that will more closely approach the power-to-weight ratio of glow engines. And an electrical energy source that can be re-vitalized in seconds.

So that you'll better understand, let's discuss some theory first. In the normal battery-equipped electric powered airplane, the battery serves to store electrical energy, releasing it on demand. That is exactly what a capacitor does, though it's not a long-term storage device like battery. Its charge bleeds off very rapidly, the actual time depending on the

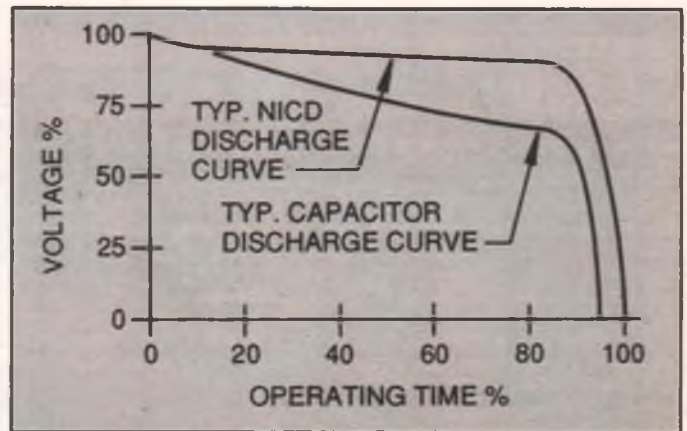
capacitor's design and intended application. But it will definitely store electricity, and release it to a load.

An example of a common application is in a related field—RC cars. The high starting current of the motors used will momentarily cause the battery voltage to drop, often below that required by the receiver, and a "glitch" results. A capacitor, in this case called a "Stutter Stopper," is used in series with the receiver's battery supply. It charges to the applied voltage and maintains the original voltage when that of the battery drops.

Another somewhat less pleasing application is those #!%&! loud automotive stereos with their hollow-log, minimal-IQ music. The heavy current demands of the sound system during sustained low-frequency notes places enough drain on the car's electrical system to drop its voltage enough to affect the amplifier. To overcome this, a large capacitor is placed across the

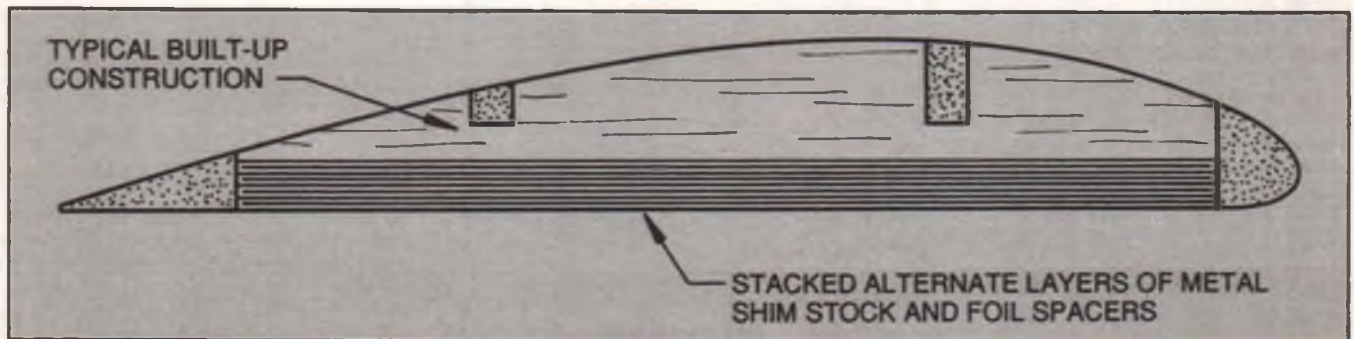
power-to-cost ratio, but luck led me to a surplus source who was able to supply me with samples at acceptable prices. Tests with these motors and available high-Farad capacitors only led to a complete demoralization on my part. The idea worked well up to a point, but suffered from one of the main drawbacks of electric power—the weight of the electrical energy source, be it a battery or a capacitor.

