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FIGHTER PILOT'S HEAVEN, Lopez. Flight Testing the Early Jets. The inside story of America's transition to the jet age. A record of Elgin AFB, Florida and the initial trials of the P-59, P-60, and P-84. 288 pgs., 44 photos, 6" x 9", hdbd. 4887 \$24.95

DEAN MOM, SO WE HAVE A WAR, Carl Bong. Dick Bong, a P-38 pilot from Wisconsin, became America's top flying Ace with 40 enemy aircraft destroyed. From his letter, combat reports, and statements, the reader will get to know this gutsy and dedicated airman and legitimate hero. 672 pgs., 250 photos, 6" x 9", hdbd. 2488D \$38.95

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DECEMBER 1995

VOLUME 25

NUMBER 3



ON THE COVER

When it comes to multi-engine models, you just can't beat the smoothness and ultra-reliability of electric power. And what faster way to get airborne than with a nicely built, all-wood ARF? Now the folks at Cermark have combined the best of both worlds in a 6-foot span sport scale replica of the Britten-Norman Islander commuter aircraft, as displayed on the cover by Mr. Iris Goren. This month, MB's Electric Power columnist, Roger Jaffe (pictured above), takes a break from his column to do an in-depth review on this impressive model—see page 26. Photo by PHOTOSENSITIVE (Gary Wiles and Debra Brown).

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"I have been designing, building and flying canard gliders for over 20 years," writes Bob Miller of Urbana, Illinois. "The one shown in the photo is fairly typical. This glider has a span of 72 inches and a length of 32 inches. Flying weight is about 21 ounces. Control is two channels—rudder and stabilizer. The wing and tail are of 'split rib' construction, borrowing from the old free flight days. I use that construction method because I like the looks, especially when covered with transparent film. The fuselage and fin/rudder are finished naturally with many coats of nitrate dope or other clear wood sealer. Although canards are not quite as efficient as conventional configurations, they can be made competitive enough to perform reasonably well in contests. When a gaggle of gliders is circling in a thermal, I don't have much problem telling which one is mine!" *Robert Miller, 408 E. Mumford Dr., Urbana, IL 61801.*



Via *MB* columnist Bill Hannan comes this photo of Nate Sturman's pretty 1/20-scale, 24-inch span rubber scale model of the Japanese Kawanishi "George" WWII fighter. Nate is an American who has been living in Japan for some years now, and is quite a prolific builder of FF scale types, the George being his most recent effort. The model weighs 82 grams (2.9 ounces) and, according to Nate, "soars like a bird." *Nate Sturman, 567-6 Kaneko, Gunma Town, Gunma Ken, 370-35 Japan.*

This exceptionally nice example of the Carl Goldberg Shoestring CL stunter was photographed and submitted by Canadian modeler Dennis Matthews on behalf of his buddy and builder of the model, Jack Oster. Jack is obviously a talented craftsman but, being a modest sort, declined to send a photo to "Plane Talk" despite Dennis' urging. No to be put off, Dennis took the pic and sent it in himself (without Jack's knowledge) and we're glad he did, because the model is really a nice piece of work. Power is the old classic, a Fox .35. Dennis says Jack started the kit way back in 1982 and finished it only recently; as of mid-August the Shoestring had logged 13 flights, and Jack says he's going to use it to practice the Old Time Stunt pattern. *Dennis Matthews, 19897—82 Ave., Langley, B.C., Canada V2Y 1Y7.*





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Piper J-3 Cub 40 (GPMA0160) — Wingspan: Standard Wing: 76.5 in (1945 mm) Clipped Wing: 61.5 in (1560 mm) Wing Area: Standard Wing: 820 sq in (52.9 sq dm) Clipped Wing: 653 sq in (42.1 sq dm) Weight: 6.5-7.5 lb (2950-3400 g) Length: 49 in (1245 mm) Engine Required: 2-stroke .40-.60 cu in (6.5-10 cc) or 4-stroke .48-.70 cu in (8-11.5 cc) Radio: 4-channel

Piper J-3 Cub 20 (GPMA0158) — Wingspan: 61.2 in (1555 mm) Wing Area: 525 sq in (33.9 sq dm) Weight: 3.75-4.5 lb (1700-2040 g) Length: 39.2 in (995 mm) Engine Required: 2-stroke .15-.25 cu in (2.5-4 cc) or 4-stroke .20-.26 cu in (3-4 cc) Radio Required: 4-channel



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How about this for a first scratch-built effort? Tyler West of Hadley, Massachusetts turned out this attractive Schneider Sport Electric from Bob Benjamin's plans in the December 1993 *Model Builder*. He powers it with a geared Astro 40, running on 21 1400-mAH cells and swinging a Master Airscrew 12x10 Electric wood prop; the finish is Coverite's 21st Century fabric and paint. All-up flying weight is 7-1/2 pounds. Tyler writes: "This airplane is very nimble and quite fast, considering the low rpm of the geared prop. It flies like a sport-pattern plane, with very little elevator compensation needed for inverted flight. Snap rolls come too fast to count. With the adequate power provided by the motor, the plane is capable of long vertical zooms, topped off by nice hammerhead stalls. I love to fly this airplane and enjoyed every minute building it." The photo was taken by Jessica Zelewski. Tyler West, 219 Bay Rd., Hadley, MA 01035.

tor compensation needed for inverted flight. Snap rolls come too fast to count. With the adequate power provided by the motor, the plane is capable of long vertical zooms, topped off by nice hammerhead stalls. I love to fly this airplane and enjoyed every minute building it." The photo was taken by Jessica Zelewski. Tyler West, 219 Bay Rd., Hadley, MA 01035.

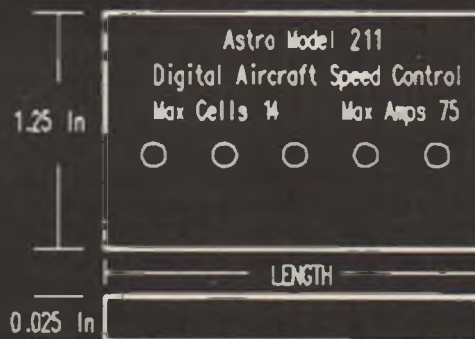
Here's one for you Old Timer buffs. Shimpei Yamamura of Japan has been enjoying O.T. FF and RC models for the past couple of years and sent this photo of his grandson with a rare (at least for U.S. modelers) Japanese gas design called a "J-1," circa 1942; he also sent along a detailed three-view of this and a larger 1943 model called a "K-1," showing the construction and dimensions. Shimpei explains that the letters represent the class according to engine size; the I class was for engines below 3.23cc (.20 cubic inch), J was 3.23—5cc (.20-.30), and K was 5-10cc (.30-.60). Shimpei's J-1 was built to the original 58-inch wingspan, is powered by an O.S. .26 Surpass four-stroke and flies with rudder/elevator/throttle controls. Shimpei Yamamura, 39 Nishionobori Omiya, Kitaku, Kyoto, 603 Japan.



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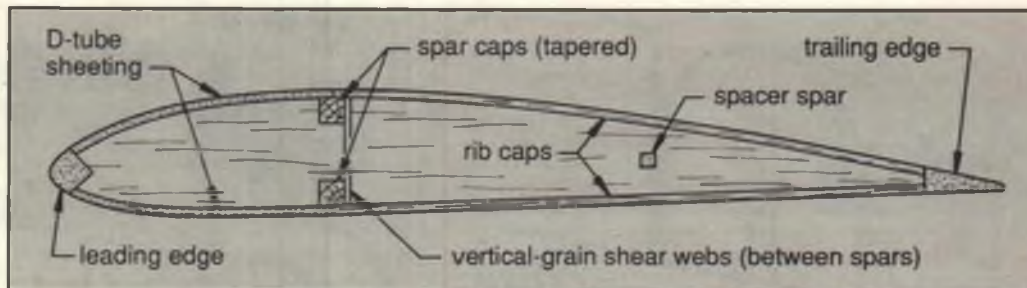
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MODEL DESIGN & TECHNICAL STUFF

BY FRANCIS
REYNOLDS

In which Francis answers readers' questions on wing structure, flaps, slots, etc.



Cross-section through a typical Francis Reynolds-style wing—see text for explanation.

We received a letter from Bob Stykemain of Toledo, Ohio. Let me repeat parts of my answering letter to Bob, and also expand upon that letter.

WING STRUCTURE

Bob, you *might* get by with reducing the size of the spar caps on your 6-foot sport RC model, say to 3/16-inch square spruce, if you are a gentle flier, fly no aerobatics, and always make smooth landings. For my style of flying, with an airplane of that size, power, and weight, I wouldn't risk it. Sooner or later

the wing would be apt to fold—at the center, of course.

You could, however, very safely remove close to half the weight of the spar caps by tapering them. I always do. The largest bending load on the wing is at the center, with theoretically none at the tips. Leave the spar caps full dimension near the center, but reduce their dimensions gradually in both width and thickness as they progress toward the tips. I taper them so that at the tips they are only half as wide and half as deep as at the root; the spars

therefore have one-quarter the cross-sectional area at the tips as at the center of the wing. For the bending loads alone you wouldn't need even that much at the tips, but there are other loads on the spar to consider.

For scale or aerobatic RC models with little or no dihedral, the spar caps should be made in one piece from tip to tip, and then tapered. If there is to be more dihedral than you can bend into the spar caps, make the usual center joint with a plywood dihedral joiner and taper the spar caps in each wing panel. Don't forget the shear webs!

Yes, tapering the spar caps takes a little more effort, and making the slots in the ribs different sizes for the tapering spar caps requires a little extra time, but it is well worth it from a job-well-done standpoint alone. I couldn't bring myself to make a wing with untapered spar caps—it is just too *wrong*! It is not efficient design. An overloaded, properly tapered wing spar would be equally apt to break at any point; the center is no longer the weak point. A tapered spar can be a "one-hoss shay."

(I'm sure that a percentage of our readers are too young to have heard of The One-Hoss Shay—aka *The Deacon's Masterpiece*, written by Oliver Wendell Holmes in 1858. The moral of that story should be observed by all designers. A short summary will get the message across. I've taken the liberty of modernizing the colloquial English that Holmes used.

The Deacon observed that most things which are built eventually fail at some weak point. His logic in avoiding that

continued on page 14

FIGURE 1

BASIC NACA 23012 AIRFOIL

Cl max. = 1.54

WITH 0.2C SPLIT FLAP DEFLECTED 60°

Cl max. = 2.53

WITH 0.2C PLAIN FLAP DEFLECTED 60°

Cl max. = 2.38

WITH 0.2C SLOTTED FLAP DEFLECTED 50°

Cl max. = 2.76

WITH 0.27C FOWLER FLAP DEFLECTED 30°

Cl max. = 2.90

FIGURE 2

BASIC CLARK Y AIRFOIL

Cl max. = 1.29

WITH FIXED SLOT

Cl max. = 1.77

WITH FIXED SLOT AND SLOTTED FLAP

Cl max. = 2.26

WITH HANDLEY-PAGE SLOT

Cl max. = 1.84

WITH HANDLEY-PAGE SLOT AND FOWLER FLAP

Cl max. = 3.37



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over the counter

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TOP FLITE'S P-47

The perfect complement to Top Flite's line of Gold Edition WWII fighter kits (the P-40E, Mustang and Corsair) is the just-released P-47D-23 Thunderbolt, said to be the best flying Gold Edition warbird yet on account of its new airfoils from Dr. Michael Selig, whose airfoil research has completely revolutionized the sport of RC soaring in recent years. Like the others in the warbird series, the P-47 is a 1/7 scale model for .61-.90 two-strokes or .91-1.20 four-strokes. Span is 63 inches, wing area is 713 square inches, and the flying weight is listed at 8 to 10 pounds. In addition to the kit itself, Top Flite offers a number of optional accessories, including a bubble canopy (P-47D-25) conversion kit, a scale cockpit kit, two types of fuel drop tanks, a vacuum-formed dummy radial engine, and more. Check it out at your local hobby dealer, or write or call for more info: Great Planes Model Distributors, 2904 Research Rd., Champaign, IL 61826-9021; (217) 398-6300.

REQUIRED READING

We thoroughly enjoyed the first edition of *Scale Slope FAI & Thermal* magazine, a special



interest publication aimed, obviously, at the RC Soaring fraternity. The quarterly magazine is a collaboration effort on the

part of Wil Byers (Model Aviation columnist and organizer of last year's World Soaring Jamboree) and Gregory Vasgersdian, who has done a few feature articles on soaring in

Model Builder (his coverage of the Los Banos Scale Slope Fly-In appears this month, in fact). Content includes technical articles, building tips, scale documentation, airfoils, competition news, construction projects, etc. . . . In short, everything of interest to the RC Soaring fanatic. A one-year subscription (four issues) goes for \$19.95 in the U.S., \$24.95 in Canada and Europe, and \$29.95 in Asia. Sign up by mail or by phone: Scale Slope FAI & Thermal, P.O. Box 4267, W. Richland, WA 99353; (509) 627-0456.

NOTHING FLIES LIKE A HOG!

That old saying, referring to



the beloved Astro-Hog of 1957 vintage, could also apply to the newest kit release from Sig, Harold Hester's "Hog-Bipe"—obviously a two-winger version of the old favorite. The new Hog is a .60 two-stroke/.90 four-stroke machine, 54-1/2 inch upper wingspan, 966 square inches, 6-1/2 to 7-1/2 pounds, with a traditional rib-and-spar open-bay wing and simple lite-ply fuselage. The kit comes complete with laser- and die-cut parts, computer-drawn plans, illustrated instruction manual, molded ABS plastic headrest and wheel pants, and a complete hardware package. The original Astro-Hog was known for its slow flying, yet fully aerobatic flight performance; now you can have that same easy-flying performance in a sport biplane design. Hog-Bipe kits are now

available at Sig dealers throughout the U.S. Produced by Sig Mfg. Co., 401-7 S. Front St., Montezuma, IA 50171; (515) 623-5154.

HOBBY LOBBY'S ELECTRIC DC-3

If the review of Cermak's Islander in this issue inspires you to try an electric twin but you want something with more of a vintage flavor, consider the DC-3 produced in Germany by Simprop and imported by

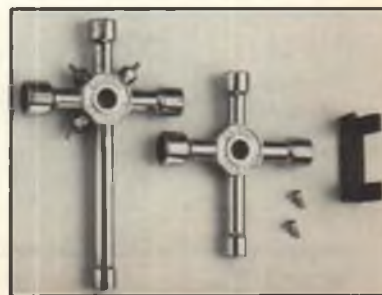


Hobby Lobby. The model is designed for two geared Graupner Speed 600 motors and features a high degree of prefabrication—pre-sheeted foam wing, stab and fin, and fiberglass fuselage and motor cowls. This is a big airplane at 78-inch span, 759 square inches and 9-1/2 pounds flying weight. Requires four-channel RC with two aileron servos. Not an inexpensive model, but one that's guaranteed to turn heads at any flying field. Hobby Lobby's Catalog 26 gives full details plus recommendations

for equipment. Hobby Lobby, 5614 Franklin Pike Circle, Brentwood, TN 37027; (615) 373-1444.

ONE FOR THE TOOLBOX

Du-Bro's new 4-Way Socket Wrench offers modelers a quality tool at an affordable price—\$5.95 retail for the standard version, \$6.95 for the XL (extra long) one. Both come complete with a storage clip for mount-



ing to the side of your field box, the hub is drilled and tapped to hold three spare plugs, and there's a special glow plug retaining clip that holds plugs securely for easy installation and removal. The sockets are sized to accommodate 5/16-, 3/8-, 7/16- and 1/2-inch, 8,10,11 and 12mm hex plugs and nuts. From Du-Bro Products, 480 Bonner Rd., Wauconda, IL 60084; (708) 526-2136.

ONE HOT 2-METER

It was back in the April '94 issue that we featured a review on the original Dove 2-meter competition sailplane from



Northeast Sailplane Products. Now NSP has come out with an updated version, the Dove II, which is in effect an entirely new model—new, slightly larger and stronger one-piece wing designed for four micro servos (for flaps and ailerons) and which comes pre-sheeted with special 1/25-inch contest grade balsa; and a longer Kevlar-reinforced fiberglass fuselage with integral fin. Flying weight is listed at only 25 ounces with a 600-mAH battery pack aboard. Overall performance and handling are said to be distinctly improved over the original Dove—which is still available, by the way. The Dove II kit is priced at \$239.95, exclusively from Northeast Sailplane Products, 16 Kirby Lane, Williston, VT 05495; (802) 658-9482.

WHO'S ON MY FREQUENCY?

As Eloy Marez writes in his "Electronics Corner" column this month, Hitec RCD has come out with a new frequency synthesizing module for its Prism 7 RC system; this Spectra module, as it's called, literally allows you to manually dial in any of the 50 avail-



able 72 MHz frequencies—no more waiting in line for a frequency pin on your channel! The Spectra module alone can be purchased to replace your Prism's current single-channel module, or you can buy a complete Prism 7 system with the Spectra module already installed—check with your local Hitec RCD dealer. Extra receiver crystals are available separately. From Hitec RCD, 10729 Wheatlands Ave., Suite C, Santee, CA 92071; (619) 258-4940.

TOM'S RUBBER SCALE MUSTANG

Tom Herr's first kit since moving to his new facility in Florida is a 28-inch model of the P-51 as designed by well-



known FF Scale modeler Tom Nallen. The kit boasts over 80 laser-cut parts, premium grade balsa, rubber, complete hardware, molded plastic spinner, clear canopy, tissue, decals, computer-drawn plans and more, for \$34.95. One interesting feature is that the landing gear is designed to be removable for longer, more scale-like flights. The Mustang and the rest of the Herr kits are available at hobby shops or direct from Herr Engineering Corp., 1431 Chaffee Dr., Suite #3,

Titusville, FL 32780; (407) 264-2488.

MIXING MADE SIMPLE

Need to mix two channels but don't have a radio with mixing capability? Quillen Engineering has just what you need in the MicroMixer, a tiny (.35x.9x1.1 inches), lightweight (1/3 ounce) on-board electronic device that will give you the mixing you want without having to go out and buy a whole new RC system. The MicroMixer plugs in be-



tween the receiver and the servos you want to mix; you can set it up for V-tails, elevons, flaperons/spoilerons, coupled ailerons and rudder, coupled elevator and flaps, etc. The unit is priced at \$29 plus \$2.25 S&H, without connectors but with complete programming instructions, and is designed to work with most RC systems excluding computer and PCM types. From Quillen Engineering, 561 N. 750 W., Hobart, IN 46342; (219) 759-5298.

SCIENTEXT'S BELLANCA

The latest kit release from ScienText is a really pretty 36-inch span FF Scale rubber

consisting of complete full-size patterns, folded plans, decals and instructions. A brochure on the C-27A is yours for a large



SASE; a full catalog of the other ScienText kits and accessories is included with each kit, or can be purchased separately for \$2. From ScienText, 48 Whitney St., Westport, CT 06880-3753; (203) 221-1326.

GREAT NEWS!

You old-timers will remember the

4-foot span "Good News" kitted by Scientific in 1947; it was a handsome FF cabin model with a classic inverted engine appearance. Now British kit manufacturer Ben Buckle, whose kits are imported and distributed in the U.S. by Hobby Supply South, has come out with a 150 percent enlargement dubbed "Great News," a 6-footer designed for three-channel RC and .30-.40 two-stroke or .40-.60 four-stroke engines. This is a complete kit with all materials, pre-cut parts, landing gear, hardware package, full-size plans, and instructions, and is priced at \$105.95. This and all of the other Ben Buckle kits, as well as a wide range of other imported and domestic kits and

model of the Bellanca C-27A (the U.S. Army Air Corps version of the Aircruiser). The Bellanca follows the Douglas O-46A as ScienText's second full kit, featuring printwood and laser-cut parts, all sheet and stripwood, tissue, decals, full-size plans, wheels, prop and rubber, priced at \$37.95 plus \$3.95 S&H (sent 2nd Day Priority Mail). There's also a "paper only" package offered for \$15.95 postpaid,



modeling accessories, is listed in HSS's fully illustrated 40-page catalog, yours for \$4 from Hobby Supply South, 5060 Glade Rd., Acworth, GA 30101; (404) 974-0843. MB

problem in the construction of his new one-hoss shay was impeccable. He had only to eliminate all the weak spots. "A chaise breaks down, but doesn't wear out. . . . The weakest spot must stand the strain, and the way to fix it, I maintain, is only just, to make that place as strong as the rest. . . . It was built in such a logical way, it ran a hundred years to the day. . . . You see, of course, if you're not a dunce, how it went to pieces all at once and nothing first, just as bubbles do when they burst."

But it is easy to design things "hell for stout"; and one-hoss shays were not as weight-critical as airplanes.

Our challenge is to try to make the wing spars (and everything else in our models) as light as possible consistent with adequate strength and no weak spots. Untapered wing spars are clearly weakest at the cen-

ter of the wing, and unnecessarily heavy at the tips.

Bob, your next question concerned secondary spars between the main spar and the trailing edge. Such rearward spars, if any, and the trailing edge "spar," should not be designed to share part of the wing's main bending load, since the wing is too shallow back there for good beam efficiency. The only logical function I see for such aft spars is to tie the weak middle-aft sections of the ribs together for mutual lateral support. This reduces the chances of one or more ribs buckling from the tension in the covering.

With a "spacer spar" such as this you can get by with lighter ribs; but, understanding the rib-bracing function of such a spacer spar, it can be very light. I usually include a 1/8 square balsa spacer spar back there. Use only one, put it about halfway between the main spar and the trailing edge, and shove it through snugly fit drilled holes at

the centerlines of the ribs so that it does not introduce a discontinuity on either surface to add drag or cause an early stall. Have a look at the sketch. With an internal spacer spar on that size airplane I would use 3/32 balsa ribs with heavier balsa or plywood ribs at the center, at the tips, and for mounting aileron servos. If you go to the trouble of using rib capstrips, you could get by with ribs of only 1/16 balsa, saving a little more weight and making a dressier-looking wing.

You asked about glues for laminating balsa sheet. I use mostly CA for this—a zig-zag trail of slow CA dribbled out over the surface of one sheet is the way I usually do it—but other glues also work well, particularly epoxy and white carpenter's glue or yellow aliphatic resin glue. I've learned to not trust contact cements in most modeling applications. They stick fine initially, but all too often let go later.

continued on page 86

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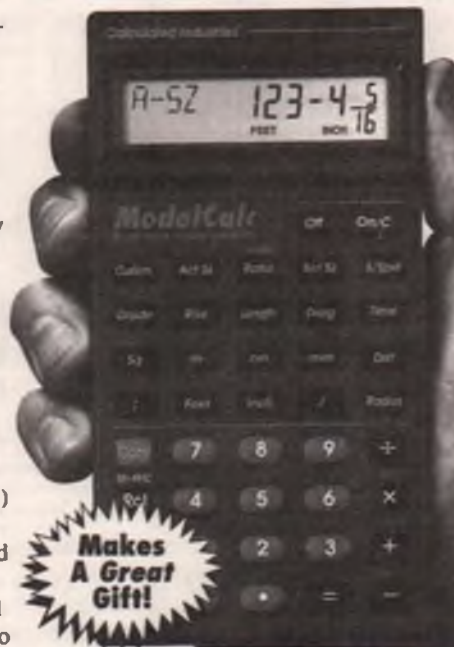
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•Kastner's Milliamp Hour Meter

•Hitec's Spectra Tx Module

•Bodden's BP-401 Servo Controller

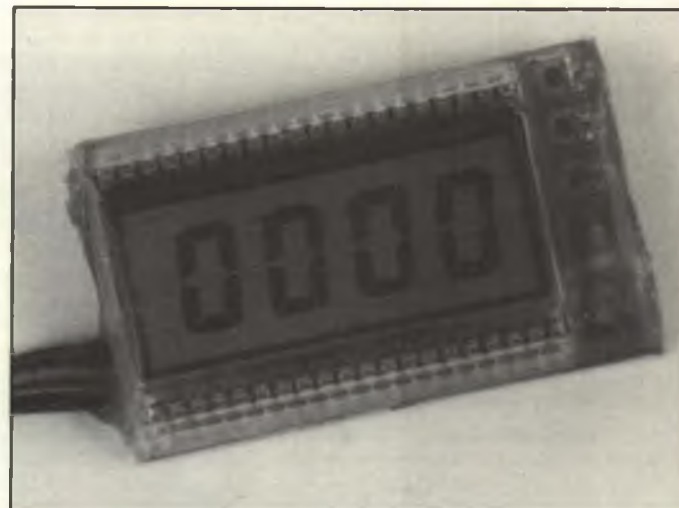
Knowing that electronic technology seldom appears first in RC equipment, I am always on the lookout for new circuitry or products that might have an application in our equipment. A couple of days ago, while walking through a local store, a new battery-powered screwdriver caught my eye. Not that such things are new; what caught my eye were the big letters on the package: *Never requires charging!* Well, that seemed to be a breakthrough worth investigating! I did—this time finding the small print that says: "Requires four AA cells."

They weren't saying anything that isn't true, and I guess it's all legal. Ethical? Well, that's something else!

A HELI READER WRITES

From Charles Leonard, of Seattle, Washington comes the following:

"Regarding your comments about battery voltage and ampacity, I use 2800-mAH flight batteries, 4.8V, which last for a full day's flying. I'm interested in more servo power and authority and the 6V option may be helpful. How much does servo performance (speed and power) change with 6 volt power compared to 4.8 volts? To use dual voltage (4.8 for receiver and 6.0 for servos), it



Kastner Electronic Designs' Milliamp Hour Meter, a multi-purpose device that can be used to provide a variety of useful RC system information, including remaining battery capacity.

seems to me that a schematic as shown is necessary.

"I do not fly without an on-board LED voltmeter installed and connected into a spare channel so I can check voltage under load. But if I use a dual battery setup, I would probably consider two voltmeters with the additional complexity. I have lost machines due to batteries dying in flight—never again!"

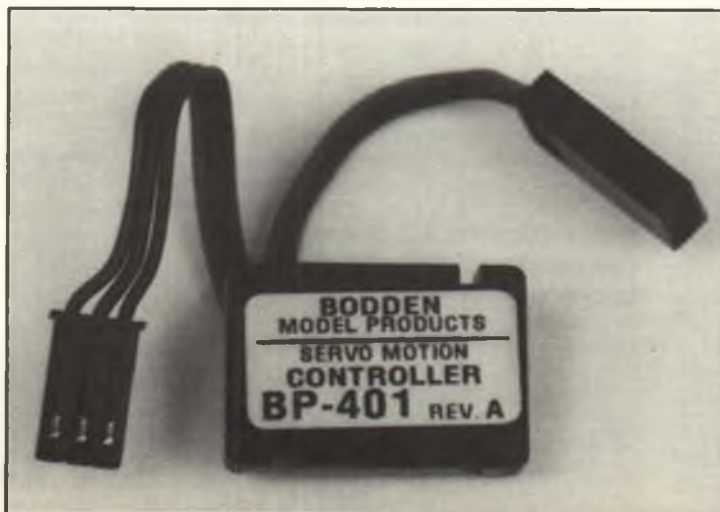
Interesting! I first have to say that I don't fly helicopters, but the basics that apply here are the same regardless of what the equipment is installed in. Charles' sketch of the dual bat-

tery installation is correct, and will also work in large airplanes that are using multiple servos and extremely high current drains.

