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AIRCRAFT**

**1992 SAM CHAMPS REPORT**

DECEMBER 1992

# MODEL BUILDER

WORLD'S MOST COMPLETE MODEL AIRCRAFT PUBLICATION



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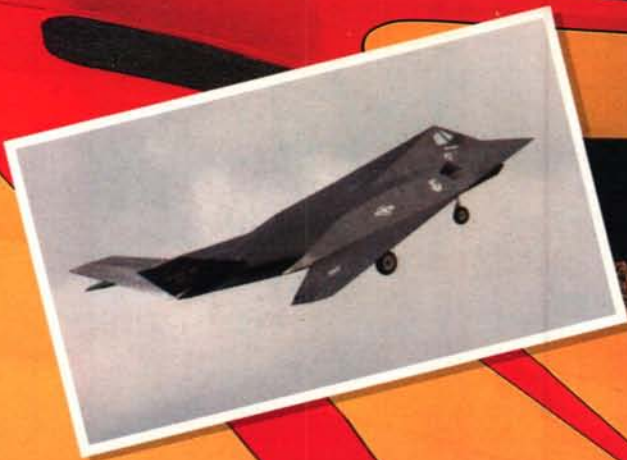
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**BABY BIRDIE  
FROM  
GLOBAL  
QUALITY KITS**

**FALCON 550E  
FROM  
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COMPOSITES**



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- ✓ Throttle Curve Adjustment
- ✓ Trim Memory
- ✓ Rudder Offset
- ✓ Dual Rate
- ✓ Exponential
- ✓ Hovering Pitch
- ✓ Hovering Throttle
- ✓ Revolution Mixing
- ✓ Throttle Hold
- ✓ Compensation Mixing

- ✓ Dual Rate
- ✓ Exponential on Aileron, Elevator and Rudder
- ✓ Trim Memory
- ✓ Four Programmable Snap or Slow Roll Set-Ups
- ✓ Spoileron Mixing
- ✓ Elevon Mixing
- ✓ Aileron Differential Adjustment
- ✓ Flap Mixing (Flap → Elevator, Elevator → Flap Mixing)
- ✓ Flap Trim
- ✓ Compensation Mixing

- ✓ Dual Rate
- ✓ Spoileron (CROW Mixing)
- ✓ Flap → Elevator Mixing
- ✓ Gear → Elevator Mixing
- ✓ Aileron / Rudder Mixing
- ✓ Flaperon Mixing
- ✓ Aileron Differential
- ✓ Trim Memory
- ✓ V-Tail Mixing
- ✓ Elevator Preset Trim

And talk about performance! The 660 features cutting edge computer programming, and is available with an FM narrow band receiver or a new PCM quick response receiver that offers super fast servo response time.

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### ON THE COVER

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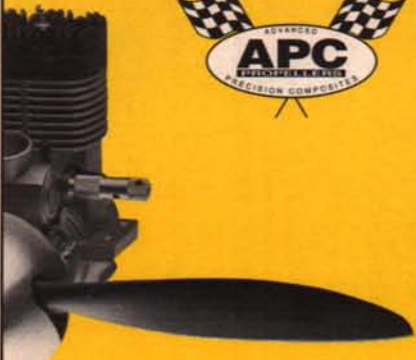
RECEIVER MODEL	PART NBR	AM/FM MODE	# OF CH.	AIRT.	RCD # THAT IS PLUG COMPATIBLE WITH:					Size-Inches H x W x L	Wt. OZ.	SUGG. LIST.
					FUT.G	FUT.J	JR	HITEC	CIRRUS			
PGP	21	AM	7	300	100	150	150	-	100	0.84 x 1.47 x 2.43	1.5	\$69.95
PGP	31	FM	7	400	-	200	600	500	200	0.84 x 1.47 x 2.43	1.5	\$74.95
MICRO	535	FM	5	2400	-	2200	2600	2500	2200	0.82 x 1.17 x 1.98	0.8	\$81.95

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5.7 x 3; 6 x 2; 7 x 3, 4, 5, 6, 7, 8, 9, 10 .....	\$1.59
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--------------------------------------	--------

**COMPETITION:**

6.3 x 4; 6.5 x 3.7; 7.8 x 4, 6, 7; 9 x 6.5, 8.5; 9.5 x 6.5N, 7N, 7.5N, 8N, 8.5N; 10.5 x 4.5 .....	\$3.95
11 x 10, 11, 12, 12W, 13, 14; 12 x 9, 9W, 10, 10W, 11, 11N, 11.5, 12, 12N, 12.5, 13, 13N, 14; 12.5 x 9, 10, 11, 11.5, 12; 12.5, 13; 13 x 9, 10 .....	\$7.95
13.5 x 9, 10, 12.5, 13.3, 14; 14 x 6, 8, 10, 12, 13, 13.5, 14; 14.4 x 10.5, 12, 13, 14.5 x 14N; 15 x 8, 10, 11, 12; 16 x 8, 10, 12 .....	\$12.95

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## WE WANT YOU!

Actually, it's photos of your current modeling projects that we're looking for. Here's your chance to win instant worldwide fame by getting your model's photo published in a new reader-involvement department scheduled to debut in these pages in the next two or three months. We haven't yet settled on what we're going to call it, but in the meantime we want to get the ball rolling by putting out the call for photos. Readers whose photos are used will be sent a colorful *Model Builder* T-shirt, guaranteed to make you the object of envy at any flying field.

So send in those pretty color prints or slides—preferably three or four of any one airplane so we'll have a selection from which to choose (all unused material will be returned, if you include a stamped, self-addressed envelope). All types of models—RC, FF and CL—are welcome. Be sure to include the pertinent info on your model—

whether built from a kit, plans or scratch; basic dimensions, finish, brand of engine and/or radio if so equipped, and any other details you see fit to include. While you're at it, tell us a bit about your modeling background. Be sure to include any club affiliations so we can give them a mention, too.

As you rush out the door with loaded camera in one hand and polished airplane in the other, intent on scoring one of those highly coveted T-shirts, keep in mind the importance of having a clean, uncluttered background. The sharpest, clearest photo is rendered unusable if you've got garbage cans, power lines or other junk in the background. You've been forewarned—now go take that killer photo!

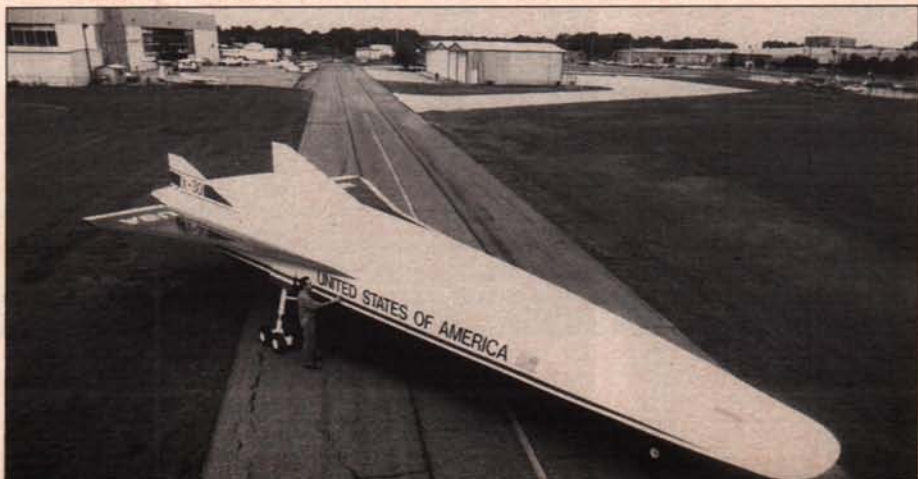
(Oops, almost forgot, be sure to specify your shirt size when sending in your entry; we have sizes L, XL and XXL only.)

Send your entries to *Model Builder*, 34249 Camino Capistrano, Capistrano Beach, CA 92624. **MB**

Thomas Gruenebaum, president of Model Aircraft Technology in Palm Beach Gardens, Florida, won the Best Scale Plane award at the Coral Springs Condors' first annual Sawgrass Big Bird Classic, held on July 18-19, with this immaculate 1/4-scale Turner Special. The plane was originally built from Wendell Hostetler's plans by Everett Ness of South Carolina and completely refinished by Florida's Bob Martin. Powerplant is a German-made 20x11-3/4 carbon fiber three-blade prop. Radio is an Ace Micropro 8000 running on a MAT 6-volt lead-acid battery (see "Over the Counter" August '92).



OK, who's going to be the first to build and fly an RC ducted fan model of the X-30 National Aero-Space Plane? This 1/3-scale, 50-foot mock-up was built over a period of five months by students at Mississippi State University. It made its first public appearance at the United States Air and Trade Show in Dayton, Ohio in June, and was also shown at Oshkosh a month later. It's scheduled to be displayed at major air and space shows throughout 1993 and 1994.





# I

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The Right Flyer 40T ARF is a superbly crafted model built by skilled factory craftsmen and then covered in a brilliantly colored heat shrink film covering. The pre-built, pre-covered, built-up sub structures only require a few evenings of easy assembly to be ready for the installation of your engine and radio equipment. The 40T's light weight, large wing area, flat bottom airfoil, and tricycle landing gear make it an excellent trainer or Sunday fun flyer. More novice pilots have earned their "Wings" with the Right Flyer 40T than any other ARF trainer. Experienced pilots find its gentle handling characteristics great for leisurely, relaxing flight sessions.

The Magnum GP .40 R/C has become one of the most popular sport engines available. Its ease of starting, easy adjust carburetor, reliability, and power has made it the NO.1 choice of new pilots and their instructors around the world.

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# DEAR JAKE

## Advice For The Propworn

### DEAR JAKE:

What makes an airplane fly?

Youngster in Youngstown, OH

Dear Youngster:

An airplane fly is no different than any other kind of fly, it just happens to be on an airplane. Probably got in while they were loading the passengers and had the door open. Once on the plane, it behaves like any other fly... sits on your fruit salad and buzzes in your ear while you're trying to sleep.

The one thing I do find interesting about airplane flies is what they must think when they get off the plane in someplace like Alaska, when they spent that very morning in the produce aisle of a supermarket in Tallahassee.

Jake

### DEAR JAKE:

The auto makers are claiming in their advertising lately that their cars' cockpits (they have their nerve, calling them cockpits!) are designed with "ergonomics" in mind. What is ergonomics?

Dennis in Denville, NJ

Dear Dennis:

The automobile industry has been borrowing terms from aviation for quite a while now. How long has it been since you saw a car ad without the word "aerodynamics" in it? I actually heard a would-be buyer in a new car showroom ask the salesman for some aerodynamics, as if it were an option you could add, like white sidewalls.

So now cars have "cockpits," and they're "ergonomic" too. Ergonomics is another science borrowed from aviation. Its name comes from "erg" (a retching sound) and "onomy" (the study of). So ergonomics is the study of barfing. In the auto industry then, an ergonomic car is one that comes not only with an air bag, but also an air sick bag.

Jake

### DEAR JAKE:

If cows had been able to fly instead of birds, would airplanes look different today?

Deep Thinker in Delaware

Dear Deep Thinker:

No, but John Greenleaf Whittier would

never have penned these classic lines:

*Birdie, birdie, in the sky,  
Why'd you do that in my eye?  
Don't you worry, I won't cry,  
I'm just glad that cows don't fly.*

Jake

### DEAR JAKE:

I've got an airplane with so much kinematic ugliness, it'll never crash in a million years.

Picture this: One yellow wing panel, one orange, an oil-soaked green fuselage, and metallic blue tail feathers. One wing half is swept and tapered, the other is constant chord. One strip aileron and one barn door aileron. A retractable nose wheel and a fixed aluminum main gear. A Fox .49, flame decals on the wings, and Garfield for a pilot. Does that sound like the Frankenstein of airplanes, or what?

As you might guess from the kinematic ugliness theory, this toad flies like a dream and is in its seventh year without so much as a minor mishap. For even better results, I'm going to build another one just like it and throw coal dust on it while the paint is still wet.

Butt-Ugly Builder in Butte, MT

Dear Builder:

For new readers unfamiliar with this theory, let me explain.

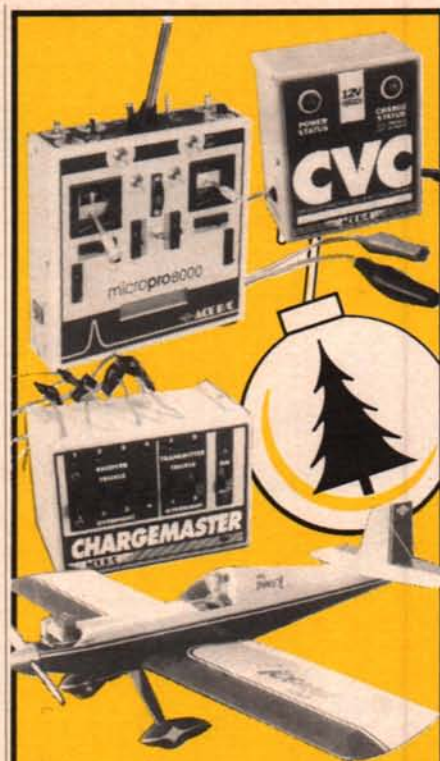
Owners of beautiful aircraft are very fond of them. This strong attachment causes a phenomenon known as "Emotional Torque" to build up on the airplane. The emotional torque results in an attraction between the aircraft and solid objects and causes these beautiful aircraft to screw themselves into the ground at a very early age.

Plain and unattractive aircraft are charged with "Kinematic Ugliness." These aircraft are so repulsive that they repel solid objects, and consequently, never come in contact with the ground, a tree, or a car door. Kinematically ugly airplanes even repel potential buyers, so you can't even sell one to get rid of it.

Putting it simply, beautiful airplanes crash and ugly ones are indestructible.

A word of caution to Builder from Montana, however. An absolutely grotesque airplane can achieve "Reflex Reactivity," which is a force that causes otherwise sane and rational fellow modelers to go berserk and stomp an offending aircraft into a pile of splinters. So don't overdo it. Kinematically ugly airplanes are an enduring eyesore, but reflex reactive ones suffer a well-deserved demise.

Jake MB



## How to get what your REALLY want this Christmas!

- #1 Just choose the Ace gift you want.
- #2 Fill in the message below.
- #3 Clip around the border.
- #4 Tape the message on the object your giver is most likely to see.

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Be creative (sneaky) and we're sure the results will be satisfactory. Good luck!

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Christmas this would be if I  
found this under the Christmas  
tree! Yours truly,

To get this Ace product, just check my hobby dealer. If he does not have one or cannot obtain one, you can order direct from Ace R/C (add \$3 postage & handling).

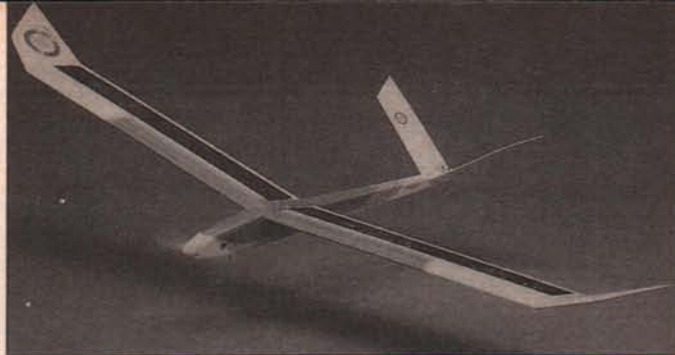


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# over the counter

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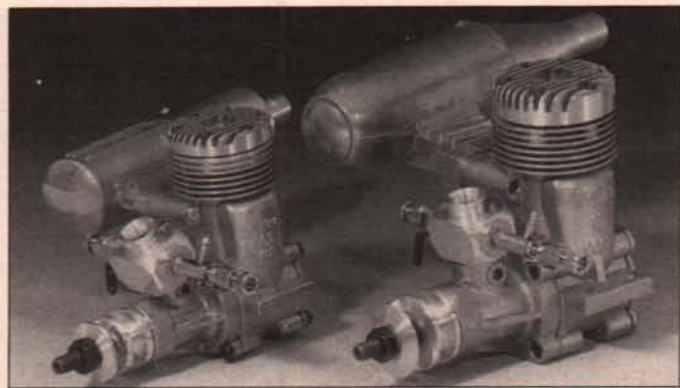
## SOLAR POWER IS HERE!

For those who are taken with the idea of solar-powered electric flight, Hobby Lobby has just the thing to get you started—the Solar Excel electric motor glider, produced in Germany by Simprop. It's pretty much the same as the standard Excel except for the increased wing area (637 versus 484 square inches). There's enough room on the wing for 34 solar cells—Hobby Lobby sells them also—which, combined with the right motor/prop combo, may be capable of pure solar flight without an onboard "buffer" battery. Some experimentation will obviously be needed to get the whole thing sorted out, but that's part of the challenge, right? Of course, the Solar Excel could also be built as a normal seven-cell motor glider with little or no modification, and with the extra wing area, should noticeably outfloat the standard Excel.

Hobby Lobby's new Catalog 20 describes the Solar Excel kit along with a host of other interesting modeling goodies. Order your free copy by writing to Hobby Lobby, 5614 Franklin Pike Circle, Brentwood, TN 37027, or call (615) 373-1444.

## THE WEBRA SILVERLINES

RC fliers on a budget should take a close look at the Webra Silverline



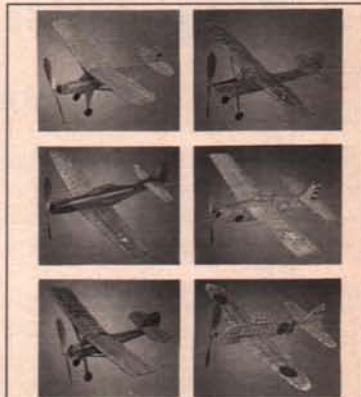
.40 and .61 engines imported from Germany by Hobby Dynamics Distributors. As the photo shows, these engines are rather spartan in appearance, but what they lack in gilt and flash on the outside, they more than make up on the inside—where it really counts—with typical German workmanship and materials. Conventional cross-flow porting, twin ball bearings, two-needle carb and a bronze bushed conrod are just a few of these engines' strong points. The .40 is priced at \$99.95 suggested list, the .61 at \$159.95. Write for more info: Hobby Dynamics Distributors, a division of Horizon Hobby Distributors, 1405 Fieldstone Rd., Champaign, IL 61821.



## SCHNEIDER SEAPLANES

Reminiscent of the beautiful Supermarine Schneider Cup racers

of the late '20s and early '30s is the trio of attractive seaplanes produced by Stream Inc. Called the Schneider Sport 60, 120 and 320 (57-, 70- and 85-inch wingspans respectively), the airplanes will accommodate a large range of engine sizes and can also be flown as landplanes by fitting a conventional taildragger gear. They're products of Stream Inc., P.O. Box 1113, Newport News, VA 23601.

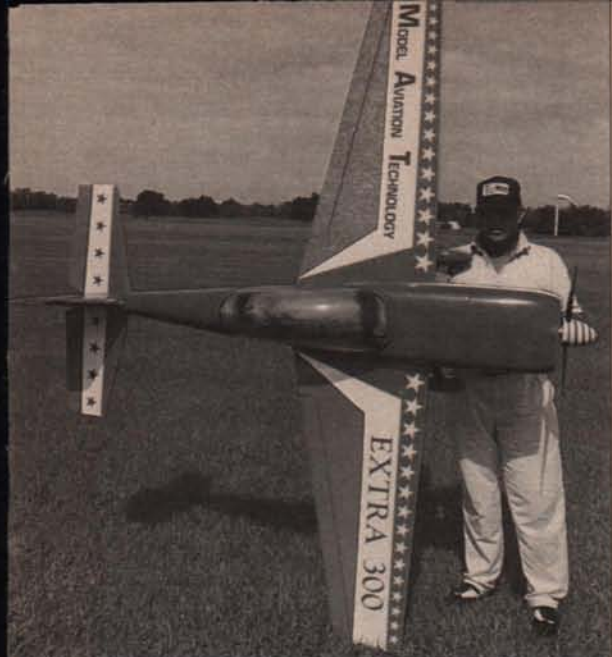


## BEGINNER'S RUBBER KITS

A great way to get the wee folk started in modeling is with one of the six new Success Series profile rubber powered models just announced by Midwest Products.

Three are all-sheet-balsa designs (Piper Cub, P-51 Mustang and Spirit of St. Louis), all priced at \$11.95 each, and the other three (Cessna Bird Dog, Navy Wildcat and Japanese Zero) are stick-and-tissue models, priced at \$12.95 each. All six span 16 inches and feature either all printed or a combination of printed and die-cut parts, all necessary hardware, tissue and rolled plans in the case of the latter three, and an illustrated 12-page construction manual. Available only through hobby dealers, these entry-level kits are produced by Midwest Products, 400 S. Indiana St., P.O. Box 564, Hobart, IN 46342.