Then, like an April shower, the solution appeared as if out of the blue. Why are high-value capacitors bulky and heavy?



Comparative discharge curves for a NiCd battery and a capacitor charged to the same voltage and discharged at the same rate, shown as percentages. Eloy's homemade capacitor discharged faster to lower values but is still adequate for flight.

something called laminated shim stock, a metal sheeting to which a .002-inch non-metallic sheeting is bonded. It's important to remember that at the low voltages involved, the insulator becomes more of a



Cross-section of a wing incorporating the capacitive element, made of layers of metal foil with spacers in between. The thickness of the material is determined only by its availability; the more layers the better. Eloy has arranged for a large electronics supplier, Four-One Forum, to offer the somewhat hard-to-find materials as a package for those who want to experiment; see their ad elsewhere in this issue.

battery to fill in the momentary voltage depressions.

A capacitor consists of two conductive plates, or electrodes, separated by insulating material called a dielectric. Its capacitance is directly proportional to the area of the electrodes and the spacing between them. The standard unit of the capacitor's effectiveness is the Farad. A capacitor will have a capacitance of 1F when a charge of 1 volt per second across it produces a current of 1 ampere. A Farad is a very large unit; most common capacitors are rated in sub-multiples—micros (10^{-6}), nanos (10^{-9}) or picos (10^{-12}). The energy that a given capacitor is capable of storing is given by the formula:

$$E = 1/2CV^2$$

in which E is the energy in joules (watt-seconds), C is the capacitance in Farads, and V is the applied voltage.

Equally important to this project was to find a motor with a suitable power-to-weight ratio. My research led me to some European motors utilizing what their makers refer to as "ironless rotor technology"; they also came with a platinum-class

Simply because they go into equipment that is itself bulky and heavy, and rated for voltages much higher than what I needed. Though armed only with a bit of theory, I knew that I could make them smaller and lighter.

Well, little did I know how little I knew! But you have to start somewhere, and I started with seemingly acres of aluminum foil, using spray adhesive to hold the layers together and to provide the necessary insulation. Though not much to look at, my crude attempts did lead to an acceptable capacitance versus weight.

The next problem was how to install the results of my efforts into an airplane. The solution was so simple I can't understand why it took me so long to see it. The capacitor needs area, right? And what has the most area on airplane? Right! Build the energy-carrying capacitive elements into the wings!

The idea was good; doing it was something else. The main thing was to find the right materials, and after weeks of experimenting with different foils for electrodes and plastics for insulators, I stumbled across

spacer than an insulator. Another bit of good news is that the material is available in 8x24-inch pieces.

From here on it was all downhill. At present, I have a 9x48-inch (less wingtips) wing that provides an unmeasured but huge amount of capacitance, enough to keep my little Swiss hummer going for just under 5 minutes, at a weight of less than 10 percent of the equivalent in NiCds.

The cross-section of my wing shows the results. As far as the output voltage goes, a capacitor will charge to the applied voltage, and so far all I have dared is 6 volts, but further tests will determine the highest safe value. Maybe a small step for mankind, but definitely a giant step for electric flight!

The whole thing is simple and easily duplicated, and more experimentation will bring faster improvements. The biggest stumbling block is that the materials are difficult to obtain, but I've arranged for a supplier to make them all available in one package, please refer to the advertisers index, under "Four-One Forum" for current info. MB



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ELECTRIC POWER *cont. from page 44*

comes to battery chargers, but I'm not ashamed to admit it. If you've heard about reflex charging, please let me know what you think—it sounds like a great way to bring dead cells back to life and to make the good ones last longer. This saves money and that *always* sounds good to me.