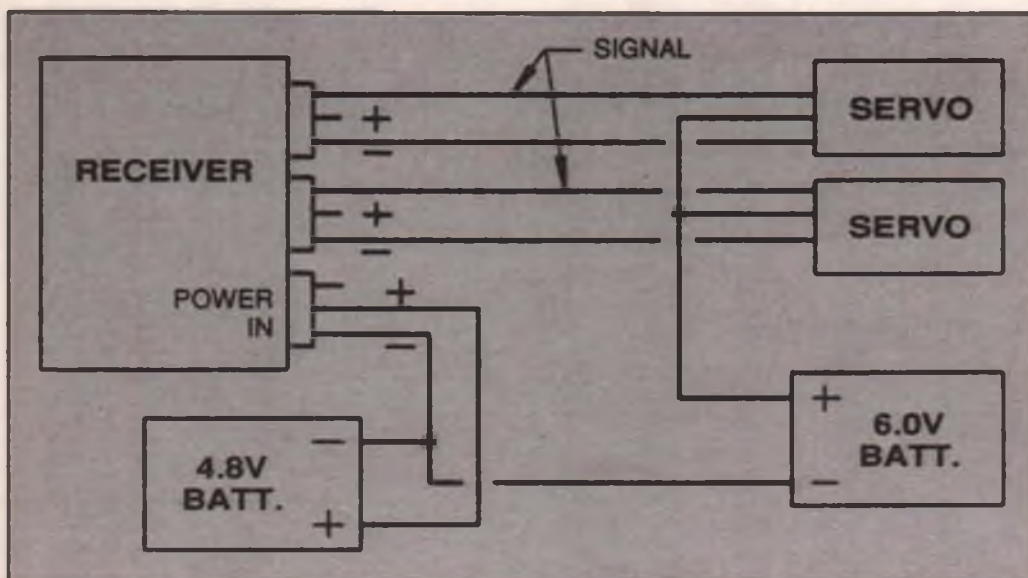
It should be noted that the receiver battery need not be of the same capacity as the one powering the servos. As a matter of fact, it can be quite small, as the receiver current is no higher than 10 milliamperes (mA), while a couple of hard-working servos can draw close to an ampere. The servo load is momentary, but it does add up in time.

Let's look at the question about servo performance at 6.0 volts. To begin with, measuring servo speed and torque is not easy, and few are equipped to do so—including, I do believe, some servo manufacturers! I've seen but one maker's figures stating both voltages, most of them neglecting to cite the test voltage at all although it's probably safe to assume it was done at the system voltage of 4.8.

Anyway, Horizon Hobby Distributors, importers of JR equipment, publishes a comprehensive booklet entitled *Understanding Servos*, which describes JR's servo line and includes a table of those important figures at both four- and five-cell inputs. Using their information, less that quoted for the 160-degree 513 and 703



The Bodden Model Products Servo Motion Controller can be set to control servo speed from normal to as much as 12 seconds; neat for scale functions.



Charles Leonard's circuit for connecting two batteries to the airborne RC system—4.8 volts for the receiver and 6.0 volts for the servos. More in text.

and the 4000 and 7000 "Super Servos," I arrived at some average percentage figures which is as close as we can come to a guesstimate applicable to other makes of servos of similar basic specs. The averages are 23.2 percent gain in speed and 19.3 percent gain in torque—but remember, these are subject to many variables.

Many of the more accomplished chopper fliers claim a noticeable improvement in servo operation through the use of a 5.2-volt regulator powered by six NiCd cells (7.2V) of higher than 1000 mAh capacity. However, the results looked for are not longer flight times, but apparently improved servo and gyro operation as a result of the stabilized voltage. Assuming the optimum in the both the machine's and the pilot's abilities, I guess it's possible that the momentary voltage drop in the battery voltage caused by heavy loads would create a noticeable change in servo operation. The regulator is known as the JMW R-522, and is available from Miniature Aircraft USA (3743 Silver Star Rd., Orlando FL 32808; 407-292-4267) and, I would guess, RC helicopter retailers.

One final comment regarding the use of visual on-board

LED voltmeters as mentioned in Charles' letter. They work fine as a status indicator, but should *never* be used religiously to calculate the charge remaining in the battery. Regardless of the claims made, such Expanded Scale Voltmeters (ESVs), be they LED or metered, simply cannot provide this information accurately. Other factors, such as cell history and ambient temperature, enter the picture with definite effects. I've been using a recently introduced device called the AeroGauge (June '95 EC) for this purpose and I am more convinced now than I was back then of its value.

KASTNER'S MILLIAMPER HOUR METER

Speaking of battery capacity, there is an interesting new product I would like to tell you about. It's the "Milliamp Hour Meter," available from Kastner Electronic Designs, P.O. Box 20983, Greenfield, WI 53220; (414) 541-3768. You say you already have a milliamp meter, as one of the functions of your digital multimeter? No, this is a different thing—notice that it reads milliamp *hour* meter, not simply milliamp meter. The Kastner MAH Meter actually

does read current flow, but it further integrates it to time, and displays the results in—you guessed it—milliamp hours.

Depending on how and where it is married into an RC system, the MAH Meter can perform a variety of useful functions: 1) A "gas gauge" for the receiver or transmitter battery; 2) Measure battery capacity, either individual cells or packs. Such a function then leads to the ability to match cells for maximum battery efficiency; 3) Bench or in-flight current consumption tests of RC system components; 4) Testing the proper operation and efficiency of support equipment such as chargers, dischargers, analyzers, etc.

The Kastner MAH Meter measures 2.6x1.6x.6 inches, weighs 2 ounces and displays the information on a four-digit, 1/2-inch LCD screen. It's powered by whatever it is connected to for testing, which can be anything from 4 to 30 volts, and draws a minuscule 100 microamps. It comes complete with leads and complete yet simple instructions on how to make proper connections for the many possible readings. Anyone who is serious about how the various parts of his RC equipment are working will



In his February '95 column, Eloy expressed doubts about the proper charging of Hobbico's new rechargeable HydriMax Nickel Metal Hydride (NiMH) cells, noting that the common NiCd charger is not properly suited to the task. Hobbico has since come out with this AC wall charger which, according to their press release, is "designed specifically to fully and safely charge HydriMax NiMH AA batteries. It allows convenient overnight charging of HydriMax AA batteries at home using any 110-120V AC source. The unit fully charges two or four cells at a time, in only 12-14 hours." The charger lists for \$24.99; the 1200-mAh, 1.2-volt NiMH AA cells (without tube) retail for \$7.40 each.

find many uses for the Kastner MAH Meter. It is available from the address cited and is priced at \$99.95 plus \$3 postage and handling.

Another Kastner product worth investigating is the Aircraft Recovery Beacon, a small (1.8x1.2x.8 inches), light (.8 ounce) device that plugs into any unused channel on the receiver and emits a loud pulsating audio tone whenever it detects the model's lack of motion, i.e., should it go down! This makes it completely different from similar items which are triggered by the lack of a signal from the transmitter.

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The Beacon is powered by the airborne system's battery, versions being available for use with from 3- to 13-volt systems. It also serves very effectively as a reminder if the receiver is left on; it features a built-in time delay to allow for normal starting and ground time. It requires only the splicing on of the proper plug to be put into operation. It does require some orientation in the airplane, but installation is simple and fully explained in the instructions.

HITEC'S "SPECTRA" TX MODULE

This one is another breakthrough from Hitec. I say "another" because I recently (July '95) reported on the exciting trim systems used on Hitec's new Flash system, the first time anything similar has appeared on anything but top-dollar equipment. Now Hitec brings us yet another product in that same vein—its RCD4400 "Spectra" synthesized frequency transmitter module.

Briefly described, an RF synthesizer mathematically modifies a basic crystal frequency, allowing switching to any one of a set of programmed frequencies. Full details will have to wait for more space; suffice now to tell you that Hitec's module drops right into the Hitec Prism transmitter and allows you to select the frequency of your choice—from Channel 12 on up to 60. Operation is simple; you merely select the desired channel number on two small numerically marked rotary switches on the side and plug it in. No tuning, adjusting or other changes are necessary.

For some unknown reason, many RCers are under the impression that frequency synthesizers are endowed with the magical ability of sweeping up and down the channels, shooting down everyone in sight. Not so; none of the synthesizers available now or in the past have that capability. They all have a built-in safety feature against such a possibility, in that if the frequency is indeed switched with the transmitter on, no changes take place. The transmitter has to be turned off and on again before the newly selected frequency will be operational.

Hitec has gone one step further to dispel this scary myth by placing the channel switches on the side of the module case;

JR SERVO PERFORMANCE SPECIFICATIONS

SERVO	SPEED (SECONDS)			TORQUE (OUNCE-INCHES)		
	4 CELL	5 CELL	INCREASE	4 CELL	5 CELL	INCREASE
341	.24	.17	29%	31.9	38.0	19%
321	.23	.17	26%	29.2	36.0	23%
3021	.22	.14	36%	37.5	42.0	12%
901	.27	.17	37%	43.1	53.0	23%
9021	.22	.14	36%	57.5	70.0	22%
507	.25	.19	24%	40.3	49.0	22%
513 (160°)	1.15	.64	44%	66.7	69.0	03%
517	.25	.19	24%	40.3	51.0	27%
4131	.23	.17	26%	90.4	120.0	33%
4721	.22	.17	23%	119.6	126.0	05%
4735	.15	.12	20%	90.0	96.0	07%
4000	.19	.13	32%	73.7	79.0	07%
3025	.15	.11	27%	29.2	38.0	30%
703 (160°)	1.36	.82	40%	93.2	112.0	20%
7005	.19	.15	21%	62.6	74.0	18%
7000	.19	.13	32%	60.8	68.0	12%
605	.28	.24	14%	139.1	N/A	N/A
3321	.36	.26	28%	59.8	78.0	30%

Everyone knows that going to a five-cell airborne NiCd pack makes for faster servo response and more power—but by how much? These numbers, for JR servos, were taken from Horizon's booklet, "Understanding Servos"; Eloy did the percentage calculations, which should be pretty close for other makes of servos as well. See text for explanation.

they are unavailable unless the module is unplugged and removed from the transmitter.

As stated, the Hitec Spectra module is intended for its Prism radio. However, its size and connections are identical to the modules used with Futaba's transmitters that are so equipped and it will work with them, with the exception of Futaba's synthesized system. The connections being the same, the Spectra will even work with older Futabas on which the module is larger, though it must be secured in place—a piece of Velcro is recommended.

The Spectra has a suggested retail price of \$199.95, with a set of four random receiver crystals also available at \$39.95. Check with your local Hitec RCD dealer.

ONE MORE NEW PRODUCT

Another clever device has just surfaced, this one from Bodden Model Products; it's the BP-401 Servo Motion Controller, a small, practically weightless on-board device that controls the operating speed of servos for such functions as retracts, canopies, bomb bay doors, etc., for which a slower servo speed is often more realistic and reliable. Installation? Now pay attention: plug one end into the receiver, plug the servo into the other end. If you can handle that, you're ready for the next step, though it will require more of you, as you have to decide at which of 16 speeds, from normal to approximately 12 seconds, you want the servo to operate. Speed selecting is done by setting a small pot; measured with the eyeball and inner clock. From Bodden Model Products, P.O. Box 8095, Redlands, CA 92375; (909) 793-2514.

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PRODUCTS IN USE

■ By Rick Lawrence

THE "LITTLE BIRDY" RC GLIDER FROM JUST PLANE FUN MODELS

Inexpensive, simple to build and very strong, the Little Birdy makes a fine trainer and/or sport model. There's lots of fun in store for those who build one of these versatile little gliders!



What's this? A kit in a bag? When I received my Just Plane Fun Models "Little Birdy" glider kit from *Model Builder* I was surprised to see that the entire kit was contained in an 18-inch long clear poly bag. When you think about it, it's actually an interesting approach to packaging, as it's eye-catching and lets you see at a glance exactly what you're buying.

The Little Birdy is an easy-building 52-1/2 inch span mini-sailplane designed for

sport hand-launch or slope flying. The plane can also be high-started, winched or powered up with a Cox Texaco or Texaco Jr. 1/2A engine, either for fun or in the AMA's No. 702 RC Duration event.

THE KIT

Upon opening the bag I discovered a high-quality kit. The full-size plans are professionally inked and clear. The instructions are equally clear, detailed in eight pages of step-by-step numbered text. Current kits

also include a separate 8-1/2x11 plan sheet detailing an optional V-tail which can be built with the supplied materials. The V-tail has the advantage of being lighter, plus it keeps the tail up off the ground and out of harm's way.

All of the wood components for the model are included and were of very good quality. The wing ribs (3/32 balsa in my kit, 1/16 in later kit runs), fuselage sides and bulkheads are machine-cut. Plywood parts—forward fuselage bottom, wing joint

doublers, wing bolt plate and main fuselage bulkhead—add strength to the plane. The built-up constant chord polyhedral wings utilize beefy 1/8x3/8 spruce spars with full-span shear webs—this wing should never break! Supplied hardware includes screw-type rudder and elevator horns and a nylon wing bolt. The builder has to supply hinges, pushrods, clevises, etc.

CONSTRUCTION

Building the Little Birdy starts with the horizontal stab, of standard built-up construction utilizing 1/8 balsa stock with diagonal truss "ribs" and a solid balsa elevator. The rudder and fin utilize the same built-up truss construction.

Because of the unique kit packaging, the 1/16 balsa fuselage sides are each supplied in two pieces and have to be spliced together. Vertical-grain 1/16 balsa doublers are then cut to fit and CA'd to the inside, starting at the nose and ending just behind the splice joint. Next, 1/4-inch triangle stock is glued to the top and bottom inside edges of the sides to allow rounding the corners later.

Before joining the fuselage sides the bulkheads have to be drilled for the pushrod sleeves—I used Sullivan #507 (1/32-inch) steel cables. I also drilled a third hole to accept an old pushrod sleeve for the receiver antenna. The fuselage top and bottom are 1/16 cross-grain balsa, with a 1/16 plywood bottom from the finger hole

RC models don't get much simpler than this. The Little Birdy features a constant-chord wing, built-up flat tail surfaces and a standard balsa box fuselage. Note the distinctive upswaft wingtips. In the interim since this review model was built and tested, Buzz Waltz has developed a V-tail conversion for the Little Birdy, which can be built using the materials supplied in the kit. The V's advantages are lighter weight and less chance of tail damage on landing; Buzz says the model's handling is also improved.



THE "LITTLE BIRDY" SAILPLANE

WINGSPAN	52-1/2 in. (projected).
WING AREA	430 sq. in. (projected).
FLYING WEIGHT:	17.6 oz. as tested.
WING LOADING:	6 oz./sq. ft.
AIRFOIL	Flat bottom, 11% thick.
ASPECT RATIO	6.5:1.
OVERALL LENGTH	33-1/2 in.
CONSTRUCTION	Balsa, plywood, spruce spars.
RADIO	Two channels required (rudder and elevator).
SUGGESTED RETAIL PRICE	\$30.
Produced by Just Plane Fun Models, 3390 Paseo Barbara, Palm Springs, CA 92262; (619) 327-1775.	

forward. The last step is to build up the canopy/hatch from 1/8 balsa stock.

Building the wing generates no problems. The builder has to take four of the ribs and cut 1/16-inch off the top and bottom to allow for the 1/16 balsa center section sheeting. Also, the center and outboard dihedral joints use a 1/8x3/8 plywood joiner, so the ribs at these joints need to be notched accordingly. The wing is designed with vertical-grain 1/16 balsa shear webs in each rib bay, centered between the spar caps to form a true I-beam spar—in contrast to many other kits which simply have the shear webs installed in front of or behind the spars.

The building sequence calls for completing all four panels with the exception of the upper spars, joining all four panels and then adding the top spars after. After sheeting the center section and shaping the leading and trailing edges, I added some



extra strength by applying a narrow strip of fiberglass cloth and thin CA glue to the center joint.

Because the plans show only the right wing half, they need to be oiled to make them transparent so you can turn them over and build the left. The instructions recommend using WD-40 for this, which I did. It works well, but you may wish to do this outdoors. I did it in my shop, and due to the overspray, there's still a slippery spot on the floor!

COVERING

I tried Goldberg's Ultracote on my model and found it to be very easy to use. Control surfaces were hinged with Graupner clear hinge tape purchased from Northeast Sailplane Products. Goldberg's 1/8-inch trim tape finished off the accents on the kit. Covering the upward-curved wingtips proved to be a challenge. To avoid distorting the shape, make sure the covering is tacked down well before shrinking. Don't overheat the covering or you'll be redoing the tip area. I had to do one tip twice before I got it right.

RADIO INSTALLATION

There is virtually no information about radio installation given in the instructions or the plans. I used my old standby system, a Futaba Attack 4 transmitter, FP-R114H receiver, 250-mAH battery and two Tower Hobbies TS-11 micro servos. The fuselage is quite narrow—there's only a 3/4-inch wide opening for the radio in front of the wing—so I placed the servos one in front of the other, just in front of the wing. The battery fit easily into the nose and the receiver was placed under the wing just behind the servos.

No control throws are specified so I started with 1-1/2 inches each side of center for right and left rudder and 3/8 inch above and below center for up and down

elevator. The finished model, with 1/2 ounce of nose weight (to balance as shown on the plan), weighed 17.9 ounces, giving a wing loading of 6.2 ounces per square foot.

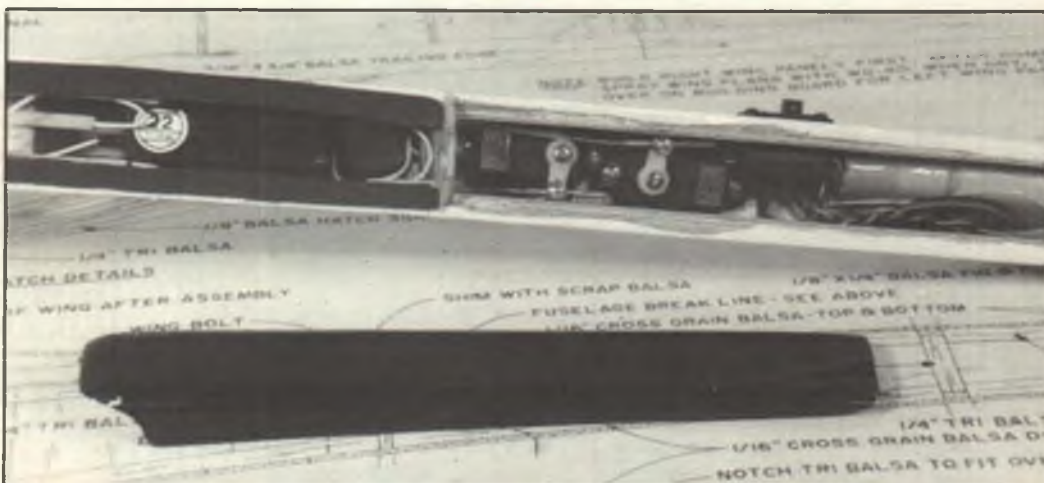
FLYING

Once the Little Birdy was completed I ventured out to the open field behind my house for some test-glides. I gave the plane a gentle hand toss and it seemed to fly forever. The controls were a little sensitive, but that's how I like them. Next came sev-

per square foot.

With the plane trimmed out I went to a nearby field and tried some serious hand launching. The wind was around 12 mph, temperature near 60 degrees and sunny. The plane launched well, however the wind was a bit strong for the way I had it set up. Still, I was very impressed with the way the plane responded to lift over some of the small undulations in the field.

The next weekend I used my little Pinnacle S mini high-start from Northeast Sailplane Products. The weather was much like



The author's radio installation in the Little Birdy: Futaba R114H AM micro receiver, two Tower Hobbies TS-11 servos in tandem, and a 250-mAH battery in the nose. For light weight, Rick left the antenna tube loose and removed it through the tail after running the antenna out the tail; with a little effort the tube can be reinserted if the antenna needs to be rerouted.

eral full-power throws. The launch was very steep, straight and high. I wasn't wearing a watch at the time but I can say that the flights were not short. It didn't take me long to realize that the Little Birdy was somewhat nose heavy, as I was having to input up elevator frequently. According to the instructions, the CG shown on the plans is a safe starting point; after you've become familiar with the way the model flies the CG can be moved back for better performance. Sure enough, after removing some of the nose weight the plane flew much better. In final trim the Little Birdy now weighs 17.6 ounces, with a wing loading of 6.0 ounces

per square foot. The launches were steep, straight and fast. Thermal activity was minimal this early in the morning but I did get several 3-5 minute flights. Control response was very good and the plane does not mind flying slow. The upswept tip design that Buzz Waltz utilizes seems to work very well.

In conclusion, one of the things I like most about hand-launch sailplanes is that their compact size allows them to travel in almost any size vehicle and to be flown almost anywhere. I really like the Little Birdy and will definitely keep the radio in this one for a while! MB

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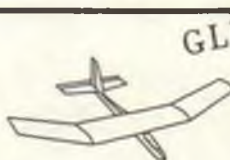
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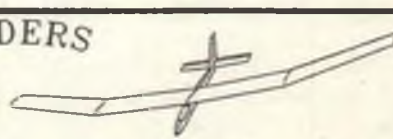
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THE BIG BIRDS FROM NORTHWEST HOBBY TECHNOLOGIES

Bruce takes a look at some of the models from a relatively new northwest Big Bird kit manufacturer. Also featured: Examining and running the new Irvine 1.50 two-stroke.

I seldom have the opportunity to visit any Big Bird kit manufacturers—most are too far away. One exception is Northwest Hobby Technologies, located in Auburn, Washington, only about 15 miles from my home. I was impressed with NHT's planes at the Northwest Model Expo back in February 1995 and even more impressed when I flew one of their PT-19s this past spring.

Northwest Hobby Technologies is run by Carl Hickey, who recently purchased all rights to the D&R Aircraft line of models and then proceeded to refine the three kits—two F4U-4 Corsairs (85- and 72-inch spans) and a 90-inch P-47 Thunderbolt—to make them lighter and more durable. The PT-19 I flew had never been in production, so Carl decided to add it to the kit line as well. I've flown all of the planes in the NHT stable and they all fly beautifully. In fact, I was so impressed with the PT-19 that I purchased one for a friend's retirement gift.

All of the Northwest Hobby Technologies kits have wings that are constructed of foam cores sheeted and capped with balsa. The fuselages are shaped foam that is sheeted inside and outside with 1/16 balsa and include some plywood doublers. Con-



Jericho Hickey poses with her dad Carl's 85-inch Fairchild PT-19; he produces this and other kits under the Northwest Hobby Technologies label. All balsa sheeted foam construction, Bruce says they're all great fliers.

struction is light and strong because the balsa skins give monocoque strength, similar to that found in a full-size aircraft's aluminum skin. Carl considers weight an enemy and has done everything possible to drop all unnecessary weight from his kits

while still maintaining structural integrity.

I recently paid a visit to NHT. Carl operates his plant in the basement and garage of his home, and when I entered the work area I saw a well lit, organized and tidy work area. This is a class act! Plywood

and balsa parts are accurately fabricated on several bandsaws, and the foam parts are hot-wire cut. Carl has several hot-wire foam cutters, some designed to cut large blocks into more easily handled smaller sizes, others made to work with templates for final part production.

Contact cement is used to fasten the balsa skins to the foam. Carl recommends a contact adhesive called Foam Bond, as it is non-toxic, biodegradable and cleans up with soap and water if you don't let it dry. The firewalls and landing gear mounts are epoxied in place. All adhesives for the kits must be purchased separately.

NHT's kits are complete with all necessary balsa and plywood parts, canopy or windshield, fiberglass cowl, and fiberglass for the wing joint. The wire landing gear is bent from 7/32-inch music wire and the hardware package is complete. The wings and fuselage are pre-cut foam as described above. No full-size plans are supplied or needed, but a seven-page narrative gives a logical building sequence, and a two-page parts list is included. A step-by-step videotape illustrates every step of the building sequence.

The P-47 and Corsair will accept retractable landing gear. Robart, Century Jet, Likes Line and others would work well. Fixed scale struts for the PT-19 will soon be available from Robart.

Suggested engines for the big 85-inch Corsair and the Thunderbolt include the Irvine 1.50, Super Tigre 3000 and Quadra 50. Suggested power for the smaller 72-inch Corsair is a .75-1.20 two-stroke or 1.20-1.60 four-stroke. The PT-19 could use



Here's the basic NHT PT-19 kit that our columnist purchased. Includes wire-cut foam parts, all wood materials and hardware. Instead of full-size plans (which would be of little use), the kit comes with written instructions and a videotape detailing the construction.

a .90-1.20 two-stroke. An O.S. 1.20 four-stroke with or without pump would also work well.

Northwest Hobby Technologies' future looks bright. In the works as I write this is a Gee Bee Model Z (that's the yellow-and-black one built before the R-1 and R-2). I've seen the early work on this model—it will be a winner. Also under development is a Goodyear FG-1A Corsair (the bubble canopy version of the F4U Corsair).

If you are looking for a quick-building warbird that flies great, then NHT has a plane for you. The 72-inch F4U-4 Corsair kit is priced at \$249.95, the 85-inch Corsair and the PT-19 are each \$289.95, and the 90-inch P-47 is priced at \$349.95. Shipping and handling is extra. For more information call or write to Carl Hickey at Northwest Hobby Technologies, 322 E St. S.E., Auburn, WA 98002; (206) 939-0884.

IRVINE'S NEW 1.50

Among modelers, the Irvine name has always meant quality, power and smooth

running, and their new 1.50 is no exception. I could tell you that the Irvine 1.50 is simply a bored-out 1.20, but that would be somewhat inaccurate because Irvine has made some subtle refinements to retain the excellent qualities of their 1.20.

I recently acquired a 1.50 and made some careful comparisons between it and the 1.20. Surprisingly, the 1.50 is only 10 grams heavier than the 1.20. The 1.50 has a 35mm bore and 29.75mm stroke for a 24.59cc (1.5 cubic inch) displacement. Compression ratio is 9.6:1. The engine features Schnuerle porting, a steel cyl-

inder, hemispherical head design, one-piece investment cast aluminum crankcase, a twin ball bearing supported crankshaft, an aluminum piston with a Dykes ring, and a machined aluminum conrod with bronze bushings on both ends. The wrist pin is retained by C-clips, as opposed to the 1.20 which has a free-floating wrist pin with Teflon pads on each end. The 1.50's crankshaft differs from the 1.20's in that the intake timing hole is larger and rectangular in shape, which allows the larger 1.50 a more generous fuel/air mixture.

The Irvine Jetstream carburetor is used to throttle the 1.50. The composite black body holds a steel barrel that has a 9mm opening. The Jetstream carburetor has three adjustments: a stop screw for the barrel, a high-speed needle and a low-speed needle. My Irvine 1.50 idles consistently at 1,800 rpm using the Jetstream. Mid-range offered no problems.