## EXTRA-BIG EXTRA

The huge 1/3-scale Extra 300 being imported from Germany by Model Aviation Technology sports such a high degree of prefabrication that buyers can have one in the air in as little as two weeks, according to the folks at MAT. The ship spans 92-3/4 inches, is 82 inches long, and tips the scales at a very light 19 to 22 pounds, ready to fly. What you get for your \$1600 is a gelcoated glass fuselage, factory sheeted wings and tail surfaces, canopy, canopy frame and landing gear with wheel pants... in effect, the complete basic airframe.

That's about all the details we have, however, MAT has a detailed color brochure available for those who are more than just a little bit interested; send \$10 to Model Aviation Technology, 12848 Touchstone Pl., Palm Beach Gardens, FL 33418.

## ANOTHER NEW MAGNUM

Global Hobby Distributors is handling the latest from Magnum

conrod, and stainless steel ball bearings are only a few of the engine's noteworthy features. For dealer information, contact Global Hobby Distributors, 10725 Ellis Ave., Suite E, Fountain Valley, CA 92728-8610.



## ONE HOT SLOPER

Elsewhere in this issue is a review of the Turbo S, a small RC slope glider that delivers some pretty wild aerobatic performance. The manufacturer, C.R. Aircraft Models, has just come out with a much larger ship, the two-meter Contender, an

Engines, the Magnum Pro .61SE, a Schnuerle ported, ball bearing powerplant that carries a suggested retail of \$259.95. A chrome-plated sleeve, one-piece crankcase, hardened chromium-molybdenum steel crankshaft, bronze bushings at both ends of the

all-out speed/aerobatic slope machine for wingeron, elevator and full flying rudder controls. The 420 square inch, high aspect ratio wings are plywood sheeted blue foam cores with carbon fiber reinforcement, feature a true Schuemann planform and are cut with a modified S3016 airfoil. Fuselage is a rugged balsa/plywood affair with a built-in compartment at the CG that will hold up to 20 ounces of ballast for racing or high lift conditions. Wing loading at the standard empty weight of 50 ounces is 17 ounces per square foot, or 24 ounces per square foot with full ballast aboard.

C.R. Aircraft Models is located at 205 Camille Way, Vista, CA 92083. You can also talk directly with designer/proprietor Charlie Richardson by calling (619) 630-8775. The Contender kit is available in some hobby shops, or direct from C.R. for \$110 plus \$3 shipping and handling and 7-3/4% California sales tax if applicable.

## BAG THAT WING!

Expanding its line of vacuum bagging accessories, Aerospace Composite Products has introduced its Auto-Vac System, a fully automatic, self-monitoring vacuum bagging system that eliminates the need to run the vacuum pump continuously. The pump starts up only when the

pressure falls below a pre-set point, and the large reservoir keeps the pump from cycling frequently even if there's a slight leak in the bag

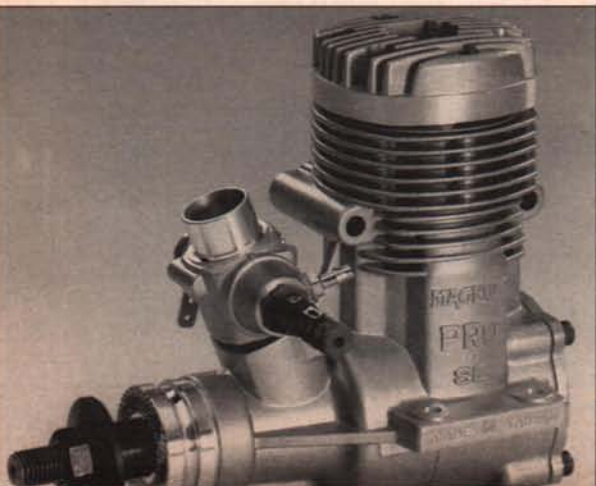
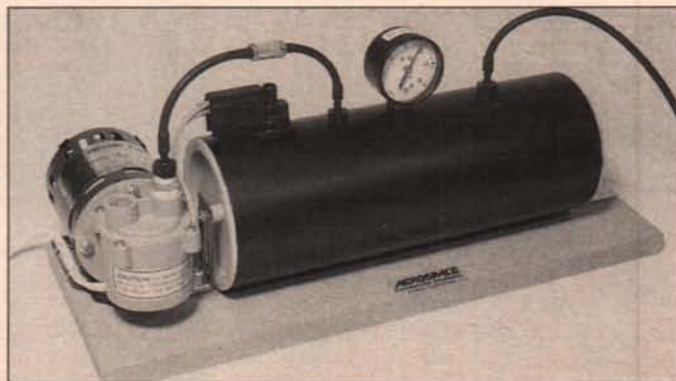
setup. The vacuum switch is fully adjustable from 2 to 24 in. Hg.

The \$189 system comes complete with the setup shown in the photo, plus neoprene tubing, connectors, bag seals, the bag material itself, and detailed instructions. Shipping and handling adds another \$7, and of course there's tax if you live in California. You can get answers to questions regarding the Auto-Vac kit or any of ACP's other products by contacting Aerospace Composite Products, P.O. Box 16621, Irvine, CA 92714; (714) 250-1107.



## TWO-METER SOARER

Hot on the heels of Northeast Sailplane Products' "Alcyone" Unlimited class sailplane comes the new Alcyone 2M, a two-meter, 609 square inch competition ship very similar in appearance and construction to its big brother—a tapered, flap/aileron, foam/balsa wing with upturned tips; foam/balsa stab, and a built-up balsa/spruce/plywood fuselage. Also like the big Alcyone, the new 2M version has the same airfoil transition—an SD7032 at the root, tapering to an SD7037 at the tip—and the same three-servo control setup, wherein one servo is for the elevator, one for flaps and one for the ailerons and





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SEE PAGE 19



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coupled rudder. The 2M was purposely designed with a longer-than-normal tail moment, both for smooth pitch response and to allow the use of a Standard class wing that NSP plans to have available as a separate, optional kit in the near future.

The Alcione 2M was designed by Leroy Satterlee and is kitted specifically for NSP by Mel Culpepper. It's priced at \$99.95 and is available only from Northeast Sailplane Products, 16 Kirby Lane, Williston, VT 05495; (802) 658-9482.

• Lutheran Church Rd., Germantown, OH 45327;  
• (513) 859-1660.

**MUSTANGS FOREVER!**

• G&P Sales has a new P-51 Mustang kit in  
• both B and D models, a 590 square inch, 7-1/2  
• pound replica engineered for .46 to .60 two-  
• strokes. Included in the kit are a fiberglass  
• fuselage, foam wing and tail surfaces, vacuum  
• formed wheel well liners, hardware, 3-1/2 inch  
• spinner, canopy, pre-cut wood parts, full-size



**BIG SCALE STUNTER**

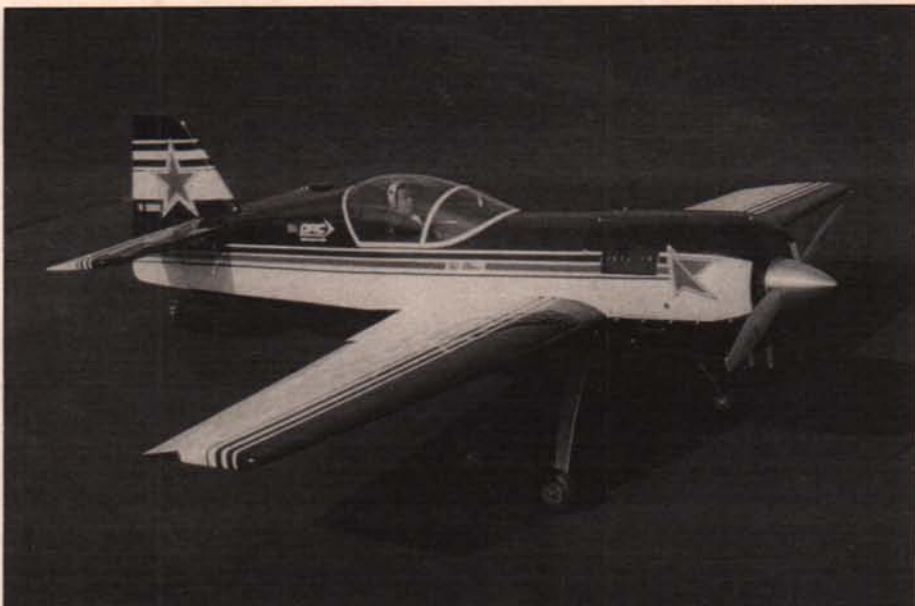
The latest release from Ohio R/C Models is a giant scale, balsa/plywood replica of the Russian Sukhoi SU-26mx, offered both in kit form for \$349 or built-up for \$795. The model spans 84 inches and is designed to accommodate anything up to 3.7 cubic inch engines. In addition to all machine cut and sanded wood parts, the kit is supplied with a fiberglass cowl, clear canopy, formed aluminum gear, and tail wheel assembly, among other things. Interested builders can get full particulars from Ohio R/C Models, 4251

• plans and more, for an introductory price of  
• \$275. A construction and flying video is also  
• available for \$24.95. Contact G&P Sales at 410  
• College Ave., Angwin, CA 94508 for further  
• details, or call company owner Bill Price at  
• (707) 965-3866.

**BIG SCALE WHEELS**

• Builders of Byron Originals warbird kits will  
• be interested in the precision machined  
• aluminum wheels being offered by Walker  
• Machine, intended as direct replacements for

*continued on page 71*



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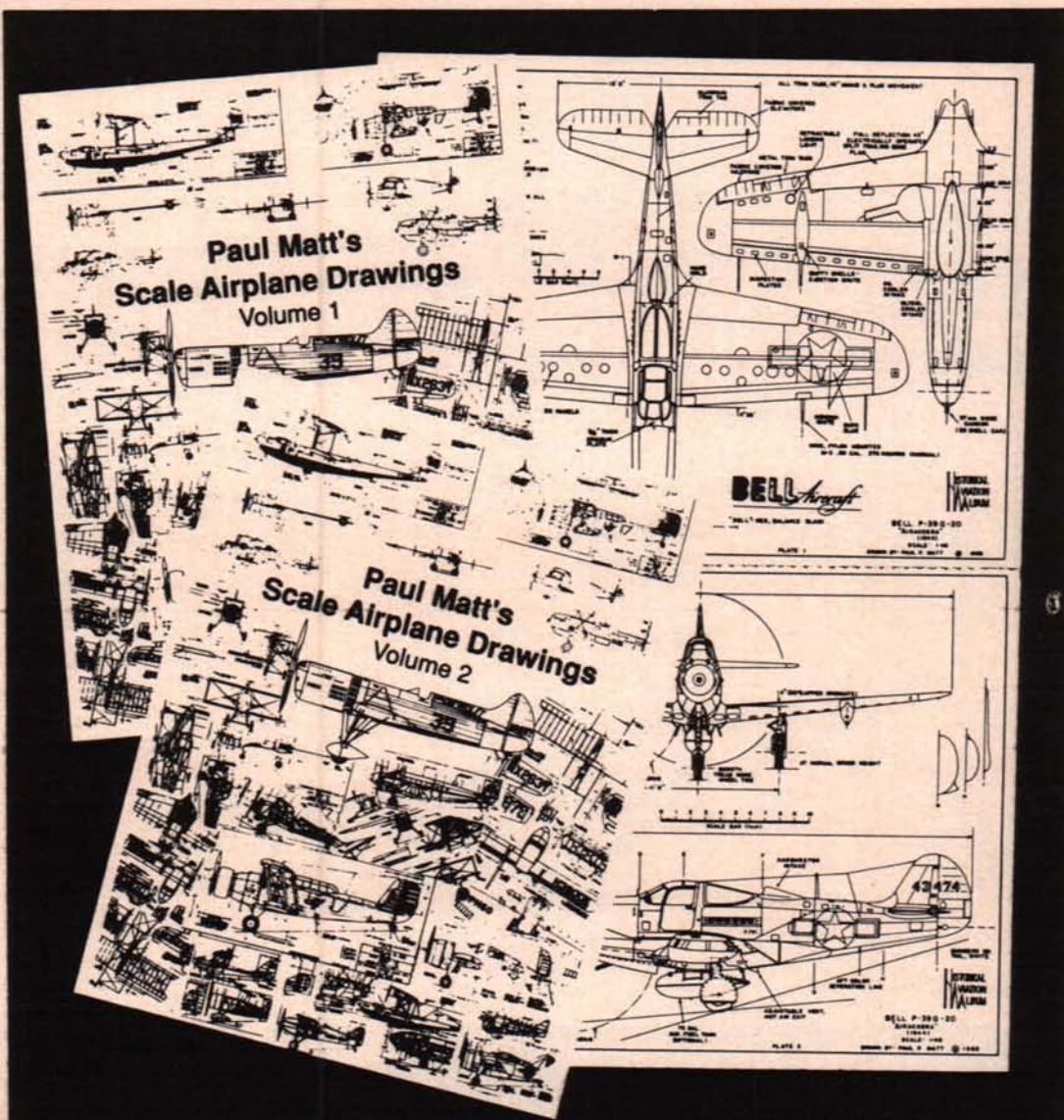
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In the October issue I wrote that my Big Bee had been attacked by a plane-eating tree. I was really bent out of shape for a few days—mostly I was angry at myself for stuffing the Bee into a tree.

My wife, Eileen, told me that I should get more flying in between fly-ins, and I could not fault her thinking. Because of my work schedule and the Big Birds column, my flying time has deteriorated to a big fat zero, except for fly-ins where I spend a lot of time getting material for the column.

Due to my recent experience with repairing the Big Bee, I thought it would be a good time to look at a plan of action for getting your bent Big Bird back in the air quickly, if you also are unlucky enough to encounter a tree or Mother Earth at a high rate of descent.

A good repair job starts at the scene of the crash. What you do there will affect subsequent repairs. It's easy to say, but try to keep a cool head. We have all observed the person who jumps on the wreckage with both feet. A futile gesture at best, and it certainly does not do much to enhance other pilots' opinions of the person doing



Tom Hammond enjoys flying his Curtiss Fledgling at the RCFCBC's Fry's Corner flying facility. It weighs 21 pounds and has an 8-foot wingspan. Power is a Quadra 35.

Bennie Phillips often opens Big Bird fly-ins by pulling the Stars and Stripes aloft. His Super Lazy Ace has a Quadra 52 for power and uses a Harris smoke system. The plane weighs 31 pounds and has a 96-inch wingspan.



Al Marten (left) liked the old Flying Quaker free flight model so well he enlarged it 200%. New wingspan is 14 feet, and it weighs in at 63 pounds. It is powered by a 7.65 cubic inch Stihl engine with an onboard starter. Al is a member of the Abby Hawks Flying Club of Abbotsford, B.C.



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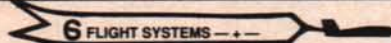
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ELECTRONICS ARE NOW



Rollie Martel did a masterful job of flying his Byron P-51 "Dago Red" at RCFCBC's fly-in. The reworked Quadra 34 uses a Byro-drive to spin that big four-blade prop. Retracts work like a charm.

his imitation of an enraged water buffalo.

In my case, the cause of the crash was obvious: Pilot error! But sometimes unexplained prangs do happen. If that is the case with your crash, take your transmitter to the crash site with the frequency pin attached and look over every part of the radio equipment where it lies. If no further damage will result, check to see if the radio is still functioning. Should the system still be operational, collapse the antenna and do a range check.

If the crash has been catastrophic and little of the airframe is intact, you will not find anything here that will help. Send the radio in for repair and pick out a new plane to buy or build. If there is any chance that the model can be repaired, carefully pick up all the pieces at the crash site.

It is a good idea to remove the fuel tank right away, especially if it has a split or is venting fuel. Turn off the radio and gather any radio equipment that may have fallen out.

You can generally find your way back to most crash sites by the trail of broken pieces inadvertently dropped as the remains are returned to the pit area. It is important to save as much of the wreckage as possible. Use a sack to carry the smaller bits and pieces.

Now that you have all the pieces back at the pit area, clean off any fuel-soaked parts and remove any moisture and mud. (My friends at the Puget Sound ROCS flying field often have to remove used hay that has been run through a bovine processor.)

The next step is to lay out the damaged airframe on your workbench and fit the pieces back together. In the case of my Big Bee there was a 24-inch section of wing shattered with about 14 inches of useable wingtip left. The left aileron was broken but

was easily epoxied back together.

The rib pieces were easily reassembled into fully useable parts using CA glue. I then was faced with having to rebuild over two feet of wing spar both upper and lower, plus about 10 inches of trailing edge. Fortunately I still had the kit plans, which took a lot of the guesswork out of the rebuild.

The first step was to secure the good portion of the wing to the board so that it could not move during repair. The broken areas of the spars and leading and trailing edge sheeting were then cut away very carefully at shallow angles. I was unsure of the correct ratio to use in the length of a spar splice, so I gave Jim Gray, a member of our club and a licensed FAA Inspector, a call. Jim said that a good FAA-approved splice on a wood spar should be at least three times the greatest width of the spar. If the spar were 1/2x5/8-inch, as on the Big Bee, the splice should be at least 1-7/8 inches long. My wing spar splices were over two inches long, well within the target range.

The length of the wing spar splices is extremely important in the successful repair of any plane because they bear the flight loads. The longer the splice, the better. Also, make the splices a very close fit; the less gaps and voids, the better the glue joint is going to be.

After the top main spar was set and straight, the wing ribs were carefully reinstalled, true and square. The lower spar was then spliced into place.

It is very important to try to match wood density when making splice repairs. It would not be advisable to splice in a very light, pithy piece of balsa to a medium-hard section of wing spar.

Having repaired the wing spars, it was time to repair the bottom leading edge



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<p>For those 19 or over by July 1 - check one only!</p> <input type="checkbox"/> <b>Open Membership - \$40.00</b> All membership and competition privileges, liability and accident/medical insurance, and subscription to <i>Model Aviation</i> magazine. <input type="checkbox"/> <b>Extra Family Membership - \$22.00</b> For 2nd adult at same address - no publication <p>_____ <i>Current Open member's name and AMA number</i></p> <p>Options: <input type="checkbox"/> Add \$20.00 for postage/envelope service at non-US address <input type="checkbox"/> Add \$6.00 for mailing in envelope <input type="checkbox"/> Check here for information on non-US membership</p>		<p>For those not 19 by July 1</p> <input type="checkbox"/> <b>Youth Membership - \$14.00</b> Same privileges as Open Membership Date of birth _____ Note: For competition purposes, Youth will be categorized as Junior (under 15) or Senior (15-19). <p>For those 65 by July 1</p> <input type="checkbox"/> <b>Special Senior Citizen Rate - \$30.00</b> For those 65 or over - must submit proof of age at time of original application. Same privileges as Open member.
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### EVERYONE MUST READ AND SIGN

Please read and sign this declaration. Applicants without signatures will be returned.

I hereby agree to comply with the current AMA Safety Code for all model aircraft operations and the NAR Safety Code for all model rocket operations. I also understand and agree that I will abide by and comply with all changes and modifications that may be made to the safety codes during my membership period. I understand that my failure to comply with the applicable Code will result in failure of liability coverage for any damages or claim so caused. I further understand that written notice must be provided within sixty (60) days of the occurrence of any incident of bodily injury and/or property damage.

I am aware that modeling may present hazards, and I exempt and relieve The Academy of Model Aeronautics, Inc. from all liability for personal injury, property damage or wrongful death caused by negligence.

Signature of applicant \_\_\_\_\_

Parent or guardian of applicant under age 18 must also sign this form \_\_\_\_\_

### Membership Information

Insurance coverage is effective on the date of receipt at AMA Headquarters of a properly completed application and correct dues payment. Membership ends each year on December 31, regardless of the date a membership application is received. If a subscription is included with the membership, it begins with the first issue available for the year after a correct current application and payment are received; it expires with the issue printed in December (which is dated February of the following year). Membership rates and insurance limits are those in effect at the time of printing. Actual cost of dues and amount of insurance coverage is subject to change. Any such changes will be noted at the time of membership processing so that they may be accepted or not.

### OFFICIAL AMA SAFETY CODE - January 1, 1992

Model flying MUST be in accordance with this Code in order for AMA Liability Protection to apply.

