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Rick Allison

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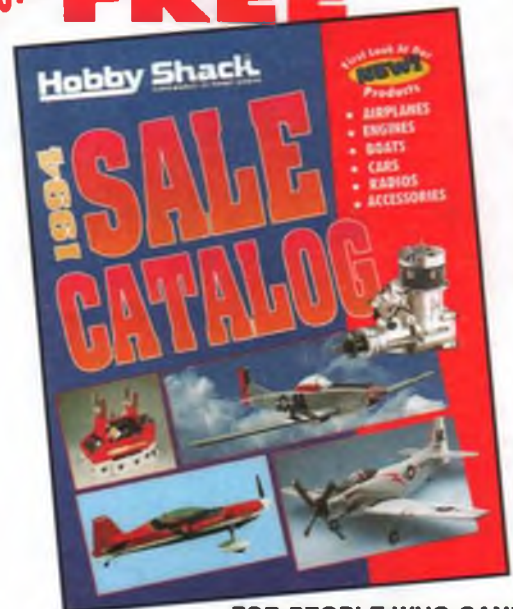
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Italy's Max Baravelli built his Ladybug from Glen Weber's "Floppy Disc" plans in the March 1993 *Model Builder*. It's made of corrugated polypropylene glued with Polyzap and reinforced with hot glue. It's powered by an O.S. .25 FP; radio equipment is Futaba. "I want to thank Mr. Glen Weber for the great idea! It's a real wild thing, flies like a fun-fly and with a little wind, will easily hover," Max reports. The lovely lady holding the model in the photo is his wife, Daniella. Max Baravelli, Via Fogazzaro 6, 40132 Bologna, Italy.



Since Peter Oesterwinter moved from California to New Jersey three years ago, he hasn't been able to find a slope suitable for gliders like his scale Robbe ASK 23. This sleek 126-inch span T-tail beauty has a fiberglass fuselage and obechi sheeted foam-core wings covered with Oracover. Peter favors the Airtronics Infinity 600 radio because, as he puts it, "The mixing capabilities of the Infinity make it, in my opinion, the best radio for sailplanes like this. Controls are rudder, elevator, flaperons, spoilerons, spoilers, aerotow release, high-start hookup and even a wheel brake." Peter Oesterwinter, 170 Township Line Rd., Bldg. D, Belle Mead, NJ 08502.

"Small control line planes are a great way to introduce kids to model building and flying," says Modesto, California's Steve Minshall. He practices what he preaches—shown are his sons (from left) John, 10; Mark, 12; and Paul, 10, holding armloads of MonoKote-covered ships. John is holding his dad's Royal .25 powered Flightstreak and his own Baby Flightstreak with a Cox Black Widow .049. Mark holds his Ringmaster Jr. with Fox .15 and his dad's Stork with PAW .060 diesel. Paul holds his Baby Ringmaster with Cox Black Widow .049 and his Little Toot biplane with Cox Pee Wee .020. Congratulations, Steve, for "building" three new model builders! Steve Minshall, 1911 Debonaire Ct., Modesto, CA 95350.



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Spitfire ARF: The WWII warbird that arrives with authentic looks built-in.

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Randy Smithisler spent better than 14 months on his Proctor Antic—time well spent, we'd say, for the finished model is a real beauty. Randy modified the Antic to handle a geared Astro 40 electric motor and 20 SR 1500 Max cells; the cowl is an aluminum flour canister donated (?) by his wife, Denise. Covering is Coverite's 21st Century fabric with one coat of dope. All-up weight came to an ounce over 9 pounds, for a wing loading of 22 ounces per square foot. Randy reports the first flight was great, with very little trimming needed, and that the model would climb easily at half throttle. Lovely! *Randy Smithisler, 1703 105th Ave. Ct. E., Puyallup, WA 98372.*



Jay Lowe of Port Orchard, Washington, says his scale Bell 222 gets lots of attention both on the ground and in the air. It's basically a combination of a DC Labs fuselage and GMP Cobra mechanics. The engine is an O.S. .61 long-stroke fitted with a Super Tigre carb, running on 30 percent nitro fuel. A 4000-mAH, 4.8-volt battery powers the on-board radio and a 6-volt, 1200-mAH battery runs the Goldberg retracts. The retract battery is also wired as backup power for the radio battery, and all of this is controlled by a JR PCM 10 radio. All in all, a very smooth and stable machine. *Jay Lowe, 8081 Vandecar Rd. S.E., Port Orchard, WA 98366.*



Oregon's Dennis Weatherly built this modified Boxer 45 from Salient Designs plans. However, instead of the piped YS .45 called for on the drawings, Dennis used a direct drive Astro 40 FAI running on 16 Sanyo 1400-mAH SCR cells; with a 10x6 APC prop, the motor draws around 38 amps at full power. The cells are all arranged in a row inside the tuned pipe tunnel, which makes for easy access and charging. Finished weight is 6 pounds 2 ounces, and Dennis says the flight performance is spectacular but short-lived; flights average about 3 minutes. The next step is to add a gearbox to try to increase the motor run time. *Dennis Weatherly, 11360 S.W. Churchill, Wilsonville, OR 97070.*



This pretty Tigerkitten-E was built from Bob Benjamin plans by Illinois modeler Doug MacDonald. He reports: "It's powered by a geared Astro 15 running on 14 SR Max cells, swinging an 11x7 prop and guided by a Futaba four-channel FM radio. It's covered with orange Litespan, clear dope and then trimmed with blue dope and white auto trim tape." According to Doug, who's been building since the late 1950s, the plane takes off easily from the grass field used by his group, the Blue Max Flying Club, located in Buffalo Grove, northwest of Chicago. *Doug MacDonald, 277 Columbia Ave., Des Plaines, IL 60016.*

A mighty handsome looking airplane is Bruce Ihde's taperwing Waco CTO, based on an Ikon N'Wst kit. Model spans 63 inches, weighs 10.75 pounds ready to fly and is more than adequately powered with a Super Tigre .90. Finish is a combination of Coverite's 21st Century fabric and Black Baron paint. No fiberglass cowl here; Bruce made his by shaping a foam plug, then overlaying it with hat crinoline and white glue—an interesting technique. Photo was taken by Frank Cooley at the Skyblazers club field in Owasso, Oklahoma. *Bruce Ihde, 1219 S. 110 E. Ave., Tulsa, OK 74128.*





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## INDUSTRY NEWS

Just before going to press, we learned that the excellent line of kits and modeling accessories produced in Germany by Robbe Modell-sport will now be distributed in the U.S. and Canada solely by Pica/Robbe in Florida. For information and technical advice regarding Robbe products, contact Pica/Robbe, 2655 N.E. 188th St., Miami, Florida 33180; (305) 932-1575. FAX: (305) 937-2322.

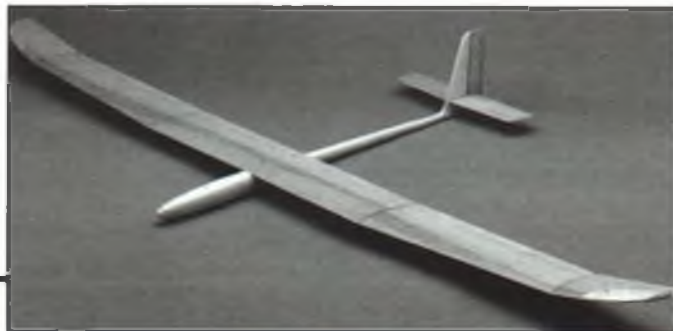


## RADIO SYSTEM FIELD CHARGER

Hobbico is coming out with a new line of electronic modeling accessories, the first of which is the Quick Field Charger, for on-the-field fast peak charging 9.6-volt transmitter and 4.8- and 6.0-volt airborne NiCd packs from a 12-volt DC source. The unit comes with its own case, or can be mounted in a field box similar to a standard power panel. Suggested list is \$69.99—see it at your local hobby shop. Great Planes Model Distributors, P.O. Box 9021, Champaign, IL 61826-9021; (217) 398-3630.

## SUPER SOARER

Global Hobby Distributors has entered the high-performance RC sailplane market with the debut of



the "Grifter," a state-of-the-art, 116-inch unlimited class ship that can be purchased either in 60 percent finished or 95 percent finished form. Wing airfoil is a modified RG-12A, a fairly fast section that also does exceptionally well in light lift, especially when used with transmitter-mixed camber changing. Wing and stab are foam core with white poplar sheeting. The white gel-coated fiberglass fuselage and slip-on nose cone are unusual in that they are laid up with the weave of the cloth on a diagonal bias, making them exceptionally stable and strong without requiring further

reinforcement. The Grifter warrants a close look if you are a serious soaring competitor. From Global Hobby Distributors, 10725 Ellis Ave., Fountain Valley, CA

92728-8610; (714) 963-0133.



## NEWS FROM K&B

Among many products unveiled at Toledo were two versions of a new 1.00 cubic inch two-stroke from K&B. The 1.00 RC is a front-rotor sport engine

said to be able to swing a 14x8 Master Airscrew at 9,400 rpm, and weighs in at a very light 20.7 ounces without muffler. The K&B 1.00 DF is a rear-rotor, rear-exhaust ducted fan engine for Byron-type fan units—the largest displacement fan engine available. Look for them at your favorite hobby dealer. From K&B Mfg. Inc., 2100 College Dr., Lake Havasu City, AZ 86403.

## THE FUTURE IS NOW!

According to the folks at Dave



Abbe Development Co., their just-released Interceptor 2000 eight-channel FM receiver is the only one currently available that can pass the

FCC's tough performance specifications that will go into effect in June of 1999. Priced at only \$79.95 retail, the completely American-made receiver is compatible with all U.S.-distributed servos and FM/PPM transmitters, and is available to fit JR, Futaba and Airtronics connectors.

Indicative of the quality of the Interceptor 2000 is the fact that each one carries a full lifetime warranty against materials and workmanship, honored at over 50 dealers in the U.S. From Dave Abbe Development Co., 1780 E. Chase Ave., El Cajon, CA 92020-8304; (619) 596-2496. FAX: (619) 596-2492.

## SUPER STAR 90

That new YS Futaba .91AC four-stroke we told you about a couple of months ago would be a perfect match for another new Futaba product, a semi-scale ARF model of



Henry Haigh's famous Super Star aerobatic mount. The Super Star 90 spans 63 inches and comes pre-skinned in the red, white and blue markings of the original. All necessary hardware is included. From Futaba Corp. of America, 4 Studebaker, Irvine, CA 92718.

### FREE FLIGHT FUN

Tom Herr, a master model designer whose credits include many of the excellent kits produced by Midwest Products, has started his own business, Herr Engineering Co., and is offering a kit for a 30-inch span rubber-powered free flight sport and beginner's model dubbed the Scout. The kit is priced at \$29.95 plus \$3 shipping and is complete with all necessary stripwood and printwood, wheels, wire, prop, two colors of tissue, etc., plus a 12-page step-by-step illustrated instruction manual and computer-drawn plans (Tom's a

whiz with CAD). Scout kits are available directly from Herr Engineering Co., 5648 Kingman Ave., Portage, IN 46368.

### HOSTETLER'S LATEST PLANS

Two new Giant Scale model drawings from Wendell Hostetler



include a 26 percent scale Cessna Skymaster (the distinctive twin-

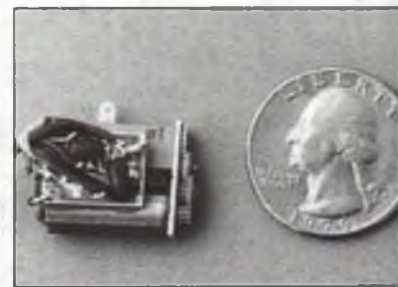
boom, twin-engine, push-pull ship), a 119-inch model designed for a single 3.6 to 6 cubic inch engine mounted in the nose; and a 105.8-inch Nemesis Formula 1 pylon racer sized to conform to the new 42 percent scale Form 1 racing rules. Both models are drawn on two large sheets and include three-view scale documentation drawings. Priced at \$29.95 each plus \$3.50 S&H; for rolled plans, add \$2.50. Wendell Hostetler's Plans, 1041 Heatherwood Lane, Orrville, OH 44667; (216) 682-8896.

### A BETTER TEST STAND

American Hobby Products is producing what it calls "A Better Model Engine Test Stand," featuring oversize heavy maple mounting blocks with adjustable spacing to accommodate anything from a .10 to a 1.20. The 7-1/2 by 9-1/2 inch base is intended to be

screwed or clamped to a bench or other sturdy support; wood dowel posts are included for attaching your own throttle control rod and fuel tank by means of rubber bands. The AHP test stand is priced at only

\$21.95, and can be ordered through hobby shops or direct from American Hobby Products, 12 West Hill Circle, Reading, MA 01867; (617) 944-8316.



### REAL WEE RC

The "Nano-Mite" is what Bearl Duddles is calling his sub-micro digital servo designed for very small rubber, electric and CO<sub>2</sub> RC models, both indoor and outdoor. The Nano-Mite weighs in at a mere 6 grams (less than 1/4 ounce!) and measures only .4x.7x.9 inch. Output is linear, rated at 200 grams of force over its full travel. As you might expect, these servos are built on a custom order basis, and they're not cheap—\$150 each, which includes the connector of your choice. Each comes with a full one-year warranty. Full details are available by sending an SASE to Bearl Duddles, 1134 Miramonte Ave., Mountain View, CA 94040.

### HERE COMES "BIG MAMA"!

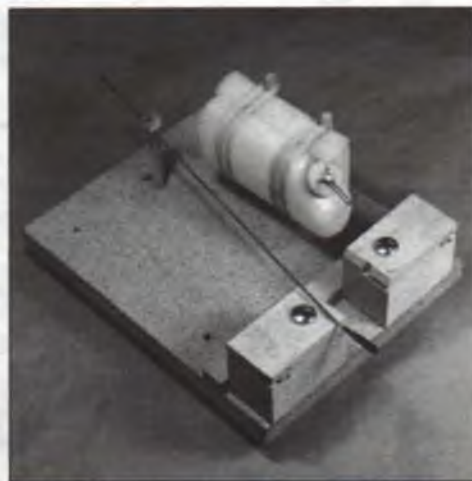
That's what The Airplane Company's Al Durel is calling the latest addition to his fleet of "Armadillo" fun-fliers. The biggest of the lot, Big Mama spans 80

inches and can be equipped with anything from a 1.08 glow engine to a big 3.7 cubic inch gas burner. She's supplied completely pre-built in your choice of red, yellow, orange or blue, requiring only nuts-and-bolts assembly—no gluing. The \$229.95 kit (plus \$15 shipping) comes 100 percent

continued on page 34



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



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KIT RC-70

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TRI-STAR can be built in any one of *three* exciting versions.  
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### SPECIFICATIONS:

LAYOUT: Swept Wing Canard, Pusher  
WINGSPAN: 47.5"  
LENGTH: 35"  
RADIO: 2 or 3-Channel, Standard Servos.  
No Mixing Required  
POWER, GLOW VERSION: 09 to 15 2-Cycle Engine  
ELECTRIC: 05 Can Motor or Cobalt, Direct Drive,  
7 to 9 Cells, 1000 to 1700 MAh  
WEIGHT: (Glow Version) 31 ounces  
(Electric Version) 43 ounces  
(Slope Version) 18 ounces  
WING LOADING: (Glow Version) 11 oz./sq. ft.  
(Electric Version) 14 oz./sq. ft.

TRI-STAR can best be described in three words,  
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KIT NO. RC-67



Designed By: Mike Gretz

#### SPECIFICATIONS . . .

Engines: .30-.40 cu. in. 2-Stroke  
.40-.50 cu. in. 4-Stroke

Wingspan: 70 in.

Wing Area: 900 sq. in.

Weight: 5.5 to 6 lbs.

Wing Loading: 14 to 15.5 oz. /sq. ft.

Radio: 4 Channel (ail, elev, rudd, eng)

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# MODEL DESIGN & TECHNICAL STUFF

BY FRANCIS REYNOLDS

## • Letters From Readers

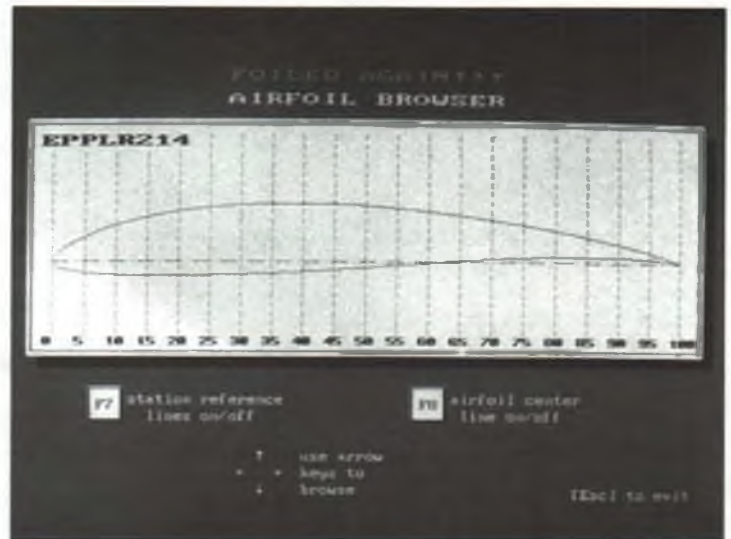
### • Cygnet Software's "Foiled Again!!!" Version 2.0

### • Michael Selig's New Airfoil Development Program

This writer recently received a letter from frequent correspondent Jim Stevens, of White Rock, British Columbia. Jim is one of several who don't let me get away with errors or sloppy writing. I quote Jim's letter in part:

"In your February column, and in Jim Oddino's February 'Airplane Stuff' column in RCM, you both make statements to the effect that nose drop following throttle chop is due to insufficient downthrust. While correct, I believe the statement, by itself, can cause confusion if not outright disbelief, because the reason is not that obvious. When the throttle is chopped the plane is a glider and has no thrustline." He's got me. Jim continues:

"The cause is that the model has first been trimmed by using elevator down trim (instead of downthrust) to counteract pitch-up under power, and it is this which causes



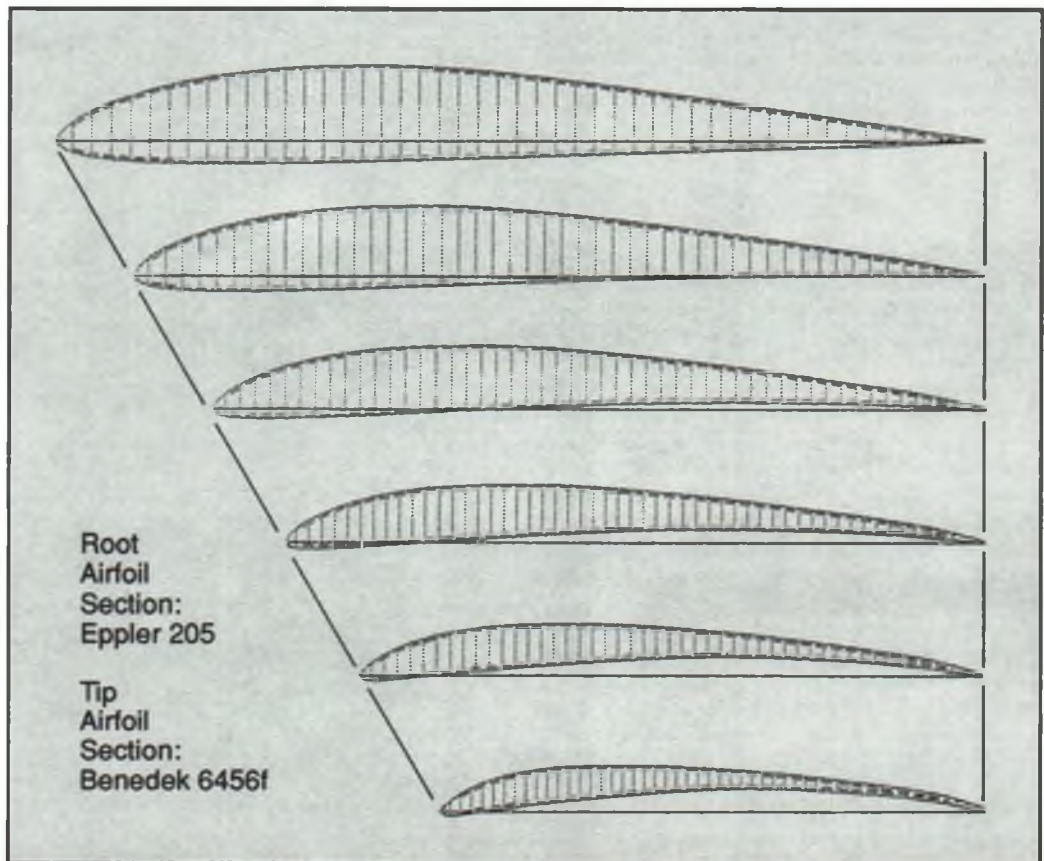
Cygnet Software's "Foiled Again!!!" Version 2.0 program includes a Browser function that lets you page through whole folders of airfoils on disk. Airfoils may be displayed with or without the centerline and with or without station reference lines at 5 percent chord intervals.

pitch-down when power is backed off. The proper practice, as we old free fliers know, is to trim for glide first and then introduce whatever

downthrust is necessary to prevent power-on pitch-up without disturbing the previously established elevator

*continued on page 29*

Using the Blend function in Foiled Again!!! V2.0, users can specify different airfoil shapes at the root and tip of a wing panel. After defining the panel shape, root and tip chords and number of ribs, the program computes all of the ribs and plots them out, smoothly changing one airfoil into the other as it goes. Drawing and photos were provided courtesy of Bernard Crowe of Sigant Software.



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**No. 8911 MARTIAN SPACESHIP \$17.00**  
Incredible RC version of the original Roy Clough flying body design. Five feet long, requires a .25 size engine. By Skip Ruff.



**No. 12911 HEATH MIDWING \$13.00**  
Perfect for 1/2A Texaco Scale RC, with 40" span. By Stuart Warner.



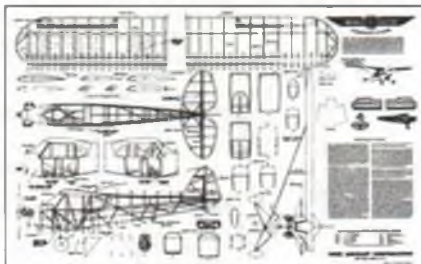
**No. 6811 CURTISS P-40 \$20.50**  
Exact-outline giant/sport RC scale for 90 power, 80" span. By Art Johnson.



**No. 10813 BUTTERFLY ONE \$5.00**  
This little rubber-powered ornithopter looks like a big butterfly. By Ken Johnson.



**No. 7761 TWIN OTTER \$21.00**  
RC Scale twin engine commuter transport. Span 86 inches, .30's or .40's. By Roy Scott.



**No. 782-CP. J-3 CUB \$5.00**  
An official 1942 Piper Aircraft Corp. plan for 25" span rubber scale model.



**No. US2872 HARBOR TUG \$17.00**  
An all-wood, 37" LOA, RC tugboat with electric drive, bow thrusters, and even a device to retrieve other boats. Designed by Francis Smith.

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# COMPUTER SOFTWARE FOR ELECTRICS

Computers have become an important design tool in the hands of serious electric modelers. The more elaborate programs discussed here can give you a pretty accurate picture of whether or not your latest design is going to perform the way you'd like.

I've been getting involved with my computer lately. No, it's not what you think, it's just that in recent months I've collected some really great software that you should know about. It's true that modelers have done nicely for the past 80 years without the help of computers, but think what can be done with them as design tools. Just imagine the music that Mozart or Beethoven could have composed with a PC at their desk! I want to tell you about some computer software that has been sent my way and at the same time send a big thank-you to those who have given me demonstration copies of their programs.

The software packages I've used range from the very basic to the very sophisticated, and from very cheap (in fact, free!) to moderately expensive. Even if you are a neophyte computer user, there is something here for you. Instructions on how to acquire each of the software packages will appear at the end of the column.

## JIM RUGGIERO

Jim's collection consists of programs that compute power and determine dimensional characteristics of an aircraft. ABBOTT.BAS is a short program that computes the output power generated by a propeller of specified pitch, diameter and speed. It uses propeller theory equations developed in the early part of this century and applied to modeling by George Abbott.

AIRDATA.EXE is a compiled BASIC program (i.e. one for which you don't need a BASIC compiler—just run it like you would any other software application). It computes many physical characteristics of the model, such as wing and stabilizer areas and mean aerodynamic chord. The program was written for those who like designing an original model rather than scaling down a full-size one.

Jim's other programs are also easy to use. CANARD.BAS calculates the CG

Figure 1. A sample output using USR&D Corporation's new AERO\*COMP Version 2.1-E, an expanded and more versatile version of the original V1.0-E program.

and other information for canard aircraft (written by Dick Sarpolus and Bernie Raad). SARPOLUS.BAS does the same thing for conventional models (also by Dick and Bernie). There are a couple of other short programs that perform similar functions.