I used Powermaster fuel for break-in running. The fuel contained 20 percent lubricant, 5 percent nitromethane and 75



Carl Hickey, the man responsible for putting out the Northwest Hobby Technologies kits.



Hot-wiring a stack of tall surface foam blanks to outline shape. Bruce says Carl's shop always looks this neat and clean.



The new Irvine 1.50 two-stroke that Bruce recently tested in his Ultra Sport 1000. A real brute of an engine but very user-friendly. British workmanship at its very best!

percent methanol. Whatever fuel you use, the lubricant should contain at least 5 percent castor oil.

For break-in I installed an APC 16x8 propeller and ran the engine extremely rich for about 4 minutes, then leaned it to a very rich two-stroke for about 15 seconds, then returned the main needle valve to extra rich for a few seconds prior to shutting down the engine and letting it cool to ambient temperature. A J'Tec Snuffler muffler kept the neighbors happy.

I continued this process and lengthened the running and leaner run each time until the engine had consumed over a quart of fuel and would idle consistently at 1,800 rpm. Now it was time to try some different props. The APC 16x8 had been turning 7,950 rpm for short bursts; with an APC 16x10 the engine turned 7,800, a Forte 16x10 gave 7,750, a Zinger 18x6 turned 7,250, a Zinger 20x6 propeller turned 6,150, and finally I tried an APC 14x13 propeller and got 8,400 rpm. All of these

readings were taken with an Ace tach and the engine was kept at a slightly rich two-stroke needle setting.

In order to put the Irvine 1.50 in the air quickly, I swapped it with the trusty Irvine 1.20 in my Great Planes Ultra Sport 1000; happily, the 1.50 slipped right in place with out even a carburetor cable adjustment. I was still running the engine rich but the performance was noticeably improved over the 1.20, and will be even better as the engine breaks in further. The larger displacement does indeed deliver more power with only a slight increase in fuel consumption.

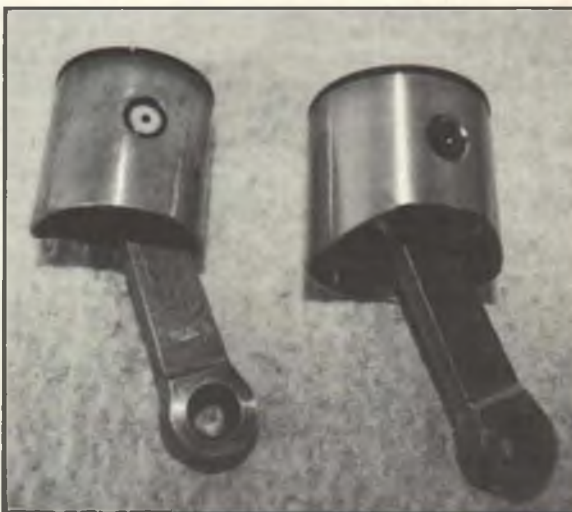
If you don't really care for gas engines, then the Irvine 1.50 would make a fine addition to your stable of glow engines. If you don't care for large glow engines the Irvine 1.50 could change your mind. I love my gas engines but there will always be a place for a glow engine like the Irvine 1.50 in my inventory. Irvine engines are produced in England; Altech Marketing recently took over the U.S. distributorship of the entire Irvine engine line. A complete Irvine engine catalog and technical specs are available at no charge from Altech Marketing, P.O. Box 391, Edison, NJ 08818-0391; (908) 248-8738.

* * *

I hope to see you at the Big Bird hangar again next month. Till then, be sure and drop me a line and a picture of your latest Big Bird project. Bruce Edwards, 8304 53rd St. Cl. W., Tacoma, WA 98467. MB



The Irvine 1.50 follows conventional design and construction inside and out. Careful engineering has kept the 1.50 only 10 grams heavier than the 1.20 but retains the latter's smooth running qualities.



The Irvine 1.50 piston (right) is noticeably larger than that of the 1.20. Both have a Dykes ring, and the conrods are bushed on both ends. The 1.20 has a free-floating wrist pin with Teflon end pads, while the 1.50's wrist pin is retained with C-clips.

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CONTROL LINE AT THE NATS

The National Model Airplane Championships was split up this year due to the lack of a single site capable of handling the entire array of model events. The annual pilgrimage to the nation's biggest model plane contest took CL fliers to Richland, Washington, site of the 1989 Nats.

It was a different sort of Nats in 1995. The competition was as intense as ever, but contestants missed some of that "Nats feeling" that comes when modelers of all stripes—CL, RC and FF—gather in one place for their annual top-gun shootout. CL fliers alone couldn't quite take over the city as the combined group usually does, but it still was not unusual to encounter modelers in the motels, restaurants and stores.

Also missing was the usual AMA headquarters, with its hobby shop, aeromodeling displays and other side-shows. The AMA's presence was simply a single room used as an office, where registration and logistical matters were handled.

The actual flying sites were slightly different from the previous Richland Nats venues, and the Columbia Basin Balsa Bashers and the AMA provided three excellent locations for CL competition. Aerobatics used a runway at Richland Airport, combat used a manicured softball complex, speed and racing used the spacious parking lot of a scenic park, and carrier used a grass area in the same park.

Attendance-wise, this was one of the smaller Nats. The turnout in aerobatics was truly at a national championship level, and speed drew a good turnout. Combat, racing and carrier had small fields of mostly northwest and western fliers, but the competition was excellent throughout.

Like any Nats, there were unexpected highlights that don't show up in the results. Paul Walker's four-engine B-17 bomber flying to a 10th place finish in Precision Aerobatics was one of the crowd pleasers. Repaired after a 1994 crash and now weighing 102 ounces, the B-17 uses four O.S. .15 engines fueled by a single bladder, using combat pressure regulators.

Young fliers were the story on the combat circles, as 15-year-old Tim Strom



Semi-scale stunters are making a comeback. Here's Windy Urtnowski's S.T. .60 powered Straga, inspired by the famous Unlimited racer of the same name, seen at the 1995 Tri-Cities Nats. Windy was one of the top placers in Expert Precision Aerobatics. All photos this month were taken by John Thompson.

marched through the competition to over-all 1st place, losing only once—to Mark Rudner, the Junior World Champion.

Cox Products added an element of interest for the spectators and younger fliers by sponsoring a successful 1/2A Mouse Race and 1/2A Stunt contest, each using Cox-provided airplanes, which became the prizes. Lots of small-airplane flying was seen on the sidelines throughout the Nats.

By far the most colorful show—and the one that drew the attention of the local news media—was the Precision Aerobatics competition. Ted Fancher of Foster City, California emerged as the winner of the Walker Cup, the trophy that goes to the nation's top flier each year. His 1,138.33 combined two-flight score narrowly topped the flyoff between the top five pilots. The rest of the top five were Bill Rich, David

Fitzgerald, Bob Hunt and Windy Urtnowski.

Jim Damerell of Spring Valley, New York topped the Advanced class fliers at 1,022.

Alice Cotton-Royer, a fast rising Advanced level flier (she finished 8th) and editor of the Northwest Fireballs newsletter in Portland, Oregon, offered her observations of the stunt activities:

In the heat of the Eastern Washington desert, 67 stunt contestants, a host of judges, runners, pit crews, score sheet calculators, observers, family members, event directors and friends attended the week-long 1995 National Precision Aerobatics Championships. There were two Advanced class circles and two Open class circles with about 14 competitors per circle. The first day of competition was calm with a slight wind from time to time (around 3-5

mph). It was clear to everyone that the level of CL stunt flying has soared. There were a handful of scores well over 500 (as high as 570!)

The second day was very windy (9-30 mph). Scores were lower; competitors were frustrated and many passed their second rounds. But the competition wasn't over until Thursday afternoon when the top finalists were identified.

The third day of competition (the finals) was very calm with a slight wind later in

activities at the Horn Rapids Athletic Complex. Here are some of his thoughts, with a few of your columnist's observations intermingled:

Entries were down in combat, and most who did come were from the Seattle area. Turnout was eight in Slow, 19 in AMA (Fast), four in F2D (FAI), and 14 in 1/2A. The level of competition was excellent, though, and the field was beautiful. Eastern Washington is a sunny desert with cheap irrigation power and water. It has the nicest grass



The Riers' award for the most beautiful Precision Aerobatics airplane went to the legendary Bill Wierwage of Berea, Ohio, who took the Concours d'Elegance with a gorgeous semi-scale P-47 Thunderbolt that he flew to an 8th place finish.

the afternoon. The Junior and Senior stunt event was also flown on this day at this site. Two Junior competitors were also Advanced class competitors and had to fly four times instead of the two everyone else flew. Competitors were tired and hot. Tension was high, nerves were frayed. The excitement and importance of selecting the Top 10 from each class was poignantly clear. After the finals ended and the scores were in, everyone was ready to relax except, of course, for the top five Open class competitors, as well as the top Senior and the top Junior competitors, who were to fly in the Walker Cup Flyoff the next day.

The last day of competition was bright, calm and very hot. Everyone gathered at a new location to watch the competition that would determine this year's National Champion. In addition to the Open contenders, the Senior flier was Robbie Hunt and the Junior flier was Dondi Garrison. It was truly awe-inspiring to watch each of them fly but, as tradition dictates, only the contestant who is best able to fly a flawless pattern brings home the Walker Cup. This year it was Ted Fancher.

• • •

Combat Event Director Howard Rush had the best view of the fast and furious

you've ever seen, and they grow it everywhere. There are great flying sites all over town in Richland.

Joe McKinzie of Fort Worth, Texas was the winner in Slow and FAI, and Jeff Rein of Bothell, Washington was the 1/2A champion.

In AMA Combat, Tim Strom was the "overall" Nats winner, but his status as a Senior class entrant left room for there also to be crowned an Open champion, and that was Ken Burdick of Seattle, the runner-up in the overall combined pyramid.

The big story is Tim Strom. He's 15 years old; this is his first season of competition. I had plenty of trouble flying against him in May, when he was a rookie. Tim is an athlete, and about as wide as he is high. His only loss was to Mark Rudner, a Junior.

Mark is another phenomenon. Last year he won the Junior F2D World Championships in China. He flew rather tentatively two years ago, but now he's a killer. In F2D Mark's dad had to resort to a technicality to beat him. Mark left his control handle in the center circle during a pit stop in their father-against-son match. This is a forfeiture offense in F2D, so Chuck won the match. Chuck may not have been able to win by flying.

It's worthy of note that in Fast Combat,



Paul Walker's four-engine B-17 was impressive in its first Nats competition, finishing 10th. It looks realistic aloft.



Northern California Rat Racers of the modern style, with inverted engines. These belong to Mike McCarthy and Roger McIntyre.

nearly all of the planes were equipped with automatic flyaway shutoffs of various designs. The one flyaway that occurred had shut down by the time it left the softball field and landed in the grass just outside the complex.

FAI was pretty silly. It took half an hour per match, and about half the matches ended in disqualification because the fliers didn't know the rules. The final match was really good. Joe McKinzie, the sole Texan in attendance, beat Chuck Rudner six cuts to four. Some folks who were looking into the sun didn't believe the cut count. The judges had the sun to their backs.

I always thought of 1/2A Combat as a children's event that employed engines that didn't work very well. I was pretty im-

pressed with 1/2A at the Nats this time. Most of the engines ran when called upon to do so. Jeff Rein, who has been working hard at all the combat events but FAI, won.

We were fortunate to have some really good judges volunteer. Tom and Tim Strom judged Slow. Don and Jacob Stewart and Joe Campbell judged AMA, which everybody else wanted to fly. Ken and David Burdick judged 1/2A and F2D. These guys were all really attentive and did a great job.

Don Stewart, Joe Campbell, and George Swanson were very helpful in getting equipment and setting up the field. Carol Green and Karleen McFadden pitched in with pull testing. Norm McFadden and Ken Burdick rounded up equipment before the contest, Gary Harris stayed over to help with ev-

everything on Friday, and Marilou Rush did the matching and made the streamers. Many thanks to these people and to Bev Wisniewski and Brenda Schuette, who ran the whole Nats with minimal AMA participation.

• • •

The field of racing contestants was small but the competition was typically intense. Mike Hazel, who was around the speed and racing circles all week, helped fill out our observations of the racing action.

Class I Mouse Race was the best-entered event, and the Streaker V design was the most popular. Paul Gibeault, of Calgary, Alberta, Canada, one of the major developers of the Streaker design, flew to 1st place with a 5:40.53 feature race. In the pits Paul's careful preparation of the Cox .049 was a seminar in "doing it right" no matter how simple the event appears to the casual observer. His preparations paid off in speed. As is typical in Mouse I, performance in the air and in the pits varied widely among the competitors. Darwin Parr of Auburn, Kansas won the Junior class at 6:24 and Stephen Cox won the Senior class at 5:25.39.

In Scale Racing (Goodyear), the speed and the sound of top-quality planes was, as usual, impressive. The fastest entries had solo airspeeds of 125 mph plus, and they were 3 to 5 mph slower in traffic. The top powerplant was a Tim Gillott modified Rossi .15. Howard Shahan of Poway, California captured a slim victory over his partner, Bob Fogg of San Diego, with a 5:36.4 feature. Bobby Fogg captured the Senior class with a 5:40 time.

A large selection of engines was seen in the Slow Rat field, including a couple of real vintage entries, but the fastest planes were using the contemporary Nelson .36. At least one Super Tigre X36 (a Nelson modification) and a few of the new Fox Mark VI .36 engines also were in use. All were fast, with the top planes running solo at 128 to 130 mph. The Fox engines were only marginally slower than the Nelsons.

Mike McCarthy had 1st place in the bag with his NorCal, a plane named after the region where he lives. An inadvertent shutoff caused an extra pit stop and gave the victory to Melvin Schuette with a time of 6:14.30. Todd Ryan of Pasco, Washington captured the Junior class with a time of 9:01.55.

AMA Rat Race is still very fast in spite of the venturi restriction that was intended to slow the .40-powered planes down and make the lighter .21 planes competitive. It was reported that the .250-inch carb slowed entries down only 3 to 5 mph. The team entries of Fogg and Shahan had the fastest equipment, with airspeeds of 155 mph plus. All entries seen were of the inverted fuselage type. Mike Shahan blazed to victory with a 10-mile time of 4:50.87.

There were only two entries in FAI Team Race; the team of Elbert/Mak of Jamaica

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...
The highlight of the speed competition had to be the bizarre finish in FAI, with Will Naemura, John Newton and Paul Gibeault all tied at 179.17 mph. After a full day of flying, they were deadlocked in that three-way tie for 1st place when Chris Sackett of North Burnaby, B.C., Canada slipped in a flight that was .01 second faster to capture the win at 179.31 mph. This is the realm of the exotic and expensive, with many Russian engines and airplanes, among other foreign-made custom parts in use. The top four finishers were powered by Rossi, Moki and Zalp engines.

Half-A Speed had a very low entry, as that event has become the realm of the homebuilt engine. The Southern California FABS team turned 150.19 mph using their ACE .049, Charles Legg went 140 with his homebuilt, and no one else was close. In 1/2A Profile Proto, once considered a novice event, all the top places were well over 100 mph, with the winner the FABS team with 113.16 mph, again using the ACE .049. Bobby Fogg turned in a Senior 1/2A Speed score of 141.22 mph. Peter Brown of Chandler, Arizona went 102.7 mph for the Senior 1/2A Proto trophy.

Bob Spahr turned 184.16 mph, well over the national record of 179, for a deci-



One of the more attractive carrier planes at this year's Mats was an original design Hawker Sea Fury by Bill Calkins.

sive win in A Speed, but he was unable to back it up with a supporting flight needed to establish a new record. He used an FAI-style plane with a single wing and sidewinder Cyclon engine, with a monoline control system. Jeffrey MacApinlac of Santa Clara, California turned in a Junior score of 77.22 mph, and Bobby Fogg went

159.37 for the Senior trophy.

There wasn't much excitement in B Speed, with Bill Wisniewski's 168 mph good enough for 1st place with a K&B .29. Bobby Fogg turned 161.51 in the Senior class, using only a mini-pipe but moving faster than most of the Open entries using

continued on page 82



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HANNAN'S HANGAR

BY BILL HANNAN

"We just happened to hit the retro timing right on. People are tired of not being able to program their VCRs. Low-tech is in."

Noted English FF Scale modeler Doug McHard, photographed at the age of 11 (circa 1939) with the partially completed framework of a Fairey Battle as kitbashed by Burd. More in text.

Our quote, by Schwinn executive Skip Hess, is in response to the amazing sales of their recently reintroduced vintage design "Cruiser Classic" bicycle, which has balloon tires, a comfortable seat and only one speed. The comment appeared in Mike Royko's *San Francisco Chronicle* newspaper column, sent to us by George Benson. Could it be that the surge of interest in old, low-tech model airplanes reflects similar thinking?

A large percentage of our mail concerns yearning for past model building satisfactions, and certainly the "Old Timer" movement reinforces that philosophy. It seems not to be just our youth we long for, but relief from the frustrations of hec-

tic modern living. We turn to our hobbies, welcome islands of escape in a perceived out-of-control world. Simplicity soothes, even if only temporarily, and many of us appreciate the breather!

A CASE IN POINT

Hewitt Phillips, longtime NACA/NASA staff member and lifelong modeler, recently found a photo of himself taken in 1934. In it, he's working on the fuselage of a Douglas YO-43, from a George D. Wanner model kit. Reported Hewitt: "I never finished the model, and the fuselage has long since disappeared, but I always kept the kit. Last year I decided that I would get to work and build the model again."



"I followed the kit plan, but used new balsa, etc., keeping the remaining supplies in the kit as antiques. I was very impressed by the quality of the kit, and don't think much progress has been made in this type of model, to the present day. The balsa was fine quality; better than I can buy today."

Hewitt described the completeness of the kit, which included excellent plans, full directions, Japanese tissue with the aircraft markings printed on, celluloid, rubber, wire, banana oil and paint. He continues: "I have finally finished the model. It has a span of 23-5/8 inches, and weighs about 1 ounce, complete with rubber. I think it should fly well, but I haven't tried it yet. I am still waiting for a calm day."

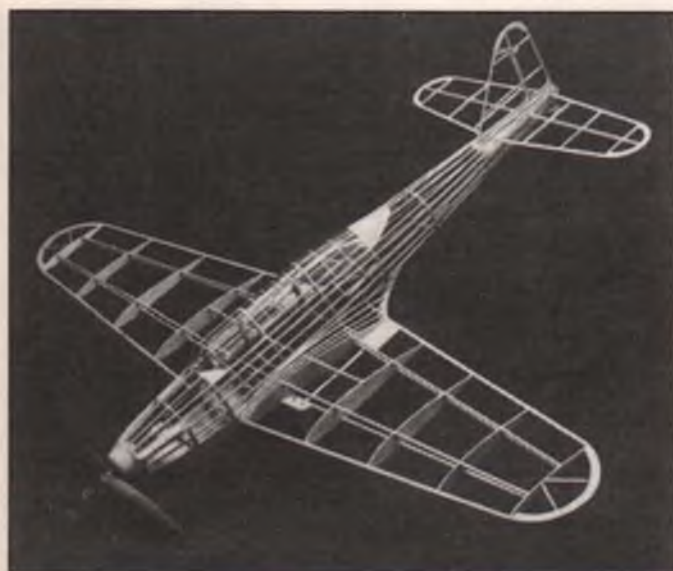
"A few months ago, there was an NACA Alumni meeting at Langley. Among the old photos shown was one of a full-size YO-43 mounted in a wind tunnel. Everyone was surprised that I could identify it and give lots of information about it."

MEANWHILE, IN ENGLAND

Back during 1939, a young Douglas McHard attended an airshow at Royal Air Force Station Thornaby. There he witnessed, at very close range, an entire squadron of Fairey Battle aircraft taxiing by in preparation for takeoff.

Doug clearly recalls: "The impact was instant, the smell, the noise, the slipstream, and the crew, with canopies open, all toggled-out in their flying gear, left me with a need to build a Battle model, and to paint it in those 103rd Squadron colours."

"Actually, I bought three Fairey Battle kits during the next few months—an Aeromodels, a Megow, and a Burd. The Aeromodels proved too complicated, but I enjoyed trying to build it; the Megow represented the prototype, and even to an 11-year-old, it wasn't 'right.' The Burd was the best of the bunch, even though it had a totally impractical re-



tractable undercarriage and movable control surfaces. These features I considered to be 'extras,' probably not fitted to the original model, a good photo of which appeared on the plan, and did not show ailerons or elevators separate, but the rudder was hinged."

Doug decided recently to build another Burd Battle, and did include the hinged rudder, but elected to employ plug-in landing gear, which are removed for flying. He continues: "Despite some quite glaring inaccuracies, it is certainly a Battle, and by the standards of the time, completely up-to-par. It's nice and light too, which is characteristic of most Burd de-

signs, but unlike several of them, it is well engineered. A few small alterations in the structure were made—not enough to change the essence of the design though, which remains essentially as originally conceived.

"The serial number is entirely bogus! K-1674 was actually a Bristol Bulldog II, but this is, after all, not a meticulously accurate scale model—it's a slightly updated Burd design, and I think the designer's choice of number should remain unaltered!"

There you have it, both Hewitt Phillips and Doug McHard found rewards in low-tech models designed more

Here are a couple of shots of Doug McHard's 1985 edition of the Fairley Battle, modified only slightly from the original Burd plans. Finished model flies as well as it looks. McHard is considered one of the world's finest modeling craftsmen, earns his living building miniature cars for collectors.

than a half-century ago.

SPEAKING OF MAIL

One of our photos shows a truly novel mailbox as fashioned by Don Campbell of Detroit, Michigan. Don has actually produced two of the Gee Bee variety, as well as others, including a railroad locomotive and a neat Grumman Navy biplane. Looking for a simple change-of-pace project? You might consider one of these! Certainly they are a refreshing change from the usually boring standard types.

Incidentally, Ed Whitten sent us an article about famed aircraft designer Burt Rutan's radical, pyramid-shaped desert home. Burt's mailbox is conventional enough, however, it is mounted to a complete tail assembly of one of his airplanes, partially buried in the ground!

PRODUCTS AND PROJECTS

•Dave Diels offers a new rubber-powered F7F Tigercat kit. Included are complete con-

struction plans and instructions, scale documentation, printed balsa, stripwood, tissue, molded canopy, decals, plastic propeller, rubber, etc. Dave also markets some of these components, such as the canopies, separately, if replacements are needed.

A complete catalog and price list for this and many other plans and kits, including Peanuts and sport models, is available for \$2 from Diels Engineering, Inc., Box 263, Amherst, OH 44001.

•Al Lidberg's latest release is a 1/2A RC model of the Focke-Wulf FW 56 Stösser, intended for sport flying or 1/2A Texaco RC Scale competition. It's available both as a set of crisply drawn plans, with complete instructions and proof-of-scale three-view, small markings, etc., or as a semi-kit with printed sheetwood and vacuum-formed spinner. A formed cowl and other plastic parts may be ordered separately, if desired. A 16-page catalog and price list describing this and many other subjects costs \$2, from A.A. Lidberg, 1008E Baseline Rd. Suite 1074, Tempe, AZ 85283.

•Number 30 in the *Naval Fighters* series of monographs concerns the Douglas XSBD-1 and BTD-1 Destroyers. Compiled by Bob Kowalski and Steve Ginter, this publication would provide ideal scale documentation, since it includes three-views, historical background, 68 photographs and detail sketches. These lesser-known aircraft have intriguing proportions, including lengthy noses (choice of several!), large tail areas (ditto), and inverted gull wings, sort of a shallow Stuka configuration. One experimental version even had an aft-mounted jet engine.

If you like to show up at your local flying field with unusual models, try this one on for size.

The 8-1/2x11-inch softbound book is priced at \$9.95 plus \$2.50 postage and packing, from Steve Ginter, 1754 Warfield Circle, Simi Valley, CA 93063.

continued on page 74



MODEL BUILDING 101

BY J.J. LEVINE

Students Give Their Thoughts on the MB101 Program

Someone once said that all national politics are local, and in retrospect we relate to that belief.

All national MB101 programs are also local and should be customized specifically to the local community. That's why we use recommended procedures for certain areas and perhaps completely, diametrically opposite suggestions for others. It's not that we're inconsistent, rather we are tailoring MB101 to the needs of those we're addressing.

I received a phone call from Donald Broggin recently. As our discussion progressed, I realized how important a person like Don is to our overall effort to enhance the teaching of aeronautics, through model building, to middle school science teachers in our country.

Broggin explained that one of his sons is a science teacher for a sixth grade class and was looking for a program very similar to ours. He had read about MB101 in *Model Builder* and wanted more information, which we happily furnished.

It didn't take long for him to order two of our "Care Packages." Each one consists of the MB101 building board with accessories, four Step One Delta kits, the instructional videotape "MB101 Step One Delta—Take II" and a listing within our or-

ganization for future newsletters and updates. This complete package is available for \$45 each, including postage and handling. Checks or money orders should be made out to Model Building 101, Inc. at the address below. This same package (and any other MB101 material) can also be ordered through Hobby Supply South, 5060 Glade Rd., Acworth, GA 30101.

The reason for two packages? Don explained that one was for his son Richard, a sixth grade science teacher, to evaluate for use in his class. The other was used by Don to introduce his other son (a high school principal) to this project in the hopes the program would be adopted and offered to the students.

As Model Building 101 grows, we begin to evolve a pattern of where our organizational strength comes from. The findings reached through these compilations are enlightening and sometimes disturbing. If you wish to send for our report "Profiles of Caring," please include a check or money order for \$5 to MB101's address listed below.

Another thought crossed our lines from someone inquiring about our program. Seems that some RC clubs are being urged to donate their unwanted

or wrecked models to their local schools for use by the students. Schools that actively use MB101 or similar programs would welcome these wrecks; students have the time, energy and primarily the desire to put the craft back in flyable condition. As a byproduct, the finished models could be sold at swap meets to help finance the school's model building courses.

Sounds like an excellent idea, and as we do with all information, we pass it on to our various MB101 participants. We always welcome any helpful suggestions.

STUDENTS' THOUGHTS

Here are some excerpts from the "thank you" notes of our sixth grade students at Simpson Middle School, after they completed the Step One Delta program. They might provide insight and understanding of why MB101 was formed.

"... I really enjoyed my Delta, especially when I got home. Thank you again... hope that I will see you in the seventh grade... our whole class loved the planes... we couldn't have done it without you—Sean."

"Thank you for your help,

continued on page 84

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Slots or Holes	A	A	A	A	A	D	D
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Dwight will fly his O.S. .61 SX-H engine stock. Cliff has given O.S. thumbs-up for the same reasons ALL hobbyists enjoy their models more when they're O.S.-powered.

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The 1995 Los Banos



■ LEFT: A real work of flying art and a joy to behold in the cloud-strewn skies over Los Banos Reservoir, was Willy Grundler's 1/4-scale 1838 SG-38 Schulgleiter. Built from the Krick kit, the 102-inch span primary trainer is a real builder's model and is available from Hobby Lobby. ■ BELOW: Lynael Miller and Sean Sharif follow through on the launch as Tom Overton's 1/3-scale Sig Spacewalker takes to sky. A sight to behold and a high point of the event, as everyone laughed and cheered while watching this converted power model run the ridge.