#### GENERAL

- 1) I will not fly my model aircraft in competition or in the presence of spectators until it has been proven to be airworthy by having been previously, successfully flight tested.
- 2) I will not fly my model higher than approximately 400 feet within 3 miles of an airport without notifying the airport operator. I will give right-of-way and avoid flying in the proximity of full-scale aircraft. Where necessary, an observer shall be utilized to supervise flying to avoid having models fly in the proximity of full-scale aircraft.
- 3) Where established, I will abide by the safety rules for the flying site I use, and I will not willfully and deliberately fly my models in a careless, reckless and/or dangerous manner.
- 4) If my model weighs over 20 pounds, I will only fly it in accordance with paragraph 5 of this section of the AMA Safety Code.
- 5) At air shows or model flying demonstrations, a single straight line must be established, one side of which is for flying, with the other side for spectators. Only those persons essential to the flight operations are to be permitted on the flying side of the line; all others must be on the spectator side. Flying over the spectator side of the line is prohibited, unless beyond the control of the pilot(s). The only exceptions which may be permitted to the single straight line requirement, under special circumstances involving consideration of site conditions and model size, weight, speed and power, must be jointly approved by the AMA President and the Executive Director. In any case, the maximum permissible takeoff weight of models is 55 pounds.
- 6) I will not fly my model unless it is identified with my name and address or AMA number, on or in the model. Note: this does not apply to models flown indoors.
- 7) I will not operate models with metal-bladed propellers or with gaseous boosts, in which gases other than air enter their internal combustion engine(s); nor will I operate models with extremely hazardous fuels such as those containing tetranitromethane or hydrazine.
- 8) I will not operate models with pyrotechnics (any device that explodes, burns, or propels a projectile of any kind) including, but not limited to, rockets, explosive bombs dropped from models, smoke bombs, all explosive gases (such as hydrogen-filled balloons), ground mounted devices launching a projectile. The only exceptions permitted are rockets flown in accordance with the Safety Code of the National Association of Rocketry or those permanently attached (as per JATO use); also those items authorized for Air Show Team use as defined by AST Advisory Committee (document available from AMA HQ). In any case, models using rocket motors as a primary means of propulsion are limited to a maximum weight of 3.3 pounds and a G series motor. Note: A model aircraft is defined as an aircraft with or without engine, not able to carry a human being.
- 9) I will not fly any model using turbojet power (axial or centrifugal flow) unless I have obtained a special waiver for such specific flights from the AMA President and Executive Director and I will abide by any restrictions imposed on such flights by them. (Note: this does not apply to ducted fan models using piston engines or electric motors.)

#### RADIO CONTROL

- 1) I will have completed a successful radio equipment ground range check before the first flight of a new or repaired model.
- 2) I will not fly my model aircraft in the presence of spectators until I become a qualified flier, unless assisted by an experienced helper.
- 3) I will perform my initial turn after takeoff away from the pit or spectator areas, and I will not thereafter fly over pit or spectator areas, unless beyond my control.
- 4) I will operate my model using only radio control frequencies currently allowed by the Federal Communications Commission. (Only properly licensed Amateurs are authorized to operate equipment on Amateur Band frequencies.) Further, any transmitters that I use at a sanctioned event must have a certified R/CMA-AMA gold sticker affixed indicating that it was manufactured or modified for operation at 20 kHz frequency separation (except 27 MHz and 53 MHz).

#### FREE FLIGHT

- 1) I will not launch my model aircraft unless at least 100 feet downwind of spectators and automobile parking.
- 2) I will not fly my model unless the launch area is clear of all persons except my mechanic and officials.
- 3) I will employ the use of an adequate device in flight to extinguish any fuses on the model after it has completed its function.

#### CONTROL LINE

- 1) I will subject my complete control system (including safety thong, where applicable) to an inspection and pull test prior to flying.
- 2) I will assure that my flying area is safely clear of all utility wires or poles.
- 3) I will assure that my flying area is safely clear of all non-essential participants and spectators before permitting my engine to be started.



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sheeting. I cut 1/2-inch wide strips of 1/64 plywood and glued them to the inside of the remaining leading edge sheeting, forming a "shelf" for the new piece of sheet balsa to rest on. I then carefully cut the new sheet to fit the good inboard and outboard sections of the wing that had already been joined by the new main spars and glued it in place. With this accomplished, the structure had regained most of its strength and the wing could be turned over, blocked up straight and true, and the top leading edge sheeting added.

During this entire operation I had been careful to add as little weight as possible, so it would be easy to rebalance the wing. As luck would have it, the wing was rebuilt light enough that ballast originally needed in the right wing half could be removed.

After your wing is repaired but before you cover it, twist it from the tip to see that all splits and other damage from the crash have been repaired. Go over the entire aircraft very carefully and examine everything, even if the parts look undamaged. If your fuselage is plywood, it is very easy to splice in new pieces and restore it to flying condition by using the same method described here to splice the spars. If your fuselage is crutch and stringers, it may be more difficult to repair because you will have to splice a lot of pieces, and it will be more difficult to set up the formers in a true position.

If you have worked carefully you will

find that your plane's flight characteristics and trims will be unchanged. I am happy to report that my Big Bee flew right off the

or five days.

Remember, make your repairs with the same philosophy with which you built your plane originally. Build it straight and build it light!



Andy McIndoe did a nice job of flying this Molly Models Laser 200. Power is an S.T. 2000. It weighs 14.5 pounds, wingspan is 74 inches.

repair board, no trim changes required. The major repairs were done in five days and the covering and details took another four

removal of the current frequency restrictions will encourage better attendance at next year's festivities. **MB**

### LSGAS SUMMER FLY-IN

In July, one of my favorite Big Bird clubs held its annual summer fly-in. The Lesser Seattle Giant Aircraft Squadron (LSGAS), better known as the "Kent Valley Blue Bellies," attend a lot of other folks' fly-ins, so we look forward to seeing other clubs attend our fly-in.

The LSGAS club's fly-ins are held at the Boeing Hawks field near Kent, Washington. The runway is 400x60 feet with a 500-foot parallel grass strip. Free lunch is the order of the day, both days. This year RCD provided two radios, as well as some free support equipment for our raffle. The LSGAS club usually puts on a barbecue or fish fry on Saturday evening.

You would think with all these things going for us, we would have a big attendance, but such has not been the case. We usually have 25 to 35 pilots present, which is not a great turnout.

The Boeing Hawks will be going to all narrow band equipment in 1993 and all channels will be in use except three close to pagers, so LSGAS is hoping that the

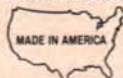
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**SPECIFICATIONS:**

Wing Span: 112" or 100"  
Wing Area: 880 or 800 sq"  
Weight: 60 oz.  
Wing Load: 10 oz./sq.ft.

**FALL SALE KIT PRICE:**

Standard Kit: \$195.00  
Pre-Sheeted Kit: \$295.00  
*Shipping & Handling not included.*



Airfoil Options: S3021-3014 S7037

## THERMAL EAGLE

**SPECIFICATIONS:**

Wing Span: 118"  
Wing Area: 907.5 sq"  
Stab Area: 96.0"  
Weight: 60 oz.  
Wing Load: 9 oz./sq.ft.

**FALL SALE KIT PRICE:**

Standard Kit: \$295.00  
Pre-Sheeted Kit: \$395.00  
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- Thermal version of current 1991 & 1992 World Champion F-3B Eagle
- Airfoil Options: RG15 or SD 8000

### KIT FEATURES:

Quality one-piece fuselage reinforced with Kevlar. Pre-fit canopy, with full size beds cut from 1.5lb. virgin foam. Obечи wood sheeting, carbon capped spar, new hard case-hardened tool steel wing joining rod. *Added Factory Extras:* Machine routed aileron/flap hinge line. (Just add 1/8" cap material and you are done.) Pre-routed servo holes (ail/flaps). Step-by-step instruction manual with computer drawn plans.

## FALCON 550E THERMAL DURATION ELECTRIC SAILPLANE

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**ADDED FACTORY EXTRAS:** Machine routed aileron hinge line, flaps optional (just add 1/8" cap material and you're done). Pre-routed servo holes. **NEW:** Step by step instruction manual.

- Highest performance 7 cell duration available.
- Easy to build—You don't need a degree in composite engineering to build this one.
- Designed by Mark Allen, 3 years research and development in new design.
- Battery change without removing wings.
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**SPECIFICATIONS:**

Wing Span: 80"  
Airfoil: E 387  
Weight: 7 cell / 38oz.  
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Standard Kit: \$150.00  
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# IRVINE Q40 ABC

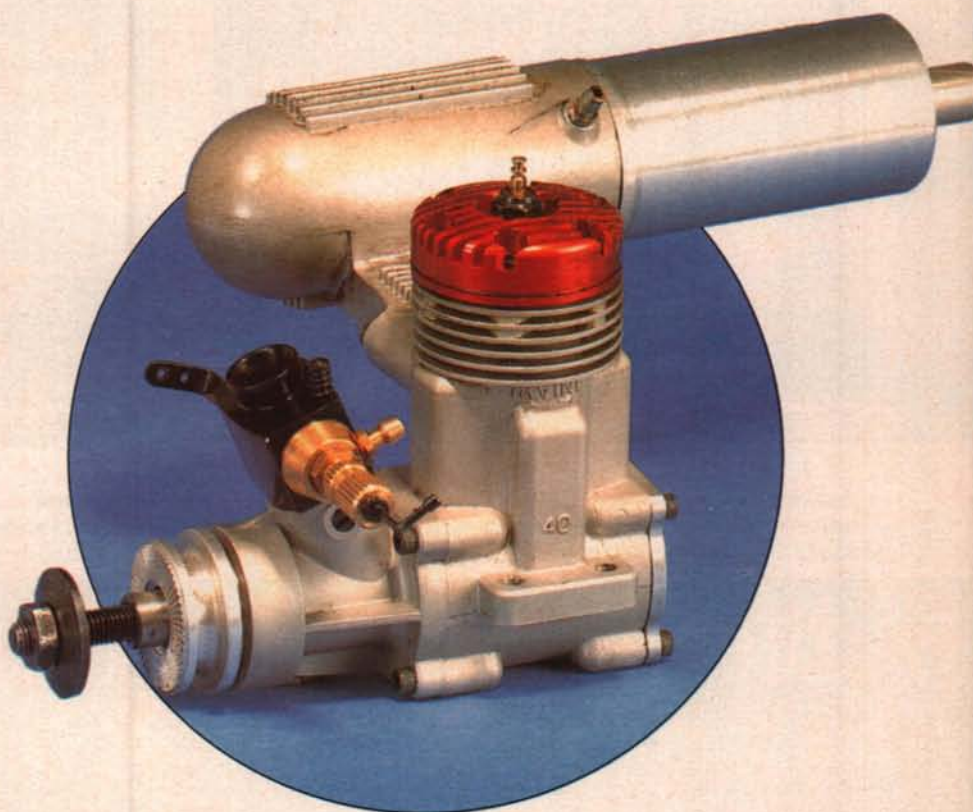
**INSIDE ENGINES BY MIKE BILLINTON**

The Irvine Q40 has had much exposure in the modeling press since its inception last year. Given the ever-present noise problem, most of the comment has naturally focused on the Q40's distinctive claim to fame—its unique and patented "Quiet" muffler. Still possible to fit into the average model engine box (itself surely a restraint on muffler development), it manages to make a significant contribution to the quest for silence.

The drawing shows the muffler's essential patented features. Note the considerable restriction to exhaust gas by its being dispersed around the periphery of the muffler can, as opposed to the usual major restriction afforded by the muffler outlet alone. Earlier fears that the very narrow passageway created by this design could allow a build-up of oil residue appear to be unfounded, because the disassembled muffler from our test engine showed no clogging even after a considerable running time.

The unusually lengthy period of this test resulted in the writer's quest for silence, because initial standard dB tests did not reach down as low as the factory claim. A new meter and subsequent numerous re-checking and pinpointing of anomalies in the writer's testing setup did reveal several small points and indicated the difficulties involved in ensuring precise and fair readings.

Best to say at the outset that the Q40 is quieter than others so far tested by this



writer, and more importantly, is the only engine so far to easily meet and better the UK DoE Code figure of 82 dB at 7 meters—

against that achievement, any inability to equal the factory figure of 76 dB is unimportant. It is also worth bearing in mind that the



Parts breakdown reveals the stout construction typical of all Irvine engines. Crankshaft is the same as used in the Irvine 46, while the ABC piston/cylinder is from the Irvine 40 Diesel. This photo was taken after extensive running tests were completed, which explains the discoloration on some of the parts.



## SPECIFICATIONS

### IRVINE Q40 6.5CC TWO-STROKE

Capacity .....	.3977 cu. in.
Bore .....	.811 in.
Stroke .....	.770 in.
Stroke/Bore ratio .....	.949:1

### TIMING PERIODS:

Exhaust .....	140°
Transfer .....	115°
Boost .....	104°

### FRONT INDUCTION:

Opens @ .....	45° ABDC
Closes @ .....	58° ATDC
Total period .....	193°
Blowdown .....	25°
Compression ratio .....	11.03:1
Exhaust port height .....	.206 in.
Cylinder head squish .....	.029 in.
Cylinder head squish angle .....	8°
Squish band width .....	.157 in.
Carburetor bore .....	.291 in.

Crankshaft diameter .....	.5905 in.
Crankshaft nose thread .....	1/4-28
Engine height .....	3.3 in.
Width .....	1.96 in.
Length .....	3.45 in.
Width between bearers .....	1.35 in.
Weight bare .....	13.1 oz.
Weight with muffler .....	16.7 oz.

### PERFORMANCE ON 5% NITRO/20% CASTOR

Maximum BHP—.89 @ 16,563 rpm (Quiet muffler); 1.11 @ 21,503 rpm (open exhaust)  
 Maximum Torque: 69 oz./in. @ 10,900 rpm (open exhaust); 63 oz./in. @ 10,693 rpm (Quiet muffler)

### RPM ON STANDARD PROPS

	Open Exhaust	Quiet Muffler
14x7 Graupner	5,992	5,754
13x6 MK glass	8,120	7,840
12x6 Graupner	9,408	9,009
10x9 APC	10,792	10,600
11x6 Graupner	10,990	10,628
10x6 MK glass	12,100	11,851
10x6 APC	13,390	12,900
10x4 Zinger	14,130	13,669
9x4 Zinger	17,391	16,658

### PERFORMANCE EQUIVALENTS

BHP/cu. in. ....	2.79
BHP/lb. ....	1.35

Manufactured by Irvine Engines Ltd., Unit 2, Brunswick Industrial Park, Brunswick Way, New Southgate, London N11 1JL, United Kingdom. Distributed by Great Planes Model Distributors Company, P.O. Box 9021, Champaign, IL 61826-9021.

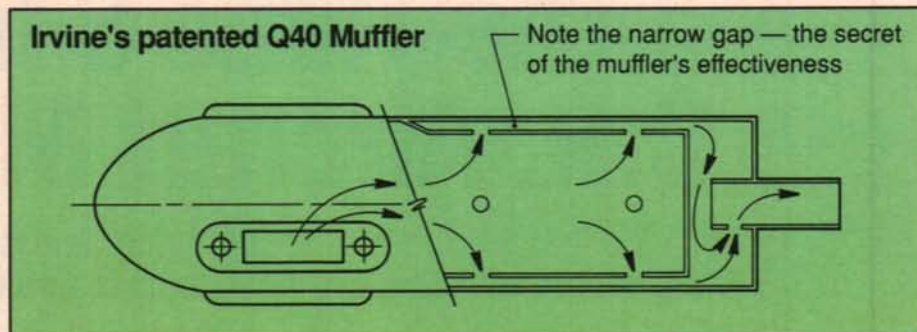
DoE code reference figure is deemed to be the maximum value of the four readings around the model, while it appears likely that the factory figure was the lowest achieved.

Unlike most of the writer's dB tests, which take place with the engine remaining in the

up to the factory rpm of 11,000 caused slightly higher readings ranging from 78 to 81 dB.

## MECHANICAL POINTS

The Q40 shares the same long-stroke crankshaft of the Irvine 46 and the modestly



dyno configuration, this Q40 was placed in a less-reflective environment in order to resolve reading anomalies which were becoming an issue.

The test setup was moved to the middle

timed liner of the Diesel 40 to produce a performance more suited to the larger propeller/lesser rpm/lower noise scenario. Best operational rpm appears to be in the 9,000 to 11,000 rpm range, using props from a 12x8 Graupner to 10x8 APC, for example.

The new ABC form of the Q40 (and the Diesel 40) gives a particularly good compression seal under all running temperatures, and is hard-wearing. The connecting-rod and crankshaft are equally well made, and the overall construction is excellent.

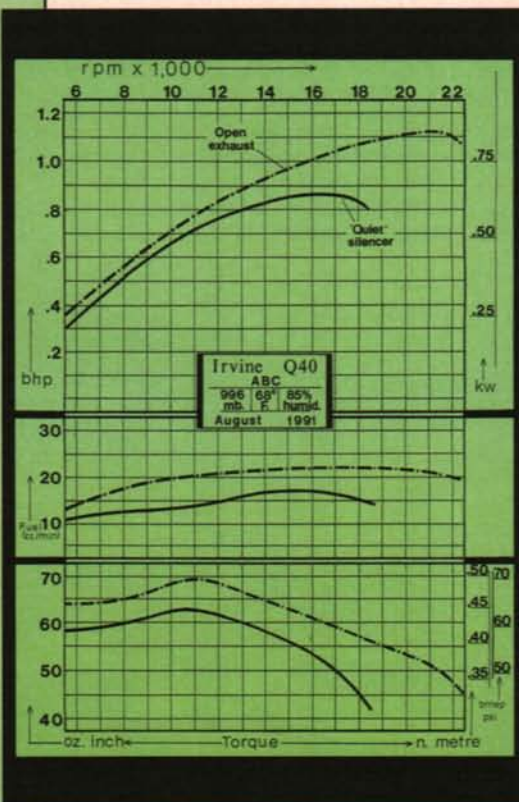
The all-metal Jetstream twin-jet carburetor is a definite improvement over earlier versions. Using fuel tank pressure, a 10x9 APC, Quiet muffler and 5% nitro fuel, an easy idle speed of 2,100 rpm was achieved.

## PERFORMANCE

While the engine will normally be operated in the maximum torque area near 11,000 rpm, maximum brake horsepower itself occurs way up the scale—.89 hp at 16,600 rpm with the Quiet muffler fitted, or 1.11 hp at 21,500 rpm with open exhaust. So, the factory figure of 1.0 hp at 14,000 rpm is another anomaly of little importance in the overall context of Irvine's aim of achieving the "Quiet" solution.

## SUMMARY

If the Q40 does no more than generate pressure for other manufacturers to engineer satisfactory standard mufflers (as full-size cars are expected to do), then that will have been enough in itself. As it is, the result is a very useable, quiet and practical version of what has always been a quite noisy and powerful device—the high-revving model two-stroke engine. Parallel techniques being continually explored in the 10cc FAI aerobatic arena involving tuned pipes and ever-lowering rpms—now around 9,000—are also revealing the surprising potential of the low-rpm, high-torque two-stroke, and the Q40 is playing its part in keeping noise at bay among the much more numerous and sensitive areas of normal sport flying operations. **MB**



of a large field of medium grass, with the engine mounted atop a steel pole to prevent an increase or masking of engine sound—either of which are common if the engine is mounted in a model. This was the twelfth such test session having varying parameters, and yielded the lowest achievable readings using this engine and sound equipment. Prop was a 10x9 APC turning 10,500 rpm, and the resulting axis readings were: 80.5 dB from the front; 80 dB from the exhaust side; 78 dB from the other side and 77 dB from the rear. Forcing the engine



BY JOHN LUPPERGER

# The Turbo S from C.R. Aircraft Models

The name suggests performance, and that's exactly what you get with this two-channel, wingeron-equipped sloper.

It may have a "moo" finish, but I guarantee you that my Turbo S is no cow! Because of its clean aerodynamics, wingeron control and a slippery Selig 3016 airfoil, the Turbo S is capable of flying in light to moderately heavy winds (without ballast), can perform wild gyrating aerobatics, yet can be docile enough to be used as an aileron trainer.

Designed by Charlie Richardson, the Turbo is offered in two versions: the Turbo S for all-out slope soaring, and the Turbo ST (slightly longer wing and I believe a higher lift airfoil) for lighter slope conditions and picking up the odd thermal that passes by

your local hill. Construction is straightforward and should present no problems, even for those who have never built a foam wing model.

The kit was well packaged and made the UPS delivery trip with no damage. Everything you need for construction is included except the elevator pushrod (we all have our favorite types of pushrods anyway). The hardware package is very complete, and the wingeron linkages are pre-assembled and very well made. You get two wing rods; one lightweight one made of carbon fiber, and a heavier one of steel for ballast purposes in higher wind conditions. All shaped

parts are machine cut and sanded.