## KEN RUSNOK

Ken Rusnok of Fayetteville, Arkansas has a program called MOTOR.EXE. It analyzes a model's characteristics and estimated motor performance to come up with predictions on the plane's performance. The

```

DATE: 03/25/94          TIME: 15:22          UNITS: ENGLISH
MODEL: EXAMPLE
MOTOR: ASTRO COBALT 40 STD          GEARED
1. NUMBER OF MOTORS
0.130 MOTOR RESISTANCE (OHM)
0.001400 DYNAMO CONSTANT (VOLT/RPM)
0.580645 GEAR RATIO
18.00 NUMBER OF BATTERY CELLS PER MOTOR
18.00 NUMBER OF BATTERY CELLS IN AIRCRAFT
1200.0 CELL CAPACITY (MILLIAMPER-HOUR)
1.30 CELL VOLTAGE (VOLT)
0.009 CELL IMPEDANCE (OHM)
0.015 WIRING RESISTANCE (OHM)
1. CIRCUIT TYPE (1=SERIES, 2=PARALLEL)
2. NUMBER OF BLADES PER PROP
13.00 PROP DIAMETER (INCH)
8.00 PROP PITCH (INCH)
1. AIRCRAFT TYPE (1=MONOPLANE, 2=BIPLANE, 3=TRIPLANE)
72.00 WINGSPAN (INCH)
0.00 WING MIDSPAN (INCH)
12.00 WING CHORD AT ROOT (INCH)
12.00 WING CHORD AT TIP (INCH)
1.50 WING THICKNESS (INCH)
1. AIRFOIL (1=FLAT BOTTOM, 2=SEMI-SYMM, 3=SYMM, 4=UNDERCAMBER)
4. FUSELAGE TYPE (1=NONE, 2=FLT, 3=PRT-RND, 4=RND, 5=PRT-STRM, 6=STRM)
28.00 FUSELAGE AREA (SQ IN)
3. LANDING GEAR (1=NONE, 2=GEAR UP, 3=GEAR DOWN)
2. RUNWAY TYPE (1=PAVED, 2=1" GRASS, 3=2" GRASS, 4=WATER, 5=HAND)
240. RUNWAY ELEVATION (FEET ABOVE SEA LEVEL)
128.00 AIRCRAFT WEIGHT (OUNCE)

10931.0 MOTOR RPM AT FULL THROTTLE
6347.0 PROP RPM AT FULL THROTTLE
26.4 MOTOR CURRENT AT FULL THROTTLE (AMP)
18.7 MOTOR VOLTAGE AT FULL THROTTLE (VOLT)
59.0 THRUST AT FULL THROTTLE (OUNCE)
2.7 THRUST DURATION AT FULL THROTTLE (MIN)
494.0 MOTOR INPUT POWER AT FULL THROTTLE (WATT, PER MOTOR)
365.3 MOTOR OUTPUT POWER AT FULL THROTTLE (WATT, PER MOTOR)
74.0 MOTOR EFFICIENCY (PERCENT)
0.79 OPTIMUM GEAR RATIO FOR MOTOR/BATTERY/PROP SYSTEM
6542.2 FULL THROTTLE RPM (PROP) AT OPTIMUM GEAR RATIO
6.00 WING AREA (SQ FT)
6.00 WING ASPECT RATIO
21.3 WING LOADING (OZ PER SQ FT)
49.0 TAKEOFF DISTANCE (FT)
2.8 TAKEOFF DURATION (SEC)
21.9 TAKEOFF AIRSPEED (MI/HR)
8.0 THRUST DURATION AT TAKEOFF AIRSPEED (MIN)
48.1 MAXIMUM AIRSPEED CONSIDERING PROP ROTATION (MI/HR)
48.0 MAXIMUM AIRSPEED CONSIDERING AIR DRAG (MI/HR)
444000. REYNOLDS NUMBER OF WING AT MAX AIRSPEED
300.0 MAXIMUM RATE OF CLIMB (FT/MIN)
819.0 MAXIMUM ALTITUDE AT FULL THROTTLE (FT)
5.8 MAXIMUM CLIMB ANGLE (DEGREE)
9.0 MAXIMUM LIFT-TO-TOTAL-DRAG RATIO
4.1 MAXIMUM GLIDE DURATION (MIN)
6.8 MAXIMUM TOTAL DURATION (MIN)
=====
AIRCRAFT IS EXPECTED TO FLY

```



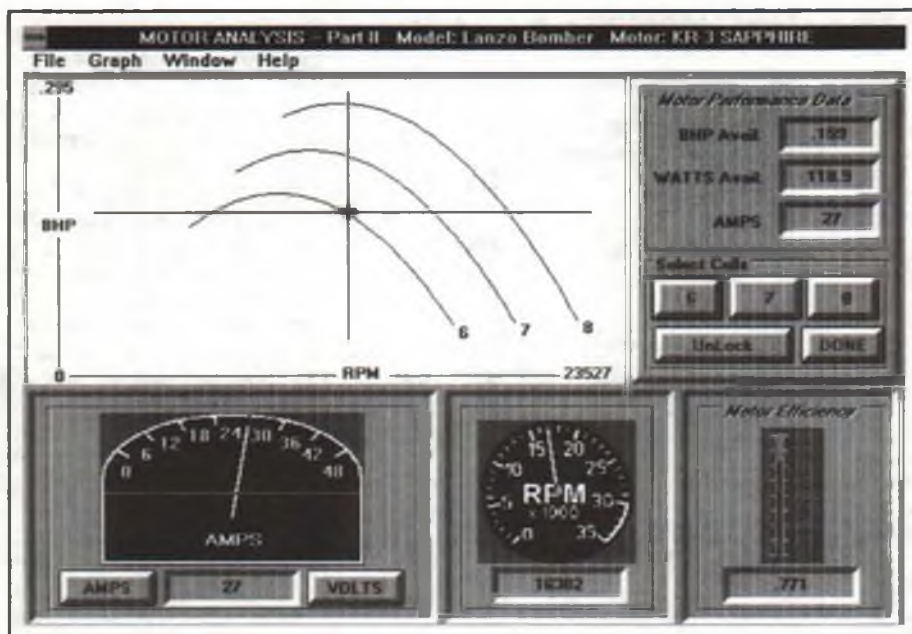


Figure 2. An example of the on-screen display provided by the Electro Flight Design program offered by Kress Jets. Here the program is analyzing the performance of a KR-3 Sapphire motor in a Lanza Bomber Old Timer, and can do it for each of three different cell counts of your choice.

program requires a simple modification to one of your computer's system files, which shouldn't be a problem. The manipulation of the motor's electrical characteristics is quite detailed in Ken's program. The theory behind the program was developed by electric columnists Mitch Poling and Bob Kopski.

### KEN MYERS

Ken Myers has put together an extensive collection of programs and data for electric power. His original program is called EF.BAS; color monitor support and some small corrections were later added by Larry Bonnette.

The program "checks buildability, before cutting any wood." After you supply basic parameters about the model such as wingspan, wing area, etc., the program will recommend a motor size, battery pack size,

cell capacity and many other things. Ken says he's been using this program for over four years with great success.

Also included in Ken's package are a number of text files containing a magazine database on electric flying subjects, motor testing data, and other information written by Ken, Keith Shaw and Jack Laird.

### USR&D

Paul Ogushwitz of USR&D Corporation sent me AERO\*COMP Version 2.1-E. I did a review Version 1.0-E in the February 1993 *Model Builder* and found it to be a good program worthy of your time and effort. V2.1-E includes electrical data for more than a hundred motors, ranging from the very small to the very large. You can input propellers of more than two blades and can directly enter the cell voltage,

impedance and wiring resistance, in addition to the cell count and capacity.

Greater flexibility when specifying the aircraft characteristics has also been included in the updated version. Now you can specify airfoil type, fuselage type and landing gear information. This update also corrects a minor annoyance I found—the

*I want to tell you about some computer software that has been sent my way and at the same time send a big thank-you to those who have given me demonstration copies of their programs.*

weight of the plane used to be specified in pounds; now it's entered in ounces, making one less computation I have to do by hand (boy, am I getting lazy!).

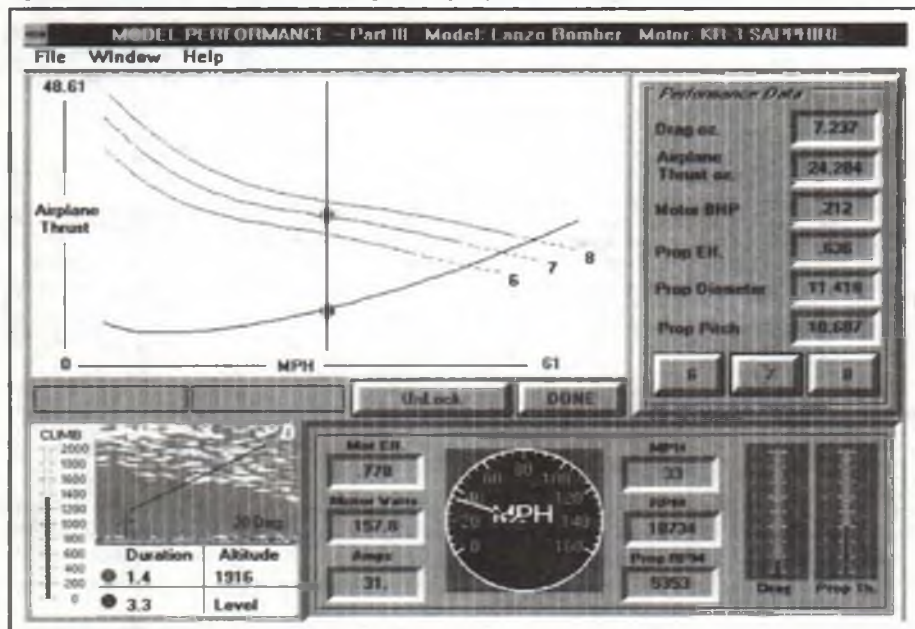
The file handling capabilities of the program have been enhanced and the set of output parameters now includes the Reynolds number at maximum speed—important information for the theorists of the electric crowd. The bottom line of the aircraft analysis is still "Aircraft is (or is not) expected to fly."

The instruction manual clearly explains how to install and configure the program. There's an error in the manual that I'm sure was an oversight from the previous version. It states that program files are placed in the C:\AEROELEC directory. They're not—they're really placed in the C:\AERELEC2 directory, which is created during the installation process.

### BOB AND JOHN KRESS

Judging by the amount of ink received by Kress Jets' new design program in the club newsletters I receive, I had to give it a try. Electro Flight Design (EFD) is the only computer program I've tried that works in the

Figure 3. Another part of the Kress Jets EFD program analyzes predicted model performance. More details in text.



### CONTEST ANNOUNCEMENT

The Northern Connecticut Radio Control Club will host its seventh annual Electric Fun-Fly on July 23, 1994, at the club field in Ellington, Connecticut. Larry Sribnick of SR Batteries will hold a clinic on electric flight, and John Sermos will display his line of electric flight products. The entry fee is \$5 and there will be many prizes given away. For more information and a detailed map, send an SASE to Ron Torrito, 1625 Main St., East Hartford, CT 06108.

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"Windows" environment. Installation is done from the Windows Program Manager and is extremely easy. Most programs written for Windows come out clean and sharp and are usually very user friendly, and Kress Jets' program is no exception.

Like AERO\*COMP, this program will spit out the flying characteristics of your model after entering the requested inputs. The program analysis is broken into three major parts: Aircraft Performance Data, Motor Selection, and Propeller Selection. Aircraft Performance Data analyzes the aircraft's flight speed and power requirements. It will tell you how much power (wattage or horsepower) you need to achieve a certain flight speed. If desired, you can also include the landing gear as an integral part of the analysis.

The neat part of the process is the real-time graphical feedback; the required power is plotted versus speed so you can get an idea of the motor requirements for the aircraft. This part of the analysis also gives aircraft drag and the lift and drag coefficients, so there is something here for the build-and-fly crowd as well as those schooled in aerodynamics.

Part two of EFD asks for your motor selection—you can select one from a number of choices, or you can enter your own motor parameters. The program requires a few motor constants that are not readily available, however the on-line help gives you directions on how to find these parameters for your motors. As I mentioned in my November 1994 column, I've found that parameters vary from motor to motor even of the same make and model, so while the pre-set values are probably adequate for use with your particular analysis, you will have more accurate results if you find the constants for your individual motor.

You can select three cell-count scenarios—for an Astro 05 you may want to run the analysis for a 7, an 8 and a 10-cell battery pack. EFD then plots motor speed versus power for each of the three packs. You can get an idea of the motor's performance and at what speed and efficiency you should operate your motor. Figure 2 shows the graph for a Lanzo Bomber with a KR-3 Sapphire motor.

Step three calculates the "optimum propeller matrix" and displays it in tabular and graphical form. For a given wattage, the program will calculate the optimum prop size, or you can specify a prop size and the program will compute power. The software graphics give a visual indication of airplane thrust and drag and also a diagram of flying attitude for the current configuration. All of the flight characteristic numbers change as you move the mouse pointer along the graph, and it really makes for an eye-pleasing and informative user interface. Figure 3 illustrates this step in the analysis.

I spent the better part of two days experimenting with the software and figure that I still have quite a few more days

to go. I do have a couple of complaints from a programming point of view. First, there are a few places where hitting the <Escape> or <Cancel> keys will back you out of the program completely—not a very graceful or user-friendly exit! The column labels on the spreadsheets change to gibberish when you use the <PgUp> and <PgDn> keys to step through the numbers.

You *must* select either two landing gear configurations or no landing gear at all to proceed through the program. Being able to choose only one gear would be helpful. You must also choose a propeller for each of the three battery pack selections to continue on to the propeller matrix spreadsheet, which is a bit annoying. Calculating the matrix with just one propeller at a time would be nice. But these are all minor problems and don't detract too much from the program. The information is valuable, but don't expect to be 100 percent literate right away. This software package has a definite learning curve. In addition to the context-sensitive help, there is also a glossary that can be accessed by clicking the mouse on any of the highlighted words appearing in the help text. This is a very useful feature that helps the user become familiar with the software's vocabulary.

#### SOFTWARE AVAILABILITY

The software by Jim Ruggiero and Ken Rusnok is available from me in a couple of ways. First, you can drop me a line with your name and address (please include \$2 for the cost of the disk and mailing) and I'll send a disk out to you. Specify a 3.5 or a 5.25-inch disk.

If you subscribe to CompuServe, I've put this software in the ModelNet Forum's library. The file name is KENJIM.EXE; just download it to your computer, execute the program by typing "KENJIM" and all the files we've discussed will be extracted and magically appear on your disk. Be sure to read the README.TXT file before executing any of the programs.

Ken Myers' programs are available directly from Ken for \$15. Write to him at 1911 Bradshaw Ct., Walled Lake, MI 48390.

AERO\*COMP version 2.1-E is available for \$79 plus \$3 S&H from USR&D Corp., P.O. Box 753, Hackettstown, NJ 07840-0753; (908) 850-4131. New Jersey residents add 6 percent sales tax, and add \$1 for overseas orders.

Electro Flight Design can be ordered for \$69.95 from Kress Jets, Inc., 643 Ulster Landing Rd., Saugerties, NY 12477; (914) 336-4629.

I can be reached at 6462 Sunny Brae Dr., San Diego, CA 92119; (619) 463-4453 between 8 and 5 Monday through Friday and also on CompuServe at 74164,3237. Internet users can send e-mail to me at 74164.3237@compuserve.com. Happy flying! **MB**

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# SO WHAT'S NEW IN THE WAY OF BIG BIRD GOODIES?

Notices of new products aimed at the Big Bird market continue to cross Bruce's desk. He also gives us a look at an exceptionally well done multi-engine scale project.

**B**efore talking about some of the neat new items available to us Big Bird folks, I want to tell you a bit about an especially interesting multi-engine project that was recently finished and successfully test-flown.

Two years ago, Canadian modeler Bill

Matheson wrote to me in search of model plans for an Avro Lancaster bomber. He had logged many hours flying a Lancaster during World War II. Bill eventually scratch built his Lancaster from plans drawn by Chris Gold in England, finishing the model in November of last year.

The model spans 90 inches and is powered by four Magnum .25s turning 8x6 APC props. Foam, balsa, plywood, carbon fiber and Parson's 0.6-ounce fiberglass cloth were used in the construction. Bill used Chevron Perfect Paints to finish his Lancaster, as he found them to be a perfect match when



■ ABOVE: Bill Matheson recalls past duty every time he flies his 90-inch span Avro Lancaster, built from Chris Gold plans. Bill flew the full-size FD-V on many difficult night missions over Europe during WWII. ■ LEFT: Old wartime photos allowed Bill Matheson to accurately reproduce the nose art from "Vicky The Vicious Virgin," the ship he and his Canadian crew flew in WWII.



Master craftsman Wim Van Der Hoek of Holland turned out these incredible working examples of the machinist's art, a V-12 with variable-pitch prop and a two-row 18-cylinder radial. This is the sort of thing you'll find in *Strictly I.C.*, a magazine targeted at amateur machinists. Details in text.

compared with an airworthy, full-size Lancaster, which is on display at the Canadian Warplane Heritage Museum near Hamilton, Ontario, Canada.

Engine control on a multi-engine plane like this can be a real can of worms, but Bill solved the problem nicely. The normal throttle stick is used for the two inboard engines and an auxiliary channel controls the two outboard engines. Bill was able to modify the knobs on his Airtronics transmitter so that he can easily operate both throttles with his left hand. This throttle setup also allows Bill to

use the "four engine rule" of throttling up the inboard engines first and throttling down the outboard engines first, which certainly helps with torque management.

Bill described the initial flight as "memorable," due to an out-of-trim elevator and three of the four engines quitting in flight. As could be expected, the landing was a bit hairy, but the plane came through unscathed.

Bill expertly duplicated the nose art from old photos of the Lancaster FD-V that he flew during World War II. "Vicky the Vicious Virgin" saw Bill and his crew through

many missions over Europe.

Three members of the original crew of seven are still with us and Bill had hoped they could attend the inaugural flight, but distance and poor health prevented their attendance. However, plans are afoot to get the crew together for some future flights.

Bill deserves a Big Bird "Well Done" for taking on such a formidable project and seeing it through, but then, what else would you expect from one of the men who flew in the R.A.F. Bomber Command?

We are expecting to see a Vickers Wellington roll out of the Matheson hangar in a few months. We wish Bill all the best with his new endeavor.

For those who like 'em *really* big, Roy Vaillancourt is marketing plans, accessories and semi-kits for this huge 1/3-scale Stinson L-5, displayed here by Charley Lucas. Two other new models from Vailly Aviation are also now available—see text.



### BIG ENGINE SOFT MOUNTS

The folks at *Model Builder* know that I'm an advocate of soft engine mounts, so when Major Decals sent a sample of their new "Aircraft Mounts" to the office, they were promptly forwarded to me. Major Decals is a big help when it comes time to decorate your newest project, and now they can help you mount your engine, too.

These mounts are of the well-nut type similar to those from J'Tec and Davis Diesel (refer to the February '94 Big Birds column). The rubber insert is a green material of slightly stiffer durometer than the black neoprene ones used by J'Tec and Davis.

To get the maximum benefit from soft engine mounts, they must be used in the correct number and in the correct mounting pattern on the firewall. If I were mounting my Saito 300 using the Major Decals Aircraft Mounts, for example, I would use two packages of four (total of eight) in a circular pattern around the crankshaft centerline, and would install them as far from the centerline as the firewall would allow.

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### WWI BUFFS, UNITE!

All World War I aviation buffs will be interested in a new organization called The First Warplanes, Inc. Well-known northwest scale modeler Dick Hansen, owner of Hansen Scale Aviation Videos, is on the Board of Directors and has informed me that modelers are very welcome in the

organization, and that the group's activities will include a good deal of World War I model flying.

The main goal of The First Warplanes, Inc. is to promote public interest in preserving and recreating the era of World War I aviation. Their annual meeting will be held in conjunction with the annual World War I fly-in at Gadsden, Alabama.

Annual dues are \$30. For more information and a colorful brochure or application for membership, write to The First Warplanes, Inc., P.O. Box 366, Guntersville, AL 35976.

### MACHINIST TYPES, TAKE NOTE

Interest in miniature multi-cylinder internal combustion engines seems to be growing, more and more of them being turned out on an individual basis by those who

Launcher Company's R/C Launcher and Pit Crew is now available in a larger size for Big Birds—details in text.



own or have access to a small machine shop. So I was not too surprised when I heard from Bob Washburn that his magazine, *Strictly I.C.*, was available to readers around the world on a bimonthly basis. Bob started out in 1988 with 84 subscribers, and now his subscriptions have grown to 2,070 worldwide.

*Strictly I.C.* covers, at one time or another, every subject pertaining to the construction and running of internal combustion engines. Even the beginning machinist is provided with instruction. Each issue also features photos of readers' projects from around the world. For more information about this very special magazine, write to Robert A. Washburn, *Strictly I.C.*, 24920 43rd Ave. South, Kent, WA 98032.

### SUPER-STRONG SERVO ARMS

Russ Pribanic noted in my past columns that I advocate using fairly substantial servo arms. Russ's company, R-Tech, manufactures some very fine servo arms that will fit JR, Futaba and Airtronics servos.

Each package contains eight super strength long fiber composite servo arms. The length of the six single arms varies from 3/4 to 1-1/4 inches, and there are also two double-enders with 1-inch arms. The injection molded arms contain long strands of fiberglass reinforcement, which makes them nearly indestructible.

For more information and prices, write to R-Tech, 120 Mountain View Dr., New Milford, CT 06776.

### VAILLY'S LATEST PLANS/KITS

Vailly Aviation's Roy Vaillancourt has been hard at work, having just completed three new projects, and is offering plans and semi-kits for same. Roy's 1/4-scale Stinson L-5 was so well received that he's now making it available in 1/3 size. The new ship spans 136 inches, weighs 32 to 38 pounds and will require at least a G-62 or equivalent. The plans include full-size patterns for ribs, formers and all other parts. Accessory parts available are fiberglass cowl, formed landing gear, vacuum-formed landing gear strut covers and blisters, and dummy exhaust. A partial wood kit is also available. No foam is used. A five channel radio is required (the fifth channel for flaps).

The second model is a 1/4-scale Cessna L-19/O-1 Bird Dog, which spans 108 inches and weighs 18 to 22 pounds. Suggested power is a Zenoah G38 or Quadra 42. In a recent phone conversation, Roy told me that any of the large twin-cylinder four-stroke engines will fit in the Bird Dog's cowl just fine. A partial kit is available, as well as a fiberglass cowl, aluminum landing gear and a construction photo package.

If you would like to participate in RC Unlimited Air Racing, Roy has redrawn his 90-inch Hawker Sea Fury to meet current Unlimited rules and specifications. The new

*continued on page 82*

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# THOSE FRUSTRATING FILLETS!

This month, John turns the column over to precision aerobatics expert Gerald Schamp to explain the art and mystery of making fillets. Outlined are two proven methods that work well.

There are times when a fine flight on a model airplane can be almost a religious experience. The beauty of the plane against the blue sky, the grace of the carefully sculpted maneuvers, the sound of the purring motor, the feel of the pull on the handle. It can seem that God is our co-pilot.

If we're going to think of modeling in religious terms, we also have to admit that

one of the most frustrating parts of the whole construction. There are many ways to do fillets, and just as many materials to do them with. Generally speaking, almost any material will work, look nice and stay that way. . . until the butyrate dope is applied over it. Then, it's hold your breath and hope the fillet doesn't bubble.

I've had excellent results with two products. One is the old standby, Sig Epoxolite,

along the fillet area, top, bottom and both sides. Lay down 1-inch wide masking tape along the marks on the wing. The marks on the fuselage will be a curve to match the airfoil, so the tape has to bend some. Use 1/4-inch tape first, then overlay it with 1-inch tape as best you can. Be sure to go right around the leading edge with the same distance of radius.

If your model has flap fairings at the



Mel Marcum did an excellent job of producing Epoxolite fillets for this Sierra profile, designed by this month's guest writer, Gerald Schamp.



The fillets on this stunter built by our columnist turned out badly, due to paint bubbling. Text tells how to avoid this problem.

the devil is sometimes at work as well.

It was the devil, for example, who invented fillets. And it's he that makes them bubble up, ruining the appearance of the finest airplanes.

As is often the case, the subject of fillets came up recently as the result of a personal experience. Our new stunt plane has badly bubbled fillets. Obviously, there's a lot we don't know about fillets here at MB control line headquarters.

So, we turned to our panel of experts and called on precision aerobatics enthusiast Gerald Schamp to give us a lesson in this elusive art. Here's his lecture:

## APPLYING FILLETS

Adding fillets to your new ship can be

and the other is slow cyanoacrylate glue and a light shot of kicker. Both have drawbacks, but it's a good bet that no bubbles will appear.

### Method #1: Epoxolite

The fillet area has to be ready and clean of dust. Wipe the area with alcohol, thinner, acetone or anything that cleans any grease or oil your hands may have left in the fillet area.

Next, decide how big a fillet you want; remember that Epoxolite is heavy, so don't make this into a custom car thing. I like small fillets myself, of about 1/4-inch radius. Make a radius tool (I made mine from an old wood prop) to match the radius you want.

Lay your radius tool in the fillet area and make small marks with a soft pencil all

trailing edge, then the fillet will go onto these, too. If there aren't any fairings, just end the fillet at the trailing edge, with a similar radius to match the leading edge. It gets a little tricky with the flap horn in the way, but be persistent and you'll get good results.

Now, the fun part. Mix up the Epoxolite. Be sure to do this thoroughly, at room temperature, as it mixes much easier when warm. You can put the little tubs in hot water for 15 minutes to be sure they are warm. Once it's mixed, you should have a nice, light, really grainy, creamy brown chocolate-colored goo.

Use your radius tool to spoon some of the material into the fillet and work it into the fillet area. Don't use your finger; the less





Gerald Schamp's pride and joy, a gorgeous Big Oriental, which uses the CA glue fillets described in text. Finish is Sig dope.

you touch this stuff from here on out with your bare finger, the better. In fact, a cheap pair of latex gloves works well here.

Get a small bowl of water. Dip the radius tool into the water and then start molding the Epoxolite into shape. Water seems to act as a thinner and lubricant that allows fine shaping of the material. Keep working the fillet until it's smooth, uniform and looks consistent all the way around. You'll have to keep dipping the tool in the water as you do this. Pretty soon the surface will get wet enough that no more water will be needed. Have a roll of paper towels handy for wiping off the excess.

Once you have the fillet the way you want it, go to the next one and repeat the process. When you have all of them the way you want, carefully remove the masking tape. There will be a little edge left when the tape is removed, but you'll fix that in a minute. Once the tape is removed, take a damp paper towel and wipe up any drips and drops you may

The powerful Stels .36, manufactured in Russia and imported by Race Force Inc., used for fast combat.



have gotten where they shouldn't be.

Now dip the tool in water and carefully blend the taped edges into the surface so there is a smooth transition from the Epoxolite into the wing surface and into the fuselage side. Don't get things too wet; we don't want this thing to turn into a sponge and soak up lots of water.

Once the fillets have been dressed off, put the plane aside for a while and clean up the mess. After about an hour, take a close look at the fillets; they will be starting to set up. You can still make corrections with your tool and a little more water. The result should leave you with a handsome fillet that needs little or no sanding.

Once the Epoxolite sets up (24 hours minimum), the surface will be kind of sticky. Take your thumbnail or a knife and poke at the fillet everywhere. It should be rock hard; if it's not, let it set a while longer. To make the surface paintable, use alcohol and a paper towel. (Hint: The 97 or 98 percent alcohol will do a better job here than the 75 percent.)

Wipe the fillets well and let them dry. The surface should come clean; it will have a slight shine to it, but the stickiness should be gone. If not, continue cleaning with alcohol; it will come clean.