Scale Slope Fun-Fly

BY GREGORY VASGERDSIAN

This year marked the second running of what has become one of the biggest RC scale glider meets on the West Coast.



Event Director Lynnel Miller's Schweizer TG-3 is now a well-used 11-year-old model. How's that for vintage, vintage! An outstanding project with a light wing loading and all built-up construction.



Steve Hinderts appears to be performing some emergency surgery on a wounded seabird, but what he's really doing is getting his 1/11-scale albatross ready to go. An unusual and large (13-foot span) model, Steve says it's a bit tricky to fly and requires not only good lift but very smooth air as well. Steve runs an outfit called The Birdworks and offers some neat products—give him a call at (503) 332-0194.

A gorgeous site, good winds, and after three days of fun flying you've had one heck of a great time and a great event! Such was the second annual Los Banos Scale Slope Fun-Fly, which came off May 5th, 6th and 7th and saw the skies above Los Banos Reservoir filled with scale model sailplanes. It was a visually enticing event with over 75 scale gliders ranging from a vintage SG-38 primary to a model of the new Genesis flying wing.

Sponsored by the South Bay Soaring Society and organized by scale enthusiasts Lynsel Miller and Sean Sharif, the event was

a relaxing three-day fun-fly. Scale slope fun-flies have been gaining in popularity, with a history of solid events from the Tri-Cities in Washington to Torrey Pines in Southern California. For scale soaring enthusiasts, the fun-fly format allows lots of flying without the bother of a competition, and plenty of time to reunite with longtime friends as well as make new ones.

Located in the San Joaquin Valley, about two hours southeast of San Francisco, the slopes of Los Banos Reservoir have long been a haven for local slope soarers. Enthusiasts have, in fact, been flying these slopes with scale machines for years, as

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there has always been a healthy scale contingent in the Northern California region. Most of the pilots who attended this year's fun-fly were from California, though some made the trip from Oregon, Washington and Canada.

The conditions on Friday made it a primo day for the PSS models that thrive in big winds. Those who made it in for Friday were not disappointed and were able to get lots of stick time for some fun, "ring 'em

and strong thermals early on Saturday morning for some excellent flights.

Slope events are always tough to predict, but this year the winds actually cooperated quite well, coming up strong around 3 or 4 in the afternoon on both Saturday and Sunday. As any slope soarer knows, all it takes is some patient waiting. Those who waited found that it was worth it, as many flew until sunset! When the winds came up on Saturday afternoon the tugs



■ LEFT: Now here's a real contrast in RC soaring: Lynsel Miller's ASW-20 perched over his Messerschmitt ME-109.

■ BELOW: Sean Sharif launches Mark Foster's big 1:3.5-scale DG-300. A Rnn pilot, Mark flew the DG from majestic thermal turns to blistering passes along the ridge. He really took advantage of all the stick time you can get in at a slope fun-fly event.



out" flying.

Saturday saw the largest turnout of fliers and spectators, but started off with finicky wind conditions. Fortunately, event coordinator Lynsel Miller had all the bases covered—a great slope, winches, and two powerful 1/4-scale tugs, a Waco UPF-7 and a Super Cub, piloted by Dick Miller and Rick Meyer respectively. These two excellent pilots clearly knew what they were doing and had the machinery to tow up big models like Hal Wamer's 17-foot SB-10, and Mark Foster's 1/3.5-scale DG-300. Unfortunately, many of the models had no aerotow release installed, much less a towhook. Those who did were able to take advantage of the light wind periods

took a break, the winches were wound down, and some of the really cool stuff took to the skies.

Biggest and baddest was Tom Overton's Messerschmitt BF-110. This beast weighed in at a mere 30 pounds, 12 of which were concrete in the nose to balance out! Launched from the slope with a bungee setup, the big sling-shot heaved the bomber into the air for a spectacular flight. On the humorous side, Tom also flew a 1/3-scale Sig Spacewalker, built purposely as a glider. The Spacewalker flew hilariously well, out and above the slope ... only there was no noise! How's that for a muffler system?! PSS models made a good showing, with a range of model types and sizes, including

Me-109s, P-38s, P-51s and even a full-scale seagull and 13-foot span albatross.

At scale events, the modern fiberglass ships usually outnumber the vintage and PSS models by quite a margin, and this was certainly the case at Los Banos. This can probably be attributed to the ease of con-

struction and definite high L/D performance advantages. At the upper end of the spectrum were two 1/5-scale SB-10s sporting 17 feet of span, as well as a 1/3.5-scale ASW-20 and DG-300. At the smaller end (if you can call 10 feet small!), there was a wide range of 1/6-, 1/5- and 1/4-scale mod-

els such as an ASW-24, DG-200, Schweizer 1-26, Swift and a Celstar. Cockpit detail on most of these models seemed to be minimal to nonexistent, though a few were finely detailed. Clearly, many of the models were built to be fliers and not museum pieces. Many models didn't even have a pilot in the cockpit, and this easy-to-include detail would have added a lot to the scale realism of the model while in the air.

Vintage ships were quite the opposite: lots of cockpit details, and almost all with pilots in them. However, the number of vintage models was quite low. The lack of quantity was compensated by the quality of these models. Ranging from a 1/4-scale Minimoa and PWS-101 to a Rhoenbussard, Grunau Baby, Schweizer TG-2A, and a delightful SG-38 primary, all of the vintage models were well-built and unique.

Pilot's Choice awards were handed out for Vintage, Modern and PSS classes, followed by a raffle thanks to generous donations by scale supporters—Jack Bale Plans, *Quiet Flight International* magazine, and *Scale Slope & FAI* magazine. The grand prize was an hour-long aerobatic ride in an ASK-21, courtesy of Soar Hollister. Luckily, I didn't win the grand prize as my stomach would never have taken it!

With a fantastic site and as the largest scale slope soaring event on the West Coast this year, the Los Banos Scale Slope Fun-Fly is poised to be even bigger and better next year. See you there! **MB**

Power Slope Scale in a BIG way! Massive 10-1/2 foot span Messerschmitt Bf-110 bomber by Tom Overton weighed in at 30 pounds and contained 12 pounds of concrete in the nose just to balance! Flies well but is too awkward to be safely launched by hand, so Tom uses a powerful bungee cord setup to literally slingshot the big bomber off the edge of the slope. Note the solar charger Tom uses to top off the radio batteries between flights.



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PLUG SPARKS

BY JOHN POND

•Vintage Flying "Down Under"

•The Forster G-29

One great advantage in corresponding with far-off places like Australia, South Africa, New Zealand and others in the southern hemisphere is the amount of modeling activity in December and January plus when outdoor competition events fall off very heavily up north.

Such is the case of activity in Australia. This writer received a nice report, and accompanying photos from Leo O'Reilly, 42 Maple Ave., Keswick, Adelaide, South Australia 5035, who is the real spark plug of O.T. activity "down under." Leo hasn't been heard from in a long time and explains in his letter that he has been quite ill for a long time.

The first three photos were taken at the Easter Holiday 1995 Nostalgia contest held at the very popular Wakerie Airport (located northeast of Adelaide). The model shown in Photo No. 1, a 1938 design



Photo No. 1. Here's a rare one: the "Edith III," designed by Alex Barter and flown in the first Australian National Championships in 1938. Photo caption info wasn't specific, but we suspect this may be the original model, not a reproduction. Pretty neat, huh? All photos this month were supplied by Leo O'Reilly.

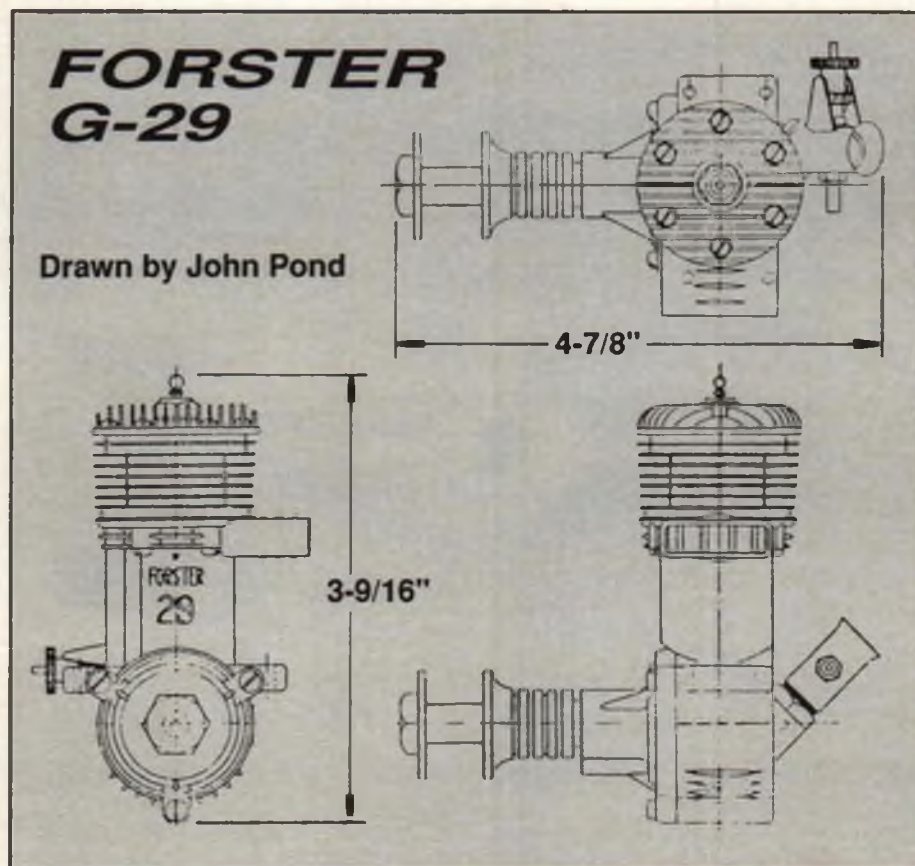
called the "Edith III," is most interesting as it does resemble the Pacer and Yehudi designs of the Brooklyn club members,

Taibi and Stoloff respectively. This Brown Jr. powered model was designed and built by Alex Barter, shown holding the model in the photo. Upon its completion, it was entered and flown in the first Australian National Championships at Sydney in 1938.

Of interest is the background showing the Wakerie Airport. Imagine all this airport being covered with grass! What an excellent place to fly models! Small wonder this writer has been to the Australian MAAA Nationals twice at this location. Gonna try for a third time in April of 1997.

Based on the recent success in Australia of the Bill Evans "Hyphen" Nostalgia design (it follows a successful winning design, "Monkey see, Monkey do"), two of those entered were by Kevin Green, using an O.S. .40 Helo type engine; and Mal Sharpe with an Enya .40 TV in his entry. Photo No. 2 shows these two well-built Hyphens.

Before the reader gets the impression that this writer is derogatory in his comments about successful designs being built in large numbers, the reader must remember that many of the newcomers to a new class event always inquire as to the most promising model for win-



ENGINE OF THE MONTH

ning. In the good old USA, this has been borne out by the heavy production of the very successful Lanzo Bomber

which was approved for the Antique event. Looking over the results, one finds the Bomber design being built in

all sizes, from enlarged models for Texaco to small reductions for the 1/2A Texaco event. Worst part of all, all sizes fly

very well and are simple to build. One wonders what the next "plague" will be.

Don't give up hope, men! The enduring popularity of Carl Goldberg models is graphically shown in Photo No. 3 showing "hot shot" Rex Brown of Adelaide. Rex is seen with an Oliver Tiger powered Comet Zipper, his very successful Goldberg Sailplane with Fox "Quickie" .40 power, and last and biggest, the famous Goldberg Valkyrie flown by Leo O'Reilly using an Enya .60 four-stroke for the Texaco event.

Photo No. 4 is living proof that the Australian O.T. RC flier is right up to date on flying models and power thereof. Taken at the 1995 South Australia State Championships, the photo depicts the winners of the Open Duration event (which corresponds to the U.S. Antique event). First was Bill Britcher with a Jett .40 powered Kerswap that gets a remarkable climb. Second was a 10 percent reduced Shereshaw Cumulus by Mark Collins. He employed the well-known McCoy .60 which is practically a fixture engine in Australia for high-climbing models such as the Playboy Senior. At the last MAAA Nationals this writer attended, no less than 10 McCoy powered Playboys were in the flyoffs. Requires sharp vision to pick out the right speck in the sky! John Keardon used the (now) old reliable Lanzo Bomber to obtain 3rd place using a Super Tigre .40 for a zippy climb. This was helped immeasurably by the reduction of 85 percent of the original size. The power race in "Oz" is no different from what the U.S. contestant runs into at the U.S. SAM meets.

Before closing out this report on the South Australia State Champs, we would be remiss if we didn't show at least one of the few free flight models entered in the "comp." Photo No. 5 shows very clearly Bob Howie's 1938 Wakefield used at Wakerie Airport. Looks suspiciously like the French



Photo No. 2. RC Nostalgia is really starting to catch on in Oz. These two examples of the "Hyphen," a good flying 1950 Australian FF design by Bill Evans, were built by Mal Sharpe (left) and Kevin Green.



Photo No. 3. Highly competitive Aussie O.T. RCer Rex Brown with three Carl Goldberg designs, a Zipper with an Oliver Tiger diesel, a Fox Quickie .40 powered Sailplane, and Leo O'Reilly's big Valkyrie with an Enya .60.

PLUG SPARKS

Fillon Wakefield winner of 1937. Again, take a look at that great grass field that forms the Glider Port at Wakerie. Impressive!

ENGINE OF THE MONTH

Right after WWII, the popularity of rear-rotor intake engines increased almost to the proportion that racing engines like McCoy, Hornet, etc. enjoyed. Inasmuch as these speed engines were quite expensive (cost of ball bearings, special steel liners, etc.), it followed that sport type engines would follow the same design.

Such is the Forster G-29, this month's engine which appeared in the late '40s. Price of \$11.75 was extremely attractive and the performance was superlative. The engine review in the August 1950 issue of *Aeromodeller* magazine gave glowing reports on the starting and running of this new Forster model.

Being tested on 37-1/2 percent nitromethane fuel, the engine produced .58 bhp at 16,200 rpm. The surprising item on the engine analysis chart was the small range of bhp on either side of the power curve at 15,000 to 16,000 rpm, giving .58 bhp. Most surprising is the small drop in



Photo No. 4. Winners of the Open Duration O.T. event held at the 1995 South Australia State Championships, from left: 2nd place, Mark Collins with his McCoy .60 powered scaled-down Shoreshaw Cumulus; 1st, Bill Brlicher with his enlarged Kerswap, powered by a Jeti .40; and 3rd, John Keardon with his S.T. .40 powered 85 percent Lanzo Bomber.

power between 15,000 and 16,000 was only .02 bhp. This gave the modeler a wider choice of propeller, ranging from 10x6, 9x6, and a speed 7x9 propeller.

In the G-29 model, the modeler was given the option of radial or beam mounting. This .297 cubic inch engine with bore

continued on page 76

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SPECIFICATIONS:

Top Wing Span:	54.5"
Bottom Wing Span:	51.75"
Total Wing Area:	966 sq. in.
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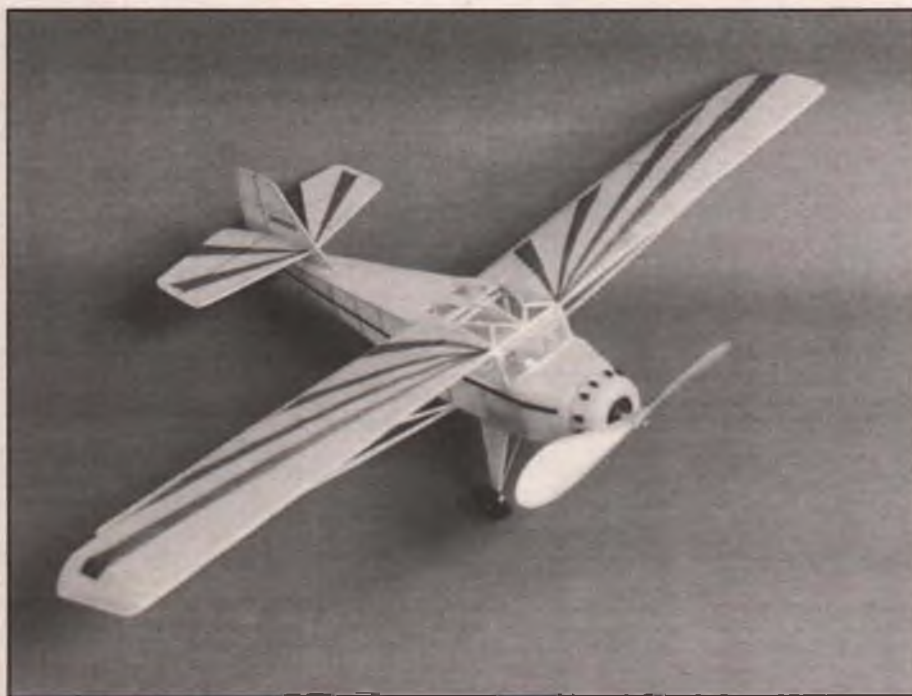
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THE DENNEY KITFOX III FOR PEANUT SCALE

One of the most popular of the modern homebuilts, the Kitfox in any of its variants makes a fine FF Scale subject. Dave's Peanut model is designed to the 9-inch fuselage rule, spans 16-3/4 inches.



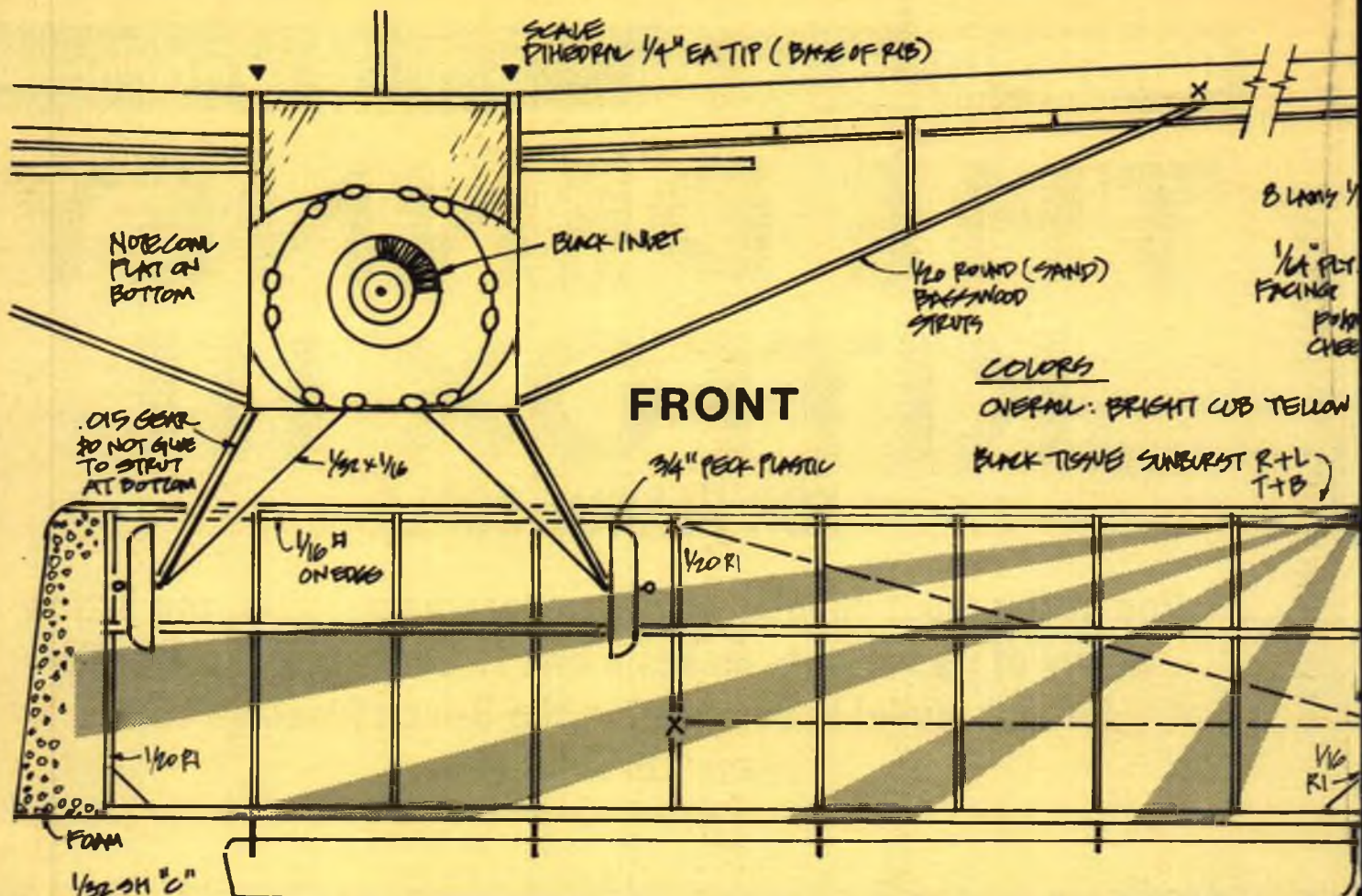
This shapely little homebuilt, from the mind of Dan Denney, is a 32-foot span, Rotax two-stroke powered beauty with folding wings, great visibility and the option of being fitted with floats (see sketch on plans), skis or tundra tires. Several different versions are currently being kitted by SkyStar Aircraft Corp., including the XL, Classic IV, Series 5, Speedster and trike-gear Vixen.

Many hundreds of Kitfoxes have been built and flown, providing a wide variety of scale color schemes for modelers to choose from—everything from the simple bright Cub yellow with black sunburst and a centerline stripe as used here, to some truly wild and colorful designs. No question about it, the Kitfox makes a great scale subject.

Are you ready to build this modern flier? Start by making two 11x17-inch copies of the full-size centerfold plan (press it tight to the glass) at your local copy shop. Tape one to your building board, cover it with waxed paper or plastic food wrap to prevent glue bonding to the paper. Use the other copy for patterns, tracing decorations, etc. Be sure to read all of the callouts on the plans and assemble all of the required tools, balsa (use 6-pound stock for indoor, 10-pound for outdoor), tissue, glue and paints (if you choose to airbrush rather than just use colored tissue). Do *not* dope this model—it will warp like a pretzel! Use rubbing alcohol to shrink the tissue, or pre-shrink the tissue on a frame before covering the model. A basic workshop tool inventory would include an X-Acto knife with a #11 blade or broken double-edge blade (be careful!), dressmaker's pins—preferably with bead heads, self-healing cutting board (a scrap of dark artist's mat board will do), glue applicator, fine-point artist's sable brush, and needle nose pliers.

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

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



FRONT

COLORS
OVERALL: BRIGHT CUB YELLOW
BLACK TISSUE SUNBURST R+L
T+B

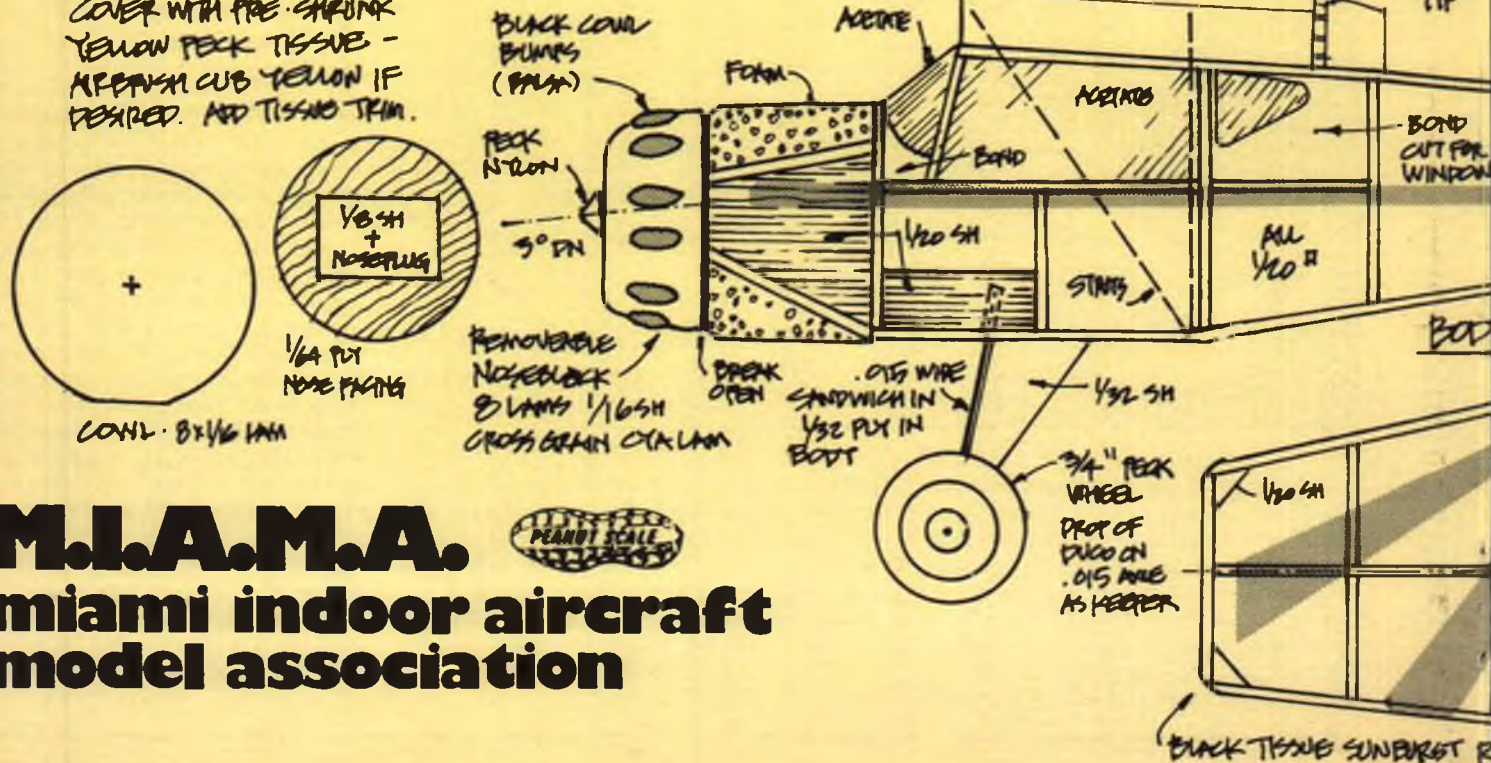
1/32 SH "C"
FLAPERON
ON 1/32 PLY STAYOFFS
SET PARALLEL TO WING, THEN
BEND RIGHT FLAPERON DOWN TO