The sheet and stick wood in my kit was all top quality and the foam wing cores were packaged in their cutting beds. There are seven pages of instructions (including a parts list) and a set of full-size, easy-to-follow plans. The instructions are well written and easy to follow, and a complete list of necessary adhesives and tools is provided to make things easier. Overall, I would rate the kit contents as "very good."

### CONSTRUCTION

There is nothing really unusual or tricky about the construction of the Turbo S, so I'll



The author's Turbo S, all dressed up and waiting to go sloping! It wouldn't be such a good idea to land the ship in a cow pasture, as it might be hard to find with this finish!





The "Moo" finish certainly makes the Turbo S visible during maneuvers, and the all-black bottom surfaces make it easy to maintain orientation during the wild aerobatics that the Turbo S is capable of performing.

### TECHNICAL DATA

Span .....	52 inches.
Length .....	30.25 inches.
Wing area .....	275 square inches.
Weight RTF .....	13 to 15 ounces.
Wing loading .....	6.8-7.8 ounces per square foot.
Airfoil .....	Selig 3016.
Radio required—two or three channels (wingerons/elevator/optional rudder).	
Produced by C.R. Aircraft Models, 205 Camille Way, Vista, CA 92083. Available at hobby retailers.	
Suggested Retail price .....	\$59.95.

### REVIEW MODEL DATA

Weight RTF .....	15.5 ounces.
Wing loading .....	8.1 ounces per square foot.
Radio—Cirrus Excell-7 PCM, Cirrus CR-227A seven-channel PCM receiver, two Futaba S3002 servos, and a 250 mAH battery pack.	

keep this part of the review short (heck, most of you only read the introduction and the flying parts anyway!). When I do a review I try not to deviate from the manufacturer's instructions or materials list, but like most of us, there are times when I feel that a different way of doing things might be a little bit better, or perhaps easier. I did stray a couple of times from the instructions and will note where and why I made any changes.

Construction starts with the wings. The foam core wings are designed with leading, trailing and center sheeted areas with capstrips between the leading and trailing edge sheets. I opted to sheet the wing completely. This not only makes the wing construction faster and easier, but makes the finished wing more efficient (as per data acquired in the Selig-Donovan wind tunnel studies).

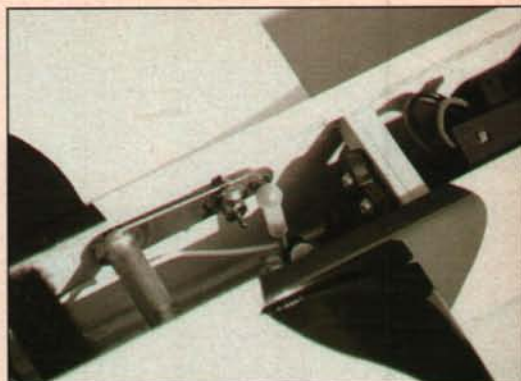
I used 3M spray adhesive as recommended to attach the bottom sheet on each panel and then weighted the cores in their beds for 12 hours. When completely cured, the cores are slotted for the spar and the wing joiner tube. These are epoxied in place with a shim under the joiner tube to produce the proper dihedral (1/2-inch under each tip). The top sheeting is then applied with spray adhesive and the cores put back in the beds, weighted down and left to cure for 12 hours. (Remember, if you build the kit as designed, you will glue on the leading and trailing edge sheeting and then cut the capstrips.)

The leading edges and trailing edges are next glued to the panels, and the leading edge is shaped to the profile provided on the plans. The root ribs and wing tips are glued in place and the entire wing final sanded.

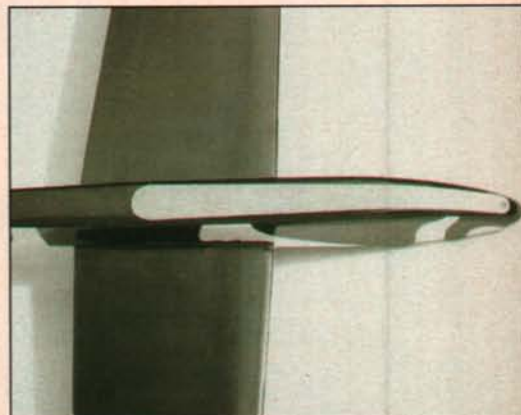
The trailing edge material in my kit was a little more than 1/32-inch thicker than the wing panel. When I sanded the trailing edge to match, the swept-back wing tips became paper-thin at the trailing edge. It was obvious that they were going to be extremely difficult, if not impossible, to cover. I therefore decided to sand them off flush with the wing trailing edge, which in turn prompted me to sand the swept-back tips off of the vertical and horizontal tail surfaces for uniformity. My apologies to the designer for removing his "signature" from the looks of the model.

The Turbo's fuselage is a very simple box structure with a couple of longerons, a nose block and one lonely bulkhead. Because it is open from the trailing edge of the wing to the nose block, the fuselage gets doubled on the *outside* in this area with 1/64-inch plywood. This seemed a bit strange to me at first, but I have to admit it makes the fuselage quite stiff.

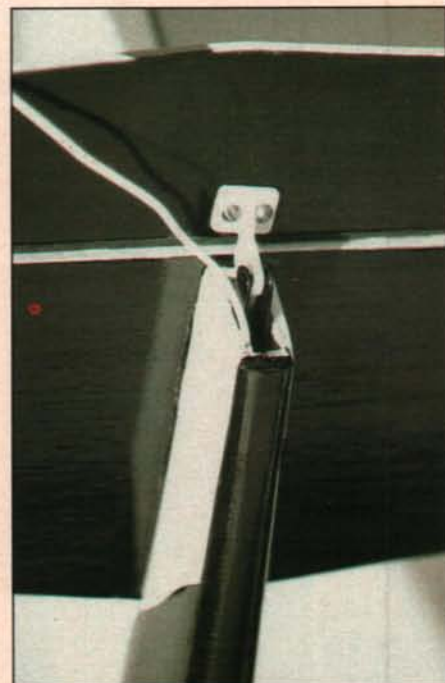
The most critical step in building the fuselage is cutting the wing rod holes and wingeron actuating slots in the fuselage sides. By using the fuselage drawings as a guide, I was able to drill these "dead on" on the first try, eliminating the need for fine



Although the fuselage is quite narrow, there is ample room for the two-channel radio. The wingeron linkage seen here comes pre-assembled and works very smoothly.



The 1/64-inch plywood skid provides excellent protection for the fuselage bottom and can be easily replaced when needed.



The elevator pushrod exits directly at the rear of the fuselage. The nylon horn is from an electric ARF model, replacing the plywood one supplied in the kit.

fitting by opening up the holes with a file.

The tail surfaces are 3/32-inch sheet balsa (two pieces for the rudder) which only

*continued on page 72*



# N-PAC'92

A report on the first-ever running of the Pan-American Championships, which promises to become the premier pattern event in the U.S.



Sixteen-year-old Master's Champ, Roscoe Segura, with his Y.S. 120 AC-powered Desire.



Steve Stricker's immaculate Excalbur 2. Y.S. 1.20 AC, Futaba 9VAP, 9-3/4 pounds.



Brian Ozment holds his super colorful Y.S. 1.20-powered SL-1. He finished the ship only the week before, placed second in Masters.





Advanced pilot Al Glenn holds his Y.S. 1.20-powered Dick Hanson Runaway, which he calls the Memphis Posse.

The world's largest open entry pattern contest for 1992 was held at Vincennes/Lawrenceville, Illinois, July 26-31. Last year, I could have made a nearly identical statement, but I would have been speaking of the pattern portion of the AMA Nationals. This year, I speak of the inaugural running of N-PAC, the Pan-American Aerobatic Championships sponsored by the National Society of Radio Controlled Aerobatics.

The original idea for the event came from a speech by AMA President Don Lowe, made at the NSRCA General Meeting held at the 1988 Fentress Nats. Don called for the creation of a Pan-American Championships, modeled on the European Aerobatic Championships, and held every two years on the off years of the World Championships. No immediate action was taken then, but Don had scattered seed on a fertile patch.

The site for the inaugural N-PAC event was the Mid-America Air Center, scene of the 1990 and '91 AMA Nats, and one of the premier pattern sites in the country. The excellent site and dates became available when the AMA



Chris Lakin's original design Fascination. O.S. 1.20 SP, 9.5 pounds, and JR PCM-10.



The Byrd family Wizard design, this one flown by FAI qualifier Rick Byrd. Y.S. 1.20 power.



Mike Klein's Nemesis design. O.S. 1.20 SP power, 9-1/4 pounds, JR PCM-10 radio. This one carried Chip Hyde to the N-PAC title.

## RC PRECISION AEROBATICS BY RICK ALLISON



decided to return to Westover AFB, Massachusetts for the '92 Nats, held this year in mid-June.

In fact, it was the sudden site and date availability that gave impetus to the practically overnight creation of N-PAC, rather than the more traditional approach of first deciding to hold the contest, then selecting a CD and a date and a site, etc. As I was a member of the first-ever N-PAC Organizing Committee, I can unequivocally state the following: there is no question that the traditional approach has become the traditional approach for good reason.

From the date the site became available to the date of the proposed event was not quite seven months. Considering publishing and advertising lead times of up to three months, this was not very much time to plan, staff, advertise, and work out the logistics for a major international event. Many of the more experienced people close to the project were convinced that it couldn't be done, that time and resources, especially human resources, were too short, and that the NSRCA was crazy to even try. They were almost right about the former, and, in retrospect, certainly right about the latter.

Nonetheless, the optimists outnumbered the pessimists on the Executive Board, and the first N-PAC was born, complete with an organizing committee composed of NSRCA District vice-presidents Paul Verger, who served as Chairman; Tom Miller, myself, and AVP Mike Harrison. Charles Castaing of New Iberia, Louisiana, graciously offered the services of his accounting firm and his personal services as comptroller/registrar, and we were off.

After some casting about, Mike Dunphy of Medford, Oregon, and Jim Fife of Lafayette, Louisiana, agreed to become the co-directors of the event. USPIA president Jim Parker accepted the chief judge position, but had to withdraw when it became apparent that the dates selected conflicted with a previous engagement. He was replaced by RC City founder Jim Graham, but an unfortunate pattern of uncertainty as to the availability of key personnel had been set, and continued to plague the committee until nearly the date of the event.

As the July date grew closer, the pace of preparation picked up. A decision was made to use a seeding system to divide the FAI qualifying portion of the event into four separate "mini-contests," as had been done at the AMA Nats. This meant an early cutoff date for registration in that class, to allow for time to seed and notify contestants of their line and frequency assignments. This produced a predictable amount of confusion.

More confusion was waiting when the event directors arrived on site. The promised AMA equipment was in use by a soaring event, and pre-event site access and key documents had not been arranged for. The decision as to the method of running the FAI finals had been deferred until arrival on site, to allow for a face-to-face meeting of

the full organizing committee plus the event directors. On top of all this, thunderstorms were in progress throughout the area, with more rain predicted for the dates of the event. These were hardly ideal circumstances for the birth of a major international event.

In spite of all of the above and against all predictions, the first N-PAC came off pretty well. The weather, for the most part, was cooperative. The initial confusion dissipated. Key decisions were made, several with the able and authoritative assistance of NSRCA president Bryan Henderson. Communication and scorekeeping problems surfaced and got solved. By the third day, thanks to a nearly around-the-clock effort by CDs Mike Dunphy and Jim Fife and head scorekeeper Maureen Dunphy, the meet was running like a new BMW.

As to the contest itself, 158 contestants registered to fly in five classes (in a departure from the traditional Nats approach, Novice class was held at N-PAC). After no-shows, the number was reduced to 139. With that number of people and all day to fly, a more relaxed pace with more breaks and shorter flying hours was possible, making for better judge and pilot concentration and a lot less "sun fatigue." Via the lottery system, all of the contestants took a turn at providing the needed manpower to run the event.

In the Novice class, turnout was light, with only five contestants. All seemed well prepared and capable, but Mike Brown of Huntsville, Alabama, is the new Pan-American Novice Champ, flying his O.S. .61-powered MK Arrow to victory over Gary Shaw of Atoka, Tennessee. Gary used a Joker, powered with a Y.S. .61. Third was Pete Sittner of Gaithersburg, Maryland, with his O.S.-engined Sig King Kobra.

In Sportsman, young Raiko Potter of Gulf Shores, Alabama, used his O.S. Hanno/Jekyll 60 combo to nail down the win. Craig Buckles of Indianapolis, Indiana, was second with his MK Aurora. Craig used the new Y.S. .61 AR for power. Third was Bryan Hebert of Baton Rouge, Louisiana, with his original design Storm III.

Advanced was the scene of some pretty good flying, with 16-year-old David Shulman of Orlando, Florida, hammering out the victory with his Y.S. 1.20-powered Desire. Tim Taylor of Sumter, South Carolina, grabbed second spot with a Hanno-powered Augusta Mk VI, which I believe is a Darrell Kampschoor design. Third was fifteen-year-old Jonas Pharr of New Iberia, Louisiana. Jonas also used the O.S. Hanno in his LA-2.

In Masters class, the race was tight and the overall quality of the flying was quite high. Another whiz kid, sixteen-year-old Roscoe Segura of New Iberia, Louisiana, finally put the edge on Brian Ozment of Peachtree City, Georgia. Both used the Y.S. 1.20, Roscoe opting for the air chamber version for his Desire, while Brian flew the standard model in a just-completed SL-1.



Tony Frackowiak (right) with his all-wood Typhoon and builder/designer Ron Chidgey. Combination was good for 4th place.



One of the Masters flight lines, Day One.



Coming in third was seventeen-year-old Bryan "Baby" Byrd, flying the Byrd family Wizard design, also Y.S. 1.20 powered.

As usual, FAI F3A was a different bunch of bananas. New for this year was a four-line, four-round "seeded" qualifying system, the idea being to disperse the fliers evenly by ability over four lines, and run each one of the four lines as a separate contest. Each line would then send the top four U.S. pilots off that line to the finals, along with any "embedded" foreign contestants. All the results would then be re-normalized with all four lines, and additional qualifiers would be selected to round out a total of 21 pilots. The qualifying scores of all the finalists would then be averaged, to give each finalist a score to take into the

finals. A three-round finals would then be flown for a total of four scores, with the best three counting to determine final placement.

The theory was to allow the judges to rank each line of pilots over one round, under nearly identical weather conditions, while having to hold a judging standard for only fifteen flights, rather than for sixty flights over four days.

In practice, almost none of the advantages were realized, re-normalizing the entire field yielded identical results, and the whole affair was an exercise in complexity, confusion and misunderstanding. I believe this method will be placed firmly in the round file under Experiments, Noble: Failed.

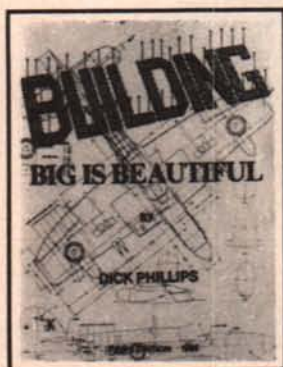
David von Linsowe, Chip Hyde, Bill

Cunningham, and Tony Frackowiak all won the qualifying on their respective lines in convincing fashion, despite a moderately severe quartering crosswind that marred the last several afternoons of the prelims. After re-normalizing and picking the extra qualifiers, the first three going into the finals were in the order above, with Steve Stricker in fourth spot and Frackowiak dropping to fifth. Sixth spot entering the finals went to Steve Helms, and Rick Byrd, Mike Klein, Chris Lakin, and Dean Koger, in that order, rounded out the top ten.

Chip Hyde had some extra adversity, suffering a midair with Ray McClellan in the first round and having to continue with Mike Klein's back-up Nemesis. This seemed

*continued on page 36*

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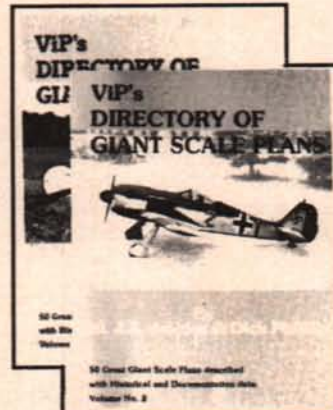


### Tales of an Ancient Modeler

Norm Rosenstock's often hilarious and always interesting story of growing up in New York in the infancy of the modeling hobby as we know it. Many of the "greats" of modeling were among Norm's friends and fellow flyers.

Norm tells of his and John Worth's attempt on an endurance record and of his experiments with early radio equipment.

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# ELECTRONICS CORNER

BY ELOY MAREZ

## DO-IT-YOURSELF RECEIVER MODS

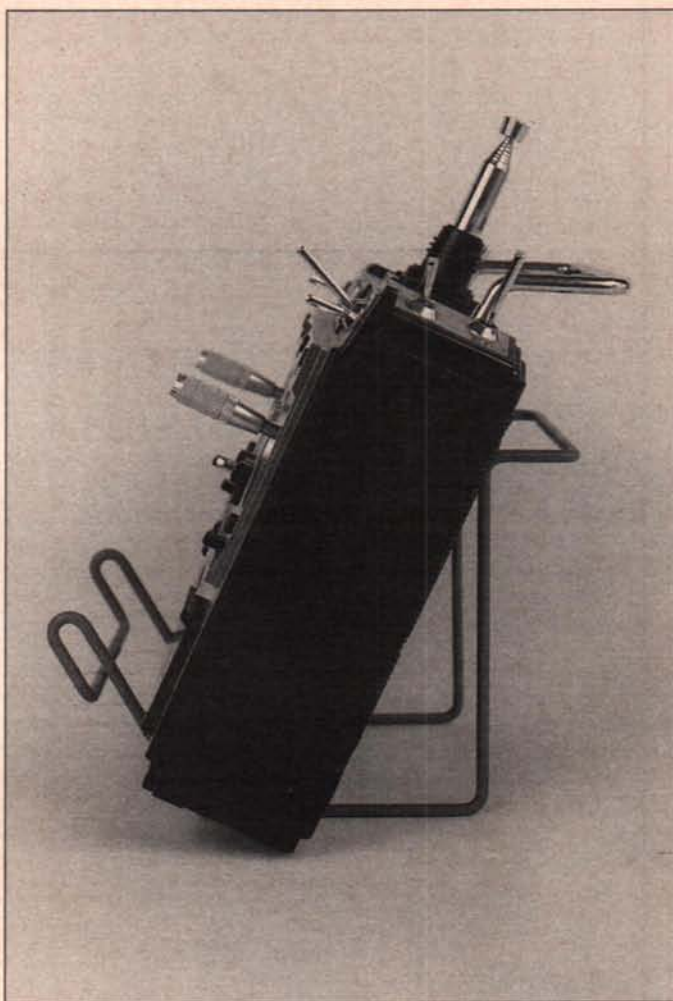
How to add one or two extra channels to some of the new ultra-lightweight two-channel micro receivers currently on the market.

Many of you interested in small airplanes have taken to using some of the newer two-channel micro receivers primarily intended for RC cars. Once the frequency question is resolved, you'll find that these car receivers work fine in airplanes; the receiver does not know or actually care whether it is running around in the dirt or flying in nice clean air. There is even something of a rebirth of the use of the 27 MHz frequencies for RC flying, as the "good buddies" seem to have found that lying to each other with illegal amplifiers is not all that great a sport anyway. It also helps that these small airplanes have to be kept in close to keep them in sight, and the available transmitter power is enough to override most of the possible interference.

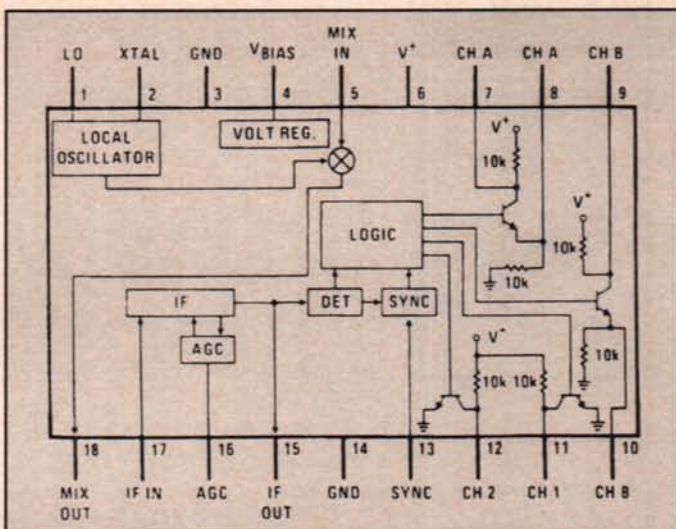
Now and then, though, the users of these small receivers start wishing they had an extra channel or two. There is a simple way of adding said channels, using only one IC and/or a few other discrete components.