The fillet is now ready for paint. Should they need sanding, be sure to put masking tape back along the edges of the Epoxolite; otherwise you'll sand gouges into the balsa. Usually a light sanding with 120-grit will suffice. Clean the fillets again before painting. Remember, keep your bare fingers off the fillets.

There are two kinds of paint that I know work over Epoxolite. One is the old formula Aero Gloss clear; I've heard that Randolph

is very similar. The second choice is Sig nitrate dope mixed fairly thin, say 60 percent thinner and 40 percent dope. Three coats about an hour apart should do.

Let this set for at least 24 hours, then sand lightly with 320-grit sandpaper. Now it's ready for whatever paint you want to put on next. Don't paper over fillets, ever! No matter what the fillets are made of, it's instant disaster if you do. And gobbing paint on fillets is almost as bad as paper. Use light coats and plenty of thinner, and you'll get good results.

If the paint does bubble up, don't panic. There's an easy fix. Use a No. 11 blade and, depending on the size of the bubble, either slit it or poke it full of many little holes. Take thin CA and put some in the bubble. Use a Q-tip or paper towel and rub the bubble down flat. This method will work right into color, if need be.

#### Method #2: Slow CA

Now let's look at the simple way to do fillets. I really prefer this way because it's fast, simple, bulletproof and looks good. I like the smaller fillets. Some of the scale planes need large fillets, but stunters, even .60-size planes, don't need 1/2-inch fillets.

This method uses slow CA glue. I've always used Bob Smith CA, both thin and thick, for building airplanes. It's predictable, strong, burns the heck out of your eyes and nose, sticks your fingers to balsa in microseconds—what more could you want?

Get the fillet area ready by sanding with a piece of 1/8-inch plywood about 2x3 inches, with the 2-inch side sanded round. I use a piece of 80-grit sandpaper about 6x2 inches. When sanding the area, hold the sanding block at about a 45-degree angle to the joint.

Once the joint or fillet area is smooth, turn the airplane up on one wingtip; this will give you a level surface to work on. Now take the slow CA and run a bead around the wing/fuselage joint. Make it as uniform as possible. Let it set for a bit, then lightly dust on some kicker from about 2 feet above the glue.

When the glue kicks, you'll have a nice smooth fillet. More than likely, it won't be uniform after it dries. Take the sanding tool and sand the fillet again, this time picking on the low spots. Try for uniformity all around. It usually takes me three shots to get the fillet I want. Once it's even all around, take the sanding block and start sanding the glue fillet until you have a nice radius sanded into it. Start on the bottom and build your technique. If you goof up, hit it with the CA again and repeat the step.

As for painting, the same rules apply. Keep the dope thin and you probably won't have trouble. Keep sanding between coats of dope and clean thoroughly before painting. Use 320-grit sandpaper to sand between coats. This is one of the best and simplest ways to make a fillet. I've had them bubble up, but poking them full of holes and gluing them down with CA cures the problem 99 percent of the time.



The Aero .40 is produced by Henry Nelson and Randy Smith for precision aerobatics.

Gerald Schamp is willing to answer questions about the two filleting methods described above. He can be contacted at 3860 Lancaster Dr., Eugene, OR 97404.

### ENGINE NEWS

This month's photos include some exciting news on the horsepower front.

The engine with the black head and the dual rear exhaust stacks is a Stels .36,

manufactured in Russia and imported to the U.S. by Race Force Inc. I've obtained one for use in fast combat, and will report on its performance in a later issue. I've had a few test flights on a Stels .049 and found it to have excellent power in hauling a large 1/2A combat airplane. Using the special glow head offered by Race Force adds even more to the output.

Stels engines also are available in 1cc, 2.5cc, 3.5cc, 3.25cc and 3.5cc sizes, in a variety of

configurations for use in CL speed and combat and free flight. Stels also makes a fast combat flyaway shutoff which includes a remote needle valve.

Race Force also has a complete line of Cyclon speed engines and equipment, and lots of other competition equipment and accessories. For a complete list, write Race Force Inc., P.O. Box 342, Edmonds, WA 98020.

The appearance of the other engine pictured should make it recognizable to many CL competitors. It's unmistakably the handiwork of Henry Nelson, maker of great CL engines. This particular engine is the Aero .40, designed and manufactured by Nelson and by Randy Smith of Aero Products for use as a precision aerobatics powerplant.

"It features a mildly timed AAC piston and liner, dual high speed ball bearings, and true venturi," writes Randy Smith in his press release. "The engines are available in four different versions, side or rear exhaust, and multiple configurations. Each engine is hand assembled and blueprinted. The weight is just over 10 ounces."

For more information and a complete catalog, write Aero Products, 1880 Scenic Hwy., Snellville, GA 30278.

One final note in the "informal products" category: Bill Dawson of San Antonio, Texas has written an 18-chapter book on the subject of beginning in precision aerobatics. The book hasn't been published yet, but Bill is willing to make the information available on computer disk to anyone who sends him the blank disk and postage. For information, write Bill Dawson at P.O. Box 13662, San Antonio, TX 78213.

As always, photos, club news, contest information, technical tips and questions are welcomed. Write John Thompson, 295 W. 38th Ave., Eugene, OR 97405. Send electronic mail to 73473.1407@compuserve.com. **MB**

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## EVEN MORE TO COME

We will continue to refine our products and extend our accessory line in the years to come. Virtually all our accessories will work on the earliest SHERLINE Lathes as well as the most recent. All improvements are upgradeable on older models as well, so your SHERLINE tools need never go out of date. If you're tired of being limited to buying parts designed and built by someone else, it's time to start building your own. Join the winners who build theirs on SHERLINE precision miniature machine tools.

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# 'PIPER—A LEGEND ALOFT,' BY EDWARD H. PHILLIPS

**S**ure to become a classic collector's item, *Piper—A Legend Aloft* traces the genesis and evolution of the Piper Aircraft Corporation and its airplanes, from its beginning in 1928 as the Taylor Brothers Aircraft Manufacturing Co. and its first aircraft, the Taylor A-2 Chummy, progressing to the association of Gilbert Taylor and William Piper and the formation of Taylor Aircraft Co., later to become Piper Aircraft Corp.

The book records the complete evolution of the company, from its modest beginnings through good times and bad—the lean times during the Great Depression, the World War II era, the postwar boom and subsequent bust, takeover attempts and its incredible longevity. Woven into this coverage is the chronological development of literally every aircraft that Piper was ever involved with—even little-known models such as the Sky Sedan, Skycycle and PT-1 are featured.

The photos are excellent, many of which are from the Smithsonian's National Air and Space Museum and the Piper Aviation Museum's extensive collection—some 100 of which have never before been published. Several noted aviation authorities and historians served as consultants in various areas, insuring accuracy to the nth degree. Author Edward H. Phillips is noted

for his outstanding work on other aviation books of a similar nature and has done an excellent job on this one as well.

The book is intended as a documentary historical guide and reference for anyone with an interest in the legendary company and how it came to be one of the most famous producers of general aviation aircraft. It is written in a manner that makes it highly interesting for even the casual reader, yet is sure to satisfy even the most insatiable appetite of the hard-core Piper owner. **MB**

This is definitely the most comprehensive history of Piper aircraft available. It includes specs, 25 three-view drawings, 402 photos, plus 10 full-page scale drawings by Paul Matt. The hardbound book comprises 172 pages in an 8-1/2x11 format, at \$29.95 from Historic Aviation, 1401 Kings Wood Rd., Eagan, MN 55122; (800) 255-5575 or FAX (612) 454-8554.



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1/6, 1/7, 1/9



Sportman  
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## TECH STUFF continued from page 14

setting. The process for RC models may well require the temporary use of downtrim until the proper downthrust setting is ascertained.

"That all this escapes many RCers is not surprising. To get the model airborne it must be powered up. Any pitch-up is usually dealt with by applying downtrim and then forgetting about it. Free flighters have the luxury of being able to test-ride their models and get the glide set up properly before going on to deal with downthrust. In either case the final elevator trim should be that established for glide only."

### ACETAL LANDING GEARS AND MODIFIED SERVOS

I received a letter from "Stoney" Stoneman, of Garland, Texas, asking questions on a couple of items in the March 1994 MD&TS. I don't think he will mind sharing my answers with you.

"Dear Stoney,

"I'm glad you like the column. With regard to acetal landing gears, you seemed to say that you might make an acrylic gear instead. *Don't*. Acrylic is very brittle. An acrylic landing gear would break on the first even slightly rough landing. I proposed acetal because it is stronger, and not brittle.

"As to modifying servos for continuous running, I'm sorry if my write-up wasn't clear. I probably tried to explain too much, and ended up making it more confusing. No, you do not take the electronics, or the motor, or the feedback pot out of a servo to use it as a proportional motor with its own speed controller. Don't change any electrical connections. You simply mechanically uncouple the servo motor from the pot, then put the gears back in and the cover back on, plug the servo into the receiver, and use it.

"But before you put the gears back in place, plug in the servo, turn on the radio, and rotate the now-uncoupled servo pot by hand (with any small tool that will work) in one direction or the other, while moving the transmitter stick, until the servo motor does what you command it to do. Play with it for a minute and you will understand it better. In most cases you don't even need to permanently dedicate a servo to this conversion; the pot coupler (if it has one) can be reinstalled later if desired, and the servo returned to normal use.

"Yes, in theory you could use such a modified servo to power an electric RC model and have a self-contained speed controller, but I didn't mention that in the column because it would be difficult to connect a prop either directly to the motor or to the first stage of the gears. Further, servo motors are usually very small, and probably not as good for flying an airplane as motors designed specifically for that



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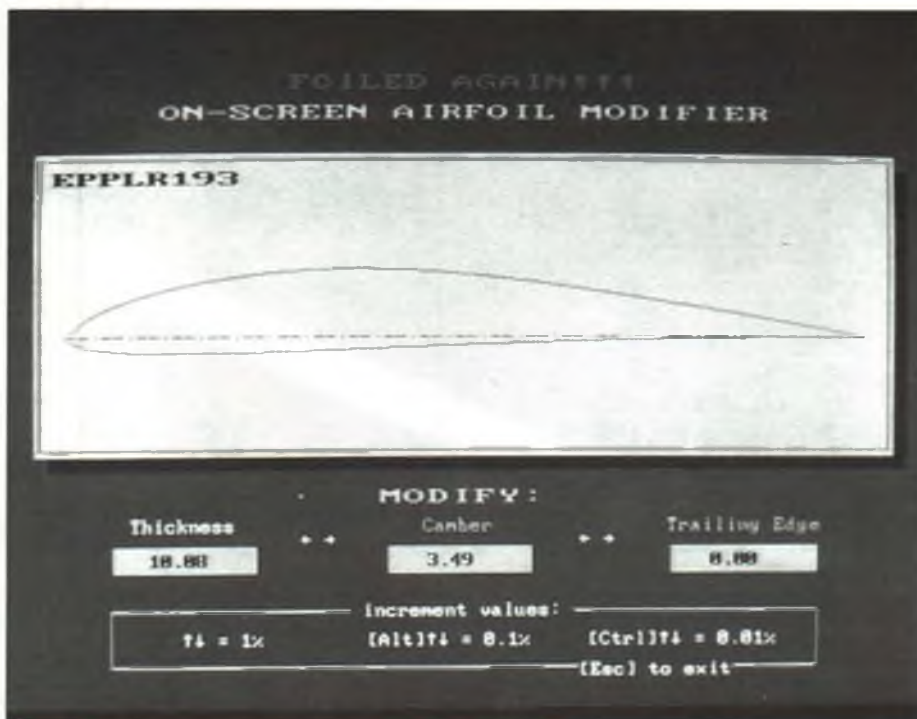
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Foiled Again!!! V2.0 users can also modify airfoils graphically on-screen, as seen here being done to an Eppler 193 section. Thickness, camber (curvature) and trailing edge sharpness may all be modified by touching the arrow keys.

purpose. With this further explanation, if I confused you before and you think you may have an application for such a continuous-running but RC-controllable and reversible servo or motor, I suggest you carefully re-read the item in March MD&TS."

### AIRFOIL PLOTTING

Way back in the dark ages (September 1992 to be exact), we talked about plotting airfoils by computer. At that time we discussed Cygnet Software's "Foiled Again!!!" airfoil plotting program in some detail. Now I want to talk about some relatively recent improvements in their program.

Cygnet is a part-time cottage industry of soaring modeler Bernard Crowe. His V1.3 version, which became available several years ago, could plot a large number of airfoils of many types from files, to any size; allowed modifying their

parameters, like the thickness and the camber (so you could customize airfoils to suit yourself); could plot all of the ribs in a tapered wing to the correct size, and other good things.

I recently got Cygnet Software's Version 2.0 of their Foiled Again!!! program. The V2 program has a number of nice features which the earlier version didn't have, such as plotting airfoils from other programs; but two new features of V2 stand out in my mind. With V2 you can see the airfoil you are working with on the computer screen (this feature requires a VGA graphics adapter), and you can have one airfoil at the root and another airfoil at the wingtip and blend them smoothly from root to tip.

My latest model development effort is an RC ornithopter. It will be discussed in future issues, but for now I have plotted all of its airfoils with Cygnet software—even those

in the tail. In the center section of the wings (it is a tandem) the centers are cambered and the ends are symmetrical. The Foiled Again!!! program neatly boosted a standard Clark Y (11.7 percent thick) up to 14 percent thick, then faired it smoothly into a tailored symmetrical NACA 0014, which the program made for me from an NACA 0009 it had in its files.

The outer wing panels of this flapper are going to be tapered, and the Cygnet program made all of the varying-length rib templates for them, again using the NACA 0014 section. You may wonder why I chose such ancient, basic airfoils. For this special flying thing I decided they were best, but the Cygnet software has internal files on over a hundred different airfoils, including the latest Selig soaring foils. Any of these can be modified in various ways if you wish, and the program will accept and plot "alien" foils as well.

The program is user friendly. Even this computer klutz got it running with little trouble. One word of caution, however. Version 2.0 is more sophisticated and uses more computer capability. The old XT IBM clones with DOS 3.2 or earlier plot very slowly using the V2.0 program, while an AT and later computers plot from it rapidly. (The earlier Cygnet V1.3 plots rapidly on the XT.) If you have an XT machine and need the V2.0 to plot a lot of blended airfoils frequently, you might consider upgrading your computer to an AT or upgrading to DOS 4.0 or later. Cygnet Software's address is 3525 Del Mar Heights Rd., #237, San Diego, CA 92130.

There are several other airfoil plotting programs on the market, but my experience is with Cygnet Software. It fills my needs very well.

### MICHAEL SELIG

I recently received a letter from Professor Michael Selig, who teaches airplane technical stuff at the University of Illinois. Michael's other claim to fame is that he is a sailplane modeler, and has been developing new low Reynolds Number airfoils for modelers in the UIUC open-circuit wind tunnel, along with several other modelers

*continued on page 82*

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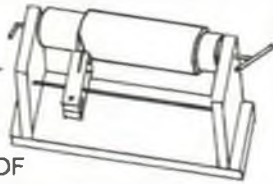
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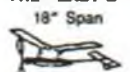
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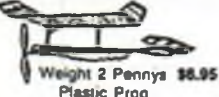
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# DEAR JAKE

## Advice For The Propworn

### DEAR JAKE

About a year and a half ago, I was arrested and imprisoned for not using a silencer when I shot a mime. Personally, I think that would have been redundant, but nevertheless, I find myself incarcerated and with a great deal of spare time on my hands. I decided to take up model airplanes as a way to pass the hours.

Prison has its own set of rules, of course, and we are forced to adapt our hobby to comply with the cell block regulations. For instance, no super glue is allowed. This rule was apparently adopted after Lenny "One Eyebrow" Figurski used some cyanoacrylate to join two guards at the face last year. No regular glue is permitted either, no doubt due to a local propensity for sniffing the stuff. Additionally, and for obvious reasons, no knives, saws, razor blades, hammers or pins are allowed. So under this set of tight restrictions, our modeling activity is limited to snap-together plastic kits and balsa gliders whose pre-cut wing and tail surfaces slide into slots.

This is not to say that we don't have lots of fun, even with our severely restricted little facet of the modeling world. We have Concours d'Elegance competitions with our plastic models and all sorts of flying events with our balsa gliders. Manny "Fats" Rugerio holds both the indoor and outdoor endurance records and Charlie "The Weasel" Giambone is the leader in the Special Achievement category. His record setting flight bounced off three trustees and landed in the warden's soup.

My question has to do with center of gravity and flight trim. I have been saving the nose weights from my balsa gliders. I have been saving them in a sock. When I have a couple pounds' worth, I plan to make an impression on one Mr. Ivan "B.O." Welch. An impression in his skull, that is.

But I digress. I've tried to balance my gliders with chewing gum, but it doesn't weigh enough and the planes are tail heavy. Down elevator helps, but if I throw the glider hard, it nose dives and crashes. Is

there some combination of wing incidence and elevator trim that will compensate for an aft CG?

Harold "The Professor" Gaines,  
Leavenworth, KS

Dear Harold:

Sounds like you're suffering from inadequate static margin and a negative velocity stability. Inadequate static margin means the neutral point is too far aft, and the moment created by the lift vector being forward of the CG is very strong and must be countered by lift from the tail, i.e., down elevator. The trim condition established is velocity dependent, and when you "throw it hard," as you say, the wing makes its lift at less angle-of-attack and the upload on the tail predominates and causes the noseover. Thus, an aircraft with negative velocity stability will diverge in a dive, or "tuck under" as it is called, when airspeed increases.

Taken together, all this information dictates that you get some more weight on the nose of your gliders and raises the following question. What exactly did B.O. do to earn a sockful of sinkers up the side of his head?

Jake

### DEAR JAKE

Could you please see that my enclosed ad makes it into the Classified section of your magazine? I've sent it in several times, but they either send it back or ignore it. Either way, it's never appeared in print. Thanks for your help.

Zeb Magruder, Macon, GA

1 enclosure

FOR SALE OR TRADE: Wife. Used, but still has some miles in her. Relatively even tempered, tolerates modeling, touchy about Monday night football. Prefer trade for 7-channel radio and Schnuerle ported engine or bass boat. Will take cash or negotiable securities. Particulars: Name—Pearl; Age—37; Height—5'6"; Weight—Considerable; Accessories—1974 Vega, calico cat. Any reasonable offer considered. Z. Magruder, P.O. Box 1620, Macon, GA 33036.

Dear Zeb:

You'll probably get more takers if you drop the Vega from the package. A pre-trained, modeling-tolerant wife should be a fairly marketable commodity, but nobody wants an aluminum block four-cylinder.







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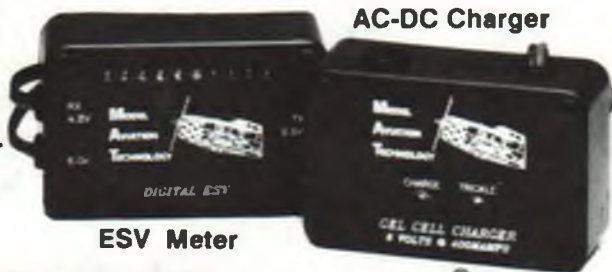


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Come to think of it, lose the cat, too.

Jake

### DEAR JAKE:

You know how baseballs have stitched seams that stick up and give the pitcher something to grip? Well, those same protruding stitches are what makes a curveball curve. The spin the pitcher puts on the ball affects the air passing over it. The air moving over the "downwind" or "retreating" side of the spinning ball moves faster than the air moving over the "upwind" or "advancing" side of the ball. Just like an airfoil, pressure is lessened on one side of the ball and lift occurs. The lift causes the flight path of the ball to curve. The stitches roughen the surface, affecting more air, and result in a bigger curve.

Why do I bring this up, you may ask? Because I've come up with the brilliant idea of stitching the MonoKote seams on my airplane in order to give it more lift. Just like a baseball, the air flowing over my airfoils will be more influenced because the stitches I've added will roughen the surface. It's got to work, don't you think?

Mel in Milwaukee, WS

Dear Mel:

Oh, absolutely. Just one question: When you launch it, are you planning to throw a spitter?

Jake **MB**

## COUNTER continued from page 11

complete except for engine and radio; those giant wheel pants are a \$29.95



option. From The Airplane Factory, 1880 Pineview Rd., Mandeville, LA 70448; (504) 626-7840.

### GET 'EM STARTED

Allen Hayes favored us with samples of the three all-balsa gliders he kits under the Alzart Originals label—perfect for introducing youngsters to the joys of model building. These are really excellent kits, with all part outlines printed on clear-grain,



lightweight balsa stock. Everything is included—materials, easy-to-follow illustrated instructions, clay for nose weight, and two grades of sandpaper—everything but glue and a modeling knife. As seen in the photo, 8-A is a basic 16-inch span model, 8-B has a 17-inch polyhedral wing and interesting stab layout, and 8-C is a challenging swept fore and aft design. All sell for \$4.95 each plus \$1 postage, from Alzart Originals, Dept. B, 6871 Oakridge Lane N.W., Alexandria, MN 56308.

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Are you familiar with Dry-Set dry transfer model markings? They're not peel-and-stick or water transfer decals, but full-color markings that are printed on the back of a transparent carrier sheet and treated with a special dry adhesive. In use, the carrier sheet is positioned on your model and the marking transferred to the surface by burnishing with a special tool. Dry-Set markings are surprisingly durable and scratch-resistant, and completely fuelproof to all types of model fuels even without a clear overcoat (although any type of clear coating can be applied without harming the markings, if you wish). A myriad of different types are offered, including full sets for a particu-



lar type of aircraft such as the 1/5-scale Midwest T-6 Texan pictured. A complete catalog is available for \$3.00; write to Dry-Set Model Markings, Inc., 7029 Sanger Ave., Woodway, TX 76710; or call (817) 741-0379. FAX: (817) 741-0335. **MB**

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# OF HOT SHIPS AND NEAT TRICKS

Bill reports on some of the neat stuff that showed up at a recent major soaring meet in Southern California.

If you want to improve the sailplane you fly, find a better one or simply improve your technique, there's no better place to go than a major soaring meet. This is the fertile ground where new ideas and products are tested, proven and perfected, and where bad ideas are rejected. This is where you should go for a soaring educa-

people who had some very interesting things to share.

Frank Chasteler was flying a Mako, designed by Ben Clerx. What caught my eye was the immaculate finish of the glider and its stark brilliance. It was a very reflective sailplane on top and very dark on the bottom. It would obviously be easy to see against a wide variety of skies, unlike the natural wood finish commonly seen these days. When asked, Frank told me the ship was covered with Goldberg's Ultracote Plus in white, fluorescent yellow and black.

I personally haven't tried the Plus (sticky back) version of Ultracote on anything but conventionally framed balsa structures, where it performed nicely. I have, however, tried regular Ultracote over obechi sheeted foam wings, but only with limited success. Following the "second method" of applying it as detailed in the instructions—edge sealing, then shrinking out the center—I found I had trapped a zillion air bubbles. These were removed by painstakingly going over every square inch with a rag and heat gun, needle and iron. I don't recommend this method to anyone except the guy



Close-up of Fred Sage's V-tail mod for contest ships. A small portion of the fin is left as a gluing surface for a balsa block stab saddle. The joined V-stab is glued to the notched balsa block, then the three elements are fiberglassed together. Complete job takes about two hours. More details in text.

who mows his lawn with scissors! Frank's covering job with Ultracote Plus, by contrast, was totally free of trapped bubbles or sun-induced wrinkles. I was so impressed that I went out and bought some white and

Bob Brown used one of Fred Sage's three different sizes of pre-built aftermarket V-tails to convert his Shadow into a "Shadow-V," leaving the wings box-stock. Bob says the modification makes the Shadow fly even better than before.



Unlike many who simply apply clear Varathane varnish or clear epoxy finishes to their obechi sheeted wings, Frank Chasteler believes in high visibility, as evidenced by the white and fluorescent yellow Ultracote covering on his Mako. Reflective prism tape on the leading edge also helps distinguish his plane among others in the sky.

tion because sailplaners are more than happy to share what they know with those who are genuinely interested.

Recently I attended a Southern California Soaring Clubs (better known as SC<sup>2</sup>) contest, hosted by the Inland Soaring Society of Riverside, California. I talked with several



Larry Jolly (left) is once again in the sailplane kit business; his latest is a very lightweight V-tail two-meter called the Volant. You may remember that it was Larry's Icarus two-meter which on two occasions won the AMA Nats with John Brown (right) at the controls. John has also made a comeback to the soaring scene and also flew a Volant at the recent SC<sup>2</sup> meet at Riverside, California.

dark blue Ultracote Plus for my next set of Falcon 880 wings.

Another new version of an old idea to aid vision and orientation at high altitude was the reflective tape Frank applied to his Mako's leading edge. This is an idea that's been around since the appearance of chrome MonoKote Trim in the '70s. What's

new this time is Frank's discovery of Pep Boys brand automotive prism tape in one-inch wide rolls! The tape reflects sunlight like a mirror. As your sailplane circles, a highly visible flash appears to travel across the leading edge.

Finally, Frank has observed that most high performance sailplane designs these

Soon to be unleashed on the RC soaring crowd is Bob Sliff's new Gnome 2M-EP, the EP standing for extra performance. Details will follow next month, so stay tuned.



days have ailerons that are bigger than they need to be and flaps that are smaller than necessary to really slow down on final approach to a precision landing. Unless you are into full-on aerobatics, you won't even notice a lack of roll response after doing what Frank did to his Mako, namely increasing the span of the flaps by an inch or two and decreasing the ailerons by a similar length.

Fred Sage, who flies mostly with the San Diego based Torrey Pines Gulls, was present at the ISS SC<sup>2</sup>, as were several of his satisfied customers. Fred is just getting started marketing foam-core, carbon fiber reinforced, pre-skinned fiberglass V-tails as aftermarket conversions for existing kit designs.

The advantages of Fred's Vs are many. The primary benefit, however, seems to be weight reduction. For example, by sawing off its T-tail and retrofitting the new V-tail, the Airtronics Legend drops anywhere from 10 to 13 ounces of total flying weight! Obviously, a lot of nose weight must be removed when the lighter V-tail is installed. Typically, the V takes 2 to 2.5 ounces out of the tail and 6 to 8 ounces out of the nose.



Larry Jolly divots the turf right on time and right on the center of the landing strip. It isn't pretty, but it is effective! It's also a testimonial to the strength of the Volant's fiberglass fuselage. Wings are a conventional, all-balsa, D-tube polyhedral design with capped ribs and spoilers.