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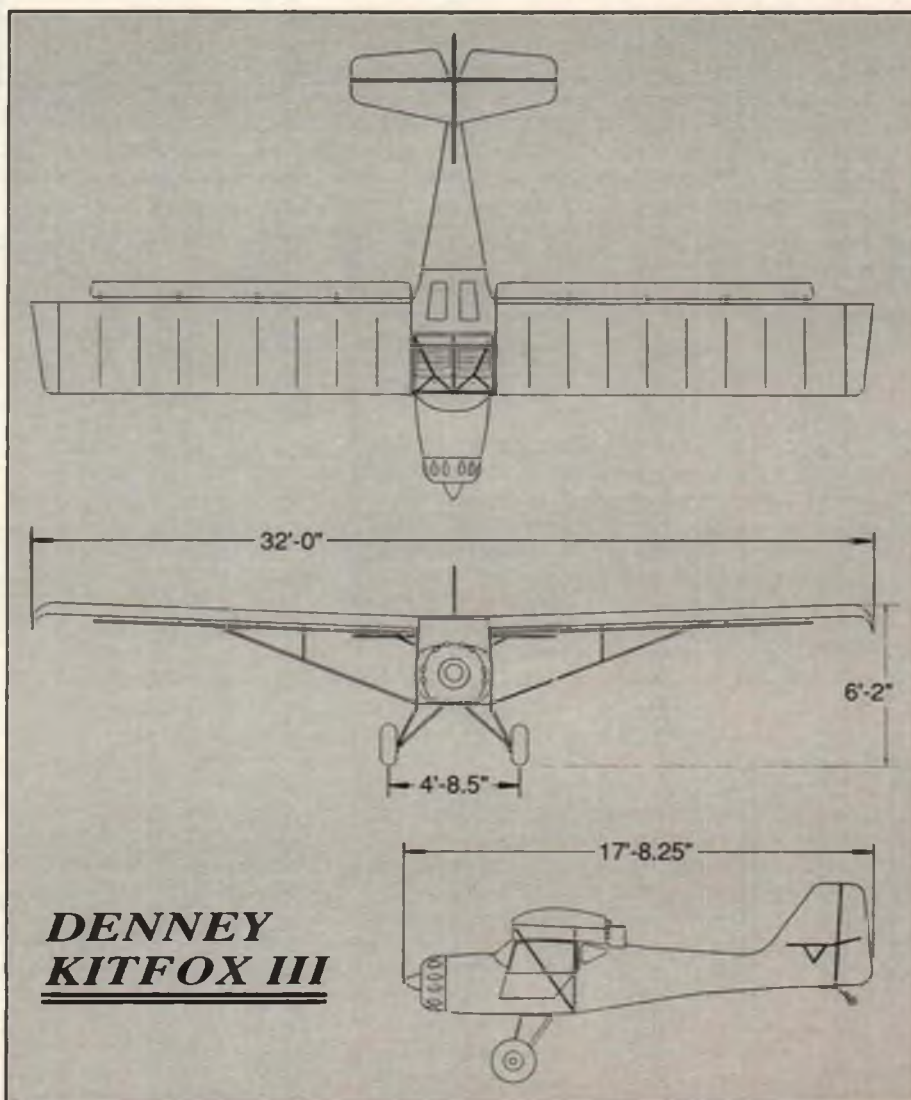
We have found that trimming high-wing monoplanes like this one is easier if you build in some down and right thrust, adjusting for a loose right-hand circle in the climb. Outdoors the glide is a minor part of the flight; indoors the prop should turn in cruise until touch-down. The balance point should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

We know you will enjoy your little Kitfox—and if you're inspired to build the full-size man-carrying aircraft, or want to



About the only unusual design feature of the Kitfox is the detached ailerons, which are entirely separate surfaces suspended just below the trailing edge of the wing (see three-view). The model pictured was built from Dave's plans and photographed by Gil Coughlin of Tacoma, Washington.

do some scale documentation research, you can reach the SkyStar Aircraft Corp. at 100-K N. Kings Rd., Nampa, ID 83687; (208) 466-1711. **MB**



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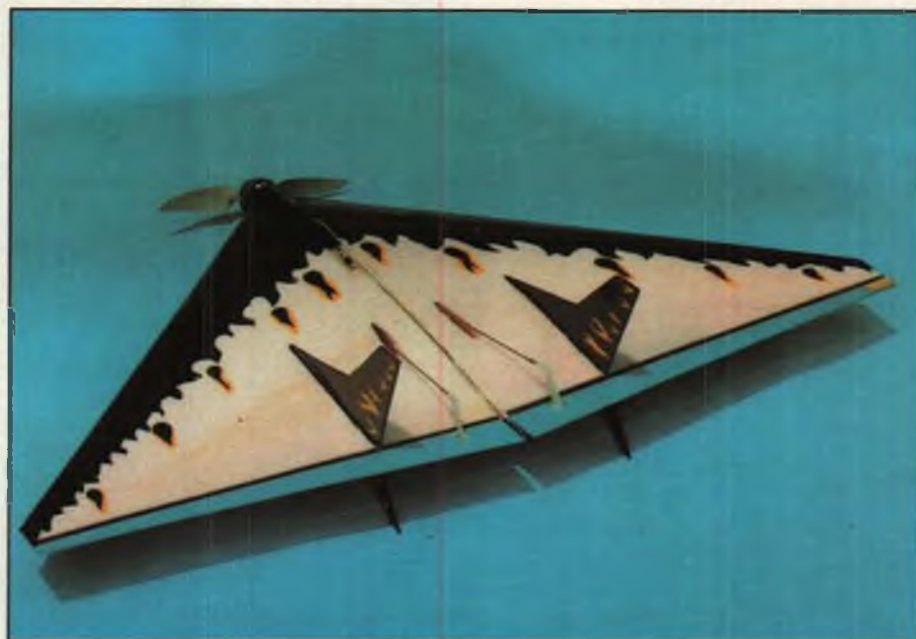
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Flash
Sundays Will Never Be the Same!



The BLACK FLAME!

Derived from William Whitten's "Delta Vee," the Black Flame is a faster, overall higher performance model for the Astro 035 and six cells. Full-size patterns on the following pages.



Looks like a lot of fun, doesn't it? The Black Flame has neutral stability when balanced and adjusted according to the directions. Jim says the first few launches are "exciting" until you get in tune with the model's size, speed and response, recommends you have a buddy make the first launches for you. The Black Flame is a one-piece airplane with all equipment permanently installed; there are no access hatches save for a small one just in front of the radio switch, used for charging the battery.

Top Gun electric pilots—attention! You gentlemen flying a "Delta Vee" built from the January, 1993 issue of *Model Builder* are now ready to advance to a new delta, "Black Flame," which has speed, stealth, speed, cat reflexes and speed. This baby packs an Astro 035 running on six cells for more power and wraps this in a speedy symmetrical airfoil with four fins. All this is

in a new 30-inch span foam core airframe that weighs in at only 22 ounces, as compared with the Delta Vee's 28 ounces. The sleek Black Flame will command everyone's attention when it shoots silently across the field.

Black Flame has subtle combat K.I.S.S. design features; pink foam strength is retained by minimizing cutouts to the extent

that the only access opening is for charging. Carbon fiber tape stiffens the motor mount and the trailing edge. A tapered elevon design increases elevator power while controlling aileron sensitivity. A microprocessor mixer provides 100 percent elevon deflection for both aileron and elevator maneuvers. The four fins provide maximum yaw stability for flight and land-

ing. A wedge trim tab counteracts the prop torque while allowing the elevons to remain at identical reflex angles. The symmetrical airfoil has the best streamlining and aerodynamic features for aerobatics, and also helps in reducing the time to cut the cores. And then there is the most obvious feature that always raises the question, "Why is the rear painted blue?" The answer is to hide elevon control movements with stealthy sky-blue camouflage.

POWER SYSTEM

The Astro 035 is a stick of dynamite with six cells on the south end and an efficient prop on the north. The NiCd's are fastened on each side of the spine in two sticks of three. Sanyo 800-mAH AR cells are recommended because they are thin and allow a thicker foam section to be glued to the spine. The only power plug is a Sermos joining the speed control to the battery, and is used for recharging. As for props, high pitch was meant for this plane. Graupner's 6x6 Scimitar is flat-out fast, and the folding blades protect the motor on landing. The 6x6-propelled silent streak changes while diving, becoming a missile with a faint but very distinctive F-51 Mustang whine.

RADIO SYSTEM

Two types of Futaba 4NBL systems have been tried with equally good results. The first included the standard four-channel R114H receiver, two Royal mini servos, a 150-mAH battery, a Quillen MicroMixer and a small generic ESC. At present, Black Flame is guided by a Futaba MCR-4A com-



Author/designer Jim Petro couldn't be more tickled with his little electric powered delta. Prop is a 6x6 Graupner Scimitar; the folding blades effectively prevent a bent motor shaft on landings. The plane is covered with UPS clear shipping tape, black and yellow MonoKote trim and Perfect blue and black paint. This is Jim's 50th anniversary with model airplanes!

bination receiver/speed control with BEC and automatic motor cutoff, two Futaba S133 micro servos and the Quillen MicroMixer.

(What's a MicroMixer? Art Quillen, electronics wizard and a flying club friend, created this micro-sized add-on device for non-mixing radios; it can be adjusted to mix two channels for elevons, V-tails, flaperons, etc. All you do is plug the two leads into the appropriate receiver sockets and plug

the servo leads into the two mixer sockets. See Art's classified ad on page 90. It seems that RC components are approaching a point where the bulkiest parts will be connectors and wires!)

CONSTRUCTION

Do not use white foam for this plane because it lacks compressive strength for skin impact resistance. Pink foam, on the other hand, has strength and is so easy to form that you should build for lightness and consider the structure as replaceable. Cutting the cores is a one-man operation using the pivot point method explained very well in the "Model Design & Technical Stuff" column in the February '89 *Model Builder*.

Laminating the foam before cutting is absolutely necessary to counteract internal stresses created during the manufacturing process. Buy the 1x48x96-inch panel and cut it lengthwise into two 24x96-inch pieces. Cut three pieces each 18 inches long from both long strips. Match each pair together with the printed side out and glue them together with epoxy, pressing them flat with weights. The edges are similar to drywall sheeting and should be trimmed back. Prepare one of the 24-inch edges on each of the three pieces to be flat and square for the template and spine. Mark two of the pieces as left and right; the third will be for practice setup and cutting. Use a ballpoint pen to mark construction lines on the three and then prepare the cutting table with alignment lines and the pivot point as shown in Figure 1. The pivot is located at the same height as the centerline of the template.

My hot wire is a 33-inch long, very thin nichrome wire with a wood dowel handle. Adjust the battery charger current (about 1



Elevon control view. Large horns are necessary to limit elevon movement and overcontrolling. The large holes for the pushrods are also cooling air outlets.

TEMPLATE FOR CUTTING FOAM CORES (1-1/2 LB. DENSITY PINK FOAM HIGHLY RECOMMENDED)

MOTOR TUBE — HEAVY BOND PAPER & GLUE WRAPPED AROUND MOTOR CASE, MINIMUM 4 WRAPS (INNER DOTTED LINE) OR UP TO 1-1/2" DIA. (OUTER DOTTED LINE) TO MATCH GRAUPNER

HOLE FOR WIRING

NOTE SLIGHT DOWNTHRUST ANGLE

1/16" PLYWOOD SPINE

CUT ON LINE TO MATCH 4-PLY OR 1-1/2" DIA. TUBE SIZE

EDGE OF FOAM CORE

HOLE FOR BALANCING

1/16" PLYWOOD BOTTOM FIN

1/16" PLYWOOD ELEVON

ASTRO.035

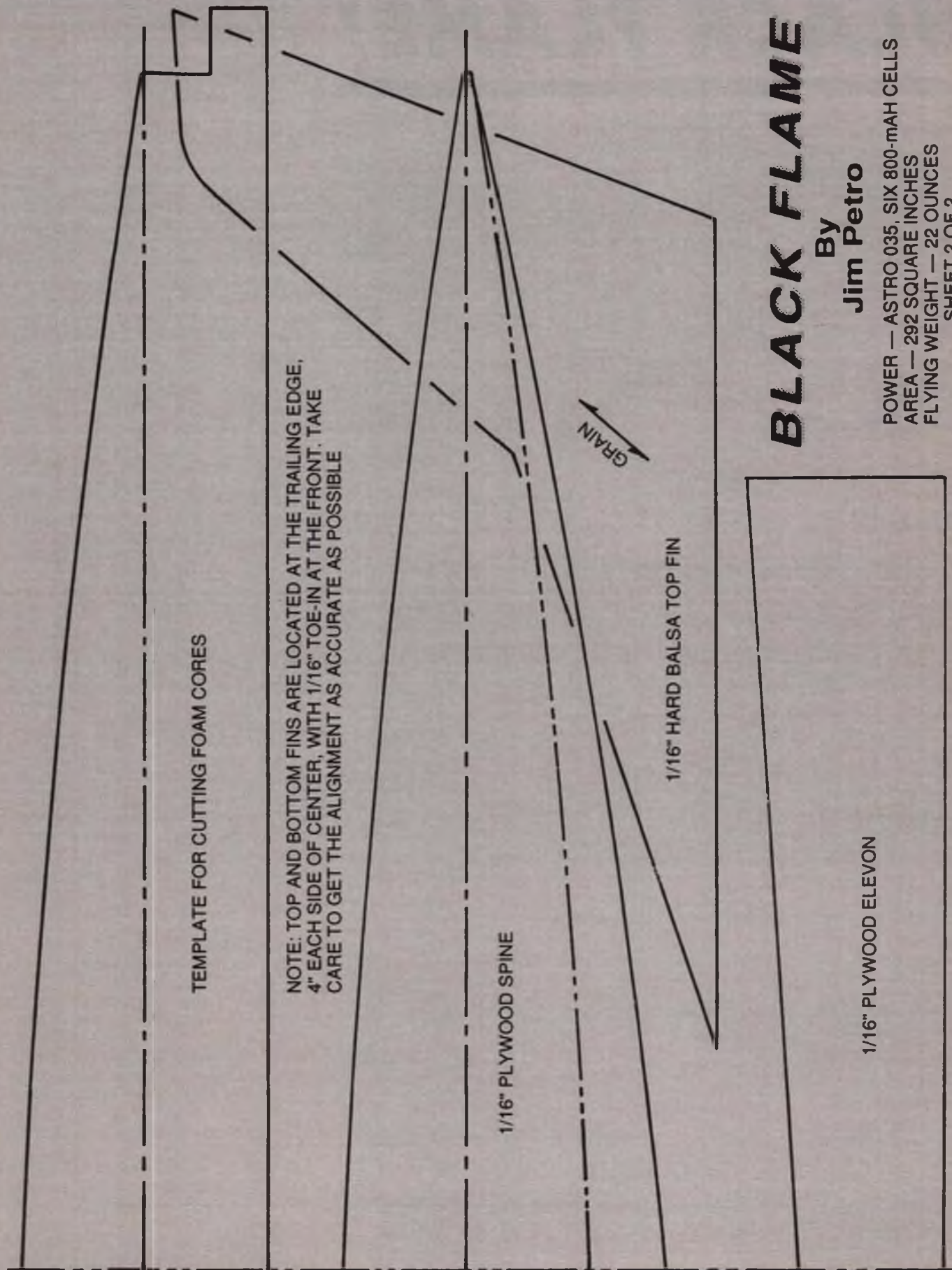
MOTOR

USE 6x6\

GRAUPNER

SCIMITAR

FOLDING PROP



TEMPLATE FOR CUTTING FOAM CORES

NOTE: TOP AND BOTTOM FINS ARE LOCATED AT THE TRAILING EDGE, 4" EACH SIDE OF CENTER, WITH 1/16" TOE-IN AT THE FRONT. TAKE CARE TO GET THE ALIGNMENT AS ACCURATE AS POSSIBLE

1/16" PLYWOOD SPINE

1/16" HARD Balsa TOP FIN

GRAIN

MATCH LINE FOR SHEET NO. 1

BLACK FLAME

By
Jim Petro

POWER — ASTRO 035, SIX 800-mAH CELLS
AREA — 292 SQUARE INCHES
FLYING WEIGHT — 22 OUNCES
SHEET 2 OF 2

1/16" PLYWOOD ELEVON

The BLACK FLAME!

FIGURE 1 — TABLE ALIGNMENT LINES FOR CORE CUTTING

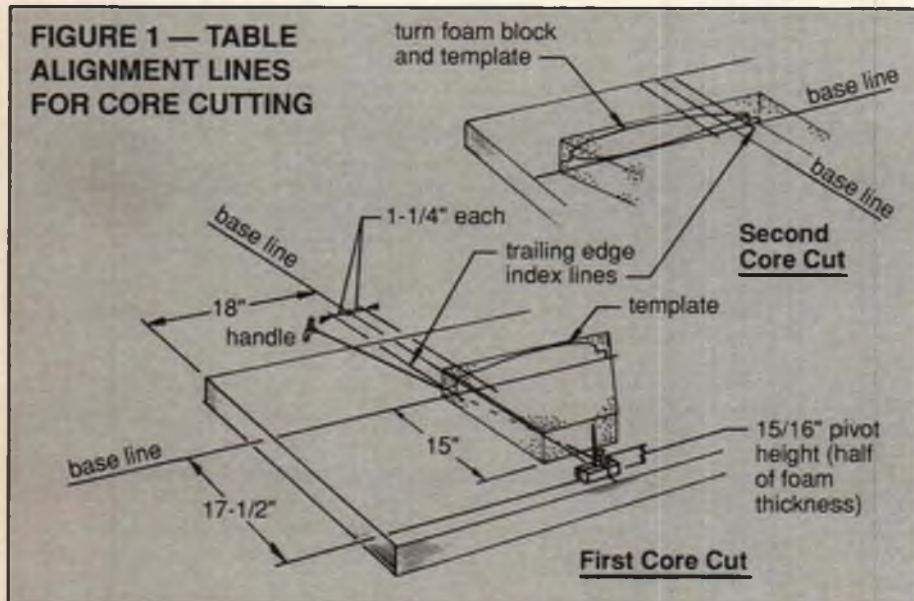


FIGURE 2 — SIGHT STICK CUTTING GUIDE

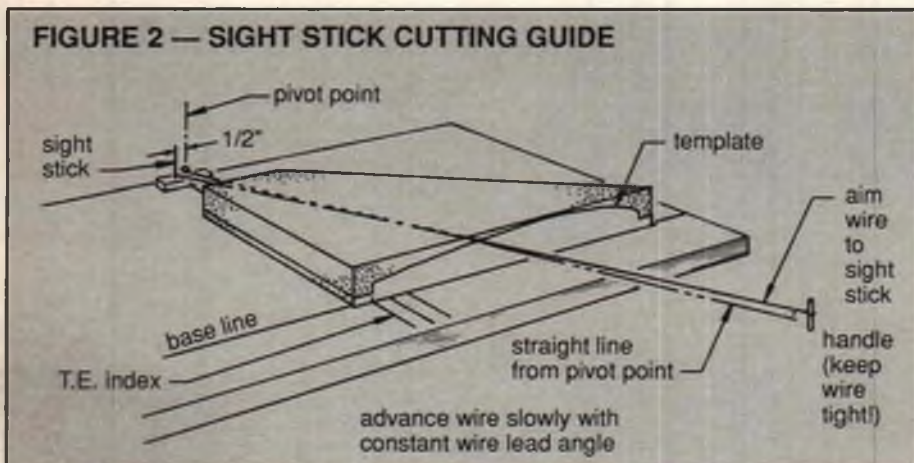
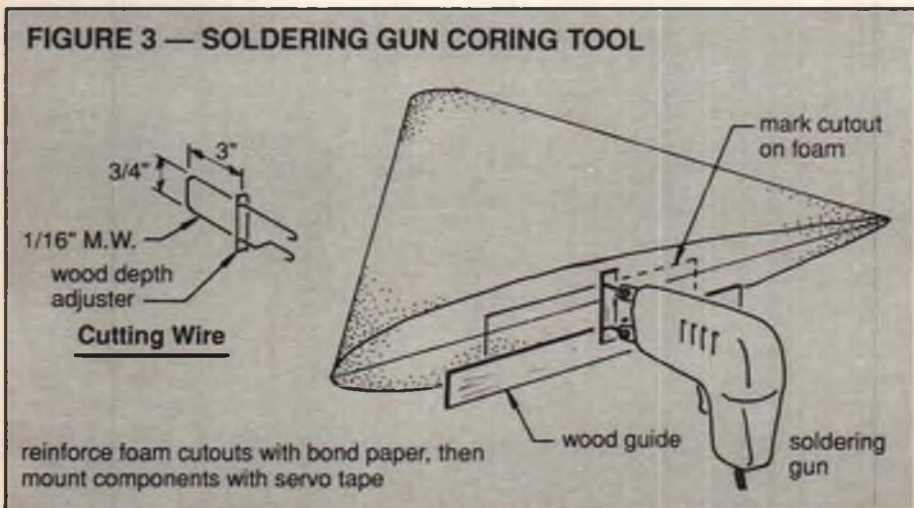


FIGURE 3 — SOLDERING GUN CORING TOOL



amp) to produce a shiny, smooth cut. Because of the extreme taper of the core, the tips are exposed to critical heating and will lack the smoothness of most of the surface. The practice core should be used to find the lowest current setting for the best general surface condition.

Figure 2 shows the use of the index rod by the pivot to sight the slight wire draw angle necessary for proper cutting. Start all cuts from the trailing edge. You will find it easier to handle the wire in one direction than the other, as when the cores are flipped over for the opposite side cut. Double-stick clear tape works well for holding the template on the foam and the foam to the table.

Interior cutouts are made with a wire tool on a soldering gun. Replace the soldering tip with 1/16 music wire bent into a channel 3/4 inch high by 3 inches deep. Figure 3 illustrates how to control the depth and position of the cuts. After determining the positions of the radio equipment, glue heavy bond paper to the foam as a base for the foam tape attachment of each component. Odorless CA glue works well with the pink foam but *do not use any accelerator!*

Tack a 1-3/4 inch wide strip of bond paper to the motor and glue and wind at least a four-ply tube—you can increase the number of tube winds to match the diameter to the spinner. Make the 1/16 plywood spine and attach the batteries. Tack the motor to the spine and cut away the motor area in the right-hand core. Tape all the components in place that are going in the right core and install the pushrod. Put the core into the bed pieces and support it vertically in a vise with the spine on top. Route the wires out the hole and then epoxy the spine to the right wing core.

Mount the rest of the components into the left core and install the pushrod. Cut the foam away for motor clearance. Cut out the access panel and switch mount area and glue the switch mount to the spine. Connect the radio and motor systems and test for correct movements; get it right now because everything gets sealed away. If you're satisfied with the installations, epoxy the left wing core to the spine, being very careful to align the centerlines and the trailing edges.

When cured, inspect the spine and fill in any voids with epoxy. Motor downthrust is set by the spine, but scrap wood shims will be needed between the motor and the cores on the right and left sides to lock the motor straight ahead. Glue the shims in place and then fill the gaps around the motor with Sig Epoxolite blended to the wing surfaces. Reinforce the motor mount with carbon fiber strips, 1/4-inch wide and 3 inches long, two on the top and two on the bottom, equally spaced around the motor tube. Put additional .6-ounce fiberglass cloth and epoxy reinforcing on the front area.

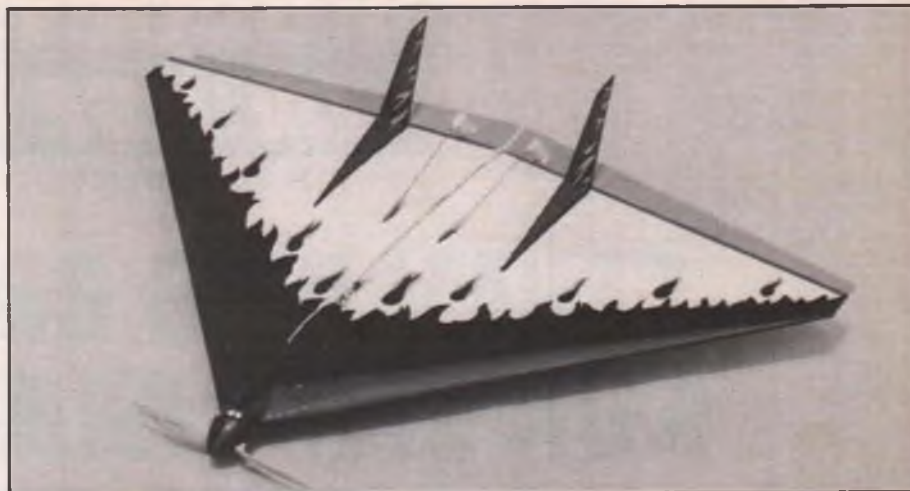
The trailing edge is sanded flat to at least 1/16-inch thickness. It's important to get the same trailing edge forward sweep on both

wings. Measure for the same distance from the front of the spine to the rear of the wingtips; use a sanding bar to bring the edges into alignment. Fill any dings and sand the wing surfaces smooth. Glue 1/4-inch wide carbon fiber tape to the top and bottom of the trailing edges. I recommend Titebond for this because you can use masking tape to hold them and the trailing edge straight.

Now is a good time to cover the wing with your favorite low-temp material. Make the top and bottom fins, cut away the covering as needed, groove the foam slightly and glue each fin to the wing so that it has 1/16-inch front toe-in and is upright 90 degrees to the surface. It's important that all fins be accurately positioned or else you'll build in an unwanted turn.

Attach the elevons to the trailing edges; I prefer Graupner clear hinge tape from Hobby Lobby, as it gives an excellent sealed hinge line. Temporarily glue a 1-inch piece of 1/2-inch wide trailing edge stock on top of the right elevon to act as a trim tab. With the pushrods attached to the horns, the elevon neutral position should be 1/8-inch above level. Choose a horn hole that raises the elevon 1/2-inch above neutral at full up elevator. Install the prop.

Turn the plane over and make a 1/16-inch hole in the skid close to the wing, 10 inches forward of the end of the spine; this is the balance point. I use short piece of 1/16 music wire with hooks on both ends



to hang the model for balancing and also to hang it from the ceiling in my shop. To balance the model, first stick brads into the light wingtip as necessary to get the wing to hang level. Next add weights as necessary to get the spine level for the horizontal balance.

FLYING

I imagine some of you started reading by jumping to this section first. Yes, this baby accelerates and it would be prudent to have a launcher give it a fast level toss for the first couple of flights. Once your reflexes become tuned there's no problem launching it yourself. Black Flame will quickly reach full speed

and is roll stable. Adjust the length of the right elevon trim tab to achieve an even elevon setting at neutral trim. Some power pitch trim is always needed on a delta because of the elevon reflex, but it is minimal with our balance point. If you think you can get away with balancing 1 inch farther back, then get ready to start building a replacement model. I find the best landing method is to approach in a fast letdown and fly to a greased touchdown. Deltas tend to cartwheel disgracefully off the field if the nose is held too high and one tip drags. Black Flame is flyable with the bottom fins missing, but is very roll sensitive.

Black flame? ... It's the hottest stuff found in a black hole! MB



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New single piece CARBON FIBER / EPOXY Unlimited racing propellers. These have the same APC design which was dominant in Unlimited Gold at Galveston and Madera in 1994. Initial sizes available will be: 18 x 18, 19 x 19, 20 x 20, 21 x 21, 22 x 22, 23 x 23, 24 x 24, 25 x 25, and 26 x 26.