To start with, most of these receivers are built around the National Semiconductor LM-1872 IC, a quite clever little device which in a single 18-pin package includes most of the circuitry for a simple, but effective, RC receiver. And fortunately in this particular case, it includes a four-channel decoder. Refer to the sketch of the IC—it gives all the details about what is going on inside, and what it does. Notice that there are Channel 1 and 2 outputs at pins 11 and 12 respectively; these are the ones normally used. In addition, there are channels designated as A and B at pins 7 through 10. The latter are primarily switched channels; that is, they are intended for on-off functions. But, with a few additional components, they will operate as normal proportional channels.

First, just in case you do want to make use of these channels in their basic mode, included is an output circuit which you can use to switch external loads. It is quite simple, and not at all critical. Any silicon PNP transistor capable of carrying 50 mils



Like everything and everybody else, transmitters don't like to be abused. Yours will look better without dents and scratches, and will probably perform longer, too. The A.J. Products transmitter stand is inexpensive, practical and doubles as a flight tray. More in text.



Block diagram on the National Semiconductor LM1872 Radio Control Receiver/Decoder IC, as used in many small receivers. Normally connected for two-channel operation, the text explains how to add on-off or fully proportional channels.



can be used. In most of these LM1872 receivers you will find these secondary channel pins grounded; you'll need only to unground the proper ones to make the necessary connections.

For full four-channel operation, things get slightly more complicated circuitwise, but thanks to another IC, not so terribly bad physically. Again, you may have to unground pin 8, but the whole thing could be added right into the original receiver case, with the new IC taped back-to-back on the 1872 and the necessary connections made with short lengths of wire. One could also wire the original servo sockets for channels 1 and 2, and use pigtailed for 3 and 4.

See how easy? Besides, you saved some weight, a few bucks, and doesn't it feel great to fly with something that you had a part in creating?

### TRANSMITTERS ARE EXPENSIVE

Well, good ones are anyway, and deserve to be taken care of. Believe me, they will repay you in kind, with reliability.

To me, taking care of a transmitter includes not dragging it across the asphalt and scratching and denting an otherwise attractive case. A relatively inexpensive item, the A.J. Products Radio Cradle, can protect it for

you simply but effectively. As seen in the photo, the A.J. cradle, constructed of plastic-covered, heavy-gage spring steel wire, suspends and cushions your transmitter, keeping it both unscratched and clean. It can be placed as shown, laid flat but off the surface, and the cradle can also serve as a transmitter tray while you are flying. The transmitter neck strap is hooked onto the transmitter in the normal manner, then guided through loops in the cradle. It will effectively support and stabilize the transmitter, which in some cases results in smoother flying.

I was told once that using a transmitter tray wasn't macho. Well, for once I have no comment, except to say that it is your choice. But a transmitter with the back scratched and scarred and with all corners dented definitely isn't macho either.

The A.J. Radio Cradle is priced at \$9.95. Interested dealers can write or call for information: A.J. Products, P.O. Box 54025, Cincinnati, OH 45254-0025; (513) 271-8429 or 232-9401.

### YOUNGER WOMEN, FASTER HORSES, OLDER WHISKEY, MORE MONEY!

According to singer Tom T. Hall, those are the answers to



Ace R/C's Servo Pacer, a small, lightweight device that can be used to reduce the speed of any normal proportional servo down to as much as ten seconds end to end; it will make those servo-operated scale functions completely realistic in appearance. It's seen here with a typical AA-size dry cell for size comparison.

every man's prayer. The average RCer would probably add: Faster Servos. Well, I'm not all that convinced about the servo part. True, there are fliers who can match servo speed to flight and airframe requirements and benefit from them, but every time I see someone wobble in for an obviously over-controlled landing I wonder if it isn't due to two common errors: too-fast servos and too much control surface throw.

On the other hand, there are some, admittedly in the minority but still around, who are looking for not faster, but *slower* servos. Their requirements are to effect realistic scale-like movement of landing gear, flaps, canopies, tail hooks, etc. Slowing down servo speed is the job of the Ace R/C "Servo Pacer"—not new, but somewhat unknown and ignored. It is plugged in between the receiver and servo, and can be adjusted to slow a normal servo's transit time down to as much as ten seconds. That is so slow that some of us are going to forget what was supposed to happen before it actually does!

Anyway, the speed is variable. You can set it to time the intended action exactly as you want it, and in addition you can tailor the total servo travel, also exactly as you want it. Adjusting the Servo Pacer is easy—there are three similar pots on the PC board, one for travel in each direction and one for speed. Installation also is uncomplicated, though in some cases you'll have to add connectors to match your RC system. All popular male and female plugs are also available from Ace R/C. The instructions are quite thorough and easy to understand, up to and including a circuit description for those of you who want to know exactly what is happening.

The Ace R/C Servo Pacer is roughly the same size and weight as the average receiver. It is available in kit form, classified by Ace as "Easy, good first kit." Kit price is \$24.95; assembled without connectors is \$34.95; assembled with your choice of Deans, Futaba G or J, Kraft or Kraft Sport is from \$37.95 to \$44.70.

Ace R/C proprietary products  
*continued on page 80*

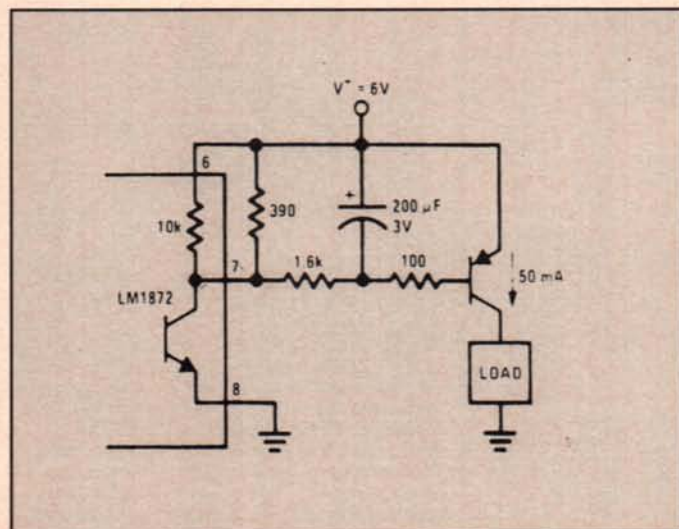
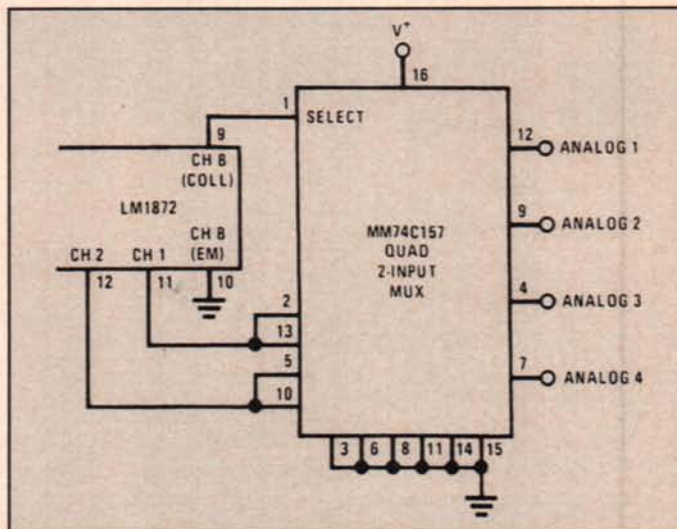


Diagram for a simple add-on to the LM1872 to increase the current handling capability of the unused channels. All components are non-critical and no adjustments, tuning or changes to the original receiver are necessary.



A single IC can be used to increase the proportional channel capability of the LM1872 receiver from two to four. Very little weight is added and the components required can easily be made to fit in the original case.



# CANDID CAMERA

Getting started in CL is made easier with the aid of a new one-hour video from Harding Productions.

**W**hen the control line flying bug bites, the new potential flier wants to get right into the workshop and build a plane—and then get out to the flying field and get it in the air as soon as possible.

The project starts with a trip to the hobby shop for a kit, an engine, and some assorted tools and supplies. Our new modeler spreads everything out in his makeshift workshop, opens the box and ...

Here's when the trouble could start, if our new modeler is working on his own.

No matter how good the kit and engine he bought, and no matter how conscientious the local hobby shop proprietor was in giving the novice advice, the chances are great that he will encounter some unexpected questions, problems and difficulties. If there's no experienced modeler nearby to help with building and flying that first airplane, the novice is going to have to muddle through, answering the questions by guesswork, learning by his mistakes, and re-inventing the wheel at various points in the process.

If you're a beginning modeler and are fortunate enough to find some experienced fliers in your area—past columns have contained a number of suggestions for doing so—you'll be in the air in no time. But, thanks to the efforts of Harding Productions,



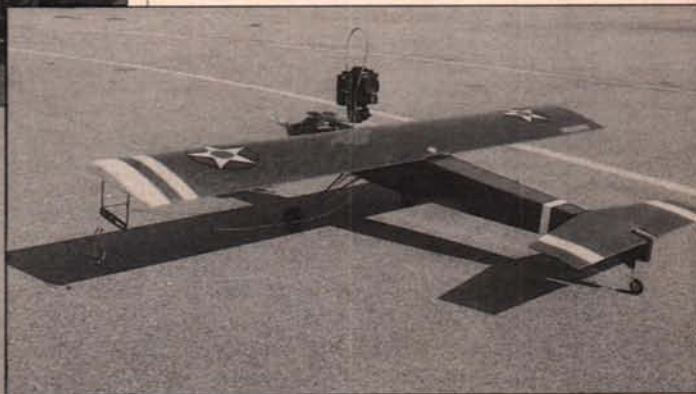
Douglas Milne of Elmont, New York, has flown CL airplanes since he was 12 and still has many of them. How many can you identify?

of New Waterford, Ohio, there's a way for novices to get some expert advice in their own home. The company has produced a one-hour video called "Introduction to Control Line Building & Flying," which covers the all of the basic skills for the beginning CL modeler.

This is a professionally produced video with expert graphics, narrative (complete

with music) and excellent quality photography of both building and flying. And, as the video is a 1992 production, the techniques described are up-to-date with modern technology in adhesives, coverings, etc.

Sig kits and products are featured in the video, a good choice for beginners because of the completeness and widespread



Above: Fred Cronenwett and Grant Heistand, both SoCal CL fliers, have been experimenting with in-flight photography from a CL model, with interesting results. The camera ship pictured here spans 71 inches, is powered by an O.S. .60FP and uses through-the-lines electronic controls for the 35mm camera, which can be turned 360 degrees as well as upward and downward. Left: One of the in-flight photos taken by the Cronenwett/Heistand camera plane. Site is Whittier Narrows, a popular RC/CL spot just east of Los Angeles.





The Northwest Fireballs of Portland, Oregon, are a dedicated flying crew. In 1991, they worked for their Academy of Model Aeronautics All-Weather Flier patches by documenting flying sessions in every month of the year. They're shown in January 1992 with their patches. Back row, from left: Dave Royer, Roy Beers, Greg Beers. Front: Jim Cameron, Laura Beers. John Thompson photo.

availability of the kits and the completeness of the Sig line of related products. The instructions, however, are generic enough that fliers will be able to adapt them to other products of their choice. The video also contains advice on safety at appropriate points.

If I were to advise a flier in a remote area how to get started in CL without the benefit of an experienced flier, I would suggest combining the use of this video with one of the CL books available at hobby shops. The books are able to provide a level of detail that can't be covered in a one-hour tape, but the video gives invaluable visual instruction.

Most of the first half of the tape deals with the construction and flying of the Sig 1/2A Skyray, powered by a Cox Black Widow .049.

It starts with a description of basic tools, advice on studying plans, tips on basics such as how to successfully remove die-cut parts, and how to use cyanoacrylate, aliphatic resin and epoxy glues. Sanding and shaping, hinging, doping and adjustment of control systems are covered.

Alignment of parts is given appropriately special attention. "Alignment is very important in model airplane construction," the narrator says. "It can mean the difference between a good-flying model and one that is a real dog."

One hint that I found useful was a good description of the "wet method" of applying stick-on decals, a way to assure proper alignment and bubble-free adhesion. It's a bit of information that can be recalled during the finishing of many airplanes during a modeler's career.

The video then moves to flying the Skyray, starting with an illustration of the mechanics behind CL control systems, basics of selection of lines, how to connect and roll out lines and how to orient the plane in relation to the wind direction. The flying instruction emphasizes takeoff, climbing and diving, and takes the flier through an excellent course in looping.

The video next covers the construction of a Sig Skyray .35, powered by a Fox .35 stunt

engine. In this section, the construction techniques include more advanced topics such as drilling, soldering, more shaping and carving, selection of a building board, filleting and hinging. Also covered are the use of cyanoacrylate accelerator, wing and fuselage construction tips and control system details.

Use of Sig Coverall iron-on fabric covering and the accessory product, Stix-It, was instructive; it's a technique I haven't seen many CL fliers use. Beginning modelers, however, would be better off skipping the recommended doping of the open wing structure and applying a plastic heat-shrink covering instead of the more complicated Coverall, which seems to be a product for more experienced modelers.

However, to its credit, the video does suggest that the novice not bother painting—beyond clear dope for sealing—his first big model. The video correctly observes that first models take a lot of wear and tear; flying is what's important at this point, not appearance.

An area in which the video falls short in regard to the Skyray is its failure to recommend beefing up the front end. As noted in my review of the Skyray .35 in a previous column, an inboard cheek cowl of 1/2-inch balsa or a second layer of plywood doubler, along with a covering of fiberglass cloth, makes the front end stiffer. Building the plane without such beefing up will result in a fairly short life, as cracks will develop around the wing-fuselage joint.

Also it would have been better to show the holes for the engine mounts, landing gear and tank bolts being drilled before the fuselage and wing are glued together, as it's more difficult to align and drill those holes after the plane is assembled.

The video recommends using engine offset for better line tension. As noted here in previous columns, leadout rake is more important to line tension than either rudder or engine offset. I would recommend against any engine offset—better to mount the engine solidly, not on offset washers. The tail offset won't do any harm, but its value to

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line tension is probably minimal. The video correctly admonishes builders to take care in locating the leadouts as shown on the plans.

The Skyray .35 flying section covers inverted flight, outside loops and lazy eights. "It's up to you now to practice until you can perform each maneuver smoothly and with confidence," the narrator says.

On the whole, the video covers about as much as a novice could be expected to handle in the hobby's "first grade" and, except as noted above, its advice is excellent throughout, including the conclusion that CL flying is "a hobby that lasts a lifetime."

The price of the tape had not been set as of this writing, but should be advertised by the time this column appears. The video will be available direct from Harding Productions, 4782 Unity Line Road, New Waterford, Ohio 44445; (216) 457-7352.

#### A READER WRITES

Do you think you've built a lot of CL planes over the years? Are you somebody who flies planes until they're worn out or crashed and then gets rid of them, or do you still have nearly every plane you ever built?

One of the latter type of modeler is Douglas Milne, of Elmont, New York, who recently responded to our standing invitation to send photos of interesting models.

Douglas took out some of his planes for a group photo. Only another airplane could tell us if all 45 of them are smiling! Doug

writes:

"I am not a competition flier, but I do enjoy control line planes. I have been building and flying since I was 12, and I'm now 45. Some of the planes in the picture are 25-plus years old.

"One major problem on Long Island is no place to fly. The RC boys with the heavy bucks get the fields, and we are left out in the cold to hunt up spots to get in a few flights before being chased. But, I will never give up control line flying."

Other fliers in the area may want to contact Doug for a joint flying session—particularly if you've found a good field. His address is 122 Ludlam Ave., Elmont, NY 11003.

#### BLADDER GRABBER

We'll close this month's ramblings with a capsule report on what is arguably the nation's most prestigious fast combat contest, Bladder Grabber XVII.

With 44 of the country's best top-gun combat fliers assembling in Snohomish, Washington, on July 18-19, it was an exciting shootout. In the end, however, it was a "local affair" as the Seattle area's Gary Byerley came out of a couple of years of retirement to take first place. Steve Stewart of Phoenix, Arizona, was second; 1991 winner Allen Deveuve of San Diego, California, was third; past winner Steve Kott of Wayne, Michigan, was fourth; and past repeat winner Phil Granderson of San

Francisco, California, was fifth.

The contest was characterized by excellent flying with a lot of clean kills and few collisions, crashes or other mishaps.

One of the most significant footnotes was that automatic flyaway shutoffs were in wide use. About a third of the contestants were using shutoffs for the whole two days. After the shutoffs were "demonstrated" by preventing at least two flyaways on Saturday—and shutting off engines without props or on slack lines—there were even more in use on Sunday.

One flier who had shutoffs for sale at the contest reported that he sold out his entire supply within minutes of one spectacular demonstration of such devices. As it happened, that demonstration involved your MB columnist. My plane was cut away, the engine shut off immediately and the model glided down undamaged in the pit area. No danger, no damage, no lost equipment.

By the end of Bladder Grabber XVII, a concept that only two years ago had not even been experimented with appears to have gained universal acceptance. It appeared to be generally agreed among fliers at the BG that shutoffs would be standard equipment for fast combat in a short time—without the need for legislation in the rulebook.

As always, control line fliers are invited to send photos, technical tips, questions, club news, contest reports, etc., to John Thompson, 1145 Birch Ave., Cottage Grove, OR 97424. **MB**

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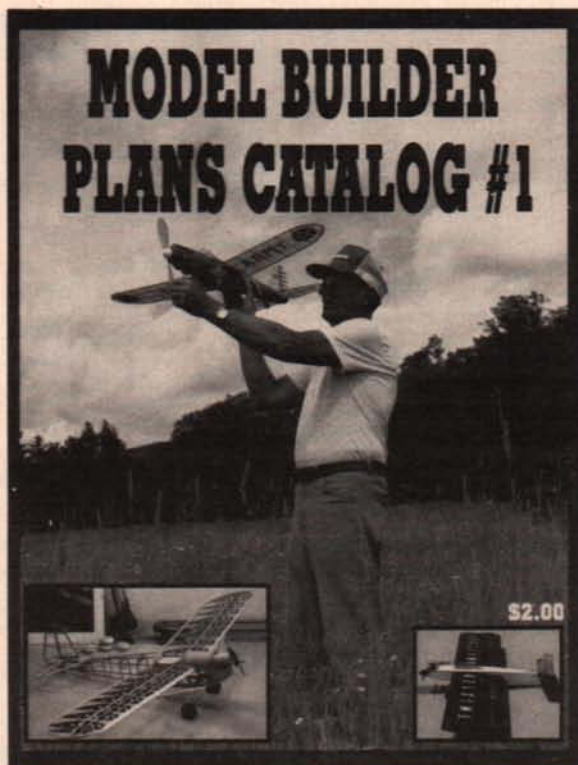
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## AEROBATICS continued from page 29

to make very little difference to Chip. Or maybe he just made it look that way.

The afternoon of the finals was overcast, with a fair portion of gusty wind and intermittent rain. It was apparent to everyone that survival, rather than aeronautical art, would be the name of the game. Even discounting the conditions, however, it was obvious that many if not most of the finalists had spent very little time learning the FAI "B" maneuver schedule used in the finals, and were uncomfortable with the pattern. The original purpose of going to a different and supposedly harder schedule in the finals was to make it easier for the judges to select the winner, and, in that sense, the new two-tiered schedule almost did the job too well, with the main problem being that no one flew really well or very consistently.

When the smoke and clouds had cleared after the third round (Yes, the sun came out. Doesn't it always?), the judges had the final tally reading Hyde, von Linsowe, Cunningham, and Frackowiak, with Mike Klein in fifth. The new World Champ is the new Pan-American Champ. Congratulations to Chip Hyde, who was heard to remark as he picked up the trophy that he "might be getting too old for all this."

Right, Chip.

• • •

Tracking the latest trends is always high on

a pattern scribbler's agenda at these major affairs, and there wasn't much difficulty coming up with the big winner at N-PAC.

Briefly, as far as the upper classes are concerned, the discussion about four-stroke versus two-stroke power seems to be closed. In Masters, five of the top seven finishers used the Y.S. 1.20, with the top two-stroke bolted into Dave Lockhart's Dash Five, down in fifth spot.