Shadows, Falcons and Makos fly with no nose weight required for balance. Thermal Eagles fly with less than 1 ounce and Leg-ends fly with less than 2.

Other improvements claimed by Fred and confirmed by V-users are reduced minimum controllable approach speed for more consistent landings; less drag due to the



Jim Markle shows off his new F3B ship, the "X-cellent III" from Hans Mueller of Germany. All-molded model features extensive fiberglass-Nomex (honeycomb) sandwich construction in the wing and fuselage. Features the RG-15 airfoil, 107-inch span, 940 square inches of wing area, and 70 ounces. Contact Northeast Sailplane Products for availability and cost.



This is one way to check all your servo centers—you don't even need to kneel down! Interesting model stand features tilting wing holders secured with wing nuts, and a big steel spike to firmly pin the base plate to terrible firms. It's also a neat way to keep the hot sun at an acute angle to the wings and fuselage—note the shadow.

decrease in stab intersections (only one for the V, versus four for a conventional all-moving cruciform stab and two for a T-tail); improved sink rate (cleaner, lighter ships tend to stay up longer); and improved spiral stability and overall handling in many cases. That's a whole lot of pluses for an investment of a few dollars and a couple hours of

*Sailplaners are more than happy to share what they know with those who are genuinely interested.*

retrofit work.

Fred sells these V-tail stabs in small (for two-meter to 100-inch spans), medium (for 108 to 118 inch spans), and large sizes (118 inch span and up). They all feature foam cores with an SD8020 root airfoil and BPT-8 at the tips. You join the halves to the fuselage and supply the new longer pushrods required.

Another exciting and more recent development for Fred is his entry into the custom wing manufacturing business. At the ISS SC<sup>2</sup> contest, Fred took 2nd place in the expert class with a ship using his own custom wings. He left the field with six confirmed orders for similar wing sets. Write or call Fred Sage for more information at 17232 Cuvee Ct., Poway, CA 92064-1214; (619) 485-6239.

#### AIRFOIL OF THE MONTH: S4233

The S4233 is a much-overlooked airfoil that has great potential for high performance soaring. Yes, it's a relative "fattie"

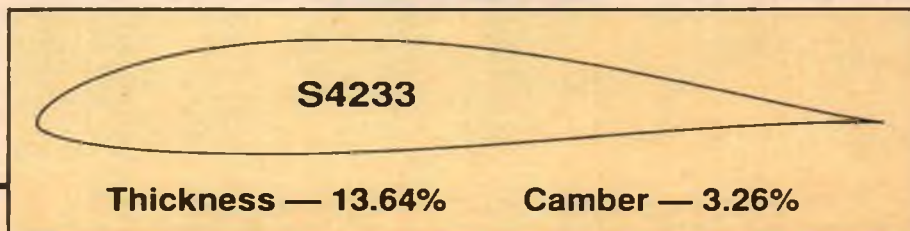
compared to the more popular airfoils we featured last month, but it has its advantages. As detailed in a great article by Oliver Wilson in Soartech 10, if designed for an aspect ratio of 18:1 or higher and if the boundary layer is tripped (turbulated with thick striping tape) at 20 percent of chord, the S4233 can actually have superior performance to the current list of "preferred" thermal duration and multi-task airfoils.

In the somewhat distant past I have run this airfoil with testimonials from fliers who used it early on. Fliers in the Virginia Beach area Tidewater club such as Bob Champine, Woody Blanchard and (I think) Herk Stokeley tried this and other 13-14 percent thick airfoils. Their experimentation supported the prediction that the S4233 would be a soft-stalling, forgiving airfoil with a broad lift range and low drag. And, because it's a thick airfoil (13.64 percent vs. under 10 percent), its competition has about half of its bending strength. More info on this airfoil can be found in Soartech 8 and Soartech 9. **MB**



Mark Levoe (left) of Levoe Design now has a larger 120-inch version of his popular 110-inch Super-V unlimited class sailplane seen here with Tony Stark, for those looking for even higher performance. The popularity of the Super-V has touched off a wave of interest in V-tails in general lately.

#### AIRFOIL OF THE MONTH



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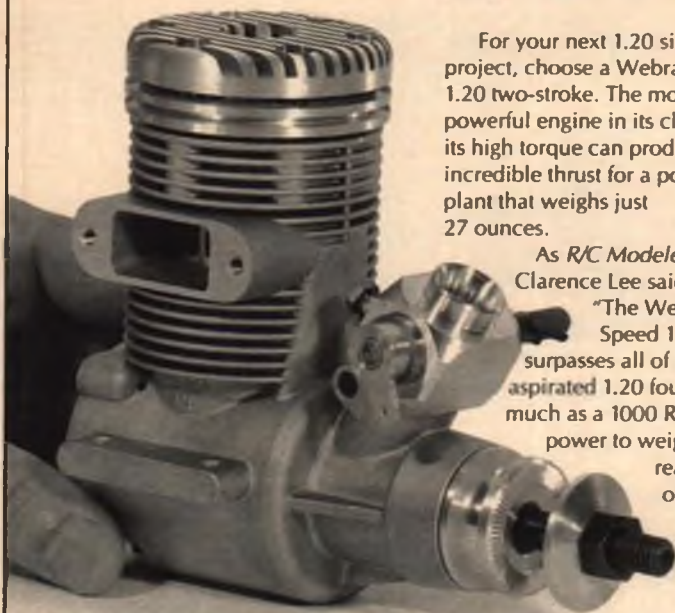
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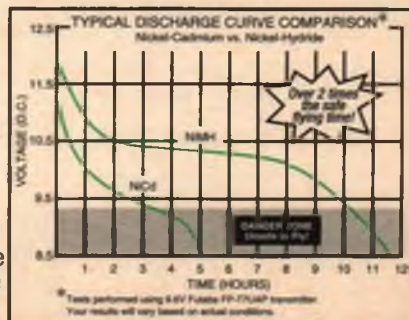
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# FREE FLIGHT

BY BOB STALICK

## • Bill Barr's .010 Baby Hawk

## • Building An Engine Timer From A Windup Toy

Over the years, free fliers have bemoaned the trend to take newly introduced "beginner's events" and make them so complicated that only the experts can excel at them—EZB and Pennyplane and Pee Wee 30 being good examples. In the FAI arena, the recently adopted F1J event is beginning to take on the same attributes that made it an attractive stepping stone between AMA power and F1C.

To be competitive in these events, fliers have begun using multi-function timers, bunt and VIT systems. Such refinements can be considered improvements on a theme, but each change is also a further complication for the modeler. The result of each complication is a reduction in the number of fliers willing to tackle the event.

Recent articles and letters in the NFFS publication *Free Flight* propose changes in FAI events, including reducing the number of functions allowed to engine cutoff and DT. Others propose an R.O.G. requirement for certain events.

In the northwest, the number of active F1A glider fliers can be counted on one finger. Maybe there's a message here.



Fred Guilfoyle, who hails from the Seattle area, built two of these Nostalgia-era "Da' Box" models. This is the A/B version, powered by a K&B Greenhead. The model features a very thin undercambered airfoil wing, and climbs and glides extremely well.

The high-zoot events are either no longer flown at most meets, or the numbers who fly them are so small as to make their

effects on the local scene trivial. So, we have a logical concern: we are not generating new blood to take the place of the aging experts who currently compete in the international programs.

We can either "dumb down" the international events by limiting their performance, or we can promote the entry of new competitors to the nation's FF talent pool. Currently, the NFFS is promoting sponsorships to the U.S. Junior Team as a means of building that talent pool. It's a worthwhile endeavor that should have long-term payoffs. Our youngsters will be competing in Kiev during the first part of August—about a month after you read this. Consider a donation from your club treasury or from you as an individual. Send to AMA, 5151 E. Memorial Dr., Muncie, IN 47302. Make checks payable to "AMA—Junior FAI



Glenn Grell of Tangent, Oregon showed up at the 1994 Strat-O-Bats Misery Meet with this Stallick-designed Simplex A-2 glider (MB Plan No. 5763, \$6.00).

Bill Barr's

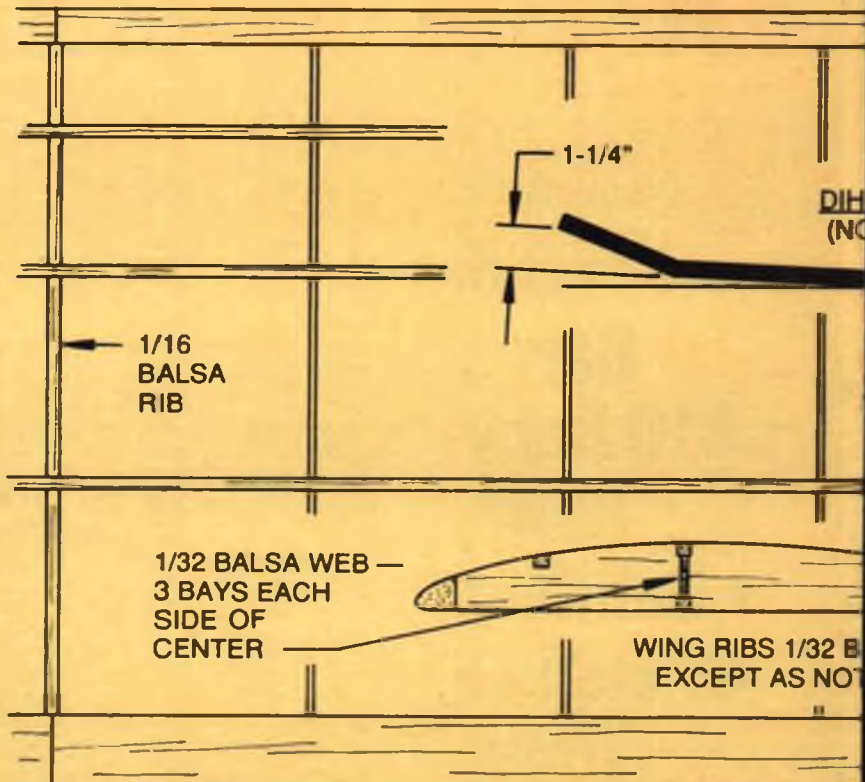
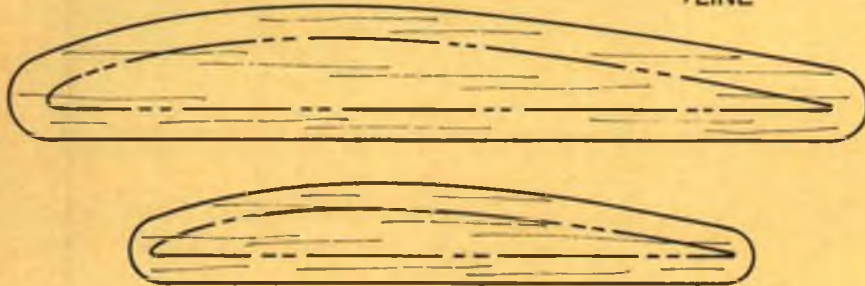
# BABY HAWK

an .010 version of Jim Clem's Witch Hawk

WING AND STAB COVERED WITH JAPANESE TISSUE, THREE COATS SIG LITE-COAT DOPE ON INBOARD WING PANELS, TWO COATS ON EVERYTHING ELSE, ONE COAT CLEAR HOBBYPOXY AROUND FRONT OF FUSELAGE

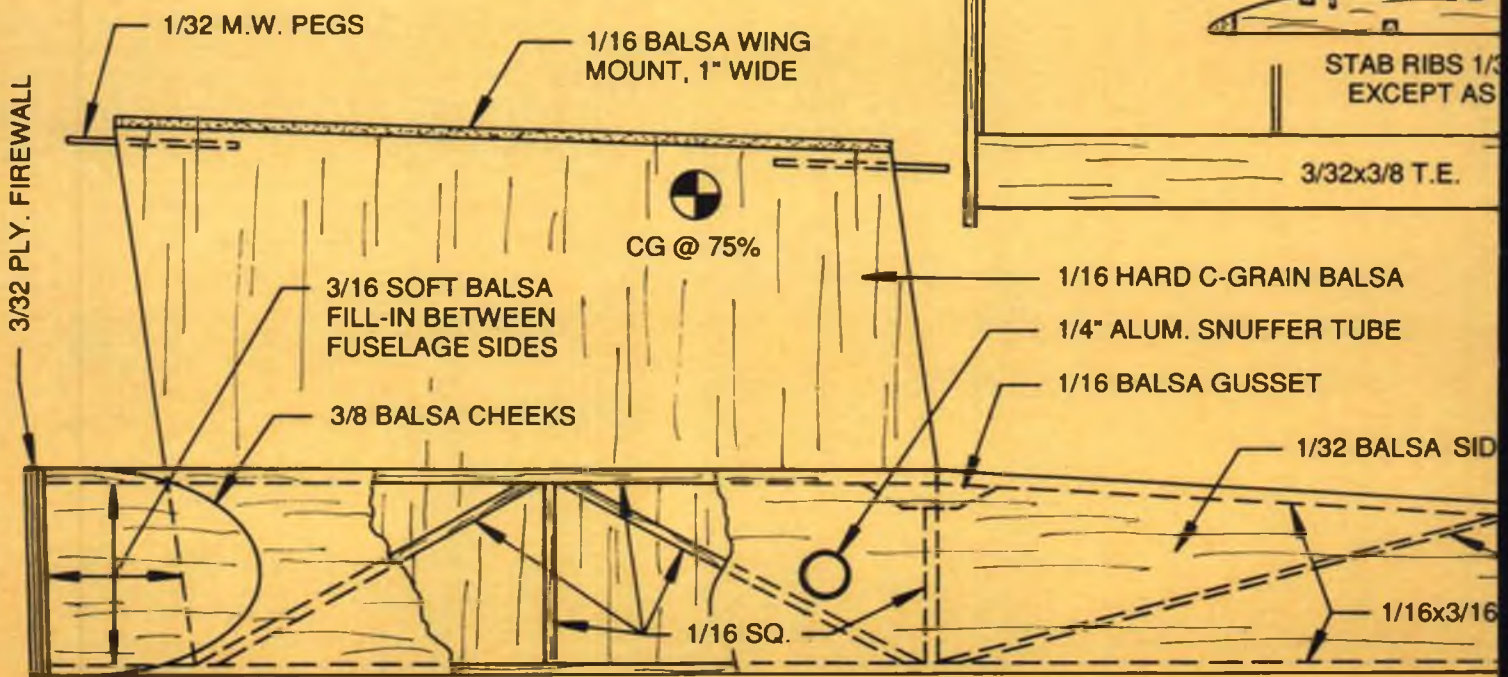
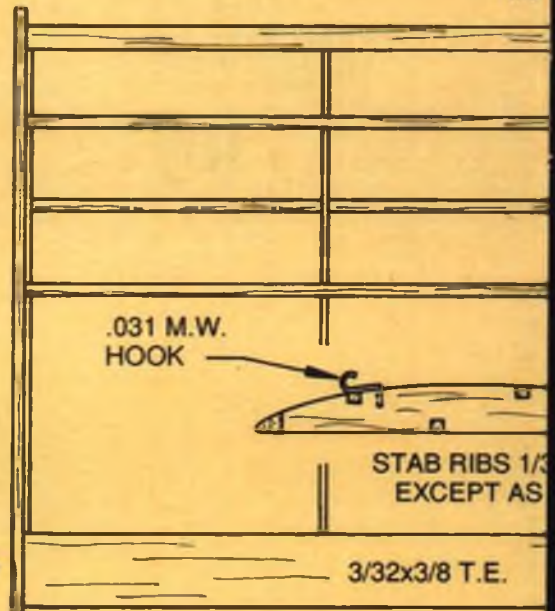
RIGHT/RIGHT FLIGHT PATTERN

1/16 Balsa Wing & Stab Tip Plates



CENTER LINE

1/8



FEDRAL DETAIL  
(NOT TO SCALE)

3/8"

1-13/16"

3/16 SQ. L.E.

ALL SPARS 1/16 SQ. Balsa

1/16 Balsa RIB

3/32x1/4x1-1/2 TRIANGULAR WASH-IN SHIM,  
BOTTOM OF RIGHT PANEL ONLY

3/32x3/8 T.E.

Balsa  
NOTED

SQ. L.E.

1/16 Balsa RIB

ALL SPARS 1/16 SQ. Balsa

1/16  
Balsa  
FIN

1/32" RIGHT TAB

1/32 Balsa  
NOTED

3/32 Balsa  
PACKING

1/32 PLY.

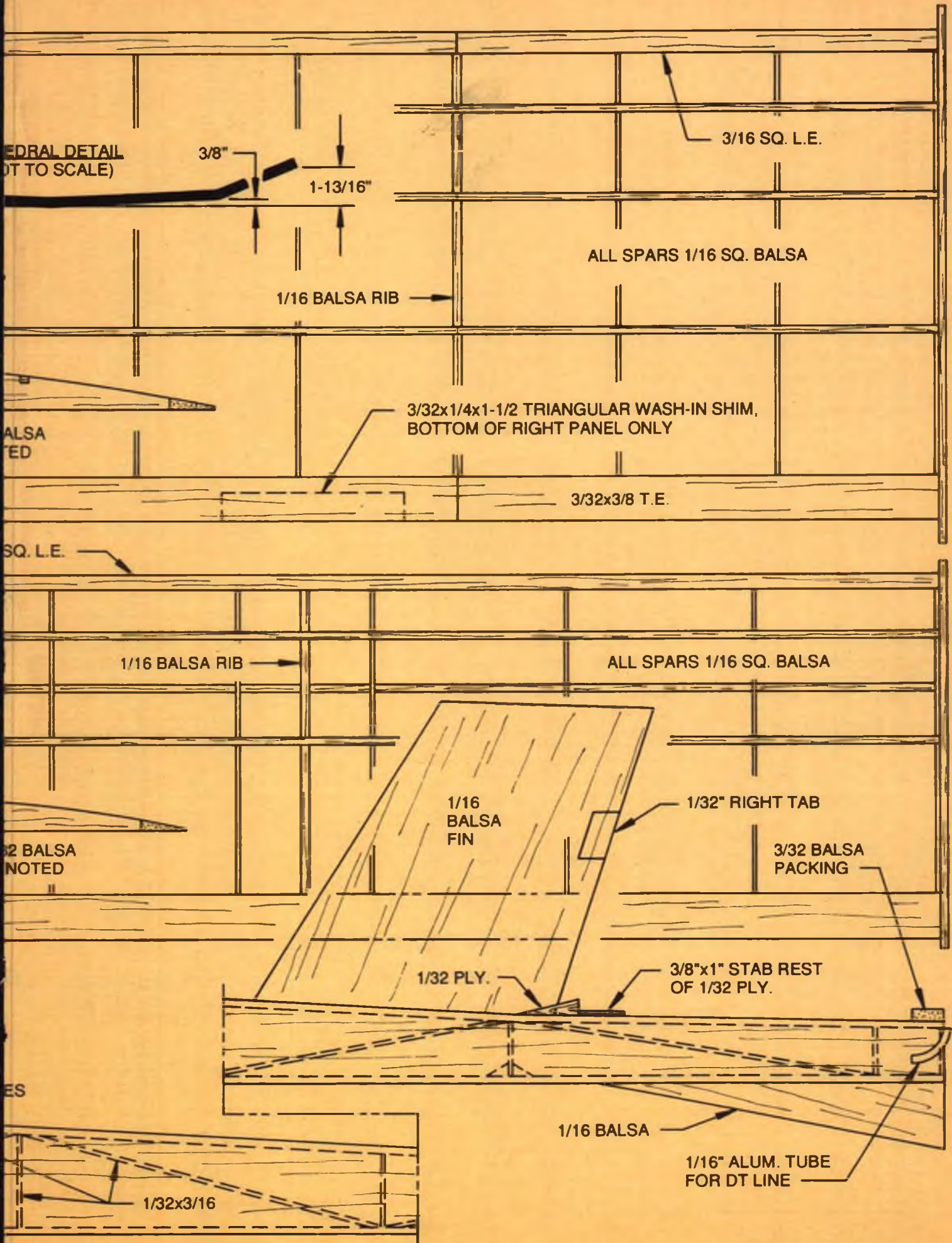
3/8"x1" STAB REST  
OF 1/32 PLY.

ES

1/16 Balsa

1/16" ALUM. TUBE  
FOR DT LINE

1/32x3/16



# FREE FLIGHT

FF Fund." Contributions are tax deductible.

The larger issue still facing the international free flight community is whether future competitions can continue without massive changes to the entire concept. This discussion needs to take place before no one is left who cares.

## AUGUST MYSTERY MODEL

One of America's legendary free fliers has a lifespan that covers nearly the entire history of our hobby. Active in all engine-powered classes, the designer of this month's Mystery Model provides an example of his winning ways in R.O.W. events. Powered by an Arden .09 on glow, the model had a 48-inch wingspan. The planform should be a dead giveaway for Nostalgia gas buffs.

So, enough hints. If you think you can identify this ship, write it down and send it in to *Model Builder*. A free year of MB will go to the one whose name is drawn at random from among the correct entries.

## MAY MYSTERY MODEL WINNER

A one-year MB sub goes to Ed Mate of Riverdale, Illinois for being one of ten who correctly identified George Xenakis' "Tadpole Mk. II" A-1 towliner, featured as one of the Ten Best Models of the Year in the 1980 NFFS Symposium and which George's son Greg flew to a Junior AMA record of 21 minutes 9 seconds at the 1974 U.S. FF Champs.

## AUGUST THREE-VIEW

Last year, when we ran the MiniPower postal contest, 1st place winner Bill Barr was the only entrant who made the full complement of three maxes. He did it using his Baby Hawk, a tiny version of Jim Clem's Witch Hawk. As you can see from the plan, it's the ultimate in simplicity.

The model is built just like a typical 1/2A free flight. It's im-

portant to build it as light as possible; the power of the Cox .010 is impressive, but it still won't haul a 3-ounce airplane very high in 10 seconds. Strive for a model under 2 ounces.

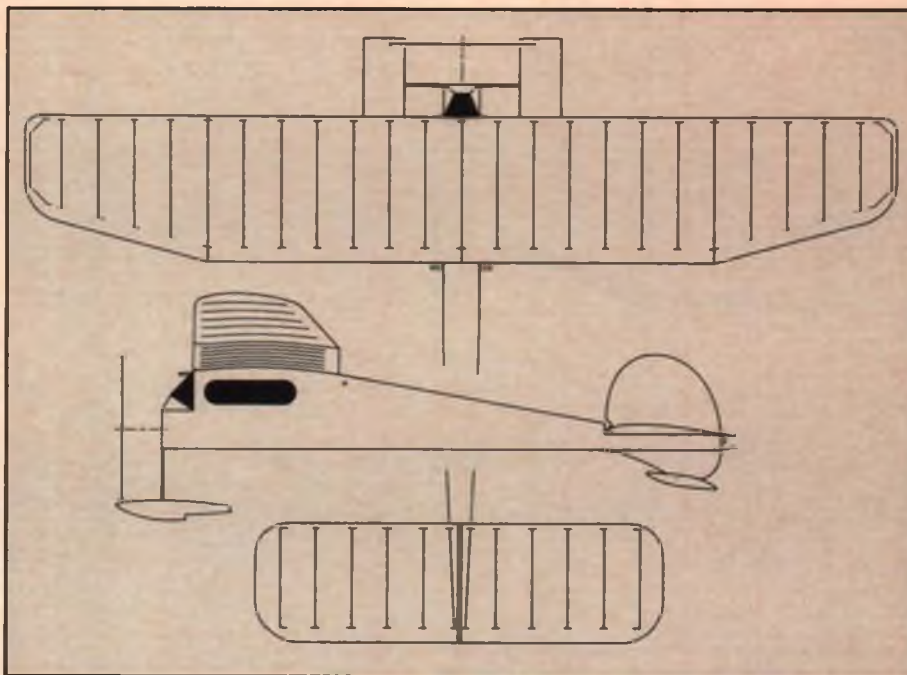
This model is designed to fly to the right both under power and in the glide. Use right thrust and right stab tilt. You may need slight right rudder tab in case the model wants to straighten out at the end of the power run. If you have further questions, contact Bill Barr at 2000 Larkspur Dr., Lexington, KY 40504.

## HOMEMADE TIMER HOW-TO

Without trying to steal the thunder from Bruce Augustus' upcoming NFFS Symposium article, the following is a blow-by-blow account on making an engine pinch-off timer from a windup toy. (See last month's column for details on which toys make the best conversions.)

Take the toy apart and you will have a windup unit that weighs about 3 grams when stripped to its bare essentials. It will typically run, when wound tight, 3 or 4 seconds for each 360 degrees of rotation; obviously, it must be slowed down. To do so, you must install a weight in the escapement.

This escapement is a piece of rounded plastic that is exposed when looking into a small slot in the bottom side of the tapered part of the timer case. To



AUGUST MYSTERY MODEL

be sure you have found it, wind the timer to the max and let it unwind. The escapement appears to vibrate back and forth, thereby keeping the timer from unwinding too fast. If your timer does not have such an escapement, the toy you bought is not the right kind. Go back and buy a different one.

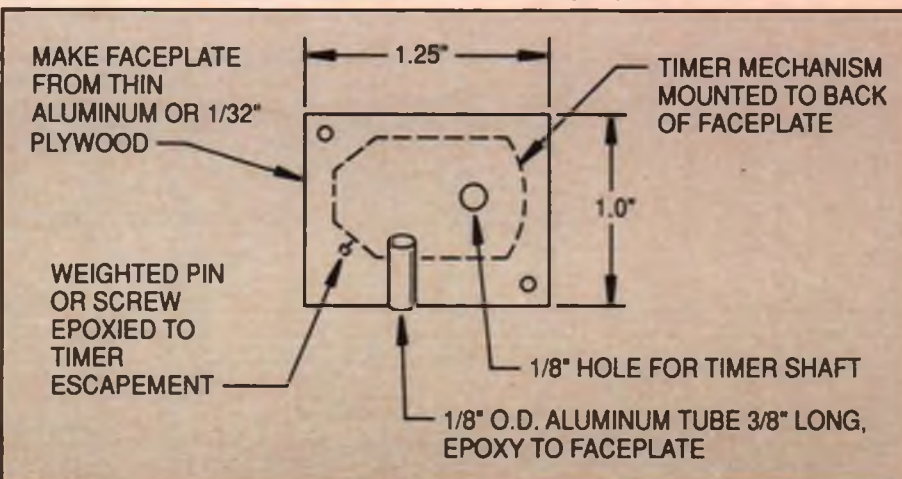
Next, drill a shallow (1/16-inch deep or less) hole in the escapement, using a drill no larger than 1/32-inch in diameter. After you have drilled the hole, install a short dress pin (3/8-inch long) or a very small wood screw (#00 or less) in the hole. Use epoxy, not CA, to secure the pin or screw in place. Let it cure. Rewind the timer to see that everything works. It should run much slower than before. If not, remove the pin, glob some solder on the end and re-install it.