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5.5 X 2	1.59	8.5 X 7.25	5.395	11 X 4	2.49	12.5 X 11.5	7.795	14 X 14N	10.1295	18 X 16	22.00	22 X 14	45.00
5.7 X 3	1.59	8.5 X 7.5	5.395	11 X 5	2.49	12.5 X 12	7.795	14.4 X 10.5	10.1295	20 X 8	12.2500	22 X 16	45.00
6 X 2	1.59	8.75 X 7.0	5.395	11 X 6	2.49	12.5 X 12.5	7.795	14.4 X 12	10.1295	20 X 10	25.00	24 X 10	55.00
6.3 X 4	2.395	8.75 X 7.5	5.395	11 X 7	2.49	12.5 X 13	7.795	14.4 X 13	10.1295	20 X 12	25.00	24 X 12	55.00
6.5 X 2.9	2.395	8.75 X 8.0	5.395	11 X 8	2.49	13 X 6	4.25	14.5 X 14N	10.1295	20 X 14	25.00	24 X 14	55.00
6.5 X 3.7	2.395	8.75 X 8.25	5.395	11 X 9	2.49	13 X 7	4.25	14.5 X 14.5N	10.1295	20 X 16	25.00	24 X 16	55.00
6.5 X 5.0	3.395	8.75 X 8.5	5.395	12 X 6	2.89	13 X 8	4.25	15 X 8	10.1295	21 X 12	25.00	3 Blade Hub 17 - 19" 54.00	
6.5 X 5.5	3.395	9 X 4	16.199	12 X 7	2.89	13 X 9	7.795	15 X 10	10.1295	22 X 8	31.00	3 Blade Hub 20 - 21" 66.00	
6.5 X 6.0	3.395	9 X 5	16.199	12 X 8	2.89	13 X 10	7.795	15 X 11	10.1295	22 X 10	31.00	3 Blade Hub 22" 78.00	
6.5 X 6.5	3.395	9 X 6	16.199	12 X 9	2.89	13 X 11	7.795	15 X 12	10.1295	22 X 12	31.00	3 Blade Hub 24" 108.00	
7 X 3	1.59	9 X 7	16.199	11 X 10	7.795	13 X 12	17.795	15 X 13N	10.1295	22 X 14	31.00		
7 X 4	1.59	9 X 8	16.199	11 X 11	7.795	13 X 13N	9.795	15 X 14N	10.1295	22 X 16	31.00		
7 X 5	1.59	9 X 9	16.199	11 X 12W	7.795	13 X 13.5N	9.795	15.5 X 13N	10.1295	24 X 10	38.00		
7 X 6	1.59	9 X 10	16.199	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 14	3.85	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	3.85	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	13.5 X 14W	10.1295	10X 6P	Pusher 3.95				
7.8 X 7	6.395	9 X 8.5	5.395	12 X 11	7.795	14 X 5N	12.95	10 X 7P	Pusher 3.95				
8 X 4	1.79	9.5 X 4.5	11.229	12 X 11N	7.795	14 X 6	12.95	10 X 8P	Pusher 3.95				
8 X 5	4.179	10 X 3	2.29	12 X 11.5	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	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 12N	7.795	14 X 12	10.1295						
8 X 9	1.79	10 X 7	2.29	12 X 13	7.795	14 X 12N	10.1295						
8 X 10	1.79	10 X 8	2.29	12 X 13N	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	11.229	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						

CURRENT USAGES

1

.049 Free Flight

2

15 Combat

3

10-15 Pylon

4

25 Pylon

5

40 Pylon

6

36 Combat

7

60 Pattern

8

CL Stunt

9

120 Warbird

10

120 Pattern

11

40 Free Flight

12

35 CC

13

70 CC

14

21-25 Free Flight

15

15 Free Flight

16

29 Free Flight

17

YS 91

MULTI-BLADE (3)

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CURRENT USAGES

1	.049 Free Flight
2	15 Combat
3	10-15 Pylon
4	25 Pylon
5	40 Pylon
6	36 Combat
7	60 Pattern
8	Cl. Stunt
9	120 Warbird
10	120 Pattern
11	40 Free Flight
12	35 CC
13	70 CC
14	21-25 Free Flight
15	15 Free Flight
16	29 Free Flight
17	YS 91

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PRODUCTS IN USE

■ By Roger Jaffe

CERMARK'S BRITTEN-NORMAN "ISLANDER" ELECTRIC TWIN

Reliable electric power is just the ticket for this scale twin—there's virtually no chance of the dreaded "engine-out" that so often proves fatal to multi-engine aircraft. Best part of all, it's an ARF!



When the folks at Cermark first approached *Model Builder* with the prospect of having me review the newest addition to their line of ARFs, a big twin-motor electric scale model of the Britten-Norman "Islander" commuter transport, I jumped at the chance. Steve Chao of Cermark was a bit reluctant at first to ship me one of the models in stock because, although the model itself had passed Cermark's quality control inspections, the written instructions had not, and were in the process of being rewritten. To me this wasn't a big deal, as the airplane is pretty basic, and so before

long I received a big box containing a big model plane, sans instructions. Steve just said to wing it (pardon the pun)—I shouldn't have any problems, and as it turned out, I didn't. The instruction manual is being finished up as I write this, and all the kits shipped will include them.

As a bit of background, the full-scale Islander was developed in the early 1960s by John Britten and Desmond Norman, who each owned 25 percent of Cameroon Air Transport; they designed the Islander specifically for use in their airline. It carries six to ten passengers, is cheap to purchase and operate and is easy to maintain.



Cermark's Islander is not a small model, as our author demonstrates. Photo was taken at one of Southern California's premier flying sites, Mile Square Park, on the morning of the first test flights.

The Islander prototype first flew in mid-1965. Later, because of financial problems, the Britten-Norman company was eventually acquired by Pilatus, a Swiss manufacturing group.

The Islander received its British certification in 1981 and its United States certification in 1982. By 1987 there were over 1,000 Islanders flying the friendly skies. Now, with the availability of this ARF



Close-up of the motor nacelle/landing gear/aileron servo installation. Note that a separate servo is used for each aileron. Roger says the supplied wheels are fine for smooth runways, but recommends going to bigger ones if flying off of rougher surfaces.

model, there will be many more Islanders in the air!

THE MODEL AND EQUIPMENT

Cermark's Islander is a 1/8-scale replica. The wingspan is 6 feet, the wing area is 792 square inches and the advertised ready-to-fly weight is 8 to 8-3/4 pounds. All of the equipment I used was already on hand: two Astro 05 cobalt motors, a Jomar Maxcell speed control, 16 Sanyo KR-1300 SC cells and a Futaba seven-channel receiver.

There are actually three different versions of the Islander available from Cermark: an uncovered, pre-built airframe; pre-built and expertly covered with white Goldberg Ultracote (this is the version I got); and pre-built, covered and including two CEM 05 direct drive cobalt motors.

What a wonderful plane! The Islander's built-up wood airframe comes 90 percent constructed and is fully covered with white Goldberg Ultracote. The compound-curved nose section is molded fiberglass, the motor nacelles are molded plastic. The wing comes in two halves, to be epoxied together with an aluminum spar joiner in between. The fuselage is completely assembled and the vertical fin and stabilizer come separate from the fuselage. The control surfaces are dry-assembled—you have to glue the hinges. Miscellaneous parts include two

CERMARK'S ELECTRIC ISLANDER

WINGSPAN	72 in.
WING AREA	792 sq. in.
FLYING WEIGHT	8-8.75 lbs. (7.5 lbs. as tested).
WING LOADING	23.3-25.5 oz./sq. ft. (21.8 oz. as tested).
OVERALL LENGTH	57 in.
MOTORS	Two direct drive cobalt 05s or 15s (Astro Flight 05s used on review model, swinging 8x4 APC props).
BATTERIES	14 cells (for 05 motors) or 20 cells (for 15s), 1400-1700 SCRs.
RADIO	Four channels required, flaperons optional (fifth channel mixed with ailerons).

Distributed by Cermark Model Supply Co.,
107 Edward Ave., Fullerton, CA 92633; (714) 680-5888.

hardwood dowel pushrods, a flexible pushrod for the nosewheel, motor mounts and brackets, landing gear parts, five wheels (two for each main strut) and a bag of nuts, bolts and assorted hardware.

The attention to detail is exquisite. For example, not only are the hinge slots cut cleanly with no balsa scraps or splinters attached to the hole, the slots are countersunk a bit so the hinges fit into the recesses. Where the upper covering overlaps the bottom, the covering trim line is smooth and straight. The fin fits snugly into the fuselage slot. Basically, every hole and slot is cut to perfectly match the part they are supposed to accept. They aren't a *little* too big or a *little* too small—they're perfect. Even

the dorsal that glues to the front of the fin is concaved to match the fin's rounded leading edge—no additional work required.

ASSEMBLY HINTS

The wing uses individual aileron servos, eliminating the need for aileron bellcranks or torque rods. In each wing panel is a square area that's not completely cut out—these are the aileron servo hatches. Just slice through the rest of the balsa and the aileron hatch falls onto your workbench. You'll find two pre-slotted hardwood blocks already installed for your servos—my Futaba S-133s fit perfectly.

Each wing panel comes with pre-drilled

About to touch down after another satisfying flight. Among the locals who tested the prototypes at Mile Square, the Islander has gained a reputation for being a smooth, very docile flying model, a reputation that our author discovered is well deserved.

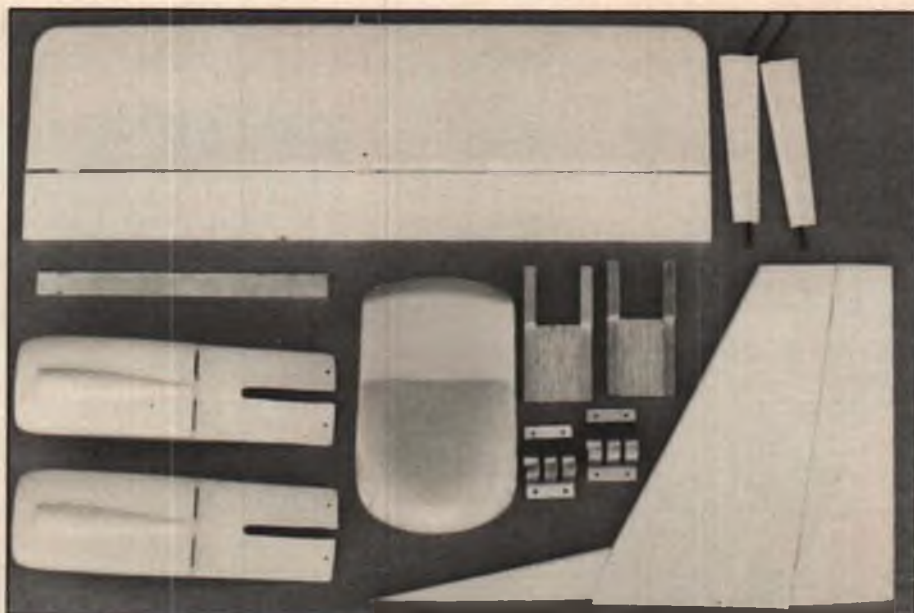


holes and pull strings already installed for snaking the servo and motor wires through. *Don't use them!* Steve Chao cautioned me about the radio interference they experienced with the prototypes because the servo wires and motor wires were too close together. To separate the wires, I drilled a hole in each root rib just aft of the leading edge and another hole just forward of the trailing edge; I then cut holes in the bottom sheeting so the wires could be pulled through the bottom of the wing. Fortunately there are lightening holes already cut in the ribs, so it's possible to snake your electrical wires through the wing using a stiff piece of music wire. It's not difficult, but it does take some patience. Run the motor wires through the forward holes and the aileron servo wires through the aft holes.

The stabilizer is held in place with two small dowels at the leading edge and a small screw at the rear. The fin is glued permanently to the fuselage.

When installing the control surfaces I first glued the hinges in place and then pinned them with some small straight pins for extra security. I found the supplied aileron pushrod wires to be very hard and brittle—both of them broke when I put Z-bends in them. Use your own music wire, you'll be happier.

Before gluing the motor mounts to the wing, make sure the motors fit properly—



Some of the Islander's smaller pieces—molded plastic engine cowls, fiberglass nose (gets screwed to the fuselage), two wood engine mounts that get epoxied into the wing, metal motor mounting brackets, etc. This particular model was supplied completely pre-covered with Goldberg's Ultracote; you can also buy it as an uncovered airframe, or pre-covered and with two CEM 05 cobalt electric motors—take your pick.

you may need to cut away a bit of the balsa spacer between the two hardwood rails to clear the motor and wires. The motors are mounted with two metal brackets that screw into the hardwood rails. The nacelle cowls cover everything nicely and attach

onto the wing with small wood screws.

RADIO AND ELECTRICAL HOOKUP

Unless you're using a computer radio and are mixing the ailerons to act as flaperons, you'll need a Y-connector to drive the two aileron servos from one receiver channel. Make sure the ailerons move in opposite directions. If they don't, you'll need to flip one of the servos over or find one that rotates in the opposite direction for the same control stick throw. According to Steve Chao the control throws should be 1 inch each way for the elevator, 5/8 inch each way for the ailerons and 7/8 inch each way for the rudder.

The choice of battery pack is very flexible. With two Astro 05 motors the plane will fly just fine with a 14-cell pack (or two standard seven-cell packs wired in series); I chose to use 16 Sanyo KR-1300 SC cells because I had them lying around. Admittedly, the 1300 SCs are not the best choice for a sport electric model like this—you really should use 1400 SCR or 1700 SCRC cells for best power and duration.

I wired the motors in series, and all of the power system wires are equipped with Sermos connectors. Please be sure to include an arming switch in the circuit; there's no easier way to add a measure of safety.

FINISHING

Instead of painting the model as shown on the box, I chose to detail it similar to a full-size British-registered Islander pictured in a book I have called *Modern Commercial Aircraft*, (by William Green, 1987 Crown Publishers, New York), which lists about a hundred different types of aircraft used for passenger service. I painted the yellow and blue stripes on the fuselage and

continued on page 64

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If the expert pilot, performance is the Obsession. This sailplane has all the attributes you look for, starting with light wingloading and low sinkrate. Its low drag planform and new Selig S4083 airfoil provide startling improvements in glide ratio, speed range and launch height.

The Obsession is a no-compromise competition handlaunch. A very slim composite pod and boom fuselage has a carbon fiber rod anchored perpendicular to the fuselage. The rod facilitates an unusual two-fingered launch, so you can bring much more force to the launch. Minimal frontal area, along with the superior properties of the S4083 airfoil,

gives you the ability to launch the Obsession very high. At high speeds, the S4083 provides a 15% improvement in L/D over the SD7037. This means greater penetration and the ability to work the broken lift typically found near the ground.

In the hands of an experienced pilot, the Obsession launches higher, ranges farther and thermals better than any other HLG we have seen!

WINGSPAN: 59"
AIRFOIL: S4083

Introductory Price **\$159.00**



Avocet

The future of high performance is available now!

Introducing the very competitive Avocet. We took the great flying characteristics of the Sparrow and added new technology and improved turning capabilities for racing—all in a 60" package. With its S7012 airfoil and light airframe, the Avocet is a wonderful light lift performer. With its generous control surfaces it has a very quick roll rate and performs aerobatics with ease. In light lift and on dual rate it is an armchair flyer an intermediate can easily fly.

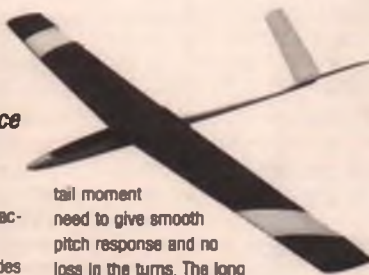
The Avocet is a no-compromise composite performance sailplane consisting of carbon fiber skinned foam wings and fiberglass skinned Spyder foam tails. The Kevlar/fiberglass fuselage is designed to have the longer

tail moment need to give smooth pitch response and no loss in the turns. The long nose moment requires little or no weight nose weight to balance the plane.

Sixty inch slopers don't get any better than this! If you are looking for a fast composite slope ship that's capable of lots of fun, or maybe kicking butt at the next slope race, look no further.

WINGSPAN: 60"
AIRFOIL: S7012 MODIFIED AT TIP

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Introductory offer: ARF Kit **\$288.00**



Dove II

Sets a new standard in two meter sailplane performance.

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

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

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agility to turn now. The result of these performance improvements is a two meter that will out-turn and out-thermal anything in its class.

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

WINGSPAN: 78.75"
AIRFOIL: SD7037 MODIFIED AT TIP

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the flaps, ailerons and servo bays are routed out.

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AIRFOIL: SPECIAL SD7037

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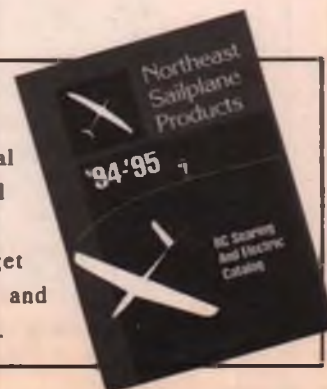
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FREE FLIGHT

.....

BY BOB STALICK

•Trend Setters! •The Ramrod 250 •Testing Cox's Killer Bees

Historians look at the past with an eye toward discovering the events which lead to the changes in direction that affect mankind. In a similar way, each of society's movements can be traced historically. Not all of these changes produce satisfactory results and almost always they are clouded in controversy.

In the free flight world, such events can be identified quite easily. For example, until Carl Goldberg popularized the pylon mounted wing on the Zipper, nearly all of its predecessors were cabin type models which had trouble handling the increasing power of the available engines. The Zipper, which didn't look like a "real" airplane, came in for an inordinate share of derisive comments, but it flew better than anything then available, and it was built by the thousands. Many other designers came out with pylon models, the Ranger and the Playboy being two notable copies. All were winners in the contests of the day.

From the introduction of the pylon mounted wing concept, free flight competition was altered forever. The era of the "pencil bomber" had begun. Future models all had the same features: thin fuselages, high



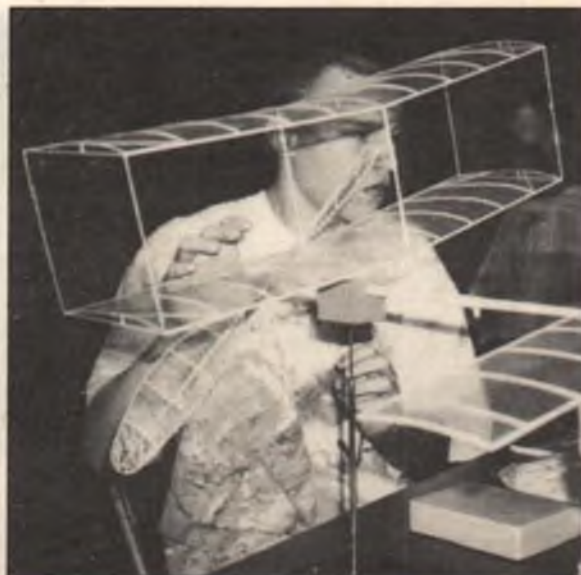
Wally Miller (left), originator of the EZB event, presents the silver plated International EZB perpetual trophy to the 1995 event winner, Larry Costick, of Missouri. Larry's two best of six flights totaled an astonishing 53:40! The scene is the Kibbie Dome at the University of Idaho.

mounted wing, and high power. Many lamented the change and vowed to never fly free flight again. I think a good part of the SAM Old Timer movement is traceable to the desire to fly "real looking" model airplanes.

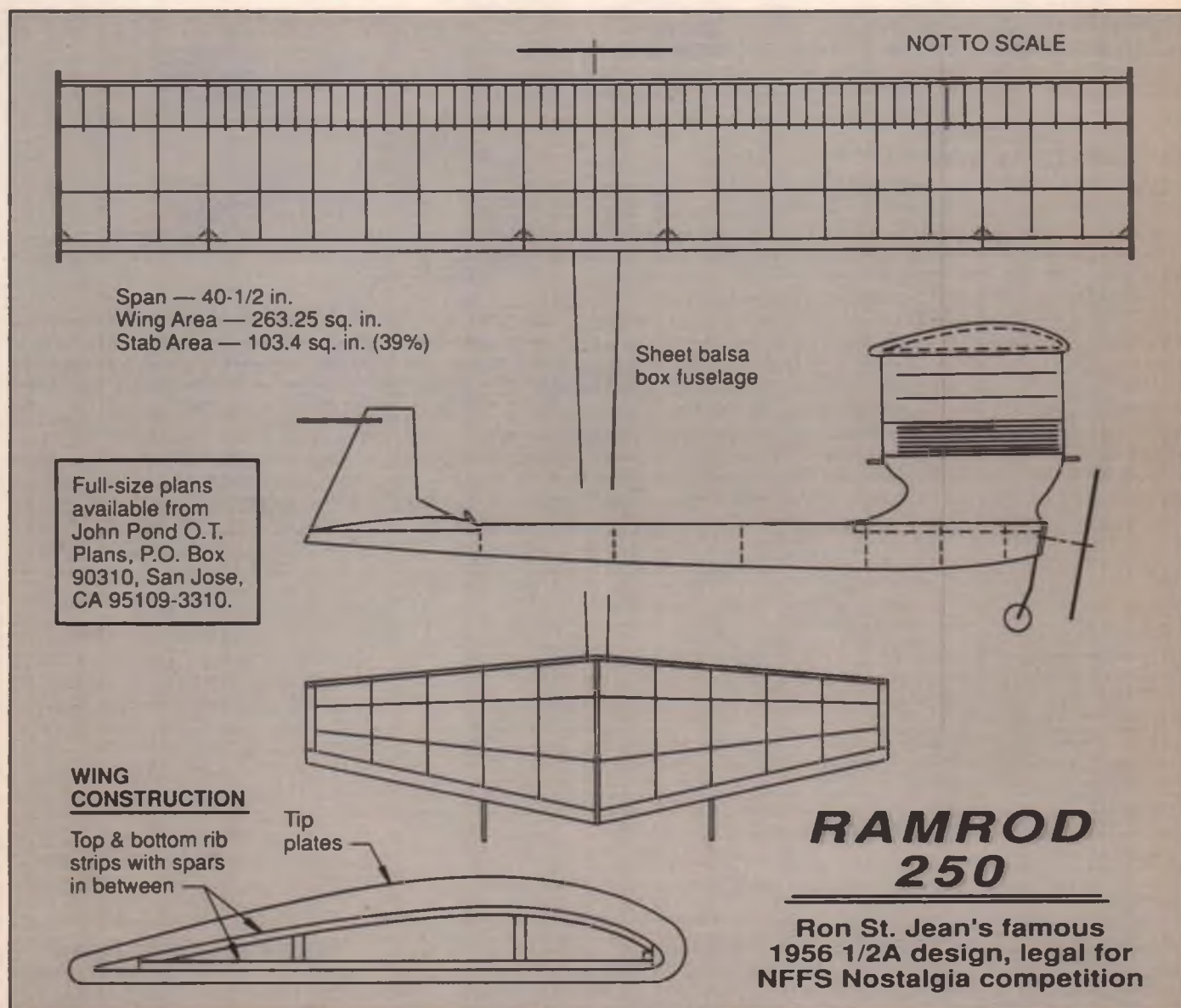
So, as we look at seminal designs that changed the direction of free flight, none quite stacks up to the changes wrought by the Zipper. One

that comes close, in my opinion, is the Ramrod by Ron St. Jean.

Up until the development of the Ramrod, 1/2A free flights tended to be small, short-fuselage designs that were reduced versions of Class A or larger models. The Ramrod represented a completely new type of competition 1/2A model. It featured a large wing, dramatic downthrust, and a trimming



Upcoming Junior contestant Jake Palmer of Salem, Oregon, readies his Pennyplane for an official flight at the AMA Indoor Nationals at the Kibbie Dome.



PLAN OF THE MONTH

scheme that made the design a winner. Until the emergence of the Starduster, the Ramrod represented the change that moved free flight competition to the next level.

PLAN OF THE MONTH: Ramrod 250

The Ramrod appeared in the June 1956 issue of *M.A.N.* and was an instant hit. The plans were presented in several different scales, from the featured 250 square inch size up to the 750. It was possible to

build Ramrods for all classes, and many competitors did so.

What Ron St. Jean did with the Ramrod was to use wing warps with a purpose. All of the offsets built into the model were done so to improve performance. Couple the large size (for then) with lightweight construction, and the flier had an unbeatable combination. The major components of the Ramrod system were:

1. The wing was warped to provide wash-in on the right main panel and wash-out on both tips. This kept the model

climbing safely to the right with the nose pointed up.

2. The stabilizer was raised on the left side to induce left turn in the glide.

3. The fin was offset to the left to provide a quick transition after the engine cut off.

4. The engine was mounted with 10 degrees downthrust to allow the model to assume the proper climbing attitude after a VTO (vertical takeoff) launch.

The model itself was simplicity personified. Traditional wing ribs were disdained (the Berkeley kit and subsequent Sig

kit reinstated them) in favor of capstrip ribs cut from 1/16 balsa. Stab ribs were simply strips of 1/16x1/8 balsa glued over and under tapered spars. A slab-sided fuselage and high pylon completed the package. The hottest engine of the time, a Thermal Hopper or Hornet, was the motive power. In the 20 seconds allowed for VTO in those days, the model would literally climb out of sight.

The Ramrod remains a potent model in Nostalgia contests today. Especially in 1/2A classes, this model is regularly

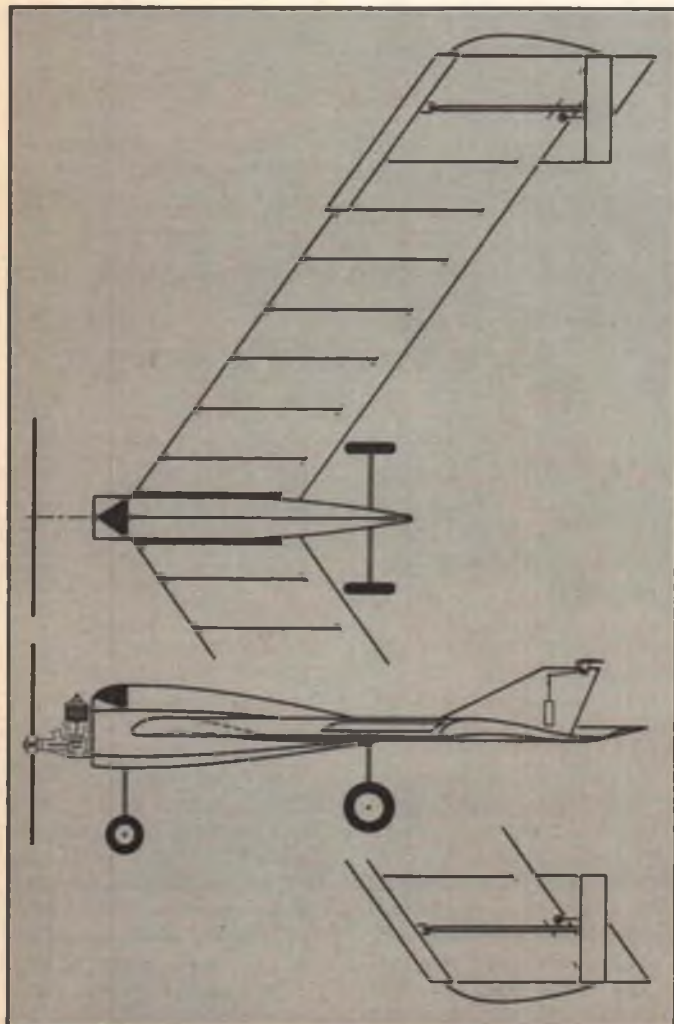
FREE FLIGHT

in the winner's circle. Plans for the 250 are available from John Pond for \$6 plus \$1.20 for postage (and 8-1/2 percent tax if you're in California); order Plan #34F1. Send your order to Old Time Plan Service, P.O. Box 90310, San Jose, CA 95109-3310.