ELECTRIC FLIER'S LOGBOOK

I was rearranging my flying paraphernalia the other day and stumbled upon an old logbook that I used to keep of each of my flights. This one is seven years old and goes back long before I started flying electrics. Reading through my entries provided lots of fond memories, some chuckles and a few guffaws! I found the first flight I had with my oldest son Ben, a fondly remembered flying session with my late grandfather, the flight on a cliff overlooking the ocean near Ventura, California where I lost the plane in fog (oops!), and (here's the guffaw), the time I hand-launched a Cox .049 powered glider and forgot to turn the receiver on (big oops!).

The most valuable thing about this book is that as I got started in electric flight, I kept track of what I flew, how many cells, changes in flying and power configurations, speed controls and such. I made notes on many planes that I built while experimenting, and I have raw data that, at the time, helped me improve the design and configuration of my models. Since I don't do as much flying as I used to, the logbook has fallen by the wayside, but since I rediscovered it collecting dust, it would probably be a good idea to put it back into use. This old one is pretty beat up now, so I designed a new log entry page that is geared to electric flying. Copies can be made and kept in a small three-ring binder.

If you'd like to give an electric flight logbook a try, make up something similar to that shown here, or send me an SASE and I'll send you a full-size copy of mine. If you have WordPerfect and CompuServe, look for a file named RCLOG.WPD in the ModelNet library.

AN EVENT NOT TO BE MISSED

Randy Smithhisler of Puyallup, Washington asked me to pass along some information about their upcoming modeling symposium and workshop on electric powered models. The Northwest has always been a hotbed of electric activity, with some of the finest electric modelers in residence. If you live anywhere close to Seattle, do yourself a favor and plan to attend this event.

The workshop started out as a small, local club event, but with each passing year it grows into something bigger. The size of the gathering now requires that the organizers reserve the Museum of Flight in Seattle. Although I've visited Seattle once, I've never been fortunate enough to see this museum. Randy says "It is truly a great facility and should make for a very success-

continued on page 68

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ELEC. POWER *cont. from page 66*

ful showcase on electric powered models." Preliminary workshop topics include speed controls, how to size Astro Flight motors to planes, Model Electronics products, batteries and chargers, brushless mo-

ELECTRIC AIRCRAFT LOG

Session # _____
 Date _____
 Time _____
 Field _____
 Aircraft _____
 Motor/Batt. _____
 Propeller _____
 Radio _____
 Speed Cont. _____
 Weather _____
 # of Flights _____

Notes _____

Our columnist's suggested layout for a logbook page—useful for keeping records of the model, its power system and performance.

tors, and the list goes on. There will also be information tables for Astro Flight, Model Electronics, HiLine, Aveox, Flightec, Jomar, Stream, Kress, Sanyo, etc.

Not only will this be a fantastic show, Randy is also asking for help and ideas from electric modelers. It's being sponsored by the Puget Sound Silent Flyers and the Puget Sound Electric Model Flyers, and will be held April 1st and 2nd from 10 a.m. until 5 p.m. both days. Since this event is still more than four months away as I write this, please call one of the organizers before making firm plans to attend. For more information and to confirm dates and times, you can call Randy Smithisler at (206) 927-4672, Bob Benjamin at (206) 352-2602, or Lyle Hegsted at (206) 491-6692. I have one of the event flyers; send me an SASE if you want a copy.

I'm still collecting names and addresses for the Electric Modeler's Mailing List. If you would like to contact other electric modelers in your area, please send me an SASE and I'll get the list to you. If you want to be included in the list, send me your name and address and I'll put you on.