In FAI F3A, the situation was even more lopsided, with only four two-strokes making it into the top 20, one of those being Dean Koger's belt-drive Vortex. The top FAI two-stroke finisher was Bill Rutledge, down in the seventh position. The O.S. Surpass 1.20 SP supercharged engine made a significant appearance in the FAI class, with Chip, Mike Klein, and Chris Lakin using it to place first, fifth and eighth, respectively.

The reasons were fairly easy to spot: More power for all the tall verticals, and a lot more solid performance by the bigger aircraft in the wind. In calm weather, the best two-strokes really don't give up much, but in any significant wind, the four-strokes have a very clear advantage. And significant wind has been a part of every major event I can remember in recent years.

Flying styles didn't seem to play a big part in determining the winners at N-PAC. In all of the full turnaround classes, we saw up and out, in and close, slow and fast, slow roll rates, quick roll rates, tight corners, loose corners, and all of it scored well if it was

flown well. There seemed to be much more tolerance on the part of the judges for differing styles than in the past, and that's certainly a welcome and healthy trend if it continues.

Another very healthy trend for the future of the sport was the amount (and quality) of youth in evidence. The average age of the five N-PAC Champions is 20.6 years, with Novice Champ Mike Brown being the oldest at 27. Advanced Champ David Shulman and Masters Champ Roscoe Segura are both 16, and the average age of the top six finishers in Masters was 21 years. Maybe Chip wasn't kidding?

The very best part of the whole affair for me was an NSRCA Executive Board decision to continue the contest on a biennial basis, in the off-years from the World Champs. It was resolved to correct the errors, build on the successes, and commit the resources to make N-PAC a major international event in future years. And that means no more seven-month wonders. Plans are already afoot for '94.

Financially, N-PAC finished in the black, but would have definitely struggled without help from the industry. Futaba Corporation of America, RC City, Airtronics Inc., Powermaster Fuels, and Advanced Aero Products all made significant contributions. The NSRCA would like to thank them one and all, and I add my personal thanks to that. These people gave something back. Remember that when you visit the hobby shop of your choice. **MB**

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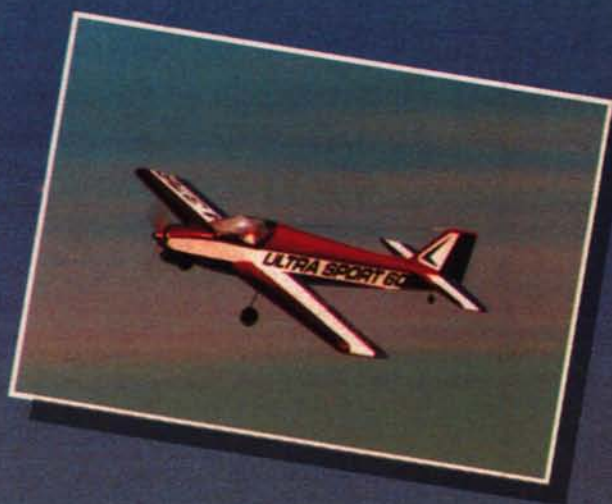


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# AN INTERVIEW WITH BOB FIORENZE

One of the best-known jet modelers  
gives us a peek at the new F-117 from Yellow Aircraft.



Sure to be one of Yellow Aircraft's most popular kits, this F-117 Stealth Fighter is currently undergoing tests by Bob Fiorenze. Wingspan measures 55-5/8 inches, length is 82 inches. Definitely for experts only!

**W**e are finally back home in Florida and it sure is good to be back, even though our two month's stay in Maine was delightful. As I had been gone for some time, I grabbed my camera and went to the club field to see if anything new had shown up during my absence. Florida is such a hotbed of model activity that I figured there had to be something new and exciting. Sure enough, Bob Fiorenze showed up with an incredible F-117 Stealth Fighter/Bomber. Awesome! The ensuing conversation went as follows.

**MB:** *Is this model a prototype?*

**Bob:** "Yes, it is a prototype from Yellow Aircraft. It's a twin engine F-117. It prob-

Engine thrust is delivered through the scale exhaust openings—wide and shallow.







Removing the rear top hatch reveals the fiberglass ducting for the twin O.S. .91s, along with some of the fuel system plumbing. Fans are Dynamax units.



Is this busy enough for you? View directly under the canopy shows the nose gear strut, the plumbing and controls for the pneumatic retract system and Lord knows what else.



The F-117's control system is quite complex and requires some unusual mixing. Seen here, for example, is full up elevator command; note how both halves of the V-tail—and the ailerons as well—are deflected to produce a nose-up effect. Nothing is simple on this model!

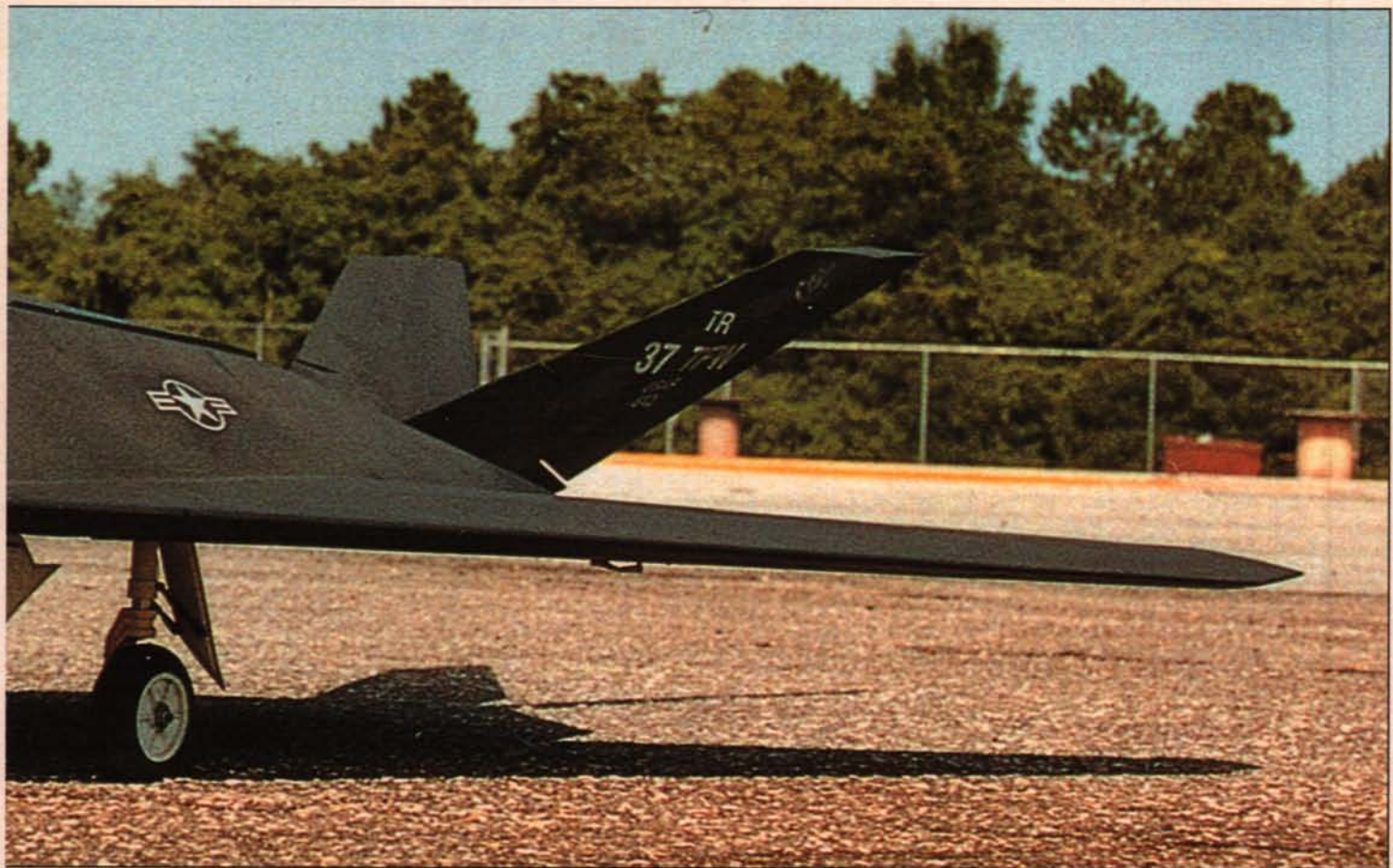
ably will be kitted a year to eighteen months from now. I'm not really sure of the schedule. The plane has two O.S. .91s and weighs 23 pounds. The radio is a Multiplex.

"One of the unique things about the

control setup is that while the ailerons work as ailerons and the twin ruddervators work as rudders, when you give elevator command up or down, all four surfaces move. With up elevator, for example, the

ruddervators both move up and the ailerons also move up. There is a lot of mixing involved.

"The plane is finished with K&B Superpoxy, and presently we have twelve



At an all-up weight of 23 pounds, the Yellow Aircraft F-117 delivers performance similar to that of a pattern ship. Needs about 250 feet to get off in no-wind conditions. See text for Bob Firenze's comments on how the airplane handles.



or so flights on it. I first flew it in Canada in June and since then I have been working on the CG location. I am presently moving the CG back after each flight."

**MB:** What fans are you using?

**Bob:** "Dynamax fans on O.S. .91 engines."

**MB:** And the landing gear?

**Bob:** "It's a standard landing gear except for the struts—those are custom made—but the landing gear mechanism itself is the Tom Cook Phantom landing gear. They have proven to be pretty reliable and strong."

**MB:** What's the wing area?

**Bob:** "I don't know. To tell you the truth, it arrived on my doorstep one day—the box

*continued on page 73*



RC SOARING BY BILL FORREY

# The Flite Lite Composites Falcon 550E

**Flite Lite is under new ownership. Here's some background on the company, along with a review of the hot new Falcon 550E motorglider.**

A few years ago, a new model sailplane manufacturer hit the soaring scene with a new design that had instant eye appeal, state-of-the-art materials, proven airfoils, and pace-setting performance. The design quickly began winning and even dominating major soaring contests including the Nationals, and just as quickly gained fame and press recognition.

Like sharks in a feeding frenzy, competitive fliers from across the U.S. ordered the custom-built, pre-sheeted model and its less-expensive kit version by the hundreds. To fly in a major soaring event in the west was to see scores of them entered. It was an American success story right out of the pages of some kind of entrepreneurial magazine.

The company was Flite Lite Composites, and the model was the AMA Unlimited Class Falcon 880 and its Standard Class twin, the Falcon 800—designed, and in many cases kitted, by Mark Allen, the company's founder.

Later F3B sailplane designs from Flite Lite were to take a one-two sweep of the 1991 FAI/F3B World Championships to further reinforce this new company's fame and

fortune worldwide.

Because the Falcon 800 and 880 were so competitive, the demand was far greater than Flite Lite's ability to keep pace. Meanwhile, the contest wins continued to rack up all across America. This fame compounded Flite Lite's biggest problem—keeping production up with sales. Delivery times became frustratingly long, and stories and rumors of six-month (or longer) delivery delays were beginning to be common.

After years of trying to improve production capacity, after years of searching, finding, and training skilled factory model builders only to see them move on from the company a relatively short time later, Flite Lite's owner, Mark Allen, made a courageous, pride-swallowing decision—sell the business to someone who could manage these problems better.

A buyer was found and the deal was closed. Time will tell, but so far it looks like a very good move for the company and for the modeling consumer.

Flite Lite's new owner is Ron Vann, a long-time slope racing friend of Allen's and an experienced modeler and model designer in his own right. Over the last six months or so, Ron has proven to be just what the



Bill enjoys the 550E's handling while flying in light slope lift near Crystal Cove State Park, near Corona Del Mar, California.

**A hearty heave-ho and full throttle on your cobalt motor gets you going fast in a hurry. Almost-level speed build-ups ensure the steepest climb-outs and highest final altitudes. Don't hang on the prop, rather, keep it on the step and let the wing work for you!**





business-doctor ordered for Flite Lite.

Now, instead of a backlog of orders, Flite Lite has inventory on hand for immediate shipping. Quality has never been higher. Models are now shipped with seamless obechi veneer wing skins instead of time-consuming, warpage-prone balsa sheets that require edge-joining.

Factory pre-sheathed kits are available and are likewise obechi veneered with carbon fiber reinforcement just under the obechi. The models are lighter than ever, and the Falcons are now available with a choice of airfoils: the new SD7037 for light lift conditions, or the ever-popular S3021 for stronger lift conditions, windy days or sportsman-level F3B multi-task flying.

Other models in the Flite Lite Composites line continue to be offered: the Swift 600 slope racer; the Thermal Eagle competition

**Now, instead of a backlog of orders, inventory is on hand for immediate shipping. Quality has never been higher.**

thermal duration ship; the reigning World Champion F3B ship, the F3B Eagle; the Falcon 600 (two meter), Falcon 800 (100-inch) and Falcon 880 (112-inch) trio; and new for this holiday season, the Falcon 550E (80-inch) electric-powered thermal duration motorglider.

An illustrated catalog of all of the models in the Flite Lite Composites lineup is now available for \$2.50, which is refundable with order. Interested modelers should send a check to Flite Lite Composites at P.O. Box 311, Windsor, CA 95492. Questions can be directed to this address or by phone to (707) 838-9020.

And what about Mark Allen? Because it was Mark's gifted design abilities and qualified success as a sailplane manufacturer that got the ball rolling for Flite Lite in the first place, it would be a tremendous loss for Flite Lite if his talents in this area were no longer available. Have no fear, Mark will continue to research, design and co-develop new models as well as perform custom model aircraft building services for Flite Lite as requests arise for truly 100% ready-to-fly sailplanes.

#### **NEW FOR 1993: FLITE LITE'S FALCON 550E**

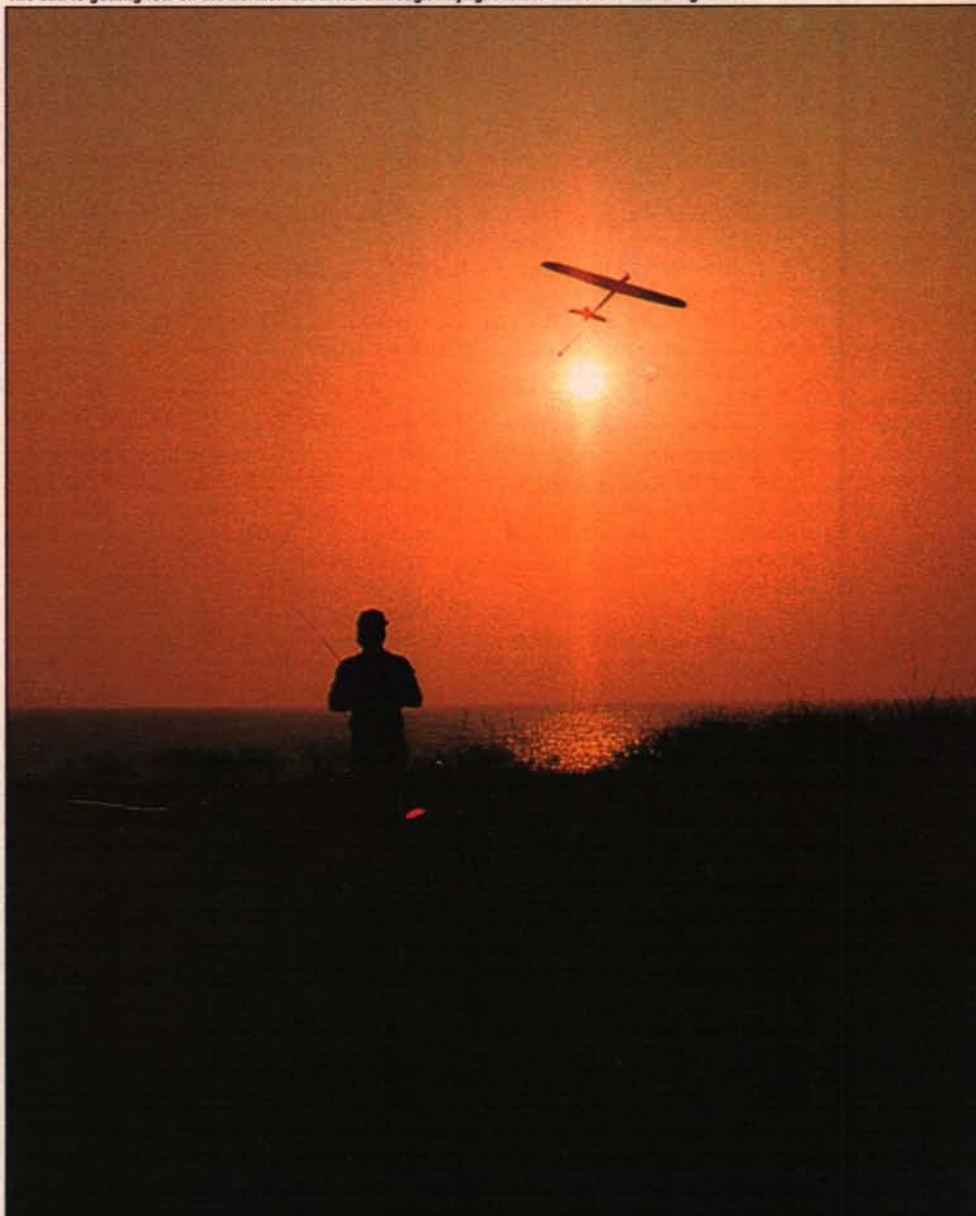
The all-new Falcon 550E has been under development for three years. Prototypes have appeared in the press (including this column) from time to time as proof that the new design was evolving and improving as time went by.

The concept started as an electric-powered spin-off of the Swift 600 slope ship. The original idea was to come up with a

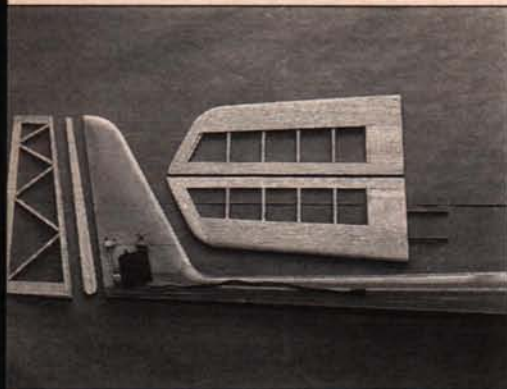


Test pilot and *MB Soaring* columnist, Bill Forrey, with Flite Lite Composites' newest offering, an electric-powered, thermal duration motorglider, the Falcon 550E. Impressive performance and attractive looks are two of its many strong points.

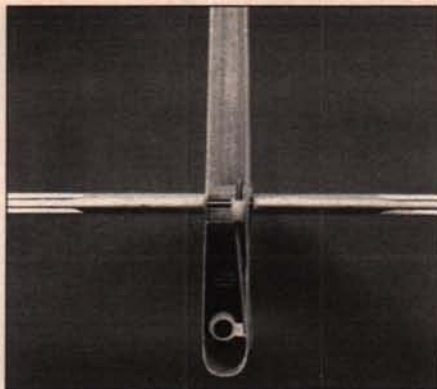
The sun is getting low on the horizon but there's enough daylight left to make one more flight.



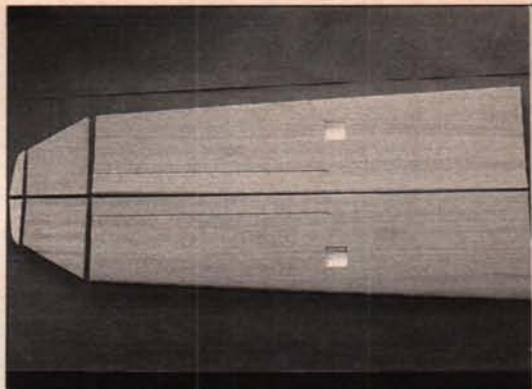




Falcon 550E tail surfaces are built-up balsa. A micro servo for the elevator (in this case a JR Propo NES-341) fits inside the vertical fin and is held in place with silicone rubber cement and a balsa shim. Rudder is non-moving, but could be an optional control surface.



Rear view of the elevator servo installation without the rudder post in place. Small bulge in the fuselage side gives servo arm clearance.



If you order the Falcon 550E kit with the factory pre-sheeted wings, this is what you get. Note the pre-routed aileron hinge lines and servo cut-outs.

model that was just as fun to fly as it was competitive in limited motor run thermal duration. Shortcomings in the modified Swift fuselage and unnecessary complexities in the V-tail design led to new designs and improvements which eventually became a completely new aircraft, namely, the one you see in this report.

The Falcon 550E has a deeper, wider fuselage that accommodates battery packs from seven to ten cells of 600 to 1700 mAH capacity. One prototype has even been flown crammed with 27 cells and a Plettenburg 355 motor (a Hobby Lobby import), but this is definitely *not* recommended treatment!