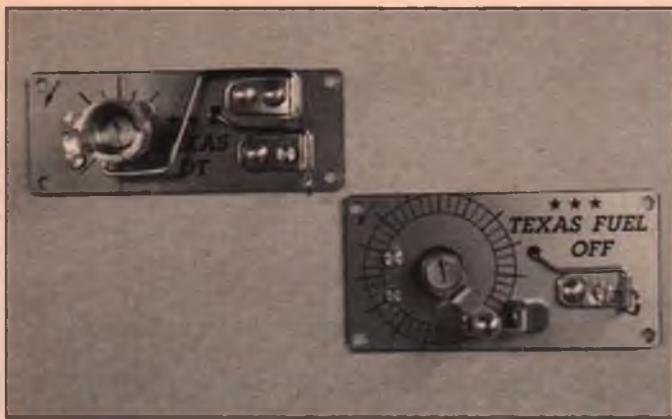
The amount of weight needed depends on the timer's use. For Nostalgia or .020 Replica events, you need a timer that runs 15 to 20 seconds. For AMA events, 10-15 seconds will do. The less weight on the escapement, the faster the timer will run.

Now that you have the timer running to your liking, it's time to make a faceplate. Carefully shove a .055-inch diameter wire into the back of the timer, pushing the windup wire out the front. Cut a piece of 1/32 plywood or thin aluminum large enough to cover the front of the timer (see sketch). Drill a hole in the faceplate where the windup wire will exit and epoxy the faceplate onto the timer case. Put epoxy only on the ends of the case and be careful not to get it on any gears or pivot points. Allow to cure thoroughly.

Drill 1/32-inch holes through

Faceplate details for the do-it-yourself engine timer built from a windup toy, fully described in text.





The Texas Fuel Off and Texas DT timers are the latest from Hank Nystrom. These are first-class units and built to withstand lots of use. Details in text.

the faceplate where it joins the case and also where the case has holes through it. Epoxy straight pins through these holes. The pins help keep the timer case in one piece and also firm up the timer/faceplate joint.

Remove the plastic knob from the windup wire. Bend the wire at a 90-degree angle with enough of it to re-install into the timer and still leave about 1/8-inch in front of the faceplate, then bend the tip of the wire at another 90-degree angle so that when you push the wire

back into the timer hole, the bent tip is just a whisper above the faceplate. Wind the timer to the max and allow it to unwind fully. Note the timer arm arc on the faceplate.

Now rewind the timer fully and lock the arm so that it can't unwind. Securely epoxy a 3/8-inch long piece of 1/8-inch aluminum tubing to the faceplate just inside the timer arm arc. Allow the assembly to cure 24 hours.

The last step is to remove the timer lock and double check to

see that the timer arm comes to rest on the edge of the tubing. If so, you're done. To test your unit, put a piece of surgical fuel line through the aluminum tube sleeve on the faceplate. When the arm comes around it should fold the fuel line over the edge of the aluminum tube. If it does, the timer is ready to use. Install it in your model in the usual fashion. You may want to install an on/off switch mechanism, or you may want to do as I do and just hold it with your thumb while starting the engine.


## TWO NEW TEXAS TIMERS

I recently received one of the latest Texas Timers, a unit that designer/manufacturer Hank Nystrom calls the Texas Fuel Off Timer. The neat thing about it, besides the powerful spring and light weight (15.4 grams), is that it has a wire bale type of

on/off switch, which is as positive as you can get. There's no chance that the vibration of the engine will re-engage the switch, as is the case with some of the other timers currently on the market.

The clockwork mechanism appears identical to the Starline pinch-off timer, which means it has a strong, positive and consistent action. Full windup on this timer will give you about 30 seconds of run.

Also available is the new Texas DT timer. I haven't seen one of these up close, but if it's anything like the Fuel Off, it's a good one. Both of these units join with Hank's other timers and can be purchased directly from him. Write to Hank Nystrom, 3317 Pine Timbers Rd., Johnson City, TN 37604. Enclose \$18.95 for the Fuel-Off and \$24.50 for the DT timer. S&H for any number of timers is \$2.00. **MB**



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SIZE	USE PRICE	SIZE	USE PRICE	SIZE	USE PRICE	SIZE	USE PRICE	SIZE	USE PRICE	SIZE	USE PRICE	SIZE	USE PRICE
5.7 X 3	1 1.59	9 X 8	1.99	11 X 9	2.49	13 X 6	4.25	14.5 X 14.5N	10 12.95	20 X 20	25.00	22 X 10	45.00
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6.5 X 3.7	2 3.95	9.25 X 5.25	4 3.95	11 X 10	7 7.95	13 X 10	7 7.95	15 X 12	10 12.95	22 X 12	13 31.00	24 X 10	55.00
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8 X 7.3	5 3.95	10 X 6	2.29	12 X 12.5	7 7.95	14 X 12	12.95			2 Blade Hub 24"	60.00		
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9 X 6	1.99	11 X 7	2.49	12.5 X 12.5	7 7.95	14.4 X 13	10 12.95						
9 X 7	1.99	11 X 8	2.49	12.5 X 13	7 7.95	14.5 X 14N	10 12.95						

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# BUILDING A SLOP-FREE CONTROL SYSTEM

The name of the game is *Precision Aerobatics*, but you'll never get very far if your control system is full of Z-bends and cheap hardware. This month, Rick explains the makings of a first-class control setup.

**A**n intrepid pattern pilot hands over his hard-earned plastic for a set of lovely coreless high-speed double ball bearing servos, installs them with loving care in his latest dream ship... and then hooks them up with a poorly made Z-bend through a hogged-out hole in the nylon arm. A 25¢ plastic clevis completes things at the control horn.

Sound far-fetched to you? Good! That means you don't do such things. Unfortunately, a good many folks never progress beyond the bargain basement servo hook-

ups shown on the plans of their very first simple trainer. If the control surface wiggles when they bump the sticks, that's fine, and hey, Z-bends never fail, do they?

No, they don't fail very often, but they don't work very well, either. Modern contest servos are precision tools. The hookup described above offers about the same level of precision tool performance to a pattern pilot as an early Neolithic flint knife would provide to a skilled chef. Dinner might still be made, but only at high cost in both plate presenta-

tion and the poor cook's frustration level.

Each year, the surest sign of impending spring is the appearance of new ships at the local field. When the new arrivals are pattern planes or scale aerobatic planes, I'm often tapped to help with the trimming. I don't mind this—in fact, I often enjoy the process (sick, huh?). I mention it only because, every year, about half of the trim problems I see are the direct result of poor servo/control surface hookups, and lousy hookups are a contributing factor in many of the remaining 50 percent.

Well-done Sallent Designs Boxer 60 built and photographed by Bryan Boutrie of West Vancouver, British Columbia.



The blame for most of this slop belongs to the RC aircraft industry. The hardware provided with trainers and many sport models is anything but expensive. Newcomers start off with this level of equipment—after all, if it came with the kit, it must be OK to use—and progress to flexible nylon tube pushrods and pop-in EZ connectors. Most learn to support the tube pushrods every few inches and that a bend of over 10 degrees in a wire pushrod end is a no-no. There they stop, happy because all the advertising they see shows them that this technology is the top of the line.

I have no intrinsic quarrel with nylon tube pushrods (the outer sheaths make great internal receiver antenna tubes) or EZ connectors, which I find frequently useful on throttle or retract hookups. They are cheap, easy to find, fast to install, and work tolerably well in many sport applications. But when it comes to flight-critical hardware for a high-powered aerobat, they aren't a good choice. Putting them in the control loop with a quality servo is like sticking recaps on a Ferrari.

The RC helicopter industry doesn't work the same way. Choppers are a vibration-intensive flight environment where precise control is necessary just to accomplish flight, let alone do quality maneuvers. High-quality hardware and high-quality servos are



The new .91 short exhaust system from Advanced Aero Products installed on a Cursor/Saito .91 combo. Works great, and so does the airplane and engine.

the rule rather than the exception, and newcomers are steered in that direction from the beginning. A similar situation exists in the RC car market. Cars live in a rough, high-speed world. Beginners learn rapidly that cheap hardware is really expensive, because it needs to be replaced constantly. Many of the recent improvements in RC servo and control technology

are owed to the demands of these applications, not the less-critical fixed wing aircraft market.

In recent years, the RC aircraft industry has been geared primarily to the sport pilot. The demand has been for ARFs, for inexpensive RC systems, and for entry-level products. Specialty items are left to the cottage industries to produce and distribute, because the high volume that it takes to interest major distributors and manufacturers isn't there. This is why most pattern fliers (and racers, and giant scalars) find little on the shelves of the local hobby shops to interest them and have to mail order many items.

So where do we look for the good stuff? Start with the hobby shop! (Right, after I told you it wasn't there, I'm now telling you it is.) Look in the car section, and in the helicopter section, and even the regular aircraft section. It isn't neatly assembled and labeled for us like it is for the sport guys, and you will definitely pay a little more. It takes judicious selection and more than a little mixing and matching with a piece from here and a bit from there, and maybe even a little help from the mail order catalogs. The payoff will be in precise control and an easy-to-maintain airplane that holds accurate trim.

Ball links are a positive boon. It doesn't make much sense to use anything else to attach a pushrod to a servo wheel. The nature of a ball link makes it vibration resistant, bind free, and slop free. The ball also provides a range of angular motion; the hookup needn't be precisely in the same horizontal or vertical plane as the servo wheel. Best of all, I've yet to replace a ball link due to excessive wear. I have no doubt that it's possible to wear them out, but I suspect it takes several airframe lifetimes in normal use.

The only objection to ball links that I've heard, besides the fact that many people don't like the way they look, is that it is

*continued on page 80*

Dave Lockhart and his new Gymodels Elan. YS 1.20, JR PCM-10S, and only 8 pounds 14 ounces. Dave Lockhart photo.



# HANNAN'S HANGAR

BY BILL HANNAN

**“Life is good, and I feel sorry for people who have no backlog of things to do...”**

Our lead-in quotation is by Bill Warner, one of the busiest people around. Although theoretically retired, the former schoolteacher is involved in community volunteer work, as well as many hobbies, in addition to the usual day-to-day duties that we all seem to accumulate. Like many other retired people, he wonders how he ever found enough time for his regular job! Certainly we can appreciate his skills in orchestrating so many activities, but likely he would extend a great deal of the credit to his wife and helpmate, Phyllis.

## PHOTOS

We continue to receive floods of photographs from our readers, for which we are most appreciative. We try to

Enrique Maltz is a cello player by vocation, but Peanut Scale models are his avocation. These are a few of his favorites. Photo by Amnon Weinstein.



Bill and Phyllis Warner successfully manage many hobbies, including model building, writing, photography, and book and toy collecting. We envy their efficiency!

present about a half-dozen of them with each column, and apologize for the delay often involved. With photos arriving in greater quantity than our allotted space can accommodate, we have accumulated quite a backlog. While

it is wonderful having so many prints from which to choose, it is also frustrating not being able to use many of them.

We do attempt to create a blend of interesting subjects, geographical variety and, in many cases, some sort of unify-

ing theme. Still, arbitrary choices must often be made, with the balance frequently tipped in favor of photographic quality. That is to say, if faced with a selection between two equally interesting models, the decision will generally favor the best picture. We all have such pride in our models that we sometimes forget the importance of good composition, contrasting backgrounds, proper lighting and proper focus. These requirements apply to all photos intended for reproduction.

Consider the thoughts of Norman B. Patterson, writing in the March/April 1987 edition of *Stereo World* magazine regarding 3-D photography: "... Photography has always been an unending process of correcting errors to get better pictures ... I have never seen a photograph which could not be improved, and never expect to see one." Strong words, certainly, but perhaps encouragement for us to keep refining our photographic as well as our modeling skills?

Our thanks to photographer



Craig Daniels for bringing this view to our attention.

## RULES FOR BUILDERS

Modeler/historian Merl Olmsted gave us a list of guidelines, source unknown, originally intended for homebuilt aircraft enthusiasts, however some of them seemed equally applicable, with slight changes, for model builders:

1. Ringwald's Workbench Law: Any horizontal space is soon piled upon.
2. Feno's Law: If you drop something it will never reach the ground.
3. Boob's Law: You always find a tool in the last place you look for it.
4. Baruch's Observation: If all you have is a hammer, everything looks like a nail.
5. Bromberg's Law: When the need arises, any tool or object closest to you becomes a hammer.
6. Golug's 2nd Law: A care-

lessly planned model project takes three times longer to complete than expected. A carefully planned project takes only twice as long.

7. Mooney's Law: The first 90 percent of a project takes 10 percent of the time. The last 10 percent takes the other 90 percent.

8. Prissy's Rule: If you don't know what you are doing, at least try to do it neatly.

9. The Roman Rule: Anyone who says it can't be done, should never interrupt the one who's doing it!

(If anyone knows who originally conceived these rules, we'd be pleased to give him or her proper credit.)

## COMMERCIAL COLLECTION

We have an abundance of products to mention this month, so we'll keep our comments brief. Doubtless any of these sources would be happy to supply more details and pricing

Taking a break from his studio to fly his rubber-powered Martinsyde S.1 is artist Tom Hallman. Photo via Tom Danders, of the Skysailors Club.



Renowned English scale modeler Doug McHard displays two of his ships, a Harold Townner designed 28-inch span Lockheed Hudson and a tiny Brewster Buffalo.

information to readers who may care to send them stamped, self-addressed return envelopes. If you do so, kindly tell 'em that *Model Builder* magazine sent you!

### •Pre-Built CO<sub>2</sub>-Powered Peanuts

Sandy Peck, of Peck-Polymer, P.O. Box 710399, Santee, CA 92072, has a limited supply of pre-constructed 13-inch span Taylor Cubs for sale. From the Czech Republic, these are genuine "stick models" completely framed up, ready for tissue covering and assembly. They are not inexpensive, however, because they are complete with CO<sub>2</sub> powerplant, and considering the building labor involved, they may be a bargain.

### •More New Kits

For those who may prefer to do their own building, Diels Engineering, Inc., P.O. Box 263, Amherst, OH 44001, is offering two recent releases, a 20-inch span Globe Swift and an 18-inch Ryan Navion. Evidently updated versions of former Comet kits, they are complete with printed plans, patterns, print and strip balsa, Japanese tissue, plastic propeller, decals, celluloid, rubber and hardware. These are limited-run kits, with only 500 each produced. An

illustrated catalog describing these and many other kits is available from Diels for \$2.

### •Brand-New Baby Brown

Although we've not yet seen one, Otto Kuhni assures us that the latest miniature CO<sub>2</sub> system from Bill Brown's factory is a real gem. Designed especially for tiny free flight models, including indoor scale types, the unit with fuel tank and propeller weighs less than 3 grams! We'll report more details as soon as we have them. Meanwhile, you might contact Brown Junior Motors, Inc., P.O. Box 77, Pine Grove Mills, PA 16868.

### •Research Galore

Finding three-view drawings, photos and other aircraft data seems one of the most time-consuming aspects of scale modeling. We have recently heard from three different sources who offer research services. Aircraft Research Ltd. has a claimed collection of over 30,000 three-views and related data for subjects ranging from the pioneer era to the present. Manager John Faymond, 68 Gordon Pkwy. #2, Syracuse, NY 13219, promises to answer all letters and requests.

Overseas, John Blagg, "Cobwebs," Burgess Close, Haynes, Bedfordshire, MK45 3PB,

# FOX

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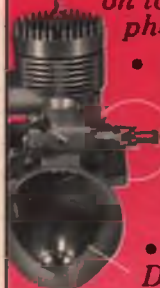


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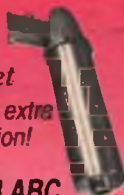


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## HANNAN'S HANGAR



Small Scale Custom Vacuum-Forming Services is run by English modeler Lindsey Smith, seen here with part of his aerial fleet. How many can you identify?

England, specializes in WWI and WWII aircraft documentation. For further details, please send him three International Reply Coupons, available from most post offices.

Charles Wyckoff, 83 Flyers Dr., Norwich, CT 06360, does research on an individual basis, with no charge if he is unable to help you. Charles also sells photo indexes to such publications as *World War I Aero* and *Skyways*.

### • Model Markings

Having selected your subject via research, how will you provide its mark-

ings? Consider Dry-Set Model Markings, 7029 Sauger Ave., Woodway, TX 76710. Offered are a variety of rub-on emblems, lettering, panel outlines and much more, suitable for models in the 1/10 to 1/4 size range. These easily applied markings are said to be totally fuelproof as-is, however they are compatible with all clear overcoatings, according to the manufacturer. Also marketed is a burnishing tool with interchangeable tips, which should find many uses in addition to those intended. Ask for these items at your local



The man behind those lovely CDz motors, Stefan Gasparin, of the Czech Republic, pictured with his AVRO Type F. Photo by Walter Hach, via Fritz Mueller.

hobby shop, or send for the illustrated catalog.

• **Guiding The Lily**

If your tastes include small stick-and-tissue scale models, you may find the *Dress Up That Scale Ship* booklet interesting. Authored by Stan Fink, 1810 Pine St., Philadelphia, PA 19103, the 25-page publication explains eight proven methods for beautifying lightweight models without detracting from their performance potential. Cost is \$10 postpaid.

• **Mustang Modeler**

North American P-51s continue to fascinate many enthusiasts, thus it seems appropriate that a newsletter devoted to these sleek machines is being published. Edited by Charles L. Neely, 4142 W. Cambridge Ave., Visalia, CA 93277, the issue we examined featured an illustrated discussion of the various Mustang canopy configurations, a four-view drawing of an Allison engine, information regarding the little-known P-51 aircraft carrier trials, and model event rules commentary.

Why not contact Charles for subscription information?

• **Arizona action**

The Arizona Cactus Squadron of the famed Flying Aces Club has produced a videotape of their 1993 free flight scale contest activities. Filmed by Red Boyles, the presentation features modelers and their models from Arizona, California, Nevada and New Mexico, including many "name" competitors such as Clarence Mather, Bill Warner, Tom Arnold, Bob and Jane Schlosberg, Dave Smith, Bob Haight, Dick Howard, Don Munn and many more.

Shown are scenes of models being wound in various types of winding "stooges," mass-launchings of model racers, WWI and WWII aircraft, as well as some CO<sub>2</sub> and electric-powered subjects. The Arizona group is unusual in having at least three active female model builders, who are shown all too briefly in the video. The informality of the club is emphasized by the conviviality of the club banquet, as well as the good fellowship demonstrated at the flying field.

Anyone who may doubt the performance capabilities of small flying scale models is urged to view this tape. Copies are \$25 postpaid from Glenna Tarango, Cactus Club secretary/treasurer/model builder/flier, 10 S. Cooper Rd., Chandler, AZ 85225.

**SIGN-OFF**

Theo A. DeCook, of Chicago, Illinois, says his wife told him: "You are an old man who builds model airplanes, but then, you wouldn't be an old man if you didn't build model airplanes." We think she meant that as a compliment! **MB**

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# PLUG SPARKS

BY JOHN POND

- **Gliders At The S.W. Regionals**
- **Engine & Model Of The Month**
- **Kordas At The '94 SAM Champs**

Thanks to the efforts of Bob Angus, we are pleased to feature photos from the 1994 Southwest Regional Championships, held at Eloy, Arizona. However, rather than feature a plethora of gas models, I prefer to emphasize the rather new O.T. RC Glider event that is slowly gathering momentum. One thing for sure, building and flying gliders is a lot simpler and just as rewarding in terms of flight performance.

Photo No. 1 shows a Frank Zaic designed Jasco Floater built from the 130 percent enlarged plans developed by this columnist. The 93-inch span yellow MonoKoted beauty, built by Frank Heacox of SAM 49, has proven to be an excellent flier; Frank's model placed 1st at both the 1991 and 1993 SAM Champs. Scaling up the original 6-foot glider not only makes for a more efficient model, but also greatly increases visibility. As we get older, this becomes an important factor for good flying.

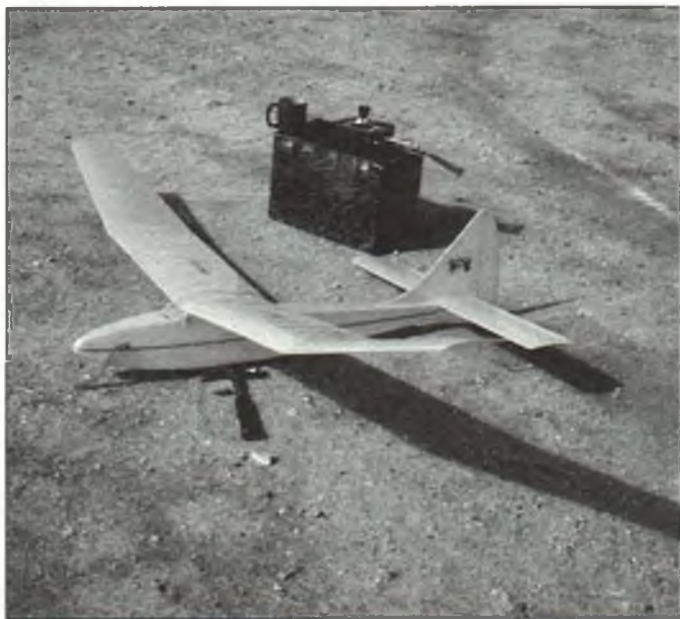


Photo No. 1. For the RC O.T. Glider event, John Pond offers plans for the venerable Jasco Floater scaled up to 93 inches (130 percent). This one, by Frank Heacox, won 1st places at both the 1991 and 1993 SAM Champs.

Photo No. 2 shows a Thermic 50 scaled up to 100 inches. No question about these bigger models flying better, says builder Ron Doig of SAM 26. Ron, who pioneered this event, first started with a large version of Henry Struck's all-balsa



Photo No. 2. SAM 26's Ron Doig competes in the glider event with a Jasco Thermic 50 scaled to 100-inch span. Scene is the 1994 Southwest Regionals at Eloy, Arizona. All glider photos this month courtesy of Bob Angus.

Soaring Glider, as published in one of the Zaic Yearbooks. Interestingly, the built-up models seem to perform better, perhaps due to a lower wing loading.

Photo No. 3 shows another scaled-up Frank Zaic design, this time a Jasco Trooper as built by George Tallent. Yellow seems to be a favorite color in the blue desert skies. The underside of the wing and stab are covered in black for good visibility at high altitudes. Placed 2nd at Eloy.

The graceful ship in Photo No. 4 really appeals to this columnist—a 10-foot span Cleveland Albatross. The gull wing feature, for some reason, is the Albatross's weak point, and it is therefore not recommended for high-start or winch launches in its stock form. However, Gerald Martin has evidently beefed up the spar so that the wing sufficiently strong.

Dave Thornburg (author of *Do You Speak Model Airplane?*) is the acknowledged guru of model sailplanes, and his se-

Photo No. 3. George Tallent flies this much-enlarged Jasco Trooper, originally designed as a beginner's towline glider. Placed 2nd at Eloy with 1305 points out of a possible 1800.





Photo No. 4. Here's a rare one: a Cleveland Albatross, lofted by builder Gerald Martin of Texas. A good flier, and at the original size of 120 inches, it's already at the maximum wingspan allowed by the rules.

lection, seen in Photo No. 5, is interesting: a Jasco Thermic 50 enlarged to 100 inches. This puts the model on a par with the pod-and-boom Thermic 100 design. The built-up full fuselage makes it a lot simpler to mount RC gear than in the 100's fuselage pod.

To wrap up, the O.T. RC Glider event seems to have arrived. Preliminary reports from this year's Muncie, Indiana SAM Champs indicate a large number of pre-registered contestants. Should be a ball!

Photo No. 5. Exalted Glider Guru Dave Thornburg (who else would be caught dead in that hat?) enjoys O.T. RC soaring with a 100-inch Thermic 50. That hat helped him place 1st at Eloy with a perfect score.



## ENGINE OF THE MONTH

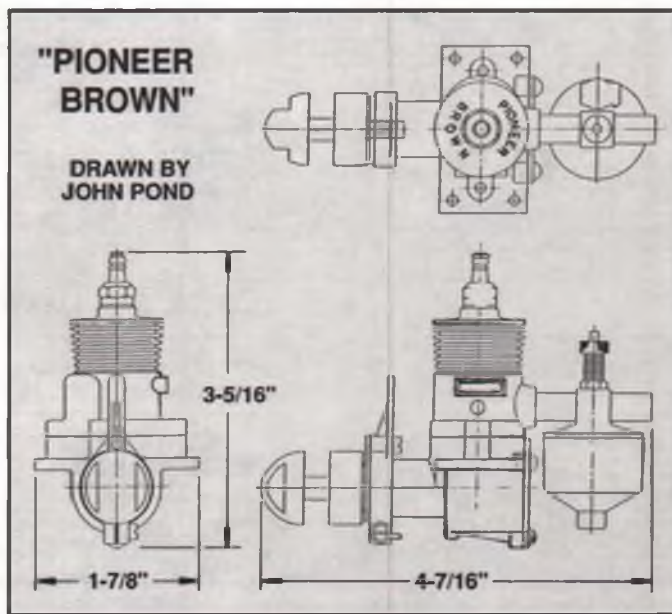
It's just incredible to this writer that so many low-cost engines were produced and sold under various names but all using the same basic design. For example, Clifford Rogers, who came from Syncro Motors, brought out a line of engines similar to the Syncro B-30 or PC-2, called the Rogers KD-29. Many of the parts in the Rogers engines were made of "V-alloy," an aluminum alloy with a

high zinc content. Despite the very clean casting look, these engines wore out very quickly regardless of advertising claims to the contrary.

About this same time, William Brown III (not to be confused with William L. Brown, Jr. of Brown Junior fame) marketed an engine known as the Pioneer Brown. It was nothing more than a Rogers KD-29 with a few minor exterior differences. The most obvious change was

## MODEL OF THE MONTH

This month's model, the Avion Oriole, is indeed a rare one, as this writer has seen only one built. This was a restoration job taken on by Tex Newman, who did an outstanding job of rebuilding it to its original configuration. The model was silk covered and painted standard yellow with blue trim.