Thanks for reading another month's worth of electric stuff. I enjoy the mail, so don't hesitate to write. Roger Jaffe, 6462 Sunny Brae Dr., San Diego, CA 92119; (619) 463-4453 (weekdays 8-5); my CompuServe address is 74164.3237, and Internet users can find me at 74164.3237 @compuserve.com. MB

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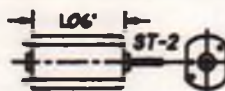
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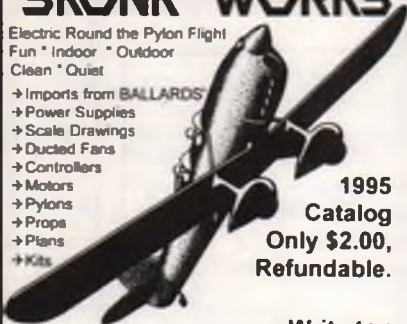
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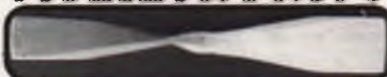
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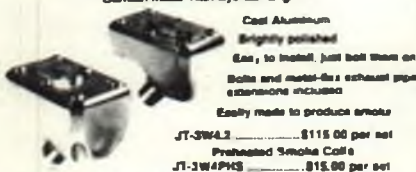
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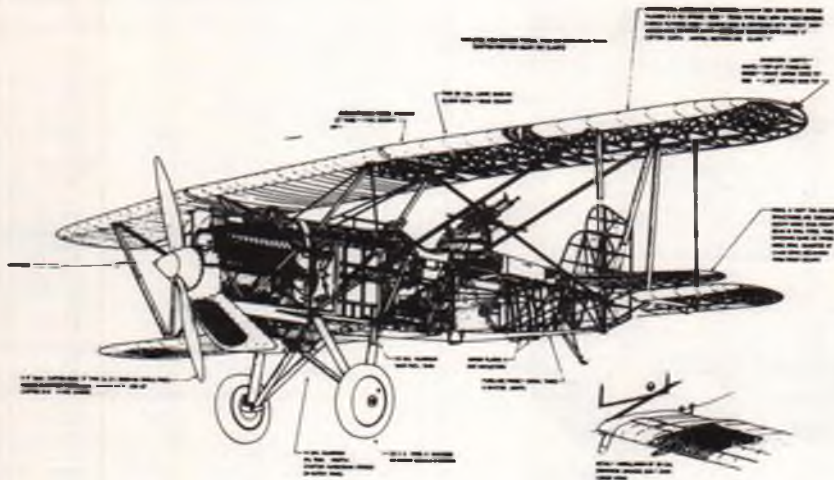
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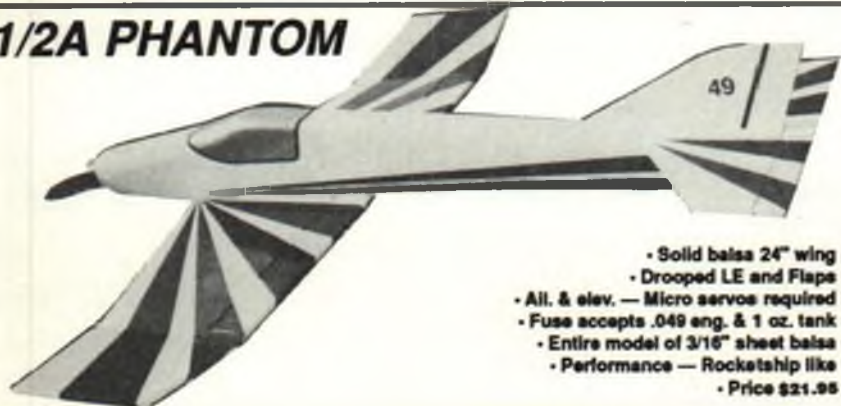
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SOARING *continued from page 62*

with transmitter impound and frequency control is the rule of the day. It's more of a fun-fly than a contest. Some didn't fly at all, choosing simply to show their models instead. This year, flying was not a prerequisite for scale judging—in fact, only a few of the winners actually flew their craft. In the future, flying will be required for judging.



Gary Kellman of Las Vegas, Nevada flew this Soarcraft Diamond at the Winter Soaring Festival. Model is 10 years old, has a 10-foot wingspan, and flies very well.