DECEMBER MYSTERY MODEL

This month's model is definitely not a run-of-the-mill ship; a 1/2A flying wing with pendulum controls! A pendulum at each tip controlled little elevons built into the wing. The wing was also equipped with Handley Page type slots and featured no dihedral. The article appeared in a popular model aviation magazine in the early 1950s.

Think you know what it is? Send your best guess to *Model Builder* magazine. If you're right, you have a chance of winning a free year's subscription. Make sure you enclose your name and address on the entry.



DECEMBER MYSTERY MODEL

AUGUST MYSTERY MODEL WINNER

Ol' Bob really picked a winner when he selected Reid Simpson's "Talon" A-2 Nordic for the Mystery Model; we received a whopping 28 entries and only one of those was incorrect. The Talon, of course, won its event at the 1965 Nats, appeared as a construction article in the April/May '66 *Flying Models*, and was soon thereafter kitted by Jetco.

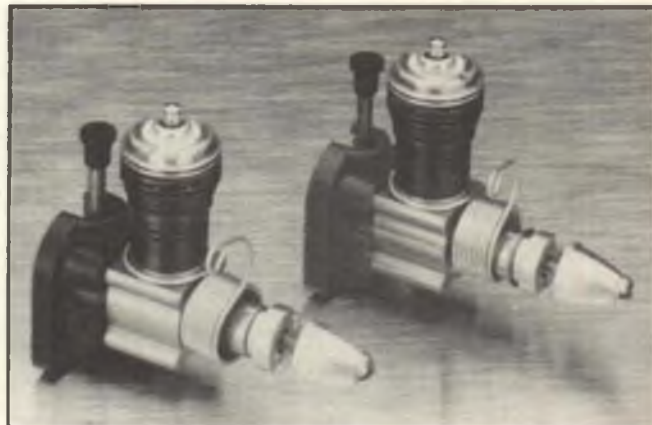
Several correspondents had built a Talon at some point in their modeling careers and included some personal notes:

•Art Christiansen, Tempe, AZ: "I built this model twice, the first one I lost 25 years ago O.O.S. in a thermal. The second one I still have but have never flown."

•Bob Harvey, Pleasant Hill, CA: "It was the first model I built after a 15-year absence from the hobby. It was overweight but it did fly good."

•John Warren, Costa Mesa, CA: "You inspired me to dust mine off. Silked wings, tissue stab, fiberglass tail boom, solid aluminum nose weight and skid brought it in 10 grams light. Its only problem is the pilot."

•Ed Mate, Riverdale, IL: "You are right, I built three. By the third one, I managed to get it to weight. Nearly made the FIA team. Tatone timer jammed and the model went over the fence at Wright-Patterson. When I got there the model had been stolen."



The two latest engines from Cox, a couple of reed-valve screamers dubbed "Killer Bees," being produced in .049 and .051 sizes (black and red plastic backplates respectively). Should be just the ticket for 1/2A and small Class A Nostalgia models. See text for our columnist's KBee .049 engine test results.

Was on top after five rounds."

•Alan Shufeldt, Alpine, CA: "I was one of the few hundred you mentioned that actually built and flew one (actually two!). The first one ended its career as a flyaway. My second one still hangs in my garage to this very day. Like you said, it is extremely overweight, but it turned that weight into speed and a decent L/D. It would make great sweeping circles hunting for thermals, then tuck in tight when it found one. I never won a contest with either of mine, but I came close. Its elliptical lines never failed to draw comment. She was, and is, a truly good lookin' airplane."

•Finally, our subscription winner, LaVon Kuehne, of Bryan, Ohio, included this note: "Our sons each built [a Talon] for Nationals competition. You are correct, the models were overweight, but flew fairly well. The Talons were later used as back-up models to Dragmasters for competition."

COX KILLER BEE TESTS

Recently Cox released its new "Killer Bee" .049 and .051 engines. They're advertised as being Nostalgia legal, but as of this writing the NFFS rules committee has not yet officially approved them for competition. Nevertheless, I picked up a KBee .049 at the local hobby shop and ran some tests to determine its usefulness as a Nostalgia engine.

My observations are that the KBee is very similar to the Cox 290, which was used in thousands of ready-to-fly Cox products. The intake (venturi) is slightly larger in the KBee—the 290 has a venturi opening of .165 inch, and the KBee is .185 inch. Both the 290 and the KBee have dual intake bypasses, just like the legal Medallion .049. The KBee crankcase is gold anodized, just like the old Golden Bee. The prop drive on the KBee is slightly more fluted than the 290, and it comes with a spinner and a

spring starter. The 290's needle valve sticks above the top of the cylinder head on my two examples; the KBee needle is shorter and has a length of flexible plastic tubing slipped over it.

When you take the engines apart, the differences are minimal. Two exceptions stand out. The old 290 uses a reed that is retained by a wire spring, while the KBee uses a plastic ring with two little stops on it to keep the reed in place. This unit slips over the inside of the backplate. Both reeds are the now standard clear Mylar types. No screen is used on the KBee venturi. The crankshaft on the 290 has a shallow relief ground into it. The KBee has no relief, but does have the crankpin side of the shaft ground away slightly.

The engines are nearly identical in weight. The KBee weighs 48 grams; the 290 weighs 46, but it has no starter spring. In comparison, a Tee Dee .049 weighs 50, the Space Hopper weighs 37 and a Hornet weighs 49 grams.

One nice feature of the Killer Bee is the availability of an .051 size, which would make small A ships possible at a reasonable cost. Also, by slipping the .051 piston and cylinder onto a Medallion, Cox could make the Medallion .051 available at no added cost to them.

My KBee performance tests were conducted over a three-day period, during which the weather ranged between 70 and 80 degrees. The humidity ranged between 45 and 55 percent. The elevation at my home, where the tests were conducted, is about 150 feet above sea level. After 10 minutes of test running using a balanced Cox 5x3 gray prop and 10 percent Sig fuel, the following results were obtained:

Propeller	Fuel	RPM	Notes
1. 5x3 Tornado Black	10% Sig	16,100	
2. 5x3 Tornado Black	10% Sig	16,400	
3. 5x3 Tornado Black	25% Sig	16,600	
4. 5x3 Tornado Black	25% Sig	16,800	+1 gasket
5. 5.7x3 A2PC	25% Sig	15,700	+1 gasket
6. 6x3 Top Flite Nylon	25% Sig	15,300	+1 gasket
7. 6x3 Top Flite Nylon	35% Sig	14,800	+1 gasket
8. 6x3 Top Flite Nylon	35% Sig	15,100	+2 gaskets
9. 5x3 Cox Gray	35% Sig	16,200	+2 gaskets
10. 5x3 Tornado Black	35% Sig	16,800	+2 gaskets

Note: The engine came equipped with three head gaskets. The notes above indicate the number of head gaskets added to the original equipment. All rpm figures were measured with a Tower digital tachometer. Total running time on the engine after break-in and testing was 23.13 minutes.

The engine took a long time to cool down during the initial break-in period, but cooled more rapidly as the runs progressed. My guess is that it will cool even quicker

with more time on it. I also believe that with more running time on it, it will handle higher nitro fuel. I don't think it will perform as well as my best Hornets or my best Space Hoppers. My Hornets will turn the 5x3 black Tornado at well over 18,000; the Space Hopper turns a 6x3 Top Flite Nylon at 17,800.

I think the KBee would be a good Nostalgia engine. It is docile, easily adjusted and performs steadily. It's also readily available and relatively inexpensive—I paid \$31.95 for mine at the local hobby shop. It's faster than the Cox 290 by about 1,500 to 2,000 rpm, using the above test as an indicator.

By the time you read this, the NFFS rules committee's verdict should be in. I hope they do approve it, as it provides one more engine option to interested Nostalgia fliers.

IZB CHAMPIONSHIPS

On July 14, the First International EZB Championships were held at the Kibbie Dome in Moscow, Idaho, just after the Northwest Indoor Championships and immediately prior to the AMA Indoor Nation-

als. Eighteen contestants entered and flew. The event was organized so that the competitors flew in rounds, just like the FAI types. As a result, each flier made six flights spaced in 90-minute intervals. The total of the best two flights was each flier's final score. It was a wonderful way to run a contest. As the day wore on, contestants could view the scoreboard and see where they stood in relation to the others. In fact, it wasn't until the end of the fifth round that the high time of the day, 27:09, was turned in by eventual winner Larry Coslick.

To present the trophy was EZB originator Wally Miller. Coslick took 1st with a 53:40 total, followed by Larry Calliau with 52:55 and Mike Pelrang with 49:12. According to contest organizers, this event will be held on an annual basis in conjunction with a large indoor contest somewhere in the U.S., perhaps at the next USIC in Johnson City.

GREAT FF READING

The NFFS has announced the availability of two new and very informative publications: the 1995 NFFS Symposium and the World Championships Plansbook. Both of

continued on page 85

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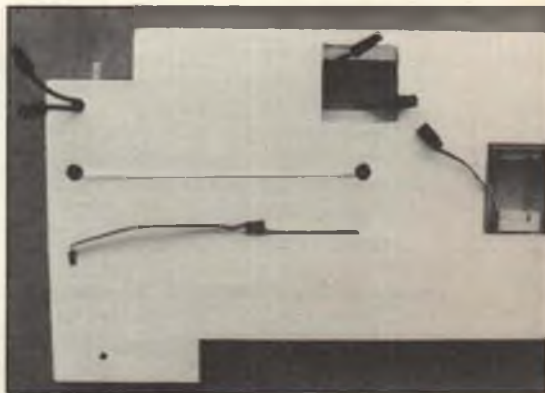
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ISLANDER *cont. from page 58*

engine cowlings and ordered some vinyl lettering from my neighborhood sign shop. The windshield decals are provided with the kit, as are two "Islander" decals should you wish to use them.

FIRST FLIGHTS

Not having a flying field nearby with an asphalt runway and a suitable background for taking photos, I made the 100-mile journey north to Mile Square Park in Fountain Valley for photos and the initial flights. We did the perfunctory pre-flight work by checking servo connections, screws and



Underside view of the left wing panel showing the wire pull string (which was not used) and the routed servo and motor wires—see text for explanation.

bolts, control horns and clevises. Because the prototype models had exhibited some radio interference, I wanted to make sure that the wiring changes suggested by Cermak would eliminate the problems. A radio check with the antenna down and the motors running at full power demonstrated solid control response with no glitching of any kind. We were ready to fly!

With the Islander lined up on the runway I smoothly advanced to full throttle, and after an accelerating run of about 75 feet we had a picture-perfect, scale-like takeoff. No dips, dives, sudden climbs or turns—just straight out on runway heading, not a single click of trim correction necessary. Gorgeous!

After flying around a bit, I made a slow climb to altitude to test the model's stall characteristics. At two mistakes high I turned the power off and eased the stick back, pulling the aircraft into a stall. The break was gentle, the nose simply pitched down and the airplane was immediately flying again, with no tendency to drop a wing. This is great!

Four low and slow passes down the runway later, I set up for a by-the-book landing. The first flight was over and the Islander passed with flying colors. The 15 or so people watching from the pits liked it too! Mile Square has seen a few other Cermak Islanders fly; Cermak has had some local modelers test their prototypes over the last year, so everyone watching was quite

continued on page 66

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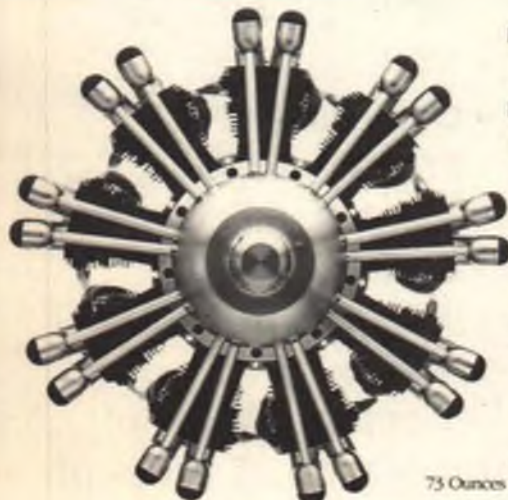
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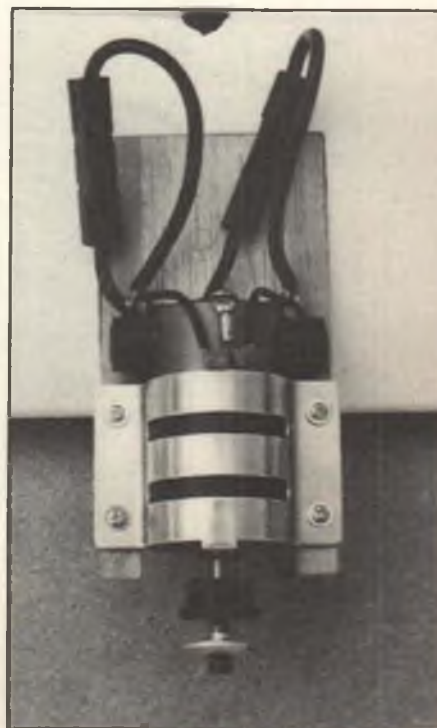
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ISLANDER *cont. from page 64*

familiar with the model. All of them have nothing but good things to say about it—and I have to agree with them 100 percent.

The second flight was exactly like the first—perfect takeoff, perfect flight, perfect landing. On this flight I switched over to low rate for the ailerons. The control throws I had set originally worked well, but the airplane was a little sensitive; with the low rate the controls are less responsive and more scale-like. The two Astro 05 motors are well suited for the Islander. Two 15s would also work well and you'll get some sportier performance from the plane.



An Astro 05 mounted in the right wing panel. Hardwood beams are epoxied to the wing; two-piece metal clamp holds the motor securely.

IN CONCLUSION . . .

If you've ever wanted to try your hand at a twin, consider Cermark's Islander. In addition to the benefits of an electric-powered aircraft, the Islander is 90 percent pre-built; all of the hard work is done for you. The assembly steps are very easy (remember that I did this without any written instructions) and it goes together very quickly. I spent about 10 hours putting it together and another four hours doing the decoration. This is one of the nicest planes around, and I highly recommend it. All three versions of the Islander are available from Cermark Model Supply Co., 107 Edward Ave., Fullerton, CA 92633; (714) 680-5888.

Please direct questions to me at 6462 Sunny Brae Dr., San Diego, CA 92119; (619) 463-4453 (Monday through Friday between 8 and 5 Pacific time) or via the Internet at 74164.3237@compuserve.com.
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ADVERSE YAW AND THE SINGLE-SERVO WING

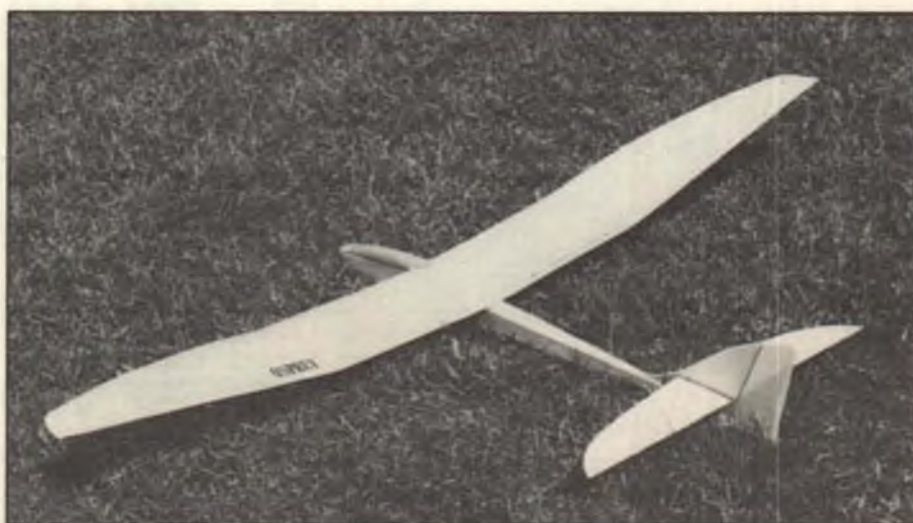
Bill also discusses the new Selig S4083 airfoil as it applies to hand-launch gliders; offers a design for a triple-taper S4083 HLG wing, complete with full-size rib patterns; and talks about some new soaring-related products.

Fred Guilfoyle of Edmonds, Washington writes:

"I wonder if you can give me a little advice. I'm designing a replacement wing for my Gentle Lady. The new wing is SD7037, white foam, sheeted with 1/32 balsa, covered in MonoKote. The key to this design is *ailerons*. I'm tired of rudder/elevator. This seemed to be the most economical way into an aileron glider. Why build a whole new airplane when I might get good results with just a new wing? Especially with this setup I don't even need a computer radio.

"The concern I have is *adverse yaw*. Do you think that because of my single servo aileron setup I might be plagued with adverse yaw because I'll have no way to set up differential aileron throw? I've never been bothered by it before on power models, but for some reason I thought it might with these long wingspan gliders (more leverage?).

"I have the four cores already cut. The outer tip panels are already sheeted, and I'm getting ready to do the center panels. Thanks for any quick advice you can give me.



The newest HLG from Sky-Beech Aerotech is the 1.5-Meter Osprey, which can be built with either a standard cruciform tail or V-tail, and with either a polyhedral wing (for basic rudder/elevator controls) or with a flat wing with full-span ailerons/flaperons or split ailerons and flaps—take your pick. According to designer Ray Hayes, the polyhedral/V-tail version can be built as light as 3.5 ounces per square foot. A flat-wing version with separate flaps and ailerons using four servos in the wing and two in the fuselage (for rudder and elevator) weighs just 14.5 ounces. This equates to a 4.75 oz./sq. ft. wing loading and results in excellent flight performance. More in text.

"By the way, I'm naming my creation 'Not a Lady'—pretty neat, huh? I was go-

ing to go with 'Exotic Lady,' or 'Sexy Lady,' but this kills two birds with one stone."

There's a probability that such a design with equal up and down aileron throws would have problems with adverse yaw,

U.S. CAPTURES F3B WORLD CHAMPIONSHIPS!

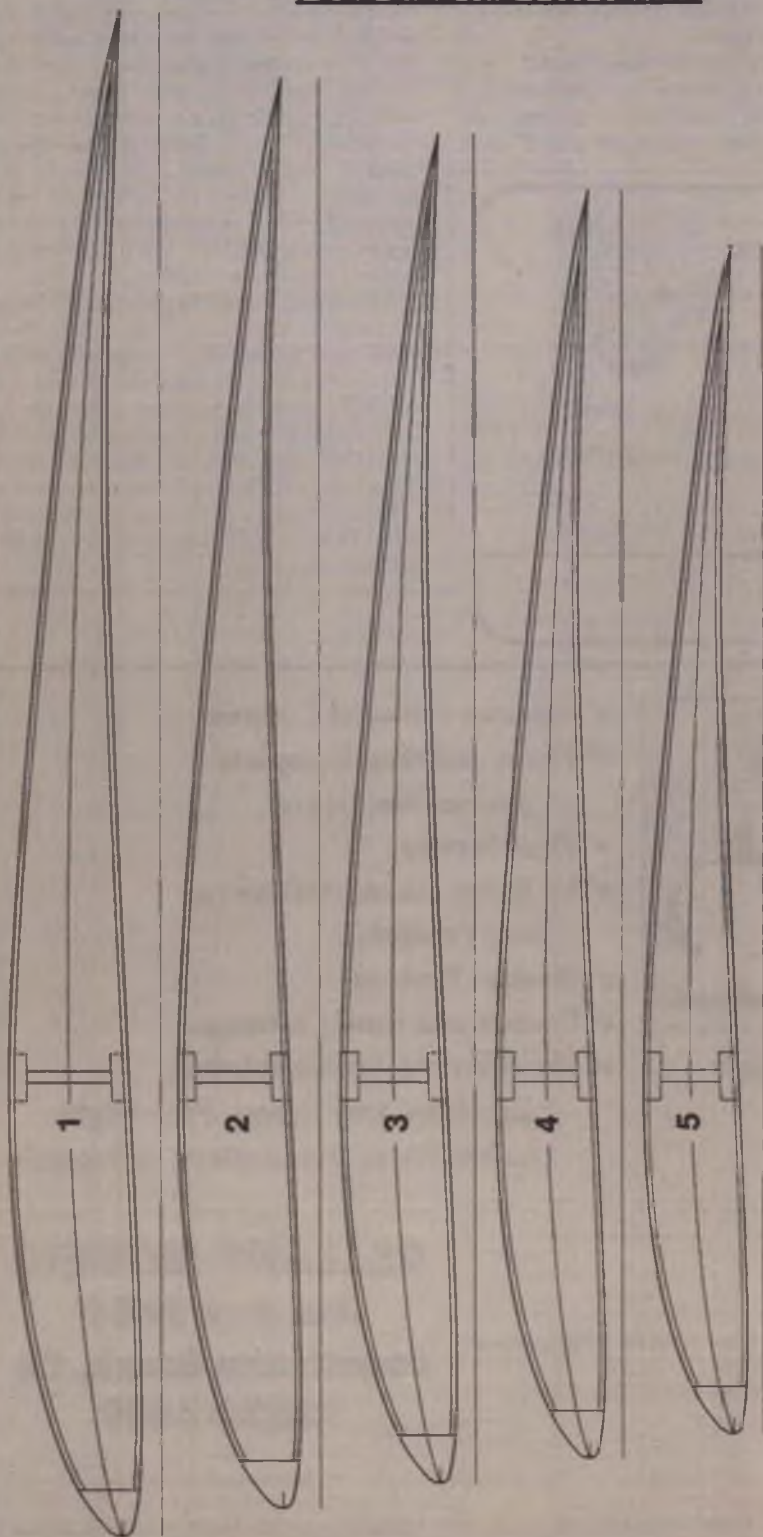
The word is out that U.S. F3B team member Darryl Perkins, photographed here at last year's Rose Bowl Spring Soaring Festival, won the title of RC Soaring World Champion



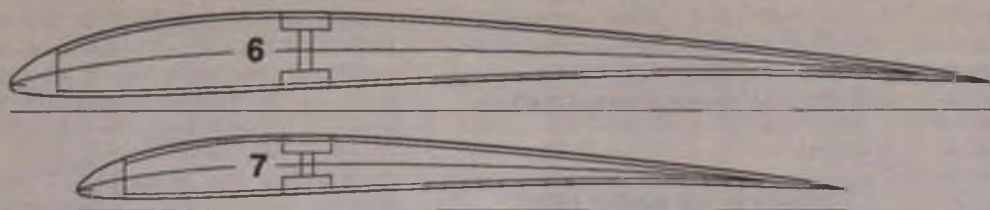
at Brasov, Romania on July 22-31. Just two places behind Darryl was Joe Wurts, and Randy Spencer finished in 15th place, bringing the U.S. team to 1st place overall. Rounding out the top five were Denis Duchesne (2nd, the reigning World Champ going into the contest) of Belgium, Joachim Stahl (4th) of Sweden, and Armin Hartzitz (5th) of Germany. Behind the U.S. in team standings were Germany (2nd) and Austria (3rd).

Congratulations to Darryl, Joe, Randy and Team Manager Larry Jolly! A job well done!

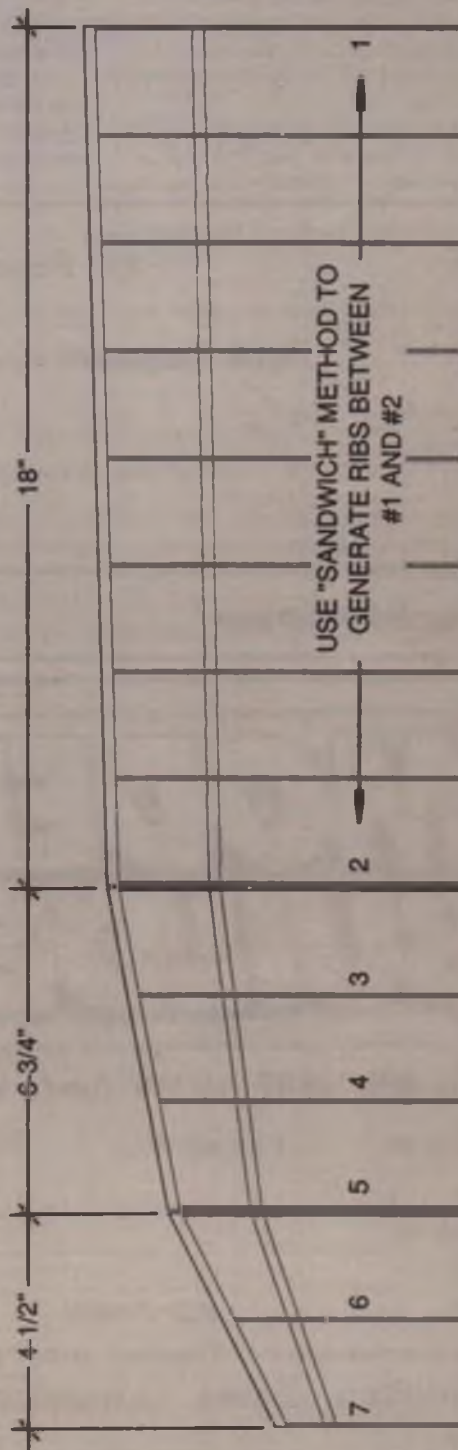
■ **OPPOSITE PAGE:** Full-size rib patterns and a 1/4-size planform drawing for the 428 square inch S4083 HLG wing designed by our columnist. The ribs are drawn for 1/32 balsa sheeting, preferably a D-tube leading edge and 3/16- or 1/4-inch wide capstrips. The leading edge is medium 1/4x5/16 balsa. Spar caps are 1/16x1/4—spruce for the inboard panels, balsa for the tips. Use two 1/16 plywood joiners at the center (different lengths to avoid a stress riser), a single plywood joiner at the first panel break (rib #2), and a balsa joiner at the second break (rib #5). Dihedral/polyhedral angles are up to you. Add balsa block wingtips as required to bring the span up to the maximum allowable 59 inches (projected span). Good luck and send us a photo if you build one!