ENGINE OF THE MONTH

that "Pioneer Brown" was stamped on the cylinder head around the spark plug boss. The backplate was similarly stamped.

It was quite apparent that Brown had struck a deal with Rogers to use up the surplus KD-29 castings and parts from the RMC-2. From this came the Pioneer Brown. Although the price of \$4.95 in kit form and \$6.95 assembled was the paramount consideration, it was truly a shame that the engines were never improved to include a steel liner, rings, and bronze crankshaft bearing.

Our thanks to Robert McClelland, MECA secretary/treasurer, for again loaning us an engine from his collection from which to make a drawing.

When the Oriole was first advertised, it was aimed at those wishing to try radio control—the big thing in those days. The first announcements appeared in 1938, making it an Antique design today by SAM standards.

This model was one of the first prefabricated gas model kits. Materials included bass, ash, aircraft spruce and balsa, the latter used primarily for fairing. Special lightweight aircraft plywood was employed in high load areas. One gallon of dope was also included in the kit! This deluxe kit sold (without engine) for \$29.00, while a "dry" kit—without wheels, cement and dope—retailed for \$22.95.

This 10-foot ship came in two varieties, one having a standard tapering elliptical wing,

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NOT TO SCALE

## MODEL OF THE MONTH

and the other being a "gull" version with ribs starting out relatively thin at the root, reaching max thickness at a point about a quarter of the way out and then tapering to the tip, giving a gull wing effect very much on the order of the Stinson Reliant.

The recommended engine for the Oriole was the Avion Mercury, which came complete with a special laminated propeller and sported a total weight of 1-1/2 pounds. Later on, the Forster .99 found more favor as it outperformed the Mercury engine and was also much easier to start and

run, especially when equipped with an RC throttle.

### KORDA WAKEFIELD AGAIN!

Received a most interesting letter from Tom McCoy, who was Contest Director at the first Korda Commemorative, saying that another similar event will be held at the 1994 SAM Champs at Muncie in September. Don Reid, SAM Champs FF Director, has appointed Tom to run all the Wakefield events being staged by SAM. Tom is quite

enthusiastic and reports his feelings from 1993:

"As I watched Dick Korda wind his model for the first official Korda Wakefield event, it is hard to express the nostalgic feelings I had seeing how the old master handled himself. Korda, like many of us old-timers, winds without the benefit of a winding stooge or protective tube for the rubber motor.

"As our lead-off man in the first round, he launched his Korda Wakefield and as could be expected, his model performed beautifully, both in

climb and glide. After an easy max flight, the model DT'd and landed about 100 feet away. Wow! What else could you say besides 'It don't get any better than that!'"

For those thinking of competing in this special event, only the Korda 1939 Wakefield Winner is eligible. Everyone who flies will be a winner, as a complete stock of T-shirts, stickers and pins will be available.

Don Reid also reports a sizable Canadian contingent will show up as will the large English group. All of these lads are keen O.T. Wakefield fliers. This sharpens the competition. Don't miss the fun!

### ELECTRIC POWER CONVERSIONS

Bill Baker of 1902 Peter Pan, Norman, OK 73072, says he's been having a lot of fun lately with O.T. rubber models scaled up for RC and fitted with electric power systems. Seen in Photo No. 6 are two such models, a Korda Wakefield and a Comet Clipper MK I (the rubber-powered version). Both have been scaled up 170 percent. Bill reports this is a great way to fly, particularly in urban areas where engine noise is a problem. Highly recommended!

### 1/2A TEXACO SCALE

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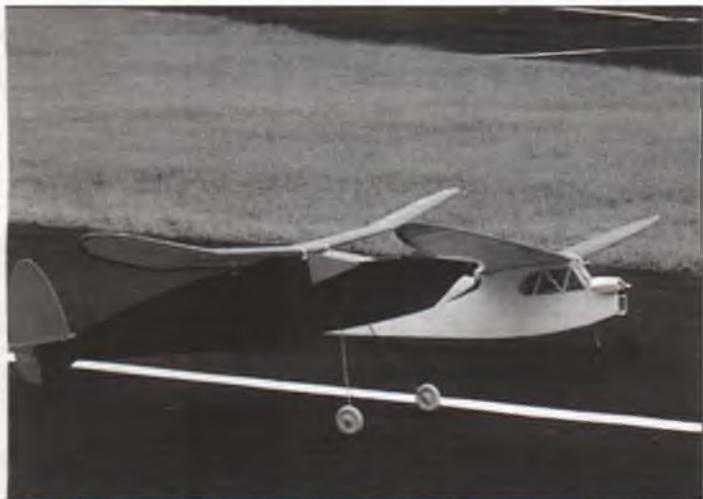


Photo No. 6. Just for fun, Bill Baker enlarged two O.T. rubber ships, a Korda Wakefield and a Comet Clipper (the rubber version), and converted them to electric RC. Just the ticket for calm-weather schoolyard flying!



Photo No. 7. An exceptionally well detailed Douglas O-43, built by Steve Bennett of Texas for the rapidly growing 1/2A RC Texaco Scale event.

ship by storm. Most all O.T. modelers dearly love scale models; hence, this event with its realistic flying has grown tremendously over the past two

SAM Champs.

Photo No. 7, from Steven Bennett of Duncanville, Texas, flies with the SAM 29 group. Pictured is his gor-

geous reproduction of the Douglas O-43 observation airplane of 1934-36 vintage. The neat thing about these models is that you can doll

them up to suit your preferences. Seen here are military markings, pilot canopy, and rear machine gun. A real beauty! **MB**

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speed: .22 sec/60 deg



BY ELOY MAREZ

## JR'S XF622 RC System

An affordable, high quality, user-friendly computer radio designed with the sport flier in mind.

**H**orizon Hobby Distributors is one of the major model supply importer/distributors in the U.S., and JR is one of Japan's major manufacturers of RC equipment. The new XF622 system discussed here is the result of Horizon's and JR's combined talents—and is well worth your consideration.

In the designation XF622, the X indicates

radio without having to spend extra money for advanced features they really don't need.

In some instances, computer radios have a less-than-ideal reputation, probably because the first ones to appear were intended strictly for competition aerobatic flying, with all the bells and whistles that such fliers demand. They were complicated systems. Many came with minimal instruc-

\$450 price range, the real-world discount prices should be closer to \$250—in the neighborhood of some of the more advanced non-computer systems.

The beginner and/or casual sport flier will ask, "What will a computer radio do for me that the other type won't?" A valid question. For one thing, it's a fact that the use of a microprocessor automatically tight-



a computer radio, the F stands for FM, and the 622 is for six channels, two model memory, and two model types (the transmitter includes programming for both fixed wing and helicopters). It's intended to be an affordable system for sport fliers looking to benefit from the precision of a computer

tions that confused more than they helped.

The JR XF622 is not of that ilk! In addition, many modern top-end radios, due to their complexity and specialized application, are more than a little pricey. The 622 is not in that category either. Though the suggested retail prices are in the \$400 to



■ **LEFT:** The XF622 transmitter is an impressive looking piece of equipment and includes programming for both airplanes and helicopters. The transmitter is the same for both the airplane and heli systems, but with the latter you get an extra servo, a larger 1000-mAH airborne NiCd pack and a different wall charger. ■ **RIGHT:** This view shows the transmitter case design that results in a perfect fit and grip for thumb fliers. The sticker on the back is a condensed programming guide.

ens up all design and assembly criteria. In a nutshell, they are made better, the XF622 using the latest Surface Mount Technology components and techniques.

Also, a computer system offers several very noteworthy advantages over an analog radio when it comes to installation and





The clearly defined 7/8x1-3/8-inch Liquid Crystal Display screen is easy to read even in bright sunlight. It displays all pertinent condition and flight information.

fine-tuning. Gone are the days of fiddling with servo arms, control horns, pushrods and linkages. Now you can adjust all servo directions and throws with the push of a button. What's more, you can set throws with *one degree* accuracy! Mixing, with its mysteries, comes incredibly easy, and is adjustable in whatever ratios are required, also in increments of 1 degree.

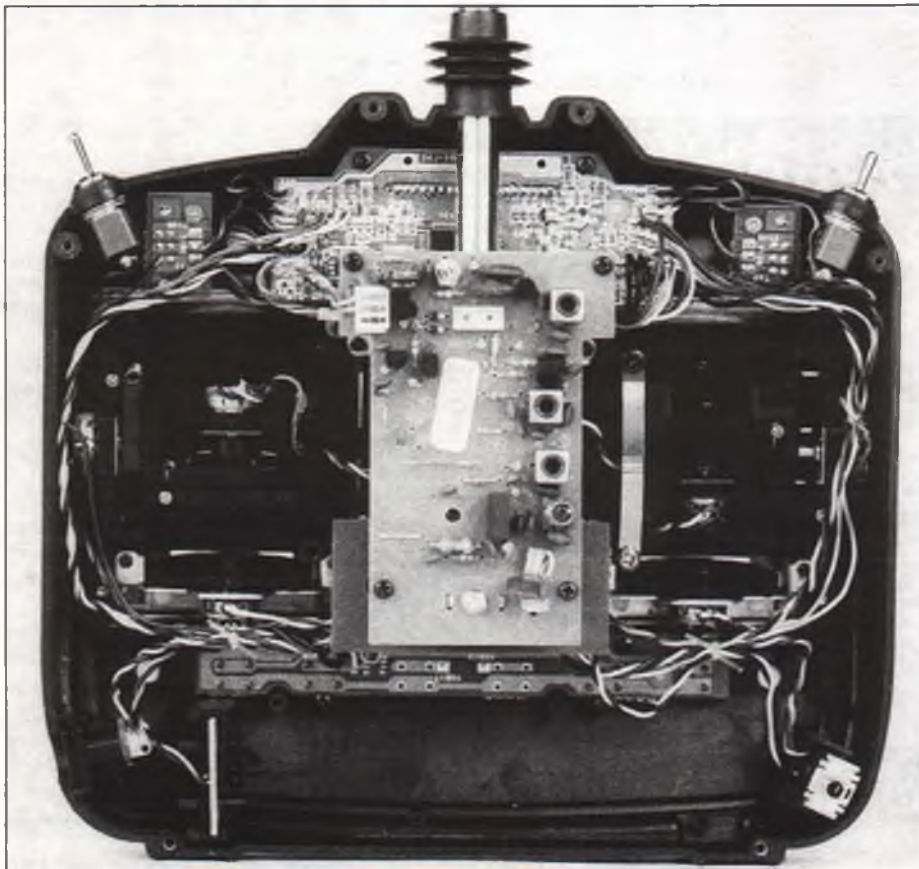
The ability to use the XF622 for both airplanes and helicopters means that should you get the hankering to try the one you are not primarily involved with, you don't need to buy another system. Simply push a few buttons and you're

ready for the wild blue yonder!

Another nicety is the two model memory. (Yes, those pattern radios have a far greater number, but we're talking reasonable here. Who has seven ready-to-fly airplanes anyway?) The XF622 can be set up for two airplanes, or two helicopters, or one of each. Of course, the not-recommended full-scale aviation practice of "kick the tires and light the fires" is not recommended here either. Checking to see that your transmitter is set for the aircraft you are about to fly is a definite requirement in your pre-flight checklist.

The instruction manual is more impor-

This view of the inside of the transmitter shows the modern Surface Mount Technology design. Stick tension is adjustable by means of four small screws, accessed by removing the back of the transmitter case. The large space at the bottom is normally occupied by an eight-cell Sanyo battery pack.



tant with a system of this type than with the others. In this case, the 63-page book covers it all in clear, concise modeler-talk, without any strangely translated English. Don't let its size intimidate you; it covers both airplane and helicopter programming, and unless you are into both, you'll only have to read the pertinent section.

To get something of an idea of how easy or difficult it might be to program the XF622, I went it at cold, without looking at the instructions. Piece of cake! How can you go wrong with keys marked Enter, Clear, Mode, Channel, Increase and Decrease? In a matter of minutes, I had grasped the basic procedure. The mixing functions are more involved, and I did need the manual for these. If you get yourself into a corner, you can call up "Data Reset," which recalls all of the original factory settings so you can



As small as you can get in a narrow-band six-channel receiver, JR's NER-226X "credit card" receiver has already established a reputation for quality and dependability.

start fresh. The programming keys are located under a clearly marked flexible membrane, with no openings but with a definite "click" when pushed.

The manual includes easy-to-understand illustrated procedures for each function. They show the screen as it is supposed to appear, tell you what keys to push and what should take place. Decals are furnished to identify each switch exactly as you will be using it. A large decal on the back of the transmitter reminds you of the basic programming steps. As JR says, "You can leave the book at home."

The XF622 transmitter is a pleasant surprise. It is perfectly contoured, with raised grips on the back, so that it drops into your

*The new XF622 system discussed here is the result of Horizon's and JR's combined talents—and is well worth your consideration.*

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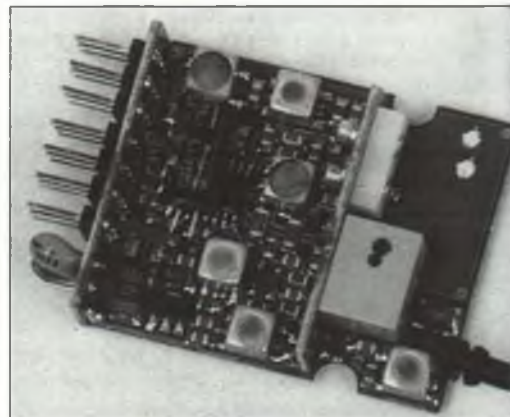
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hands like it was molded there. It is indeed a thumb-flier's delight. With all auxiliary controls logically placed and operating positively and smoothly, you'll find it hard to fault this one.

The stick-operated channels are all equipped with ratcheted trim levers. The throttle trim works only in the low idle position, so that the high throttle setting isn't affected. The other two channels are switch operated and located on top for easy forefinger operation. Dual rates are provided on the elevator and ailerons, and can be operated either independently or together by a single switch in a mode JR describes as "Mild/Wild."

There is a related function described as



The **NER-226X** receiver insides show a well-thought-out design. SMT electronic assembly of this type requires complex robotic manufacturing equipment.

Variable Trace Ratio (VTR) that provides a reduced servo-to-stick reaction around neutral and full throw at stick extremes. I find this particular terminology somewhat confusing. I could better understand Variable Throw Ratio—couldn't you?

Additional functions include sub-trims; flaperon mixing; V-tail mixing; aileron/rudder mixing; elevator/flap mixing (to increase the pitch rate of the airplane); aileron differential; and flap/elevator trim (to offset pitching tendencies when flaps are deployed). Also, a Direct Servo Controller or DSC is provided, allowing the operation of all controls without a signal being transmitted.

The XF622 system's battery complement is the normal four-cell airborne and eight-cell transmitter rechargeable NiCd packs. I was pleased to see Sanyo cells used throughout. The wall mounted, dual LED charger furnished provides the proper overnight rate to match your particular system's airborne battery. I was also pleased to see that the transmitter battery is installed with a secure plug and socket—much more positive than the metal spring contacts used by some manufacturers.

The connector used for charging the transmitter battery is of the coaxial type, and although there are no electronic industry standards for its polarization, most RC equipment uses the center con-

nection as positive. JR uses the center connection as negative. If you opt to use a different charger, be sure the polarization is correct, as reversed connections are sure to cause damage. You are warned in the manual that such damage is not covered by the warranty.

The transmitter battery voltage is displayed on the LCD screen when the transmitter is initially turned on, and an audio warning will sound eight beeps when a critical low voltage (9.0 volts) is reached. If you're in the air at the time, a quick landing is in order. Capacity testing of the transmitter battery with one of the devices available for that purpose can be done directly through the charge plug (again, watch the polarity!), as there is no series blocking diode installed.

The XF622 system's receiver needs no introduction, it being the popular six-channel NER-226X, otherwise known as JR's "credit card" receiver. It's a skinny one indeed—only 9/16 inch high, 1-7/16 inches wide and 2-1/16 inches long. It weighs in at exactly 1 ounce. I personally tested both this receiver and the transmitter on a calibrated spectrum analyzer and found them to meet all required and recommended narrow band specs.

The servos furnished with the XF622 are also known to previous JR owners—NES 507s, JR's "standard" servo. It uses all mod-



The XF622 airplane system comes with a complement of four NES-507 servos, JR's basic "standard" servo. JR produces a full line of competition quality servos, from the very small to the very large.

ern servo technology throughout—SMT amplifier, direct motor and pot connections, indirect servo drive, and thick output gears. A companion ball bearing version (NES 517) is available, as are other competition class drop-in replacements, ranging from the micro 341 to the FET-boosted monster 605.

### THE BOTTOM LINE

I do own a dog (an ARF!), which I use for a test bed. But my favorite airplanes are those I have built, the ones I've cut out, shaped, glued, sanded, filled, covered, painted, and otherwise sweated over. And I wouldn't hesitate to trust any of them to the JR XF622 RC system! **MB**

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## THE EX-29

**An easily built rudder/elevator sport model that delivers truly excellent performance from an inexpensive Kyosho AP-29 motor and a five- or six-cell battery pack.**

**BY AL CLARK / PHOTOS BY JOHN CHAPMAN**

The EX-29's simple, straightforward design and construction show up well in this photo. Weight and drag eliminated by omitting the landing gear is one secret to the model's amazing performance with a small power system. Motor battery sits directly above the wing, hence the row of cooling air holes on both sides of the fuselage.

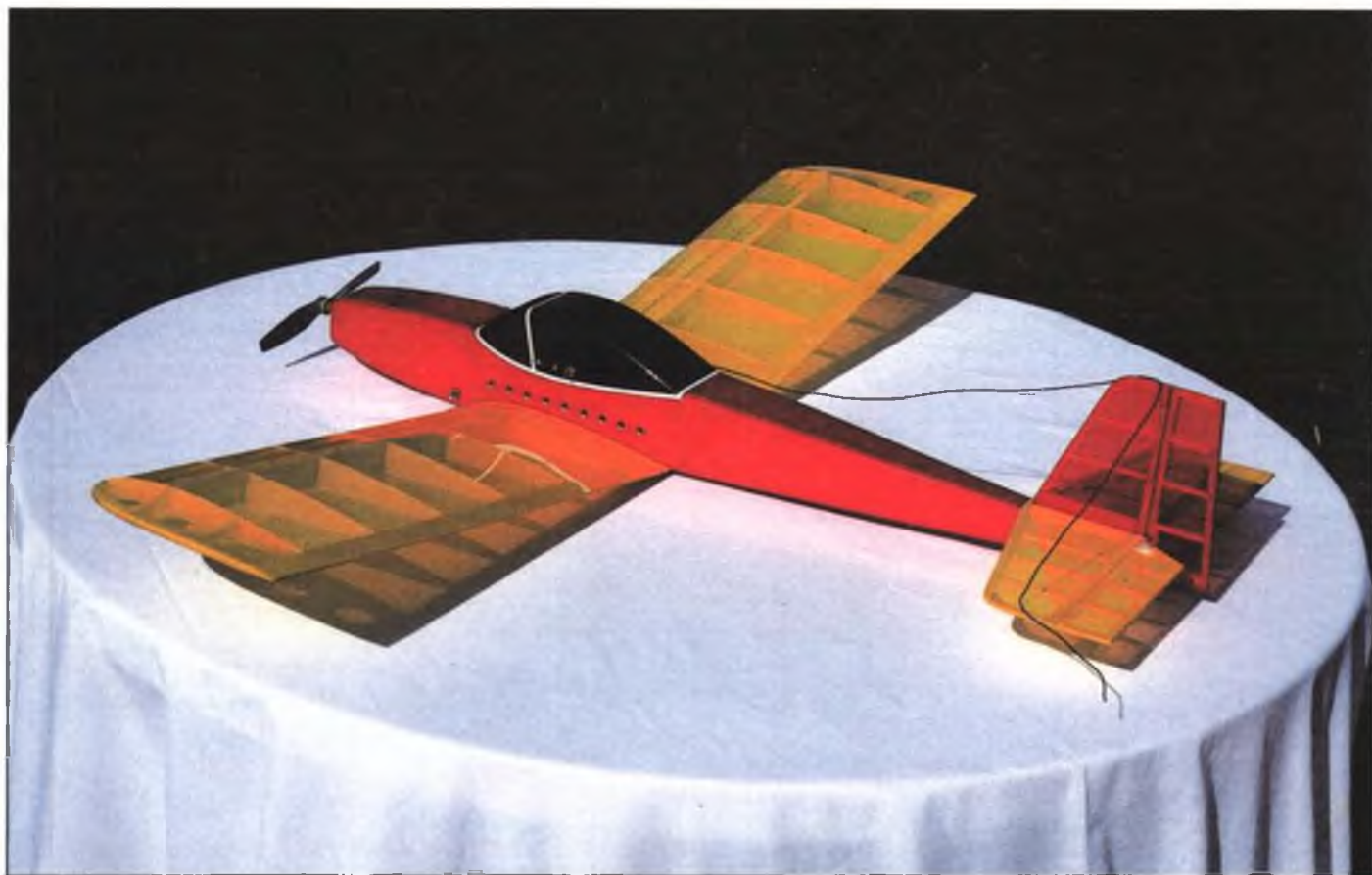
I've long been tempted to build an electric-powered RC airplane, but the cost of the power systems most modelers were using seemed excessive to me. When I tried to get some of my friends enthused about electric power, they told me I was crazy to spend that kind of money. I concluded that many modelers are like me and aren't willing to try an electric airplane unless the initial expenditure for the power system is reasonable.

I had almost forgotten about electric planes until purely by chance one rainy summer day, I witnessed something that got me to thinking that maybe there is an inexpensive way to fly electric. A good friend of mine, Rex Powell, called to say he was about to test-fly an electric sailplane, and did I want to come see it fly? After watching several flights in the overcast, no-lift conditions, I was impressed with the performance

of Rex's little motorglider. The model used a wing from a Class A (59-inch span) hand-launch RC sailplane and a Kyosho AP-29 motor.

Rex had found the AP-29 in the Tower Hobbies catalog. This motor was used in some Kyosho ARF electric airplanes. It's an O35-size ferrite motor and sells for about 20 bucks! Also, it operates on five or six cells, resulting in light and inexpensive (\$15-\$25) battery packs. The motor and battery pack together don't cost much more than a Cox Tee Dee .049! Could this be the inexpensive electric power system I thought didn't exist? The more I thought about it, the more enthused I became. If Rex's motorglider performed this well with the AP-29, then it should also be possible to design a small, 1/2A-size power model that would fly well using this motor.

Back home, I sat down at the drawing board with calculator





Low and close-in—the fun way to fly! The use of plenty of dihedral and rudder/elevator controls results in decent axial rolls as well as great snap rolls and spins. We've seen a video of this model in action and can attest to its aerobatic capabilities—including outside loops!

and pencil to see what I could come up with. A couple of days later, I had the prototype EX-29 drawings completed.

I designed the EX-29 to be as light as possible but still have sufficient strength for everyday flying. First, I used poor man's retracts (no landing gear) to reduce weight and drag. I normally fly at a grass/weeds field, and a landing gear would only

flip the plane over anyway. Second, I decided to use only two flight controls, to lose the weight of one servo. The two controls would be rudder and elevator, allowing snap rolls and spins in addition to rolls. With ailerons and elevator, snap and spin maneuvers wouldn't be possible.

The final weight was 25.5 ounces with a five-cell, 800-mAH battery pack; and 27 ounces with a six-cell pack. This results in a very reasonable wing loading—13.4 to 14.2 ounces per square foot. I've flown many 1/2A gas models that had higher wing loadings than this.

So how does the EX-29 fly? I must admit that I was a little surprised by its performance. I've seen several electric-powered airplanes that were obviously struggling when they flew, but this is definitely *not* the case with the EX-29! Performance is very good with the five-cell pack. Consecutive loops from level flight, rudder rolls, snap

rolls, spins, split-S's, Immelmans, hammerheads, and inverted flight are no problem. As expected, with six cells the model flies and climbs faster. Maneuvers are quicker, and snap-rolls on top of loops as well as outside loops are pos-

sible due to the increased flying speed. The six-cell pack is lots of fun and is good for showing off a bit, but I usually use the five-cell pack unless it's a very hot day (high density altitude).

What about launching and landing? Just grab the model behind the wing, hit the power and give a smooth, level throw. Within a few seconds, the EX-29 will be up to flying speed, and then the fun begins! It will climb out at a fairly steep climb angle, and altitude is gained quickly. Power-off performance is very good, the glide being quite flat. Landing approaches are easy due to the shallow glide angle, and the EX-29 will slow up quite well just before touchdown, so the landing speed is not "hot" like some electrics you may have seen. In fact, I normally fly mine from a soccer field, and have had no problems with landing space.

The EX-29 gives you a lot of bang for the buck, and considering the very reasonable price of the Kyosho AP-29 motor and a five- or six-cell battery pack, you have no excuse not to give electric a try!

## CONSTRUCTION

*(Editor's note: The construction text that Al supplied was very detailed—stick-by-stick detailed—and was much longer than we had room for. Rather than chop it down to a useless fraction of its original length to make it fit, we've decided to keep it intact but not reproduce it here. Those who order the full-size EX-29 plans will get a copy of the complete original text.)*

### THE EX-29

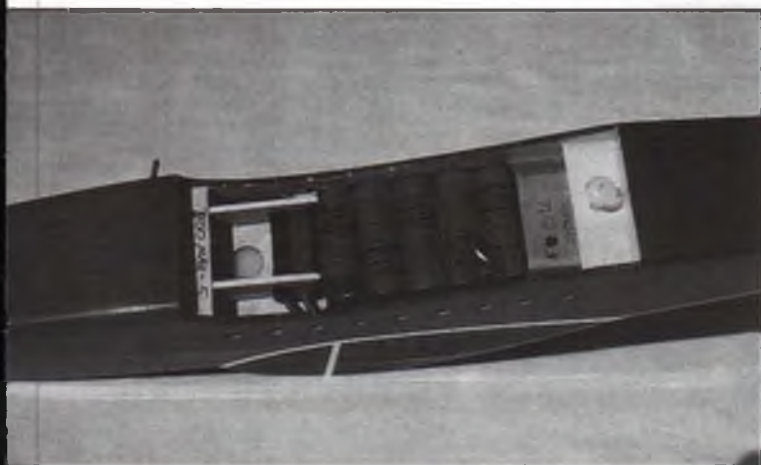
Designed by Al Clark

WINGSPAN ..... 40 in.  
 WING AREA ..... 274 sq. in.  
 FLYING WEIGHT ..... 25-27 oz.  
 WING LOADING ..... 13-14 oz./sq. ft.  
 CONSTRUCTION ..... Balsa,  
 spruce, plywood.  
 POWER ..... Kyosho AP-29 motor  
 (available from Tower Hobbies),  
 800-mAH battery pack  
 (five or six cells).  
 RADIO ..... Three channels required  
 (rudder/elevator/on-off motor  
 control). Lightweight micro  
 system recommended for best  
 performance.