Due to its close affiliation with the Vintage Sailplane Association, a very special annual award, the John Robinson Perpetual Trophy, will be given to the best vintage scale model at the meet. This John Robinson is not the famous football coach, but a famous old-time soaring pilot who set many of the early altitude and distance records and earned the very first Diamond C distance badge. In the '20s and early '30s, Robinson built his own sailplanes, cartowed below the cliffs of Torrey Pines and Point Loma, instructed military glider pilots during WWII, and later captured three national soaring championships. His will be a memorable award, indeed.

Trophies were also awarded to the Best Vintage Model (with ribbons for 2nd and 3rd places), Best Scratch-Built Model (ribbons for 2nd and 3rd), and Best Modern Scale Model (no 2nd or 3rd places awarded due to the emphasis on vintage designs). Flying awards were given for the longest flight from a winch tow (aerotowing didn't count), for which a \$125 cash award was also given; and the most precise landing. There was even a perpetual "Mole" award for the best crash, and a Most Distance Traveled award. Next year there will be raffle prizes also.

The Royal Plaza Inn in Indio served as the official hotel for the meet. Special overnight rates were available for meet participants.

Make plans to build and fly in next year's Winter Soaring Festival. Build a vintage or antique sailplane (any sailplane built prior to WWII) and compete for the John Robinson Perpetual Trophy. Got a modern "glass slipper"? Bring it too! All are welcome!

For information about next year's meet, contact Buzz Waltz at Just Plane Fun Models, 3390 Paseo Barbara, Palm Springs, CA 92262; (619) 327-1775. Details should be available long about August or September 1995. *MB*

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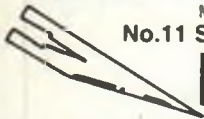
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CONTROL LINE cont. from page 21

Kusik, who had a missed catch and an extra pit stop.

In the second preliminary round, Willoughby/Oge improved their "American record" to 3:26.7, only to see it taken away by Braun/Kusik at 3:24 in a two-up second heat. The Aschers were unable to take advantage of a two-plane heat, hitting only 3:37.3. All three Russian teams won places in the semifinals, along with teams from Austria, France, The Netherlands, Italy and Switzerland, and Braun/Kusik of the U.S.

To gain places in the finals, Heiner Borer and Cesare Saccavino of Austria streaked to a 3:15, Russians Vladimir Titov and Victor Yugov went 3:18.5 and Fischer/Straniak went 3:18.5 during the semifinal heats.

Borer/Saccavino used superior airspeed to capture the championship in a final race in which all three teams were virtually flawless in the air and in the pits. The final times were Borer/Saccavino at 6:46, Titov/Yugov at 6:53 and Fischer/Straniak at 6:59.

The U.S. racing team finished 3rd behind Russia and France. Individually, Braun/Kusik were 7th, Willoughby/Oge were 11th and Ascher/Ascher were 20th.

U.S. combat fliers took a team approach, all using the same airplanes and mostly the same engines. The planes were Faizov-1s, which are manufactured ready-to-fly by Mejzlik Modellbrau of the Czech Republic. The engines were the



U.S. racers Steve Willoughby and Bob Oge took two sleek team racers to the championships. A close look shows Kermit the Frog as the pilot (a pilot is required by FAI rules).

Doroshenko .15 for Mike Willcox and David Owen and Nelson .15 for Chuck Rudner. The junior fliers, including American Mark Rudner, were mixed into the draw.

"The U.S. teams' preparation was as good as it has ever been, having brought 70-plus aircraft and plenty of the best Russian and American engines that money can buy," Pat Willcox reports. "Pitting and aircraft support was first-rate and the team standing was greatly enhanced by the tireless work of team mechanics Alan Deveuve, Rich von Lopez and Gary Arnold, with yours truly helping out as needed."

Observers reported some questionable scoring of cuts during the course of the combat competition, particularly in the first of two final round bouts between Beliaev and Jones.

Chuck and Mark Rudner picked up first

...Mike Willcox and David

came back for wins in the second round, Mark won again and Chuck Rudner suffered a loss. The Russian team had only one loss through the first two rounds.