FULL-SIZE RIB PATTERNS



**PLANFORM
WING AREA
420 SQ. IN.**



**NOTE: ADD TIPS AS NEEDED TO BRING
FINAL PROJECTED SPAN TO 59"**

Bill Forrey's S4083 RCHLG Wing

especially at slower speeds. But there are ways, even with a single servo, to get differential throw. You can start at the servo output wheel. Here, instead of attaching the pushrods 180 degrees apart on the output wheel, you can attach the separate (left and right) servo-to-bellcrank pushrods at, say, a 45-degree angle as shown in the drawing. This V-shaped arrangement will give more movement in one direction than the other. You can accomplish the same thing by offsetting the aileron horns so that the clevis attach point is 45 degrees in front of or behind the hinge pivot, depending on whether the horns are on the top or bottom of the wing.

If you have a typical four-channel radio and you like to fly Mode Two (but with a

single stick), you might also get a Y-lead for the rudder and aileron servos. Drive them both from the aileron output of the receiver and you can coordinate your aileron turns with rudder using just one hand.

And speaking of new wings for old ships . . .

AIRFOIL OF THE MONTH: S4083

This month's airfoil is presented in a way that I hope will be useful, especially if you're a scratch builder who doesn't have access to a computer, a printer and an airfoil output program.

The airfoil is the new Selig S4083. This 8 percent thick section was designed for competition RC hand-launch gliders and would do well as a "moderate speed" sec-

tion to supplement a glider using a higher speed airfoil such as an RG-15 or thinned-down SD7037—both common choices these days. If the wind and lift are light, use the wing with the S4083; if the wind is up, switch to the RG-15. The rules don't forbid it, so why not?

I've spoken to a couple of HLG fliers who have used this airfoil. They report it doesn't have quite the high end speed of the thinned SD7037, but it does have a better L/D than the actual SD7037 or any other section they've tried. Selig reports the best L/D of this new section actually occurs at a slightly higher speed than the SD7037, and it's a slightly better L/D as well. To quantify this statement, at a lift coefficient of 0.4, the S4083 has been measured to have a nearly a 17 percent improvement over the E387 or SD7037 for a typical RCHLG. The climb rate may not be as good as the SD7037, but the difference should be hardly noticed.

With this column I'm including full-size rib patterns for a new, 420 square inch triple-taper S4083 HLG wing with an 8-inch root chord. To make the ribs for the inboard panels, make sheet aluminum or 1/16 ply templates for the #1 and #2 ribs, then stack-sand nine ribs between them. The remaining ribs, #3 through #7, can be cut directly from a photocopy of these patterns. Don't cut up your copy of *Model Builder* magazine!

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NEW VIDEO

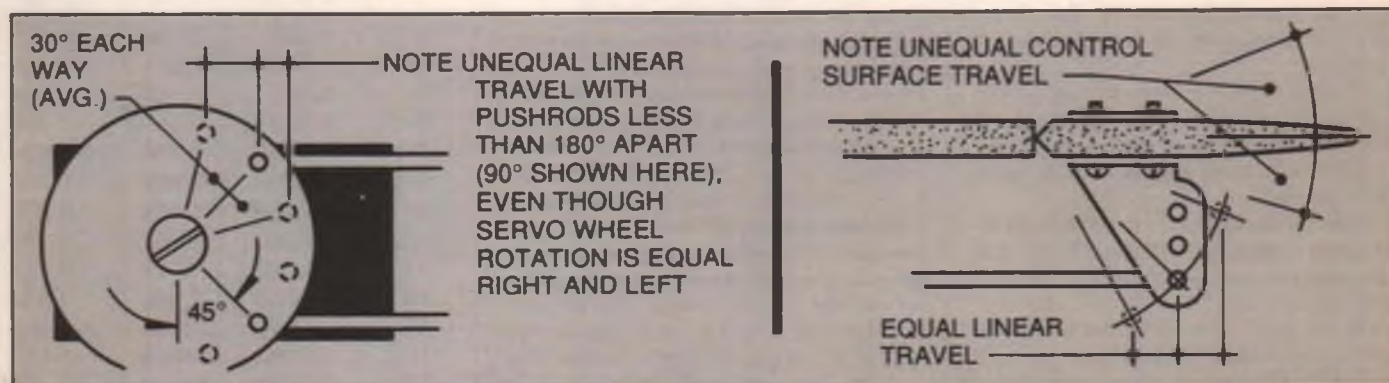
I recently received and watched a new video offering from Soaring Stuff (9140 Guadalupe Trail N.W., Albuquerque, NM 87114; 505-898-8281). Entitled *Building Hollow Composite Aircraft Structures*, it's an 80-minute tape that should give the mo-

sand should save some bucks, and the method requires nothing but basic hand tools you probably already own.

If a mold is only as good as the plug, then building the plug must be one of the most important steps. The video doesn't spend much time on plug making, how-

rate, more beautiful, and you can eliminate wood wing skins entirely. This last point will be very attractive to anyone who has ever experienced wood warpage (most notably at the trailing edge) caused by changes in humidity and temperature.

Even though a mold only allows that one



Using offset control linkage connection points on the servo output wheel (left) is one way to achieve aileron differential in models using one aileron servo; another way to do the same thing is to offset the aileron control horns relative to the hinge pivot point (right). More in text.

tivated modeler everything needed to make wing and stabilizer molds, then composite molded hollow wings and stabs.

Fred McClung is the mold and model maker as well as the star of the show. The tape shows only one method of mold making, Fred's method, but it is unique (to my knowledge) in that the molds are made of two types of epoxy resins, a little fiberglass, and—get this—a whole lot of sand! The

ever, if you've ever built a fully sheeted foam core wing, you can probably make an accurately contoured, filled, and finished plug without much trouble, and the video will take you from there.

Why build a molded model sailplane? Well, if you have a pet design that you are truly happy with, you can reproduce it easily and quickly knowing you can make it stronger, lighter, straighter, more accu-

design to be made from it, you can still vary the internal structure, fabric, external color, materials layout, size and shape of control surfaces, etc. Using a good multi-task airfoil like an RG-15 or S7012, you can make a model that is very lightweight and will excel at thermal duration. Add extra strengthening materials in the skins and spars, and for a little weight penalty you can have an F3B ship or slope racer!

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RC RECRUITMENT VIA CABLE TV

Need some new blood in the old soaring club? You might try what Ray Hayes has successfully tried up in Michigan. Ray writes:

"Thanks to the exposure your article gave to our WINGS Flight Achievement Program, we now have people in Australia, Germany, Japan and the U.S. pursuing the challenge.

"The enclosed video ran on a small local cable station and recruited four more new people into our group, folks who had never before been involved in radio control in any way. RC clubs could use this at mall shows. Hobby shops could use it to help sell sailplane products. Individuals may want it to simply relax and enjoy. Cost is \$19.95 plus \$3 S&H.

"Presently, I know of only two other clubs that have picked up on 1.5-meter span, high-start launched, man-on-man scored, soaring contests. Both clubs are very enthusiastic when describing the fun they are having."

The video shows how Ray and one of his fellow club members were interviewed by a TV personality who later in the tape tries her hand at the controls. There is plenty of flight footage, both hand-launch and high-start, so the tape is both educational and fun to watch. Might make a good foundation for you and your club to build on or emulate. Perhaps in a large metro area the results of such a cable showing would be frighteningly effective, if four responded in Washington, Michigan!

Ray also sends info on a new kit aircraft of his. The Sky-Bench Aerotech 1.5M Osprey is, of course, a hand launch glider, and from the looks of it, a competition oriented one! Ray writes:

"The Osprey is designed to be extremely stable and offer the builder a choice of options to suit his building/flying experience. This model has absolutely no tendency to tip stall and is perfectly suited for beginners as well as competition. It can be built with a standard or V-tail, and the wing can be built polyhedral, flat with ailerons, spoilers/flaperons, or split flaps and ailerons.

"Construction is easy and results in an extremely rugged airframe that will stand the rigors of hand launching. If you modify the spar just a tad, it can be launched from an electric winch. Instructions are very detailed and written for new people coming into RC sailplane flying for the first time.

"The plans are CAD drawn, and the wing ribs are laser-cut with much of the wood removed to reduce weight. The fuselage parts are machine-cut for accuracy, including the stabilizer spar caps and elevators for the V-tail version. All the hardware is furnished including a tow hook for those who like to use a Sky Bench Mini Hi-Start. The wing is fully sheeted on top to maintain an accurate airfoil and provide strength. The rudder and stabilizer are built-up construction and covered with lightweight heat-shrink covering material.

"Flight performance is unquestionably awesome. The S3014 airfoil has proven to be an excellent choice. The 1.5M Osprey has great dead air time, but can penetrate very well to cover the field searching for lift. Flying the 1.5M Osprey on a slope is pure fun and the wing is strong enough for aerobatics. The S3014 airfoil, lightly

AIRFOIL OF THE MONTH

S4083

No.	X	YU	YL
1	0.000	0.000	0.000
2	1.000	1.436	-0.790
3	2.000	2.194	-0.975
4	4.000	3.313	-1.160
5	6.000	4.148	-1.244
6	8.000	4.817	-1.269
7	10.000	5.366	-1.258
8	15.000	6.365	-1.142
9	20.000	6.968	-0.958
10	25.000	7.261	-0.742
11	30.000	7.317	-0.514
12	35.000	7.192	-0.286
13	40.000	6.945	-0.066
14	45.000	6.614	0.141
15	50.000	6.224	0.329
16	55.000	5.792	0.498
17	60.000	5.328	0.648
18	65.000	4.836	0.772
19	70.000	4.319	0.830
20	75.000	3.774	0.806
21	80.000	3.198	0.720
22	85.000	2.580	0.540
23	90.000	1.908	0.353
24	95.000	1.142	0.202
25	100.000	0.000	0.004

loaded, thermals very easily in the lightest lift.

"Specifications: 59 inch span, 425 square inches wing area, poly/V-tail version weighs 11 ounces for a wing loading of 3.73 ounces per square foot. The kit price is \$89.95 plus \$6 shipping and handling. Order directly from Sky Bench Aerotech, 58030 Cyrenus Lane, Washington, MI 48094; (810) 781-7018."

BOB HOLMAN PLANS UPDATE

If you like to scratch build and you're into scale sailplanes, check out the June 1995 update sheet offerings from Bob Holman Plans. You can get a copy by sending Bob \$3 for his full catalog of sailplane plans which will include the update, or simply send an SASE for the update alone.

In the update you'll see photos of a Darmstadt D28 Windspiel in 1/4-scale (I like this one!); an Oberlechner MG 19A Steinadler (a long, sleek, fabric-covered classic); a Supermarine Spitfire PSS glider; a Six Foot Plank flying wing; a 6-foot span Vertex flat field floater/trainer; and a Sukhoi Su-25 Frogfoot PSS. Drop a line to Bob and tell him MB sent you: Bob Holman Plans, P.O. Box 741, San Bernadino, CA 92402; (909) 885-3959.

* * *

Bill Forrey, 3610 Amberwood Ct., Lake Elsinore, CA 92530; (909) 245-1702, or E-mail at BFORREY@AOL.COM. I prefer phone calls or E-mail if you just have questions, but submittals are always welcome at the above street address. MB



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CLP-20

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cont. from page 33

PLANS SOURCE BOOK REVISIONS

John C. Fredriksen, Ph.D, is compiling an updated edition of his international guide to flying model plans and kits sources. He's interested in expanding its coverage to include more foreign magazine plans, as well as photo and three-view documentation sources. Anyone willing to assist him on this monumental project, especially in the areas of English, French, German and Italian magazines, may contact him at 461 Loring Ave., Salem, MA 01970.

MASS-MASS LAUNCH

We've saved mention of this "happening" for last, because it is so far-reaching in concept. Even if you miss it this year, keep it in mind for 1996.

David G. Smith, has an idea—a really big cyberspace-sized one. Noting how popular mass-launch events have become at free flight scale contests, he envisions a nationwide version, wherein everyone with access to a rubber-powered free flight scale model of any size or type would launch it at an exact prescribed time. This could occur at contests, or at anyone's home field. Or even in your own backyard.

David realizes the need to allow for different time zones and selected October 14, 1995 at 4 p.m. Eastern Standard Time as the moment of launch. This would translate to 3 p.m. Central Time, 2 p.m. Mountain States Time and 1 p.m. on the West Coast.



Yipes! Don Campbell, of Detroit, Michigan, created this clever "Air Mail Gee Bee" from a standard mailbox, augmented with wooden accessories. Details in text.

Since the Flying Aces Club has so actively promoted mass-launch events, FAC Commander Lin Reichel has agreed to tabulate the results, while Dave himself will field the incoming postcards and letters. All he asks is the name of the flier, type of scale model and the duration.

Modest prizes, such as FAC plans packs, will be awarded to the top placers, with a Kanone to the winner, however the prizes are incidental. Just having your name on the results with the "big name" Flying Aces makes you a winner.

If the results are as encouraging as expected, next year's event may be worldwide. Sound like fun? Let's do it! As Dave puts it, at the very least, the world will be a little lighter for a moment. The address is David G. Smith, 6715 Lake Arcadia Ln., Columbia, SC 29206.

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



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PLUG SPARKS *cont. from page 42*

of .750 inch and stroke of .6718 inch showed surprisingly easy starting characteristics even with a compression ratio of 10:1. No question about this rear rotary disc valve engine enjoyed good performance mainly due to its downdraft carburetor that did not require pressure feed.

An unusual item was provided for the installation of the beam engine mounting



Photo No. 5. Only a few FF models were flown at the S.A. State Champs at Waukegan, one of which was this good-looking 1933 Austin Waukegan flown by Bob Hovine.

with two spacing blocks to line up the thrustline with the lower side of the mounting lugs. This gave the best direct drive arrangement cutting down vibration modes resulting from the thrustline being above the mounting plates. In short, a good engine that suffered from the very high competition coming out of the West Coast area; i.e., McCoy, Torpedo, Atwood, Phantom, Ohlsson, and a flock of lesser known engine manufacturers. The modeler in the late '40s enjoyed the engine products brought on by the keen competition.

OBITUARY NOTICE

Just received a telephone call from Meredith Chamberlain of Anderson, Indiana, that well-known Chicago modeler Mitchell Post passed away on August 15. Mitch was quite well known in the Midwest competition circles and was quite adept at winning, as he did win the overall Free Flight Championship at Lawrenceville, Illinois.

We are going to miss the easygoing manner of model competition of Mitch Post. Many a contestant has been fooled by his offhand manner of competing in the numerous events. Thermals, old boy!

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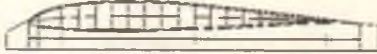


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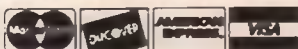
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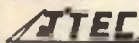
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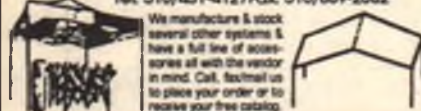
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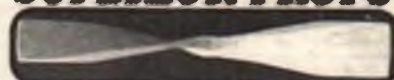


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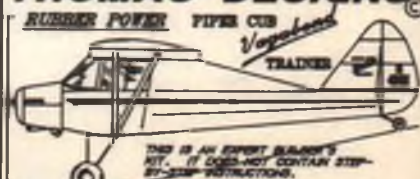
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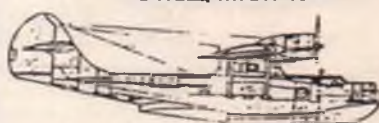
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CONTROL LINE *cont. from page 31*

full-wave pipes.

Formula 40 entry was strong and the competition close; the top five entries were between 150 and 154 mph. Most of the fastest entries were inverted style planes with K&B power. The Brown/Morris/Puleo team was tops with 154.71 mph. The top Senior out of a field of four was David Van Allen of Chandler, Arizona, at 143.66 mph.

Glenn Lee turned 154.31 mph for a new record in .21 Sport Speed, using a Rossi .21. Peter Brown was the top Senior at 139.91 mph, and Michael Wisniewski of Lake Havasu City, Arizona was top Junior at 141.23.

The FABS team's asymmetrical composite construction plane was impressive in D Speed, turning 194.73 mph with a homebuilt ACE .65 engine.

Bill Nusz and Jerry Thomas led the field of jets at 190.8 mph and 184.54 mph respectively, managing to defeat atmospheric conditions that often give jet competitors fits in Tri-Cities contests. Both used the Thomas "Hummer" design, which features a single wing and outboard upright engine with a Thomas design head.

After a couple of years flying on the required alcohol/propylene oxide standard fuel blend, the jet competitors have observed that the fuel works but has a very narrow high-power band; 10-20 mph differences can come and go with almost no change in conditions.

• • •

Event Director Joe Just provided highlights from the carrier circle:

Though the turnout was low, the competition was excellent, with five points separating the top two contenders for the Eugene Ely Award, which is given to the top scorer in the three carrier events. Pete Mazur of Aurora, Illinois captured the award for the ninth time, just edging Bill Melton of Las Cruces, New Mexico.

Joe points out that the carrier fliers showed excellent sportsmanship throughout the contest. Local Junior flier Euan Edmonds was in beginners' heaven, as four of the top carrier pilots in the nation spent hours helping him get his Profile ship in



Tim Strom, 15, cruised through the Open Fast Combat field for 1st place, losing only once—to reigning Junior F2D World Champion Mark Rudner.

condition to fly. For two days before the actual competition, the adults helped the youngster and even loaned him fuel for practice flights.

During the contest, Dick Perry approached Joe with a request to cancel the scores from his Class I flights because of a mix-up that caused him to have processed his plane with an oversize engine. The voluntary disqualification knocked Dick out of a sure 3rd place finish.

Most Open fliers had trouble turning in their usual high scores on Thursday because of fairly high winds that day. Gilbert Ruiz of California fought through the conditions in Open Profile to capture 3rd place and the Navy Carrier Society's Rookie of the Year award.

Todd Ryan of Richland used his non-scale Profile in Class I and turned in a flight that would have broken the national Senior class record if the flight had been in the Profile class.

Pete Mazur's 435.1 points topped Class I, and he scored 439.5 to capture the Class II title. Bill Melton was the Profile champion at 263.2 points. Todd Ryan won Class I Carrier's Senior division at 282.1.

• • •

Don't forget to send contest flyers, contest results, club news, photos, questions, technical tips and other items of interest to CL fliers to the *Model Builder* Control Line column. Write John Thompson, 295 W. 38th Ave., Eugene, OR 97405. E-mail at johnT4051@aol.com. MB

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these books are consistent with past high-quality NFFS publications. The Symposium features an excellent article on F1C airfoils which have been subjected to wind tunnel tests, plus other learned pieces on various types of free flight competition. Of course, two of my favorite features are the Ten Models of the Year selection and the NFFS Hall of Fame (inducted this year: Bob Sifleet, George Xenakis and Doug Galbreath). The publication is topped off by the wit and cartoons of Will Nakashima. It's available to NFFS members at \$20 each plus \$3 postage. Non-member cost is \$24.

The *piece d' resistance* publication, however, is the long-awaited FAI World Championships Plansbook. This book assumes nearly epic proportions and features three-views of nearly all of the models that flew in the 1993 event. Plenty of pictures, both in color and black-and-white, are lavished throughout the 244-page, 2-pound book. Seven authors share their ideas and comments about the competition, the models and the fliers. Trends in the FAI events are both discussed and illustrated. It will make a significant reference book for any free flyer's col-



Along with his Mystery Model entry, Richard Lape, of De Witt, Michigan, enclosed this photo taken at a contest in Owosso, Michigan in the early 1970s. On the left is Dan Hinbaugh with an extensively modified Jelco Mordic 72; that's Dick on the right with his Jelco Talon. Dick writes, "The model and myself are still in good flying condition."

lection. Hardbound copies are \$42 and softcover sell for \$35 each. Postage in the U.S. is \$4 with overseas costing \$6.

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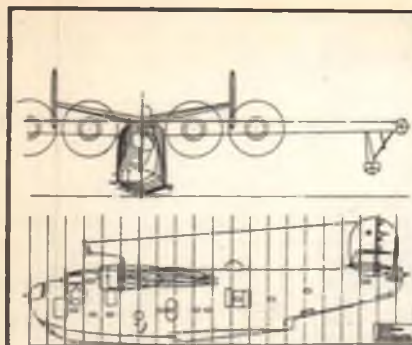
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TECH STUFF *cont. from page 14*

SLOTS

From what you wrote, Bob, I wonder what your objective is in wanting fixed slats and Fowler flaps, which you indicate are to be extended all the time. Any open slot or deployed flap greatly increases the drag. This would be a slow, draggy airplane!

Like flaps, the purpose of leading edge slots (a "slat" in front of the effective leading edge, forming a slot) is to provide a maximum lift coefficient much higher than that of normal stall for the basic airfoil used, so the airplane can land and take off slower.

The Handley-Page Slat is an automatic device that fairs nicely into the leading edge of the wing in normal flight, but moves forward by aerodynamic forces, opening up a slot, when the speed is reduced for landing. It closes automatically after takeoff, and opens again automatically for landing. Some airplanes have also been built where the slat was moved back and forth by the pilot. This could be done with a servo in RC models if it is found difficult to get it to work automatically.

I'm not aware that anyone has developed an automatic slat for models. If you care to undertake that challenge I would report on your efforts in this column. I cannot advise you on settings for slats, Bob, as I've never used them; but I do know that the shapes of the slat and the leading edge, the angles, and the width of the slot can be quite critical.

In his book *R/C Model Airplane Design*, Andy Lennon has an excellent and extensive chapter on the various types of slats and flaps. The book is published by Motorbooks International, Osceola, WI 54020.

With regard to fixed open leading edge slots, Lennon's book has some design data. The following example was worked out from the curves in Fig. 5-11 of the 1986 printing of his book. For a particular foil and fixed slat, at a Reynolds Number of 609,000, the plain airfoil (no slot) stalls at 15 degrees and at a lift coefficient of 1.3. With a fixed slat (forming an open slot) in the same foil, the section stalls at 24 degrees at a CL of 1.75. That's a healthy CL max. We can't expect to get all that extra lift for free, however, and we don't; the airfoil's drag coefficient, which is .17 at the stall of the plain section, goes up to .34 at the stall of the section with fixed leading edge slot—it *doubles*!

But we are going to do most of our flying at a much lower lift coefficient, say at CL=.50. At this more normal figure these curves show that the plain section would be operating at a drag coefficient of about .032 and the slotted section would be at a CD of .048. Here, in normal flight, the presence of full-span open slots would still cost us a 50 percent increase in drag, which explains why Handley-Page invented the self-closing slot.

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FLAPS

Flaps are devices for increasing the effective camber of wings at will. Low-angle deployment of flaps can increase the maximum lift coefficient considerably with a modest increase in drag, just as an airfoil with a lot of camber does. At high angles of deployment the increase in maximum lift coefficient may be nearly double that of the basic airfoil, but at an even greater increase in drag. The high drag of completely deployed flaps is fine in landing, since the drag helps shorten the landing run. On takeoff, however, high drag would be a no-no, so flap is used there only in moderation, if at all. Figures 1 and 2, from NACA windtunnel tests, show typical characteristics for the different types of flaps and slots and their combinations.

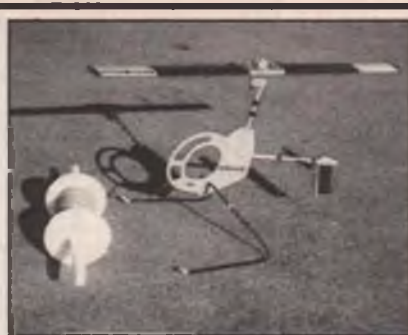
How much will flaps reduce the landing speed? Let's assume we have a full-scale airplane with an NACA 23012 wing section which lands at 40 mph. If it has full-span plain flaps (unlikely, since roll control would become a problem) to be deployed 60 degrees, Figure 1 shows us that the maximum available lift coefficient increases from 1.54 to 2.38, or a ratio of 1.54:1. Remembering that lift varies as the square of the velocity, we need to take the square root of 1.54, which is 1.24, and divide our 40 mph landing (stall) speed by that. The new landing speed with flaps down would therefore be 32.25 mph. But since the flaps are usually a lot less than full span, the actual reduction in landing speed will be less.

Now assume we have another airplane, with a Clark-Y wing, which also lands at 40 mph minimum without high-lift devices. But this time we have full-span Fowler flaps and Handley-Page slots, and we will use them both. From Figure 2 we see that the maximum lift coefficient goes from 1.29 up to a huge 3.37. The new landing speed is now 40 mph divided by the square root of the quantity 3.37/1.29, or 24.75 mph.

The advantage of Fowler flaps is that they move rearward as well as angle down, increasing the chord and therefore the wing area when they are deployed, further increasing the maximum lift coefficient (when it is based on the original wing area). Fowler flaps are seldom used on models because of their weight and the difficulties in getting the flaps to ride out and down on their tracks smoothly and reliably. Split flaps, plain flaps, and slotted flaps, with their simple hinging, are much easier to design and make.

There is an interesting and useful operational difference between slots and flaps. When a flap is deployed (a flap of any kind) the pitch angle must be *reduced* by many degrees in order to maintain the same lift; but when a leading edge slot opens the pitch angle must be slightly *increased* in order to maintain the same lift.

The required decrease in pitch angle is understandable when a flap is deployed. The flap deployment is really increasing the



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camber, but that increase is all at the trailing edge, effectively increasing the angle of attack of the new high-camber composite section—so we have to lower the nose.

A practical consideration which results from this difference in pitch angle between deployed flaps and opened slots is that the use of flaps permits shorter landing gears for three-point landings, while slots require longer landing gears. By using a combination of flaps and slots, the stall with and without high lift devices deployed can occur at about the same angle.

PROPWASH

Joe Barkley, of Hixon, Tennessee, the gentleman who alerted us to the Bathtub Aerodynamics story we covered in the July '95 column, asked some questions about the effect of big and/or blunt fuselages on prop efficiency.

The aerodynamics books would probably not call the effect of a blunt fuselage nose a reduction in propeller efficiency, Joe, but an increase in airplane drag. Whatever the semantics, my opinions on the subject are as follows:

Pusher configurations are usually more efficient than tractors (pulling-prop airplanes), because the high-velocity propwash or slipstream doesn't add to the drag of the fuselage. Since drag varies as the square of the velocity, the fuselage drag is considerably greater if a tractor prop adds to the air velocity the fuselage sees. If the fuselage is large, aerodynamically "dirty," and/or blunt, this effect is amplified. In Joe's SE-5 model example, the square corners of the fuselage would also cause extra drag due to the rotation of the slipstream. A vortex would be generated at each fuselage corner.

In small airplanes with large radial engines, such as the Gee Bee, the frontal area of the fuselage is great, and it masks a considerable percentage of the propeller disc area. Fortunately this masking is in the center where the prop isn't generating much thrust anyway; and the "masking" isn't a total loss, since we must ram some flow through the radial-engine fins for cooling. The "cuffs" which we have seen on the propeller blade roots of some radial-engined airplanes were probably added to cure an engine cooling problem. The optimum prop for a radial-engine airplane is probably different from the optimum prop for the same airplane fitted with a liquid-cooled engine of the same rpm and horsepower.

Well-designed liquid-cooled powerplants cause less total airplane drag than radials, but weigh more and have more components that can fail. The U.S. Navy favored radial engines in 1930s and '40s, and the Army used both radial and "wet" engines—on dry land.

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