Removing the forward hatch reveals the Ace Silver Seven receiver; a High Sky on-off motor controller lies underneath and is taped to the receiver.





Removing the wing gives access to the motor batteries—either five cells (seen here with appropriate spacers) or six, depending on the performance you're after.



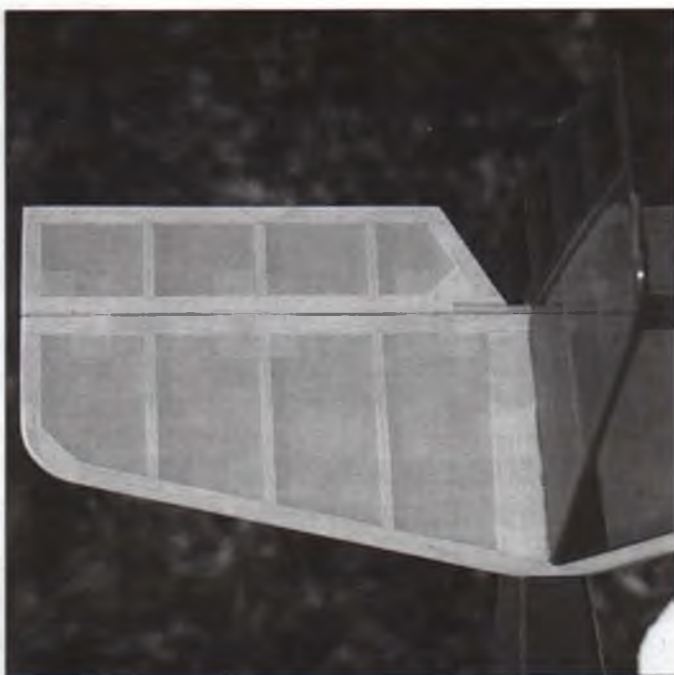
The battery floor is a drop-in fit; removing it exposes the rudder and elevator servos (Futaba S33 micros) and the radio battery.

### POWER SYSTEM

I recommend replacing the leads on the AP-29 with 16-gauge wire (look in the RC car section of your local hobby shop) to better handle the current. I use a High Sky on-off controller (see their ad elsewhere in this issue of

*Model Builder*). The motor and arming switch are wired directly to the controller using the screw terminals provided. The only connector in the system is a Sermos connector for the motor battery.

I'm using packs made of Sanyo 800-mAH AR and 1200-mAH AE cells. With a Cox gray



Tail control surfaces are hinged via MonoKote "figure eight" hinges. The author's construction text, which is not presented here because of its length, goes into much detail on how to make such hinges. A copy of the complete construction text is included with the full-size EX-29 plans.

6x4 prop, I get about 3-1/2 minutes from the 800s and about 6 minutes from the 1200s. The 1200 AEs are the same size and weight as the 800 ARs, but they aren't designed for fast charging or high discharge rates. By raising the battery floor, Sanyo 1700-mAH SCRCs can be accommodated. I'd use a six-cell pack because of the extra 3.7 ounces; the EX-29 should handle the increased wing loading with no problem. This pack would give you 8 or 9 minutes of flying time!

I recommend not using the motor brake circuit on the High Sky controller—just let the prop freewheel. This allows the prop to be knocked out of the way when landing and avoids breakage. I have

yet to break a prop that was freewheeling upon landing.

### FLYING

Launch the model into the wind (no more than 5-8 mph for test flying) using a firm, level throw. Don't try to climb until the EX-29 gets up to flying speed—this won't take more than a couple of seconds. Get some altitude and trim for level flight, then have some fun! During the test flights, it's best to land before the motor battery runs completely down in case you have to make a go-around. After you learn the glide angle, you'll find that precise landings are easy.

I hope you enjoy your EX-29 and let your buddies fly it. It has a high fun-per-buck ratio! **MB**

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BY JOHN LUPPERGER

# Return of a Legend: The Hawk From Ross Models

A truly ageless design, the Hawk is now in its 20th year and, as reported by a dyed-in-the-wool Hawk fanatic, the Ross Models version is better than ever.



**T**he Hawk (originally the Hobie Hawk), like the Grateful Dead, is an American legend. Like the Grateful Dead, you are either totally in love with the Hawk or you don't like it at all. Many Hawk lovers have owned more than one, and are completely lost when their "baby" is broken or otherwise not airworthy. Those who have flown a Hawk and didn't like it, find it hard or impossible to fathom the total devotion of a true Hawk lover.

Not only am I a Deadhead, I'm also a Hawk fanatic. I presently own five—four original Hobies (including one 10-footer) and the subject of this article, the new Ross Hawk.

Hobie Alter, of surfboard and catamaran fame, would be proud of the job Ross Models has done with their rendition of his legendary, curved-wing bird. I pulled my original Hobies out of the rafters to compare them to the new Ross Hawk. Being a true Hawk fanatic, I was ready and willing to tear the new Ross Hawk apart. What a surprise! Not only is the Ross kit as good as the original, in many ways it is even better!

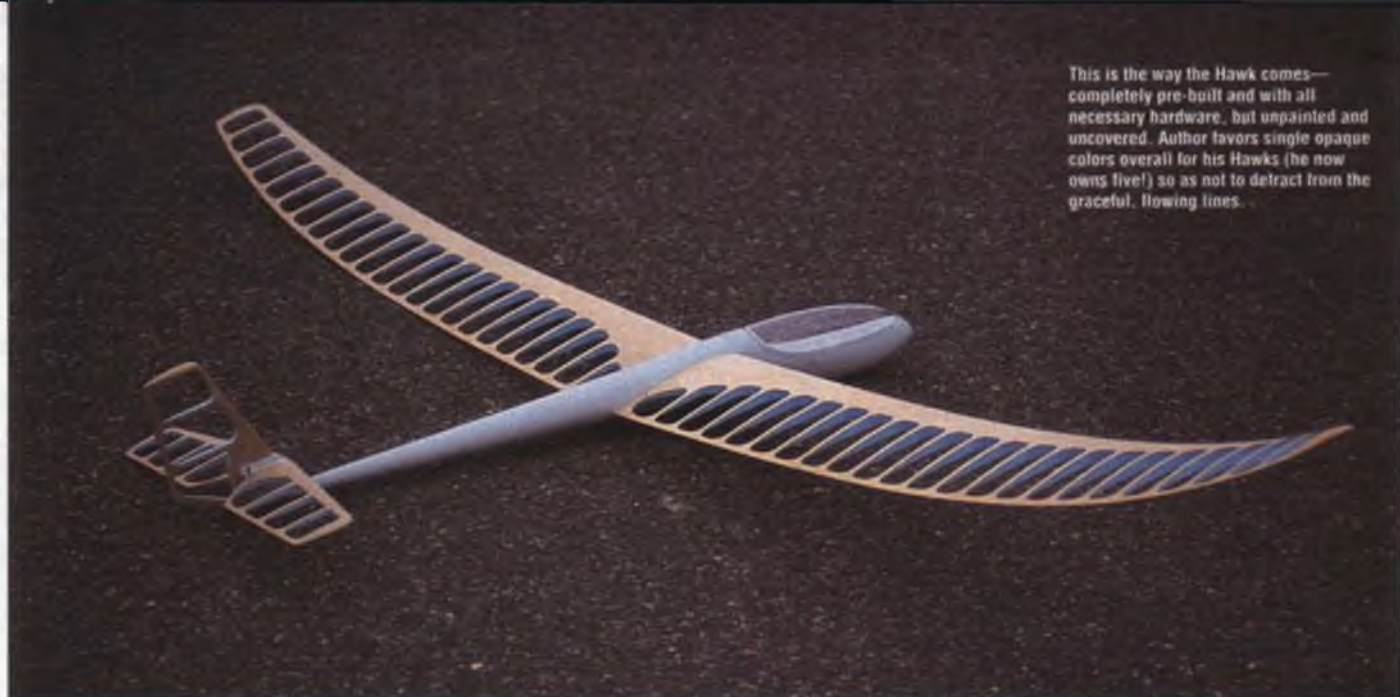
### BUILDING THE HAWK

The entire model consists of only six main pre-built components. Wing, rudder and horizontal stab cores are cut from blue

foam and sheeted with plywood—1/32 on top and 1/64 underneath on the wing and 1/64 ply on both sides of each of the tail surfaces. All leading edges are made of pine. Root ribs and tips are ABS plastic.

The fuselage is supplied assembled but unpainted and is composed of a polyethylene nose cone, fiberglass tail cone, and polycarbonate dorsal assembly. A bit of prep work is required prior to painting. The joint between the nose cone and the tail cone is pretty pronounced, but if you take a little extra time and sand the raised portion of the tail cone, you won't need much filler.





This is the way the Hawk comes—completely pre-built and with all necessary hardware, but unpainted and uncovered. Author favors single opaque colors overall for his Hawks (he now owns five!) so as not to detract from the graceful, flowing lines.

After sanding the entire fuselage with 220 and then 400 grit sandpaper, the polyethylene nose cone must be flame treated. You literally use a torch and pass the flame over the nose cone as though you were spraying paint. This treatment removes any oils or "fuzz" from the surface, allowing good adhesion of the primer. After priming, it is essential that you don't sand through the primer to the polyethylene surface, otherwise flame treating will again be necessary to assure that the final coats of paint will stick.

The wings and tail surfaces also require a bit of work. The five ABS tips are all glued

in place with 5-minute epoxy, then the pine leading edges of all surfaces are shaped and everything is finish sanded. As the instructions state, the plywood is thin, and care must be taken not to oversand any one area. I was really impressed with how well the flying surfaces are constructed. There were no small chips in the plywood from routing out the open areas, and the resulting "ribs" were very straight and equal in size.

#### FINISHING

I love the smooth, flowing lines of the Hawk and tend to do mine in one-color

finishes, as I hate to be distracted from the beautiful form by multi-colored panels. With this in mind, I painted the fuselage with white Pactra Formula-U and covered the flying surfaces with white Oracover from Hobby Lobby. The instructions recommend MonoKote, but I think this is mainly due to the fact that up until the fairly recent release of other coverings like Oracover and Ultracote, MonoKote was one of the few materials that could hold the required wash-out in a Hawk wing (it takes a bit of effort to twist those plywood sheeted surfaces). I've covered Hawks with almost every covering



Even after 20 years, the Hawk is still in a class by itself. Looks just as modern today as it did when it was first introduced.

#### THE ROSS MODELS HAWK

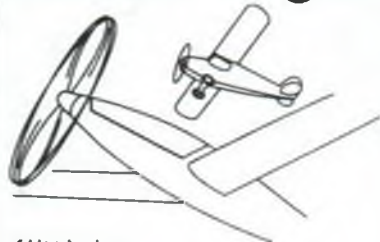
WINGSPAN .....	98 in.
WING AREA .....	590 sq. in.
FLYING WEIGHT .....	38 oz. (42 oz. as tested).
WING LOADING .....	9.2 oz./sq. ft.
	(10.2 oz./sq. ft. as tested).
AIRFOIL .....	6 percent undercambered.
RADIO .....	Two channels required
	(rudder/elevator).
SUGGESTED RETAIL .....	\$350.

Distributed By Ross Models Inc., 708 Dermody Way, Sparks, NV 89431; (702) 358-7677.

available over the years, and for me, Oracover goes on the easiest, plus it is capable of holding the necessary washout. Also, the recommended procedure of weighting down the wingtip to flatten the panel for covering isn't necessary with Oracover.

I always found it difficult to get a good finish on the wings with MonoKote. Once the weight was removed and the panel sprang back, the wrinkles that often showed up in the MonoKote were very difficult to remove. But maybe this is just a problem for me, as I've seen many beautifully MonoKoted Hawks over the years.

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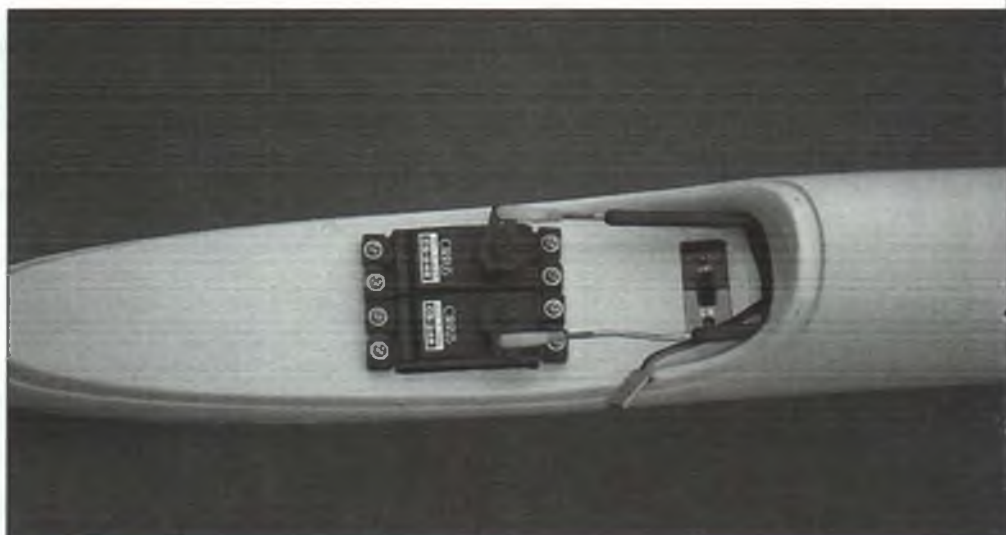
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## RADIO INSTALLATION

The procedure for determining component location prior to actually installing the radio is to tape all of the components temporarily in place, mount the tail surfaces, canopy, wing rods, and tape the pushrods to the outside of the fuselage in their approximate location. With the main wing rod resting on a smooth surface on both sides, the distance from the bottom of the skid directly below the rudder hinge line to the surface the wing rod is resting on should measure 19-1/2 inches. Shift components around or add lead to the nose until it does. Either way, *don't fly until you have your Hawk balanced*. A nose-heavy Hawk is difficult to land (you tend to run out of elevator), but a tail-heavy Hawk is murder!

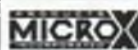
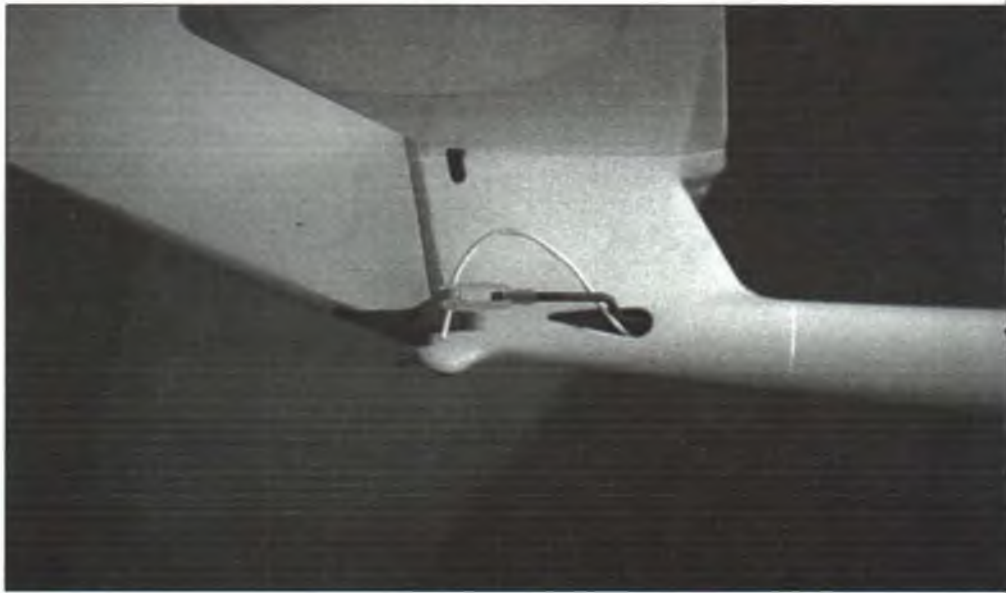
The last step is to make the cutout for the servos in the nose cone. The receiver and battery are installed through this hole, and all that shows in the canopy is the servos.

## FLIGHT PERFORMANCE

Oh boy! The fun part . . . time to fly! Hand tosses at a local park produced a long, flat glide, and all that was left was to wait for the right weather and hit the slopes. As luck would have it, I had to wait over a week for some decent wind, and even then it was only a 6-9 mph breeze. That doesn't sound like much, but the Hawk is an exceptional soaring bird, and I was ready to go for it. What a beautiful sight! The Hawk flew majestically and after just a couple of passes, was well over 100 feet above the lip of the hill. That first flight lasted about a hour and ended in a picture perfect landing.

The next day looked more promising—winds of 20-25 mph with occasional gusts to 30. Today was going to be fun! With several clicks of down trim, I launched the Hawk straight out. She went up like a rocket and before I could complete one pass across the face of the slope, she was up at least 200

The rudder hinge and control horn are a single molded unit. Rudder pushrod exit is clean and unobtrusive. Hinge pin for the full-flying rudder snaps securely into the tail skid bump and allows for easy rudder removal if needed. Elevator horn and pushrod are completely enclosed in the fuselage.



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feet. This is where the real fun begins. After a prolonged dive, pull up, hard rudder, and over she goes. No other glider rolls quite like a Hawk; it's kind of a half roll, half loop—sort of like doing a loop sideways. You have to see it to appreciate it, and it's even more fun to do!

How about thermal flying? Many people think of the Hawk as strictly a slope ship, but nothing could be further from the truth. Thermalling a Hawk simply requires finesse. It's not difficult to thermal, it just takes a certain flying style to get the most out of it. Unlike a polyhedral model that can be forced through maneuvers, a Hawk takes a light, deft touch on the sticks. When coring a thermal, it's best to fly a wide, smooth circle. The Hawk doesn't like to be wracked up on a wingtip, nose high; it will just fall off on the inside tip and you'll find yourself losing a lot of altitude.

Something you often hear about the Hawk



Molded ABS wing roots come already installed in the wing panels and have the brass tubes for both wing rods already in place.

is that it's all over the sky during a hi-start or winch launch. Again, it's a matter of flying style. Most people tend to put more than the recommended throws in the rudder and elevator, and this is where the "wobble" comes from. When launching a Hawk on a hi-start or winch, it's important to throw straight so that you don't have to make a lot of corrections during the first (and fastest) part of the launch. If you need to make corrections, keep them small. If you have more than the recommended amount of rudder throw, you'll probably overcontrol, then find yourself wobbling all over the sky trying to catch up with your own control inputs.

### CONCLUSION

The Hawk is more than "just another glider." The Hawk is an experience—one that will either leave you breathless, or wondering what all the fuss is about. If you're lucky enough to fly a Hawk that's properly set up, you'll surely experience the thrill that so many have known over the past 20 years. And, lucky for you, the legend lives on in the Ross Hawk. It's not inexpensive, but then, you get what you pay for... and you definitely won't feel like you overpaid for the privilege to be a Hawk fanatic. Heck, some people have traveled halfway across the country just to hear the Grateful Dead play! **MB**

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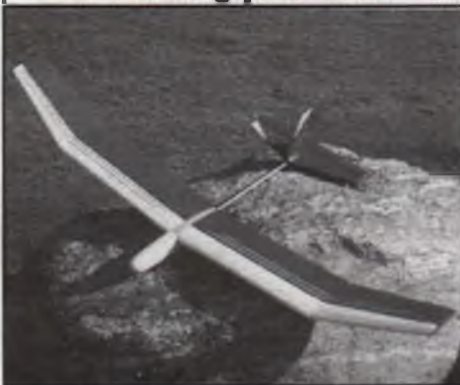
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# ELECTRONICS CORNER

BY ELOY MAREZ

## Checking Your Airborne Radio Installation For Excessive Current Drain

*The basic unit for measuring electrical current is the ampere, but in dealing with smaller quantities, we have to use sub-multiples of that.*

The subject for this month involves some commercially available test instruments, which, if used correctly, could extend the life of your RC models. There are three such devices: the Servo Analyzer from Custom Electronics; the System Analysis Meter from Hobby-Tec; and the Jam Check'r from Hitec RCD. In general, what we have in the first two are milliammeters—current reading devices intended to be inserted into the airborne RC system harness and which measure and display the current consumption of the various components. The Hitec device provides roughly the same type of information, but in a different manner.

Let's start with some theory. The basic unit for measuring electrical current is the ampere, but in dealing with smaller quantities, we have to use sub-multiples of that; in this case, we are dealing with as much as 1/2 amp, so these particular instruments are designed to read and indicate in milliamperes (one thousandth of an amp, also called milliamps or just mils, and abbreviated mA).

Reading electrical current requires that the meter be placed in series with one of the conductors. Ammeters are

polarized, the positive terminal needing to be connected to the positive source (battery or otherwise) and of course the negative terminal going to that source point.

Now, as you might expect, a meter cannot consist of a dead short. It must have some resistance. This internal resistance—the lower the better—is a measure of the quality of the instrument. But *some* resistance will always exist, and what happens when we insert a resistance into a circuit? Right, it causes a voltage drop across it, i.e., the total circuit voltage will be less than it was before. It's Ohm's Law! It is also Ohm's Law that the current in a given



The Custom Electronics Servo Analyzer is a small transmitter meter type of instrument intended to show variations in servo operation, which are indications of possible problems.

circuit is determined by the applied voltage, so it follows that the series-connected ammeter, by causing a drop in the voltage, is not giving us 100 percent correct information about circuit conditions. In some cases, it will disrupt the circuit enough to be noticeable.

This means that the photos you've seen of someone testing a charger, for example, and showing you at just what rate the battery was being revived, are not quite correct. Said charger would actually be charging at a higher rate were the meter not in the circuit. In the case of the instruments under discussion here, you will notice that, when installed as directed, the speed of the servos will be slower. Not a whole lot, but noticeably slower.

Why, then, do we bother, when we know that the information being obtained is not altogether true? Because we still obtain valid information that we cannot get otherwise. There are instruments and methods for

obtaining more accurate current measurements, but they are not always necessary. In this case, we are not really in need of true current values as much as we are of changes and/or abnormal conditions. The milliammeters described here can be used to distinct advantage.

A bit about the actual current drain of our airborne RC components. The average modern receiver will consume some 10 milliamps of current. This is a constant value and will not change regardless of the number of servos connected or in operation at any one time.

A servo is something else entirely. There are actually two values involved, that of the amplifier and that of the motor. The amplifier is the purely electronic part of the servo. Its current consumption, called its "resting" current, is also constant, and also on the order of 10 milliamps. The current hog in this case is the motor. Its consumption is the product of two things: design and the ac-

tual work it is called upon to perform. There is an important and often confusing point here, being that the servo motor, and thus in effect, the servo, consumes a significant amount of current *only when the motor is moving*. When the servo stops, regardless of its position (centered, at one extreme or the other, or anywhere along the way), the current drain reverts to the value used by the amplifier only.

For an example, let's take the average "standard" servo. With no mechanical load attached, pulsed back and forth, it will indicate an average consumption of just over 200 mils. The current flow will increase dramatically as the servo is loaded, i.e., when it is made to move a control surface. Current consumption is adversely and drastically affected by such things

as poor hinging, binding pushrods, and friction anywhere in the control system. Even such seemingly minor things as tight-fitting clevises will increase current drain, Z-bend pushrod ends being notoriously bad in this respect. The real culprit, though, is a completely stalled servo, which will use current at 1/2 amp (500 milliamps) or higher. Such stalled conditions are mostly seen in nose wheel steering mechanisms and throttles. If at high throttle, the carburetor bottoms out before the servo reaches the end of its travel, that 1/2 amp is being drawn constantly—and well, it was a nice airplane, wasn't that a dumb way to lose it?

Let's see now how we would connect a series milliammeter to the airborne RC system and what it would

The System Analysis Meter from Hobby-Tec uses a large color-coded scale to indicate normal or abnormal current drains.



Seen here perched atop a 9-volt battery to illustrate its small size, Hitec RCD's Jam Check'r uses three different colored LEDs to indicate normal or excessively high current drains.

tell us. If connected between the battery and the receiver, it would initially give us a total of the receiver and the resting currents of all of the servos. With four servos installed, it would be somewhat less than 50 mA. When a servo is commanded, the reading would increase by the amount consumed by it; more than one servo in operation would result in yet a higher reading.

Erratic readings could indicate a number of things, from defective or discharged batteries, to poor connectors, a defective switch, or a fault in one of the servos. Your next step in pinpointing the problem would be to replace and/or unplug the various components one by one.

To check individual servos, the tester is installed between the receiver and a servo—obviously one channel at a time. This is a better servo test; you will initially see the small amplifier drain, and increased drain as the motor runs. By

comparing one servo to another, you'll be able to determine improper servo operation, which can be in the wiring, the amplifier, the motor or even the gear train. If the servo is installed in your model, a high current reading can point to one of the installation problems previously mentioned; an extremely high reading at full travel is crying out STALL! A binding pushrod or similar fault should be corrected; a stall *must* be corrected.

The Servo Analyzer from Custom Electronics does its testing on a small meter, of the type we're used to seeing on a transmitter. It is calibrated to read to 400 mA, which sounds like a rather wide range for an instrument of this size, but as stated in the instructions, it "is not intended to be an accurate current meter but to show changes in current." It's important to remember that with

*continued on page 74*

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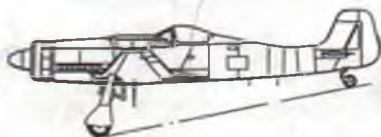
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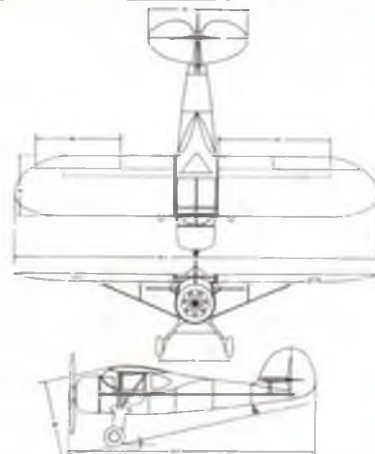
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## ELECTRONICS continued from page 69

whatever instrument you choose, an exact value is almost unobtainable because of the many variations involved, and even so, more accuracy would not fix anything or even locate the source of a problem. What you *will* discover is an anomaly that, if neglected, could ruin your whole day!