All four U.S. fliers picked up third-round wins, with Mark now standing at 3-0. Boris



Travel to the World Championships involves planning. This is the well-equipped model box for the Jed Kucik/David Brown racing team.

Faizov handed Mark his first loss in the fourth round. Chuck lost to China's Wang Shi Min in what sideline observers said appeared to be a timekeeping error that led to a draw, followed by a loss in the rematch. A similar fate befell Michael Willcox when a streamer error resulted in a rematch—which the American team felt should have resulted in a disqualification—and Michael lost to Czech Pavel Kucera on the tangle- and crash-filled second go-round.

In the fifth round, Mark Rudner, Michael Willcox and Chuck Rudner all were bedeviled by equipment problems. Mark lost to Mervyn Jones of England and Mike lost to Vadim Arifov of Russia. Chuck Rudner was eliminated in a tough battle with Wang Shi Min of China; the bout was a rematch that had resulted from a scoring problem in the first attempt.

The finals shaped up as a challenge for Mervyn Jones, who took one loss up against two-time champion Beliaev, who had not been beaten in the double-elimination affair. Jones won two straight matches for the championship.

The U.S.' final team standing in combat was 4th, behind Russia, Great Britain and the Czech Republic. Individually, Michael Willcox finished 10th and David Owen and Chuck Rudner were tied for 16th.

A number of people assisted in the compilation of these World Champs highlights. Special thanks to Pat Willcox, Bill Lee, Paul Walker, Chen Xin, Teresa McKee of the AMA, and the *Stunt News* and *Skywriter* newsletters.

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



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THE SIG STORY cont. from page 34

wood of anyone in the world!"

In later years they had to abandon this cutting method due to the increased cost of raw balsa and the excessive material loss from the thick sawblade. They went to bandsaws, using a special blade, and Glen invented a type of sander that could sand



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both sides of the wood at once. Much of the wood processing machinery still in use today was designed and built at the plant by Glen.

To be concluded next month. MB

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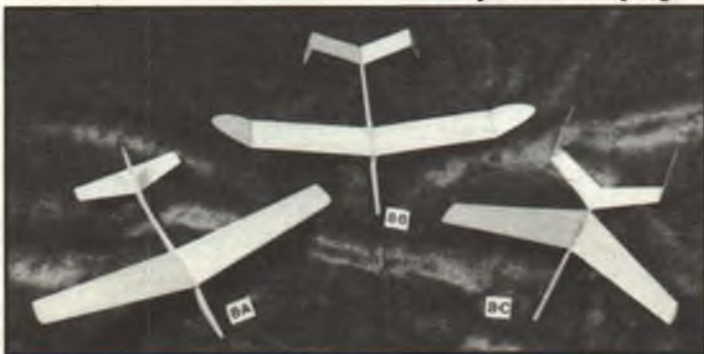
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Skyways is similar in general format but is devoted to the 1920-1940 aviation era. Sample issues of either magazine are available for \$4 each (be sure to specify titles) from WWI Aeroplanes, Inc., 15 Crescent Rd., Poughkeepsie, NY 12601.

•Former *Model Builder* Editor/Publisher Bill Northrop runs a sideline business called NASCO (Northrop Aeronautical Supply Company), offering a large variety of model plans for free flight, control line and RC subjects, as well as a few boats. Also available are back issue magazines, and article reprints from the long-out-of-print *Flying Scale Models of WWII*. A complete catalog is available for \$1 from Bill Northrop, 2019 Doral Ct., Henderson, NV 89014-1053.