For this article, Ron supplied a completely built Falcon 550E with radio and power system installed, ready to fly. The ship was equipped with seven 1,000 mAH Sanyo SCR cells (about the same size as the older, more common 900 mAH SCR cells). These cells rode out every flight directly under the wing, and although charging did not necessarily require wing removal, we removed it anyway in the interests of better cooling.

The Falcon 550E fuselage is one tough customer, yet it remains quite light at a mere 3 ounces. The entire fuselage is two layers of 3-ounce crow's foot weave fiberglass, one layer of 1.8-ounce Kevlar (nose to tail), and a few carbon fiber strips under the wing and canopy cut-outs.

Our test plane was fitted with a Hobby

Lobby imported Graupner Ultra 800-4 motor, which boasts four turns of double wire and cobalt magnets. This motor flat-out kicks tail and takes names, and is perhaps the strongest-pulling seven-cell motor I have ever flown.

The propeller used was a new Aero-Naut Carbon 8x5 folding prop designed by the reigning FAI/F3E World Champion, Rudolph Freudenthaler. These are also being imported by Hobby Lobby. (Hobby Lobby has a free catalog available that describes these and all sorts of other neat electric goodies—order yours by calling 615-373-1444.)

Immediately behind the motor was a Novak 410-M1c electronic speed control with heat sink. Its outer plastic case was removed for a better fit, better cooling, and lighter weight. Also, the red lead pin was removed from the three-pin plastic mini connector to prevent BEC function.

Riding above the motor's battery pack was a 275 mAH radio system battery pack, which could be eliminated with the use of a BEC-style speed control with voltage regulator or automatic motor cut-off. Most guys, however, prefer the receiver battery pack as added insurance against premature radio system fade-out.

Behind the motor battery pack and inside the tail boom, wrapped in foam rubber, was an RCD Micro 535 dual conversion, five-channel FM receiver. This being my first direct contact with an RCD product, I was very curious to see how it would perform under these, the worst possible conditions—namely, high-current electric powered flight at great altitude, controlled by a high-frequency electronic speed control. The results? Flawless reception under power and glide with no noticeable glitching at any time. Inside the tail fin of the Falcon 550E was a JR Propo 341 micro servo, glued into the fin and connected directly to the rear horizontal stab pin. A minor bulge in the right side of the fiberglass fin (for the servo arm) is the only clue that there is a servo hiding in the tail.

The all-up flying weight of our model was 45 ounces. More weight could be dropped from the model for all-out competition by

going to 600 mAH cells and a BEC speed control, but I doubt it's necessary. The Ultra 800-4 powered Falcon 550E gets small fast!

The wing airfoil used is the tried-and-true, 3.8% camber, 9.06% thick Eppler 387. Fully obechi veneer sheeted, this white foam core wing also features carbon fiber spars top and bottom and carbon fiber reinforced servo cut-outs and trailing edge. If you order the standard kit version, you have to bond the carbon tow and obechi veneer to the core yourself. If you purchase the factory pre-sheeted kit, this is done for you. Also, the two servo holes are pre-cut, as are the two aileron hinge lines and sub-skin aileron servo extension cable channels.

The aileron hinge area leading and trailing edge pieces and the wing leading edge pieces are basswood for strength and ding resistance. Our test plane was landed several times in tall, dry, miscellaneous California weeds with nary a scratch along the leading edge or the double-varnished obechi skin.

## FLIGHT PERFORMANCE

The Falcon 550E set up like our test model is perhaps the fastest climbing seven-cell I've seen, and I've seen a lot of 'em! I stop short of saying it is absolutely the best climbing seven-cell I've seen because there were no other "known quantity" seven-cell competitive sailplanes around for eyeball comparison. I would categorically say, however, that if you were planning to attend a major E-power thermal duration event, you couldn't go wrong with a Falcon 550E. It surely would be competitive against all others I've seen to date.

What if thermal duration isn't your thing? No problem. Our test flights were one aerial ballet after another. This ship is poetry in motion! Even though it features only aileron and elevator control, aerobatic maneuvers are not only possible, but habit forming! To heck with that long flight, let's see her loop, roll, spiral dive, make high-speed passes both upright and inverted, outside power loop from a dive, power up to a speck in the sky—you name it!

And yes, it thermals! The sink rate of the

*continued on page 84*



Equipment installation in MB's test plane was functional if not very pretty! Photo shows the Aero-Naut 8x5 folding prop, Graupner Ultra 800-4 cobalt motor, Novak 410-M1c (sans case), seven-cell 1,000 mAH flight pack, and 275 mAH receiver pack.

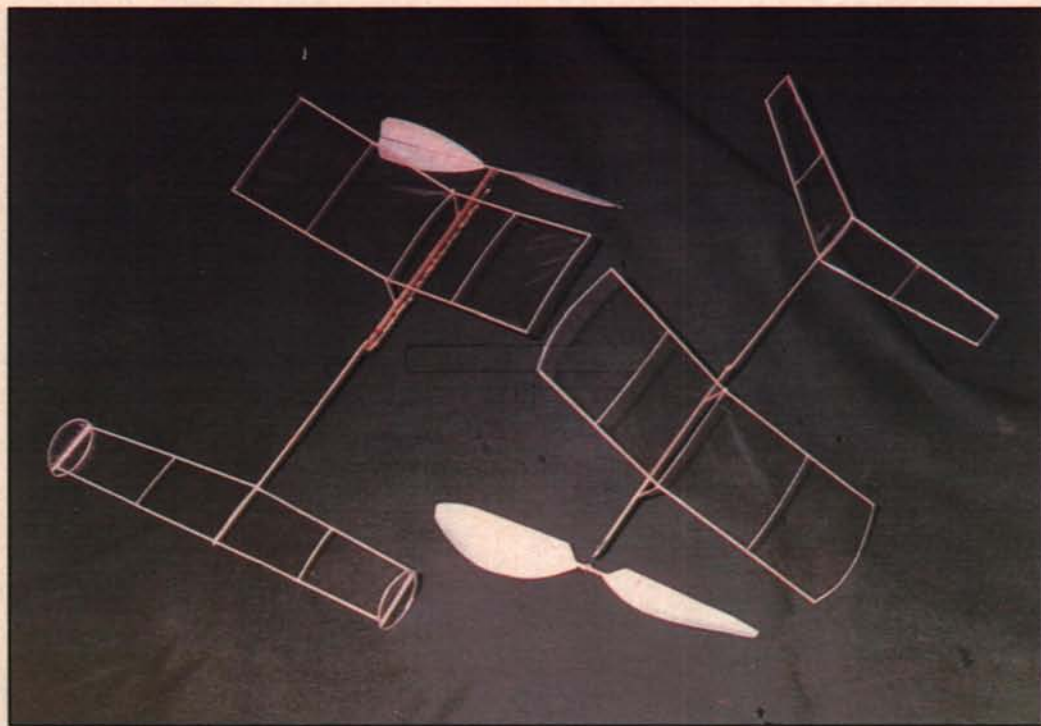


## AN INTRO TO 'MINI STICK'

**A primer on one of the fastest-growing new indoor events, complete with full-size plans and detailed instructions for building the author's "Tutail Mini Stick."**

**BY KEN JOHNSON**

Ken Johnson's Mini Stick indoor models, showing both the twin-fin and V-tail versions. Both are detailed on the plans.



Every so often an indoor event comes along that catches almost everyone's interest. Some years ago it happened with Easy B. At almost every contest I attended across the country, entries were high in Easy B. Beginners and experts could enjoy these models equally, and beginners became experts in a rather short time.

Again it happened with Peanut Scale. Many old-timers were drawn back into modeling by seeing the Peanuts fly. They remember the dime kits from years past, and are now reliving those times with Peanut Scale.

Now in 1992, a new star is

rising in indoor modeling. It's called Mini Stick—a duration event for stick-fuselage models of 7-inch wingspan. This event is the brainchild of Tom Vallee and Pete Stachling, who originated it as a partial solution to the flying site problem. These little planes can be flown seriously in almost any room. Mini Stick is becoming a big hit around the U.S. as well as in Europe and the Far East.

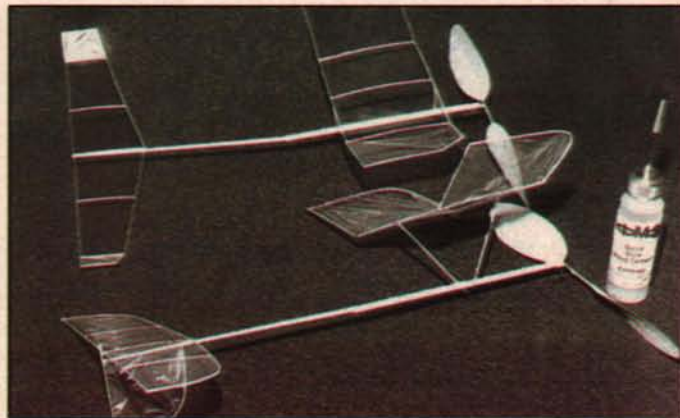
The first contest was held in Tom Vallee's living room. The high time was about three minutes. Tom says that the Parlor Mite models by Bud Tenny and the Matchbox models by Bill Bigge were the inspiration for Mini Stick. They are great for an after-the-business-ends event at club meetings.

Mike Coling, of England, held a postal contest for these tiny models from January 1 to March 31, 1992. There were 117 entries from eleven countries for the one event. This has to be one of the largest and most successful indoor contests ever. The three winning times were: 1st, G. Hunter with 430 seconds; 2nd, Tom Vallee with 390 seconds; and 3rd, J. O'Donnell with 336 seconds.

At the USIC indoor meet at Johnson City, Tennessee earlier this year, there were 62 entrants in Mini Stick. First place was won by Joe Krush with a flight of 10:20.

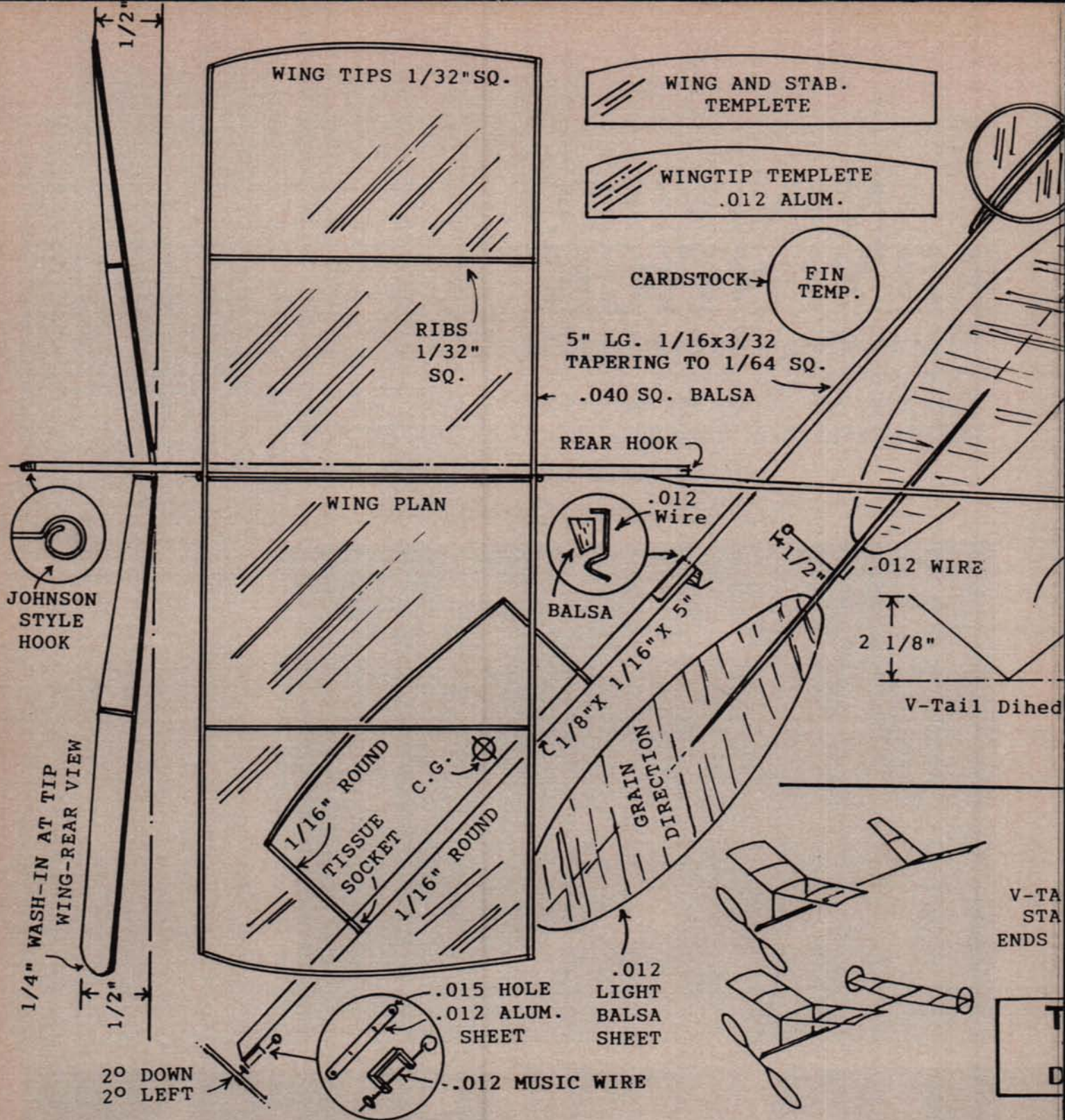
### **BUILDING THE "TUTAIL MINI STICK"**

Begin by selecting 4- to 6-pound balsa. Trim the motor



Left: Lifting Mini Sticks from the box can be tedious! Best part is that two complete models can be carried in a small cardboard box, as seen here. Above: The author winding his V-tail Mini Stick at the Burbank Jr. High gym in Burbank, California. Photo by Sweeny Hayashi. Right: Two Mini Sticks built from the Indoor Model Supply kit. This company also sells a complete line of indoor supplies. Photo courtesy Lew Gitlow.





stick and tail boom to the sizes specified. The tail boom is cemented alongside the rear of the motor stick with a 3/8-inch overlap. Elevate the back of the tail boom 1/16-inch and angle it to the left 1/4-inch (looking down from above).

The thrust bearing (which I prefer to call the shaft hanger) is made from .012 aluminum. Cut a strip measuring 3/8x1/16 inch, drill a 1/64-inch or #78 hole 1/32-inch from each end, and bend the hanger as shown. If

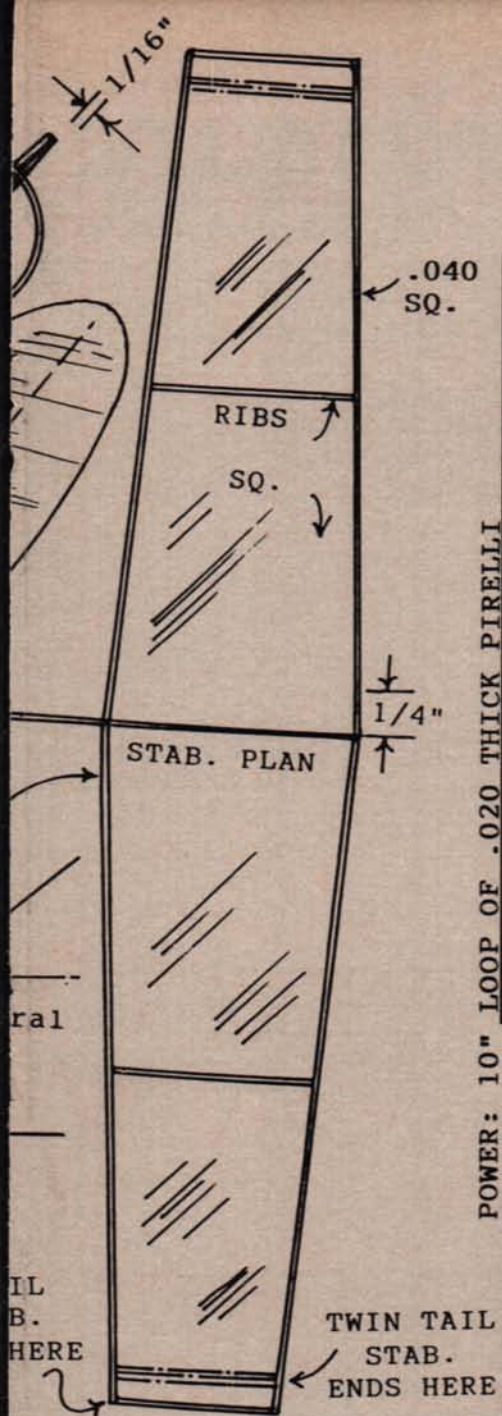
you choose, a thrust bearing can be obtained from one of the suppliers listed at the end of this article.

The rear rubber hook is fashioned from .010 or .012 music wire. Most indoor builders have their own style of hook; the one pictured on the plan is mine. The hook should actually be cemented in place before the tail boom is attached to the motor stick. When cementing the shaft hanger to the underside of the stick, bind the hanger to the

stick with thin monofilament thread. Cement and trim the thread neatly. I suggest building 2° down and left thrust into the shaft hanger.

The flying surfaces are best built with the aid of cardboard templates. The template is pinned down over the plan, then the wood strips are placed alongside and pinned against the template. *Never pin through indoor strip wood!* Place the straight pin alongside the wood or cross pin over the wood.





**TUTAIL MINISTICK**  
**7 Inch Duration Model**  
 Designed By Ken Johnson

The wing and stab ribs and wingtips are made from light 1/32-inch quarter-grain balsa. Make templates for these from .012 sheet aluminum. Dress the edges with a fine file so that the knife blade will pass smoothly along it.

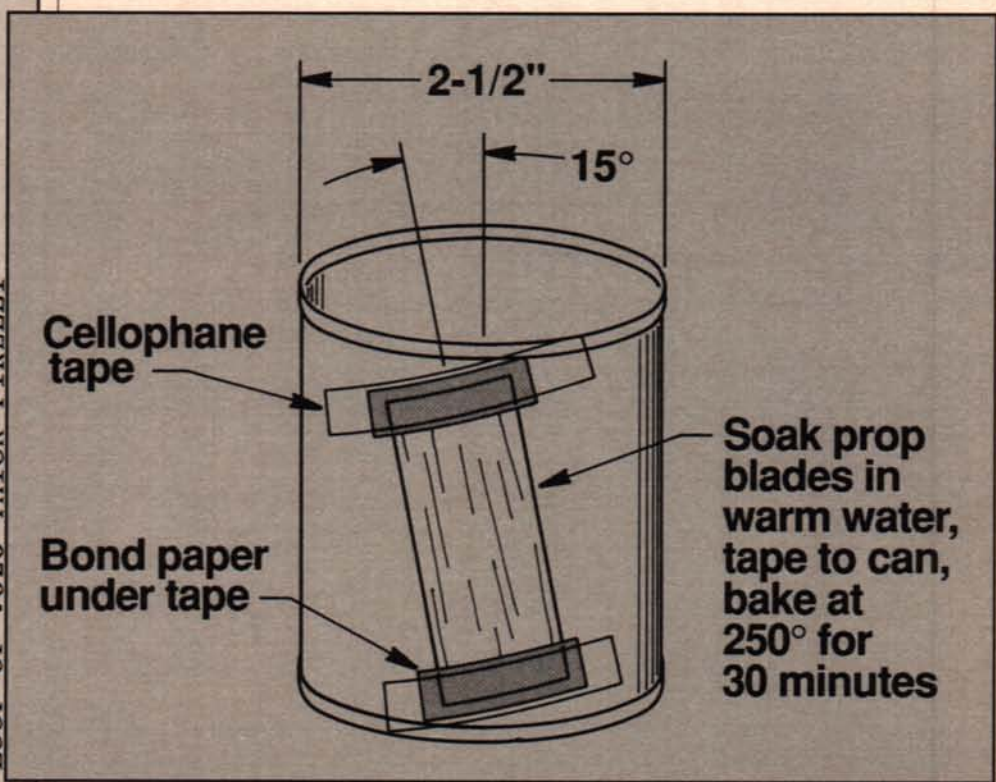
The balsa for the ribs should be about 1/4-inch longer than needed. Place the wood and template on a sheet of art illustration board so that the cuts will be cleaner and sharper. With the airfoil template at the top

of the balsa sheet, make a cut along the edge, then move the template down the wood 1/32-inch and make another cut. Continue the rib cutting process until you have all you need plus a few extra.

After pinning down the leading and trail-

to the stab tips after covering.