The CE Analyzer is furnished with an additional resistor and instructions to convert the reading to 800 mA, for those installations using larger or an abnormal amount of servos. Previous purchasers who did not receive this little extra should contact CE if interested in this change. The Analyzer is available with (\$19.95) or without (\$14.95) connectors, the latter being available for all major RC systems. Custom Electronics, R.R. 1 Box 123B, Higginsville, MO 64037; (816) 584-6284.

The System Analysis Meter from Hobby-Tec utilizes a meter with a 2-inch scale, color coded into four sections

marked Idle, Normal, Hi Load, and Stall. Again, the idea being to establish standards or to detect abnormalities, these colored scales might be somewhat easier to remember than numbers. If you insist on having figures, the sections represent 100 mA—175 mA—175 mA—100 mA, for a full scale reading of 550.

Hobby-Tec's System Analysis Meter comes without a harness; your best bet is to obtain a servo extension to match your system and install it to the knurled connectors per the instructions furnished, though it is not absolutely necessary to cut and connect the negative wire, only the red one. The instrument is diode protected against reversed connections. It is priced at \$24.95 plus \$2.95 postage, from hobby dealers or direct from Hobby-Tec, P.O. Box 220762, Santa Clarita, CA 91322.

The Jam Check'r from Hitec RCD is a similar yet different type of instrument. While it is current actuated, it does not display any specific values, though it does provide a definite warning of the cardinal sin of stalling a servo. It is a small device,

half the size of a servo, which connects between the battery and the receiver. It uses three LEDs (green, yellow, red) to indicate normal and abnormal conditions at various levels. It comes with the Hitec connector which will also mate with Futaba and JR, and which can be easily changed if needed. It is priced at \$16.95 and is available from Hitec RCD, 10729 Wheatlands Ave., Suite C, Santee, CA 92071; (619) 258-4940, or its many dealers.

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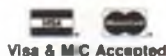
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Model Aviation Magazine, June, 1994

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## Chopper Chatter Potpourri

BY JAMES M. WANG

In which James touches on several topics, including a discussion on fuel pumps for heli engines, some handy hints he's picked up over the last few months, and some new helicopter goodies now on the market.

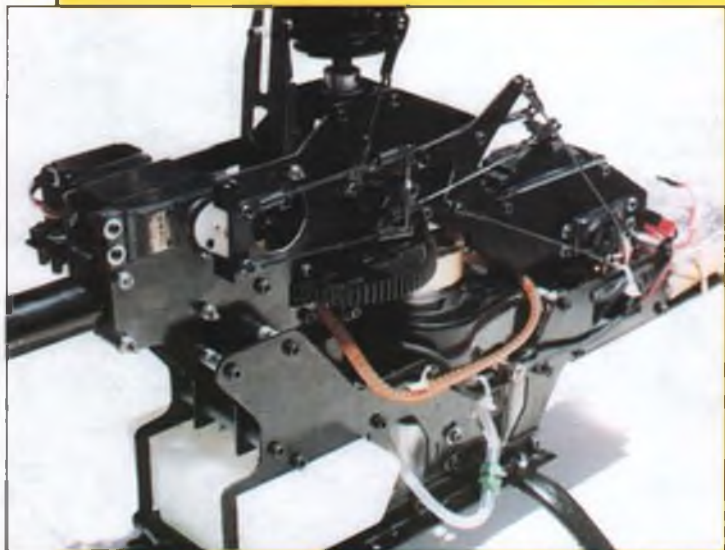
Using a pump to deliver fuel to your heli's engine offers several advantages over a standard fuel system, which relies on venturi suction effect to draw fuel from the tank to the carburetor. The tank can be located away from the engine, and does not have to be at the same height as the carburetor. A pump engine will develop more power, will run consistently at any attitude, and will give a consistent run right down to the last drop.

Most model engine pumps use engine crankcase pressure to oscillate a diaphragm inside the pump to force fuel from the tank to the carburetor. The pump itself does not increase horsepower; however, using a pump allows you to use a carburetor with a bigger bore, which supplies a bigger fuel/air charge to the engine for increased power. Any large-bore carb *must* be used in conjunction with a pump, otherwise there will be fuel draw problems.

The earliest such device is the Perry Oscillating Pump, now being produced and marketed by Varsane Products (619-591-4228). It's a small canister device about 3/4 inch in diameter and 1 inch long, and plugs into the fuel system separate from the engine. Based on the Perry design, in 1987 O.S. started making pump engines. The O.S. .61 SF and RF pump engines came with an 8H carburetor, which has about a 15 percent bigger throat opening than conventional 6H and 7H carbs. The O.S. .61 SF with the stock 6H carb put out 1.85 horsepower;

The new Ninja RC helicopter from Century Helicopter Products is designed for .32-.46 size engines. James promises a review on this model as soon as it comes out.





The Ninja 30 mechanics come standard with push-pull controls on the collective and cyclics. The sidelrames are made of G-10 composite. The fuel tank provides 15 minutes of flying.

with the 8H, it jumped to 1.95 horsepower.

A month ago, I decided to install a brand-new pump-equipped O.S. .61 RF in my new Jet Ranger. Boy, was that a mistake. I spent hours and hours tinkering with it. When it ran, it ran great. But when the fuel was half gone, the engine would start to lean out. Also, the needle valve was extremely critical; two clicks made a huge difference.

The engine also tended to run excessively rich at midrange and idle—even with the idle adjustment screwed all the way in. The pump was forcing too much fuel into the carb. This problem was solved by using a hotter glow plug, an Enya #3, instead of the O.S. #8. A hotter plug makes the engine run leaner, thus the idle and hover became better. Once the top end needle was richened slightly, the engine performed perfectly.

***A pump engine will develop more power, will run consistently at any attitude, and will give a consistent run right down to the last drop.***

However, making engine adjustments inside a full-fuselage helicopter is no fun. I never had this much frustration before, because I was using pump engines in pod-and-boom helicopters, where they are easy to work on. The upshot is that I've now removed the pump and have replaced the large-bore 8H

carburetor with a regular Super Tigre .60-size carb.

O.S. still makes pump engines for airplanes, but the pump heli engines have been discontinued. My recommendation is that if you need more power for your helicopter, go buy a newer engine such as the O.S. .61 SX, or the YS .61 SF, or the five-port Rossi .61.

Another experiment I tried on my O.S. was removing the pump and using direct crankcase pressure (tapped off the engine backplate) to pressurize the tank. A YS one-way check valve was installed between the crankcase and the tank. It ran much better than with the pump, and behaved very similar to a YS engine. A hot plug like the Enya #3 works best in this configuration..

The bottom line is that if you want a user-friendly engine that



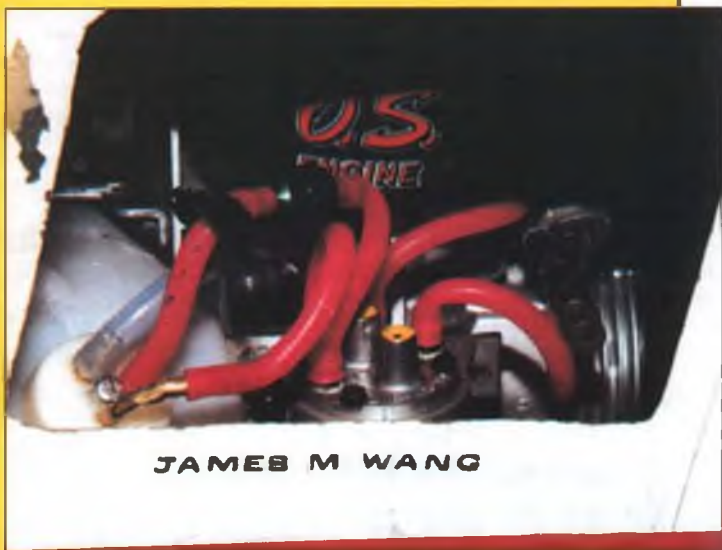
The plumbing in Len Sabato's Kalt Baron Alpha II helicopter, equipped with a ringed YS .61 SF. Note the small feeder tank on the side. With fuel lines running every which way, you can see why a pod-and-boom machine like this is so much easier to service than a full-fuselage model.

provides plenty of power, stick with the stock O.S. .61 SFN-H or the Super Tigre .61 H. For even more power, try the O.S. .61 SX or the five-port Rossi .61 ABC.

## HANDY HELI HINTS

- I spoke above of changing glow plugs to tailor an engine's performance. Here is how to select a plug for your engine. If the engine rpm drops after the battery is removed, then either the idle mixture is too rich or the glow plug is too cold. Another symptom of the plug being too cold is when the engine runs excessively rich during hover, but the top end is fine. In this case, use a hotter plug to help lean out the midrange and open the main needle a few clicks to prevent running too lean at the top end.

Conversely, the symptom of using a plug that is too hot is when



JAMES M WANG

Looking through the window of James' GMP Cobra/Jet Ranger. It's an O.S. .61 RF ring engine and O.S. fuel pump. Those fluorescent pink fuel lines are called "Lightning Lines," are also offered in fluorescent red, yellow and green and are marketed by Horizon Hobby Distributors.

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Ralph Dalesio made a cordless electric starter by taping twelve 1200-mAH NiCd batteries to his 12-volt starter. One charge lasts a whole day of flying. The batteries are strategically placed to give the best balance.

the engine makes crackling sounds in hover and runs excessive lean at the top end. My favorite plugs are O.S. #8 and Enya #3, the Enya being the hotter of the two. Which one you need depends on your fuel, engine and pressure system. I like the Enya #3 for YS engines, any pump engine, any engine using crankcase pressure, or when using 30 percent nitro fuel. The O.S. #8 works well in all O.S. engines from the CZ .15 up to the .61.

- The silicone coupler on a tuned pipe or muffler—or the O-ring on the Hatori 666 muffler—should be replaced periodically, especially if there is a gap between the engine header and the pipe. When the inside of the coupler becomes charred, the burned carbon flakes can migrate into the fuel tank through the pressure line. To prevent this, always use a filter between the muffler pressure tap and the tank.

- If you ever need a replacement plastic landing gear set for a .60-size helicopter, try the Kalt Alpha II landing gear set (Kalt #0603-051-8). The set comes complete with two black aluminum skids, two black plastic struts and all necessary tip caps, for less than \$30. It's sleek looking and extremely tough. The Kalt struts are slanted forward, have an aerodynamically shaped cross-section, and the ground clearance is over 3 inches. Century Helicopter Products sells a similar set for .30-size helis.

- If you are a beginner, try adding an extra set of flybar weights to your model. I guarantee it will make your helicopter more

stable. Intermediate and advanced pilots can benefit from this as well. Yes, it will mellow out the cyclic response, which reduces aerobatic capability, but you can regain control response by maxing out the swashplate tilt. You will end up with a stable yet still very aerobatic machine.

•Recently I had to take the mechanics out of my Blackshark fuselage to change the engine. The bottom of the fiberglass fuselage had developed cracks, so I decided to add a layer of fiberglass and a 3/32-inch plywood floor. The inside of the fuselage was extremely oily. To clean it, David Ramsey suggested taking the fuselage into the shower and washing it thoroughly with dishwashing detergent and a sponge. It really works! David also says a great way to sand a new fiberglass fuselage is to use wet-or-dry sandpaper and sand it in the shower. There will be no dust flying and you will get a smooth fuselage.

•At my local field, Ralph Dalusio showed up with a great idea. He made a standard 12-volt electric starter into a portable unit using twelve 1200-mAH NiCd cells taped to it. Ralph says it's good for a whole day of flying. To give a balanced feel, the batteries must be located by trial and error to an optimal location.

#### NEW HELI PRODUCTS

In the September '93 column I reviewed the 6-volt, 1200-mAH gel cell receiver battery from Model Aviation Technology. I've been using it ever since, and like it very much. The higher voltage makes the servos move faster and the gyro spin faster than a standard 4.8-volt NiCd. The MAT wall charger fully charges the battery in 2 to 3 hours, then automatically switches to trickle charge. Two LEDs indicate whether the charger is in fast charge or trickle charge.

When not in use, the MAT battery has a slower discharge rate than conventional NiCds. Mine was in hibernation for two months this past winter. When it got it out and checked it, the ESV showed it had kept 90 percent of its original charge. The only drawback is the battery weight—10 ounces. MAT also makes a special ESV that checks the condition of their 6-volt battery or any regular 4.8-volt NiCd under a 300-mA load. For more info, contact MAT at 12848 Touchstone Pl., Palm Beach Gardens, FL 33418; (407) 626-6955.

At the Pasadena IMS Show, Nick Nicholas of Vortex R/C Helicopters (714-751-6212) showed me some nifty new items. One is an aftermarket all-metal main rotor head for the X-Cell 30 and 60. Nick has also become a direct importer of Hi-Product fiberglass rotor blades from Japan. Another item is a machined aluminum mounting bracket for the Hatori 666 muffler, made by KSJ in Japan. The bracket also fits Miniature Aircraft's .60-size nitro muffler and Century Products' .60-size black nitro muffler. I highly recommend it. The KSJ bracket is also available from GS Hobbies in New Jersey at (908) 727-7871. **MB**

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## AEROBATICS continued from page 47

theoretically possible for the link to pop off the ball under load. I say "theoretically" because in reality, it just doesn't happen. I've run ball links exclusively on elevator and aileron hookups for the last five years without a single occurrence of this type—in

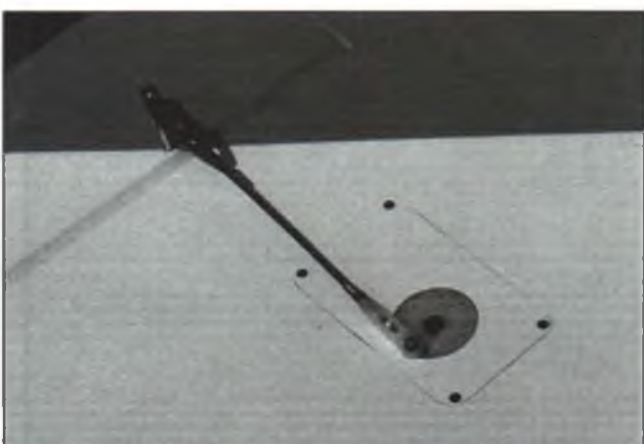
fact, without a single failure of *any* type. I've used them for mechanical retract hookups on plug-in wing aircraft where they must be popped on and off the balls at each assembly and disassembly. Until its eventual demise, I owned one old soldier with that sort of gear hookup that had 2,500 flights in the logbook. That meant a minimum of 5,000 connect/disconnect cycles and another 5,000 gear cycles. The plane may have been old and tired when it died, but the gear was operating perfectly, and the ball link hookup survived the crash!

Good quality ball links can be found in most hobby shops. The best ones are found among the helicopter parts. Kalt and Miniature Aircraft are good brands. In the aircraft section, Rocket City and Du-Bro ball links will do the job. When picking out a link, look for a sturdy and stiff nylon socket that puts a

good amount of meat around the ball. Most of the stuff out there will do a good job, and it's hard to go wrong.

A pull-pull cable hookup is the way to go on rudder (and elevator as well, if possible). It's more efficient and positive to pull a surface into position than to push it. Cable systems also provide a significant weight savings. The average fiberglass arrowshaft pushrod weighs well over an ounce; cables weigh about 1/3 of that. And all of that weight saved is behind the CG. Sullivan makes a decent cable system, and Proctor's giant scale rigging hardware is easily adaptable to control system use. The nylon-coated steel fishing leader available from sporting goods stores is excellent, cheap, and available in a variety of sizes and weights. Control line leadout cable can also be used. Cable exits can be fabricated from short lengths of small diameter styrene tubing, glued in place with CA and microballoons. The excess tubing on the outside of the fuselage can be sanded off flush or faired in smoothly with microballoons and epoxy. Take care to get as straight a cable run as possible.

Clevises will always be with us. Nothing else really works as well or is as convenient



Rick took this photo at the '93 Mats, showing a first-class control hookup. Flush-mounted servo wheel, Tetra ball link, metal pin clevis—no slop here!



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at the control horn end. A clevis is a clevis, you say? Not always, at least for our purposes—and the quality varies wildly from brand to brand. A good general rule for pattern use is to select a unit with a metal pin, and make sure that the pin is a good, snug slip fit in the control horn. I like the units made by Hayes, in both 2-56 and 4-40 sizes. Tetra makes an excellent, very high quality line of clevises and other control hardware including ball links, threaded pushrod links, and solder type plated couplers. These are my personal favorites, but are lately very hard to find in this country and very expensive.

I've used 2-56 hardware and threaded links for years, but have switched to heavier 4-40 units on the new 1.20 size planes. The flight loads and vibration levels are greater, and the larger diameter rods, larger brass couplers and bigger clevis bodies offer a big increase in strength and stiffness for a very small weight penalty. It might be overkill, but it makes me feel better!

While I'm on the subject, check your servo wheels. Don't use white nylon wheels that have discolored to a yellow tinge—these are old and brittle and can break. A round wheel is much stiffer and less prone to flex under load than one with narrow arms. With good ball links, a high-quality clevis with a snug-fitting metal pin and a double ball bearing servo, the last remain-

ing place for slop to hide is in the wheel. The ultimate solution would be one of the machined aluminum wheels from Hangar Nine. These are expensive, but I expect they are going to be wildly popular nonetheless.

That's the rundown. Ditch the Z-bend habit—you'll be glad you did.

## NEW GOODIES

•This first item isn't a goodie at all, but a contest. The '94 NSRCA Pan-American Championships will be held at Tullahoma, Tennessee, August 14-19. This will be the largest pattern contest in the world in 1994, and the best. If you aren't there, you will definitely miss something special. All classes will be held, including Novice. Contact Charles Castaing, 814 Prioux St., New Iberia, LA 70560 for registration details. Pre-registration is required and closes August 1st, so don't delay!

•The good folks at Dremel have some diamond cutters that merit your consideration. I've only seen them thus far in a set (The Diamond Wheel Point Set, #9927) that includes four cutters—a ball end #7103, a square end #7122, a taper end #7134, and a radius end #7144. Chuck one of these babies in your Moto-Tool and you have what amounts to a laser knife for cutting holes in fiberglass parts. They aren't cheap, but once you try one, you will be unable to

live without them.

•I've been testing some new exhaust systems from Advanced Aero Products, including a rear exhaust header for the Saito 1.20/1.50 and an inside header for the Saito .91. There are two systems to complete the .91 setup; one is a one-piece short muffler that mounts in the belly pan short of the wing leading edge, and the other is a tuned muffler similar to the 1.20 unit that uses a header pipe extension. All of these prototype units work very well, are very quiet, and will be in production shortly. Call Kelly Jacobsen at (214) 924-3940 for prices and availability.

•In the mail recently was a review copy of a new publication entitled *Building a Pattern Airplane* by Bruce Thompson and Don Atwood. This spiral bound manual is full of good quality B&W photographic illustrations and is available from T&A Publications, 456 Jackson St., Denver, CO 80206. There is a lot of very good information packed into it. Not all of the techniques illustrated would be my choice, but that's a minor point and hardly worth quibbling about, as all of them will work nicely and, taken together, will produce a good airplane. A bit pricey at \$17.50 a copy, but *not* knowing some of these things could cost a beginner many times that amount. My early copy had a few typos and misspelled words, but I assume these have been cleaned up. **MB**

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 Master free flight scale modeler Hurst Bowers turned out this nicely proportioned and great flying replica of a classic French high-wing cabin monoplane from the 1920s. Designed for the HiLine Mini 6 electric power system, the model spans 28-7/8 inches and is 21 inches long. Two different color schemes are detailed on the plan.

**No. 7942 FARMAN F-190F-192 \$12.50**  
 A 138 percent enlargement of Hurst Bowers' attractive electric powered FF Scale model (Plan No. 7941), intended for 1/2A RC Texaco Scale competition or just a fun two-channel "schoolyard scale" ship. Should fly quite well with a Cox Texaco .049. Span is 40-1/8 inches, full wing area is 318 square inches. Builders will have to determine wood sizes, beef up the structure in places and plan the radio installation.

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 An interesting model of Willy Messerschmitt's 1925 two-seater lightplane, designed by Van Herford for the 1/2A Texaco Scale event. With its clean lines and high aspect ratio tapered wing, the M 17 looks like a powered glider and should be a strong competitor. Spans 59", 280 squares, all-wood construction, rudder/elevator controls, Cox reed-valve .049 engine.

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**No. 2941 WACO YMF-5 \$14.00**  
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## TECH STUFF continued from page 30

and some graduate students. Earlier he conducted a similar airfoil development program with John Donovan and the late David Fraser at Princeton University.

Michael sent me a six-page report on their program. Space prevents me from quoting much of it, but here is a summary: The Princeton work involved over 1,200 hours of wind tunnel testing and resulted in the development of over 60 new airfoils. These foils were presented in Soartech 8, titled *Airfoils at Low Speed*, which is available from the Soartech Journal, c/o Herk Stokely, 1504 N. Horseshoe Circle, Virginia Beach, VA 23451. This 398-page paperback book sells for \$20 by book-rate mail, or \$23 by first-class mail.

Plotting airfoils is only half of our needs. The other and first half is knowing the performance of airfoils so we will know what we want to plot. The Soartech #8 book gives the lift and drag coefficients vs. angle of attack at several low Reynolds Numbers of most of the airfoils in the Cynet airfoil plotting software, and a lot of other information besides.

Selig reports that these new foils have resulted in marked improvements in sailplane performance in particular, but he sees improvements to be made with better airfoils on sport, aerobatic, free flight, and electric models, and on helicopter blades.

But there is a lot more work to be done, such as turbulator tests, and where to place the "trip," and more good airfoils are needed. He also wants to test wings with blended airfoils, such as we discussed in connection with airfoil plotting. There is a continuing need for new tunnel models. Michael's team invites

interested modelers who would like to build wind tunnel models for the test program to contact James J. Guglielmo, Coordinator, Department of Aeronautical and Astronautical Engineering, University of Illinois at Urbana-Champaign, 306 Talbot Laboratory, 104 S. Wright St., Urbana, IL 61801-2935; (217) 244-0684 work; (217) 367-1960 home (answering machine); (217) 244-0720 FAX; e-mail: jggug@uxh.cso.uiuc.edu.

Selig went on to point out that this program for modelers requires funds for equipment, maintenance, upgrades, and particularly to compensate the graduate students for their time in running the tests. He encourages modelers (the recipients of this research) to contribute to it. Send your contributions to Prof. Michael Selig at the above address. Michael's phone number is (217) 244-5757. Make checks payable to "University of Illinois, AAE Dept." Also, please write on the check "Selig—Wind Tunnel Testing/AAE Unrestricted Funds," and provide a letter stating that your contribution is to be used by Prof. Selig and his group of students (both undergraduate and graduate) in support of airfoil wind tunnel tests.

## PARTING WORDS

Today is my birthday, as I write this; my 74th. I can imagine some of my young readers are a bit shocked at this revelation. "Why, he's an old man!" Not so—as long as I can design, build and fly models I will never be old. I know from my mail that a large percentage of our readers are also retired, and have been designing and building models all their lives, as I have. We aren't old, are we guys? We don't get older; we only get better.

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

## BIG BIRDS continued from page 23

plans are for a plane of 101-inch span and 1,910 square inches of wing area. Suggested powerplant is a Sachs 4.2. The plans are drawn with Like's retracts in mind. Construction is all wood, and a partial kit is available. Tried and true construction methods are used throughout.

Full details on these or any of the other Vailly kits is available from Vailly Aviation, 18 Oakdale Ave., Farmingville, NY 11738; (516) 732-4715.

## RESTRAIN THAT BIG BIRD

Gary and Laurie Swaney have had their "R/C Launcher and Pit Crew" on the market for about two years, and have now come out with a Big Bird version. I've written quite a bit about Big Bird restraint in past columns, so when Gary encouraged me to try the Big Bird version of the launcher I decided to give it a go.

The first thing I noticed when pulling the launcher out of the box was that the device is made from the same composite material as the base of my NordicTrack exercise machine, which means it is good, rugged stuff.

The design of the launcher is quite good and it works smoothly. I especially like the fact that Gary has added polyethylene cushions to the restraining arms where the horizontal stabilizer contacts them.

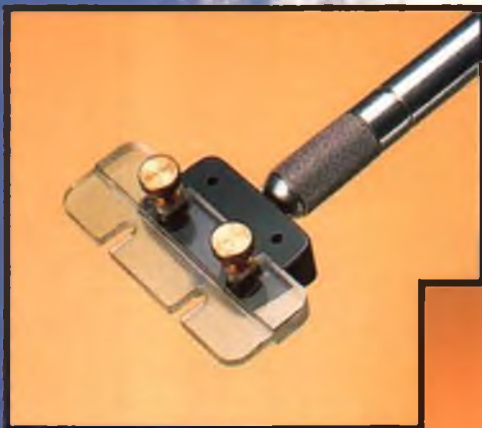
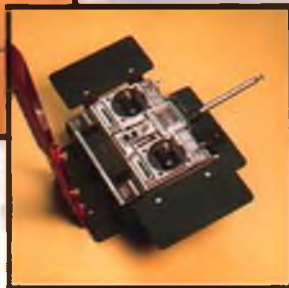
The R/C Launcher and Pit Crew may be just what you need to keep your Big Bird from having you for lunch! It's produced by Launcher Company, 5806 Lancelot Court S.W., Olympia, WA 98512; (206) 786-8460.

Bruce Edwards, 8304 53rd St. Ct. W., Tacoma, WA 98467; (206) 564-4416. **MB**

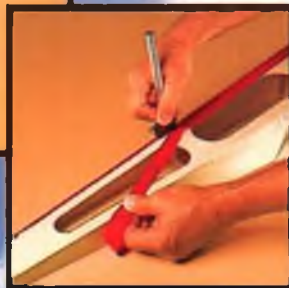
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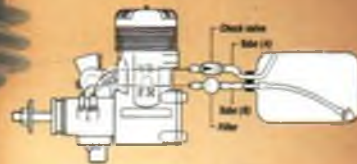
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