•Dave Stott, co-innovator of the Flying Aces Club movement, has just announced the *Airdevil Model Co. Planbook*, and it is a nostalgic gem. Inspired by the "good old days" 10¢ kits, each plan has been designed for simplicity of construction as well as esthetic charm. Seven 11x17-inch plans are accompanied by a brief history of the aircraft plus general instructions. Designs include the Hollywood Hamilton, Nicholas-Beazley, Alliance Argo, Pitcairn Fleetwing II, Ong Continental and the low-wing Stearman Trainer. A surprise offering is the old-fashioned solid-model plan for the Linberg Racer, a cute little biplane. Priced at \$10 postpaid, this is the first of what may become a continuing series, by an acknowledged master model builder/flier. Order from Dave Stott, 4304 Madison Ave., Trumbull, CT 06611.

MB SALES SOAR

Photographer Dan Walton wrote in to report that when his photo of young Eric Horton holding his grandpa's P-38 model appeared in the November *Model Builder*, family reactions varied. Eric's father was proud, of course, and his mother, though quite excited, complained that Eric's hair had not been properly combed.

But grandpa had the most positive response of all; he simply went to the local magazine store and bought every remaining copy of *MB*!

SIGN-OFF

We close our column with this bit of encouragement to hobby newcomers: "Remember, in model plane building, it is not the first hundred years that are the hardest, but only the first year. After a year of trial and error and doing this wrong and that wrong, you will suddenly find that you are getting the feel of the thing; that you can do the job skillfully and quickly—the wings and the fuselage rapidly take shape under your fingers; a mere block of wood becomes a beautifully-shaped propeller as if by magic." Frank Zaic, from the 1942 *Book of Knowledge Annual*. *MB*

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TECH STUFF continued from page 14

with the highest strength-to-weight ratio is the goal, the Selig shear web is well worth the effort. For light, powered models, I suggest 1/64 balsa plies; for .40 and .60 powered models, use 1/32 balsa plies for the diagonal laminated shear webs, and keep the weight of the glue down.

I-BEAMS VS. [-BEAMS

I always used to make I-beam ("eye" beam) spars by cutting the shear webs to exact height, centering them between the upper and lower spar caps, and gluing them in. I got an argument from friend, reader and frequent contributor to this column, Jim Stevens, of British Columbia, who said he always puts the shear webs on one side of the spar, to make a [-beam ("bracket" beam?). Jim's arguments are that many shear webs fail, at least in part by failure of the bond between the web and the spar caps; the available bond area in the butt joint between a thin shear web and a spar cap in an I-beam is very limited. I too have seen those bond failures.

Jim went on to point out that there is much more bond area if we glue a full-height shear web to one side of the spar caps, making the [-. Furthermore, the [- is easier to build, because we don't have to tailor the shear web height to the exact spacing of the spar caps. Jim is right; I now build [-beam spars.

After the September 1993 column appeared, I also received a letter from Ralph Evans of Tucson, Arizona. Ralph complained that all the kits he has seen have the shear webs glued to the rear side of the spars (I-beams). Ralph thought it would be stronger if we put them inside and centered on the spar caps. Around and around we go.

I wrote to Ralph and agreed with him that the I-beam is the theoretically pure configuration, but told him the above story. Ralph drew some sketches in his letter to illustrate what he was talking about. His sketch for the outside shear-web configuration didn't look like a [-; it looked more like a C. He had sketched a very shallow beam with thin, wide spar caps.

With a beam proportioned like Ralph's illustration, I would have to agree with him. A shallow spar with wide spar caps and a shear web on only one side would be badly unbalanced. The spar cap in compression would tend to twist and buckle on its unsupported side. The ribs would give some support to the open side of the spar caps, but perhaps not enough, considering that our usual balsa ribs are weak in compression vertically.

For a wide, shallow beam spar of the type used in high aspect ratio sailplanes, a "box" beam, with shear webs on both sides of the spar, would be much better than on one side only. Box beams also take longer to build. In the practical world we have so many factors to consider. **MB**

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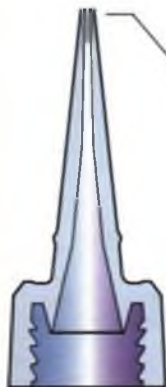
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