Before cutting out the prop blades, the blade blanks must be cambered. Refer to the illustration for details. The blanks are first soaked in warm water for 15 to 20 minutes, then placed between two layers of paper



Putting both camber and helical twist into the prop blades is done by taping the soaked wood blanks to a tin can as shown and baking in an oven for the specified time.

**Mini Stick Rules**

Model Type .....	Monoplane.
Maximum Span (projected) .....	7 inches.
Maximum Wing Chord .....	2.5 inches.
Maximum Motor Stick Length .....	5 inches.
Maximum Model Length .....	10 inches (less the propeller).
Maximum Stab Area .....	50% of the wing area.
Covering .....	Plastic/paper. No microfilm.
Propeller .....	Wood only.
Minimum Weight .....	.015 oz. or .43 grams.

**Flying**

Steering .....	four 10-second steers.
Attempt .....	15 seconds or more.*

\*Special flying rules for very small (living) rooms.

ing edge spars (along the cardboard template), cement each rib in position. The front of each rib is attached first. When dry, the rear of the rib is trimmed to length and cemented in place. The wingtip shape is made the same as the ribs, but uses a higher arch curve.

There are two different stabilizers shown on the plan. One uses twin rudders, the other is the V-tail type. Pick whichever you like best. The round twin fins on the former are bent around a 1-1/16 inch diameter template and baked (while on the template) in a 250° oven for 20 minutes. The fins are cemented

towel to absorb the excess water, then taped to a metal can as shown and baked in an oven for a half-hour or so. Let it cool, then go ahead and cut the blades to shape as shown on the plan.

Make a prop jig from a balsa block and three balsa triangles, as shown in the sketch. The center triangle holds the prop shaft vertical, while the two outer triangles determine the proper blade pitch.

The hub spar of the propeller is made from 1/16-inch square medium-hard balsa. Sand a 3-1/2 inch length to a round cross-section by spinning it back and forth in a folded piece of medium-grit sandpaper. Hold the paper between the thumb and forefinger of one hand while spinning the wood with the other hand. From the center, taper each half smaller toward the outer tip, down to 1/64-inch round at the tip. When both are the same, drill a .015 or #78 hole through the center of the spar. Bend a short length of .010-.015 music wire with a round loop at one end—a 1/16-inch diameter loop is about correct. Then pass the straight end of the wire through the hole in the prop spar.

Make a right-angle bend in the shaft wire. Cut off the excess wire, leaving a 3/16-inch piece past the bend. Glue the wire to the prop hub, making sure the shaft is at a 90° angle. Cement the wire shaft to the vertical

continued on page 77

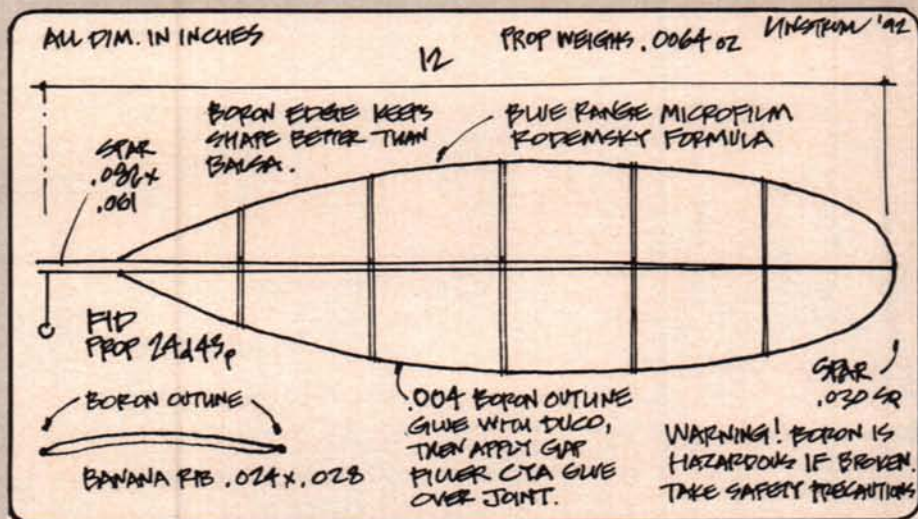


# INDOOR INNOVATIONS: TECH TRENDS

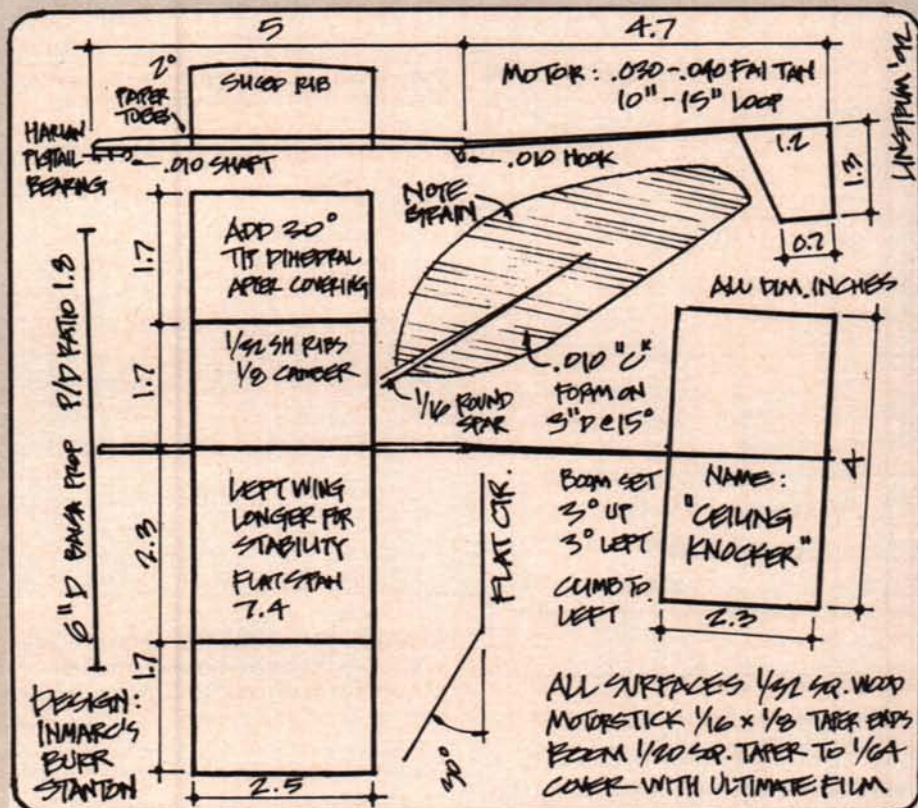
BY DAVE LINSTRUM

Ever since Carl Goldberg and his fellow Chicago Aeronauts started flying indoor models in 1935, there has been only slight advancement in the technical end of the sport. If you look at a prewar *Zaic Yearbook* or other plan record of the era, you will see microfilm models and balsa gliders that are not all that much different from those flown at this year's U.S. Indoor Championships in Johnson City, Tennessee. Held in a fantastic flying site, this annual event drew fliers from California, Canada, Texas, Florida, New York and even England. It is certainly the mecca for indoor fliers, with a 116-foot ceiling making possible microfilm model flights over 1/2 hour and Mini-Stick flights over 10 minutes.

We observed some trends this year and have recorded them in a drawing format, much like Frank Zaic used to do for his Yearbooks. We hope you will enjoy perusing this quartet of innovative approaches to indoor flying. The new Mini-Stick event, held for the first time last year by Burr Stanton, is now in full swing at the USIC and in international postal contests. Because you can fly this event at your local gym or even at home (the Brits call it "Living Room Stick"), you will find it an easy way to enjoy indoor endurance flying. Just don't expect to equal Joe Krush's winning USIC time in your parlor—unless it has a 116-foot ceiling!



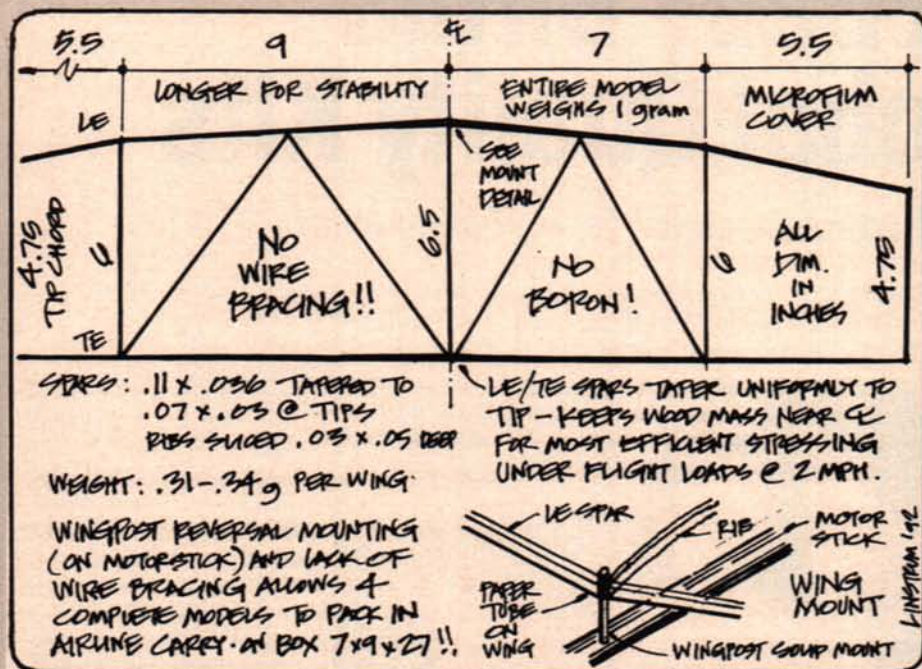
**GHILTON PROP** STAN CHILTON WICHITA, KS. INTER. STICK



**STANTON MINI-STICK!**



# AT THE U.S. INDOOR CHAMPIONSHIPS



## CEILING KNOCKER MINI-STICK

Use an enlarging copier to make the plan full size—enlarge the stab to 4-inch span and you will have it. All material info is on the plan—use 6-lb. indoor wood for best results. Cover with clear Ultimate film, applied with white glue or 3M SprayMent.

## TWINGE IHLG

Bruce Kimball of Seattle has come up with a rigid wing for his IHLG that allows him to fling it higher, for flights around a minute at the USIC. Note the laminated L.E. and the Mylar covering, shrunk tight for rigidity.

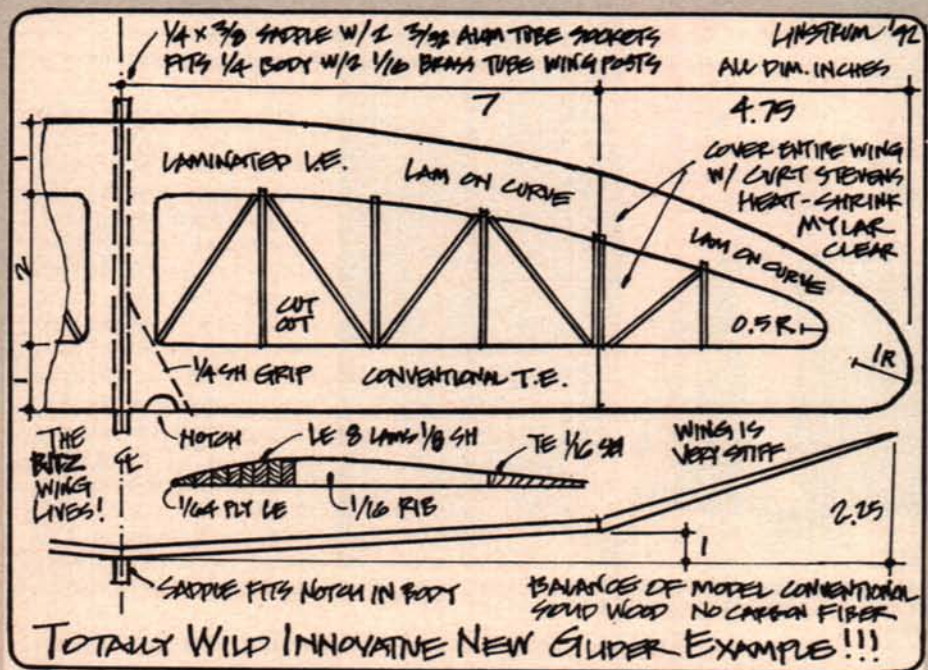
## CHILTON BORON PROP

Stan Chilton of Wichita has always come up with innovative ways to increase his times—his latest is a Boron-edged prop for his F1D microfilm model. This replaces the usual balsa strip edge, which is fragile. Like the Twinge, this revolving wing is stiff.

## HUNT F1D WING

Probably the quantum leap in microfilm model technique, this wing has none of the delicate wire bracing used since the early days to stiffen wings. It is simply built with fine stress engineering to allow it to flex in flight without bracing, but without breaking. Bernard Hunt, on the 1992 British Indoor Team, deserves credit for developing a model that can be boxed and hand-carried on jumbo jets, avoiding much trouble with baggage handling! **MB**

# HUNT F1D WING BERNARD HUNT - ENGLAND



# TWINGE IHLG BRUCE KIMBALL STRAT. O. BATS SEATTLE WA.



BY JOSE TELLEZ

## 1/2A Baby Birdie From Global Quality Kits

Try this smooth-flying, pattern-type aerobat for high-performance 1/2A fun!

If you are endowed with nimble fingers, good eyesight and enjoy an agile, fast and good-looking model that can be carried in the smallest car, Global Quality Kits has a model just for you.

Let me say up front that the 1/2A Baby Birdie is *not* a beginner's model. Not that there is something unusual or terrifying about its flying or construction—it is simply not your everyday high-wing trainer that flies almost hands-off and comes with volumes of instructions. Baby Birdie calls for someone who has already built a kit or two and who is comfortable—and competent—with control sticks at his thumbs.

If you fit that description, you will love it!

The model is just 37 inches in span and 30 inches long, with a tapered wing and a graceful profile. It is designed for a Cox Tee Dee .049 or .051. The instructions mention the alternate installation of a Cox .074 Queen Bee engine for those who want the luxury of throttle control, but include no details. A casual comparison of the Queen Bee with the plans reveals that the firewall would have to be moved back about an inch, which limits the space available for the fuel tank.

As we have already established that you are not a beginner, I am not going to drag you through a boring step-by-step of how I built the model, but rather tell you what choices or modifications I made and why, as well as a few pertinent hints that might help if you choose to build one of these good-looking, fun little machines. For the most part, the instructions supplied, simple as they may be, are a reasonable guide to the construction.

The instructions suggest flying without a landing gear, hand launching the ship and landing on grass. Alas, my home field is

wheel hubs riding on the screw threads, so I bought a set of Klett #303 wheel axles to provide a nice smooth surface for the wheels.

Du-Bro and Goldberg also supply similar wheel axles, so use whatever is available at your local hobby shop.

Because there is little description as to how to install a landing gear, I was able to vent off my scratch-building instincts and made an installation that also allowed me to replace the wing hold-down rubber bands with nylon screws, which mount the gear to the fuselage and the wing to the fuselage. The gear is now easily removable in case I ever find a grass flying field. I will describe this in more detail, but first let me mention a few other items.

The plans call for a CB Tatone Long 1/2A motor mount which, after much searching, I found is no longer being made. Instead, I purchased a Great Planes MM05 motor mount, which is made for the Tee Dee .049 or .051 but is shorter than the one on the plans. As a result, the firewall had to be moved forward about 3/8-inch, which is fine because it allows a little extra room for the tank and battery installation.

One embellishment I allowed myself was to make the forward fuselage top removable, which allows access to the fuel tank, receiver and servos. This is not called for in the plans, but I am most happy I spent the extra effort. It not only eased the installation but also allows for adjusting and troubleshooting.

The kit provides plastic hinges for the elevator and ailerons. These hinges are fine



The 1/2A Baby Birdie is small and good looking, and our pretty little model, Kimberly Lacroix, has the proper scale to display it. Kimberly's father, Charles, and the author are both members of the Capistrano Aero-Dumpmasters club.

endowed with the most abrasive runway in the solar system (it's actually a paved asphalt road), which dictates the use of a landing gear. I followed the recommendation in the kit and purchased a Hallco B105-1 aluminum gear. It comes with 6-32 screws to serve as axles, which leaves the



for the ailerons, which attach to a 3/16-inch thick wing trailing edge, however, the elevator and stabilizer are built up from 1/8-inch thick strips, and in my kit, the wood was quite hard. Trying to make slots to insert the hinges would have most probably split the wood or at least compromised the strength.

If there ever was a place to use MonoKote hinges, this is it. I have used MonoKote hinges for years. I have several models that have been flying for five years or more and I have never had one fail. They are flexible, reliable and easy to do. I hesitate to describe making these hinges, as the technique has been repeatedly published, but if you are not familiar with them and need some advice, drop me a line and I will be glad to help you.

The kit went together rather quickly and I have no other comments relating to the construction, so let's go back to the landing

pattern should be drilled in the Hallco landing gear.

Cut four pieces of Nyrod (the inner rod on Sullivan #503 Gold-N-Rod or the sleeve

*One embellishment was to make the forward fuselage top removable, which allows access to the fuel tank, receiver and servos.*

part on Sullivan #507 or #515); these will become the nuts in the mount. Insert them in the 1/8-inch holes (they will fit snug) and apply some CA glue to bond them in place. When you are sure the CA has cured, use a single-edge razor blade to trim the rods

shape the outside to the airfoil contour.

To have a bolt-on wing, I glued a strip of lite-ply across the fuselage just forward of the wing spar and a glued a second strip to the side of the fuselage and to bulkhead F-4. One of the photographs shows these strips clearly. I backed the plywood with a piece of plastic, drilled and tapped to receive the wing hold-down bolts. My wing is held on by three #8 nylon bolts, which is overkill—one front and one back would be enough. The front bolts go through the landing gear and gear platform, and no further reinforcement is required. A scrap of lite-ply should be used to reinforce the wing where the rear bolt goes through.

Covering is very simple, as there are very few compound curves. I used MonoKote because I wanted to try out their new pearl wine color combined with cream. I thought the result was outstanding and have had many compliments on it.



The Baby Birdie shows up as a blur as Dave Herbert makes a low pass for the camera.

gear installation mentioned earlier.

Take a look at the sketches and photos and the idea will become clear. A landing gear mounting platform is laminated from two pieces of 1/8-inch lite-ply and is cut to fit forward of the bottom wing spar between the W-2 ribs. Four 1/8-inch holes are drilled as shown in the sketch. The same hole

flush with what will be the bottom of the platform. You can at this point run a 2-56 tap through each nut or have the mounting screws do their own tapping.

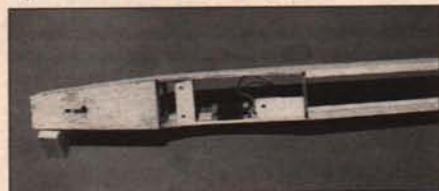
To mount the platform to the wing, you will have to trim the center W-1 rib as shown in the sketch. After gluing the platform into the wing, use a sanding block to

With my Birdie looking very racy, I thought it deserved to get a little extra class in the power department, so I ordered one of the aftermarket cylinder heads from Kustom Kraftsmanship, which allows you to use a Nelson glow plug on the Cox Tee Dees. KK claims a power boost through this modification and although I cannot quantify it, my

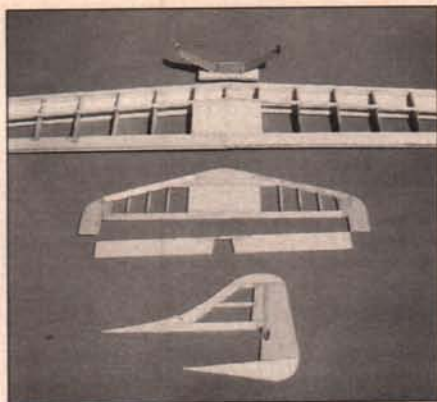




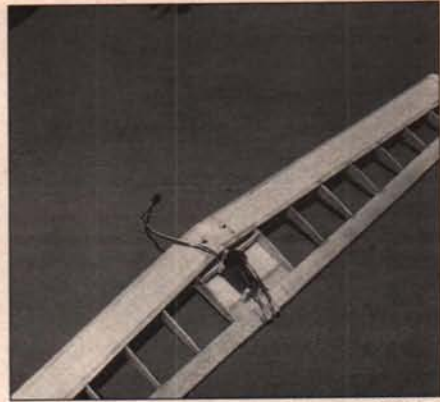
The lite-ply landing gear platform with the recommended Hallco gear attached with four 2-56 screws. This is something the author came up with on his own, to keep from damaging the model when landing on the asphalt road he often uses for a flying site.



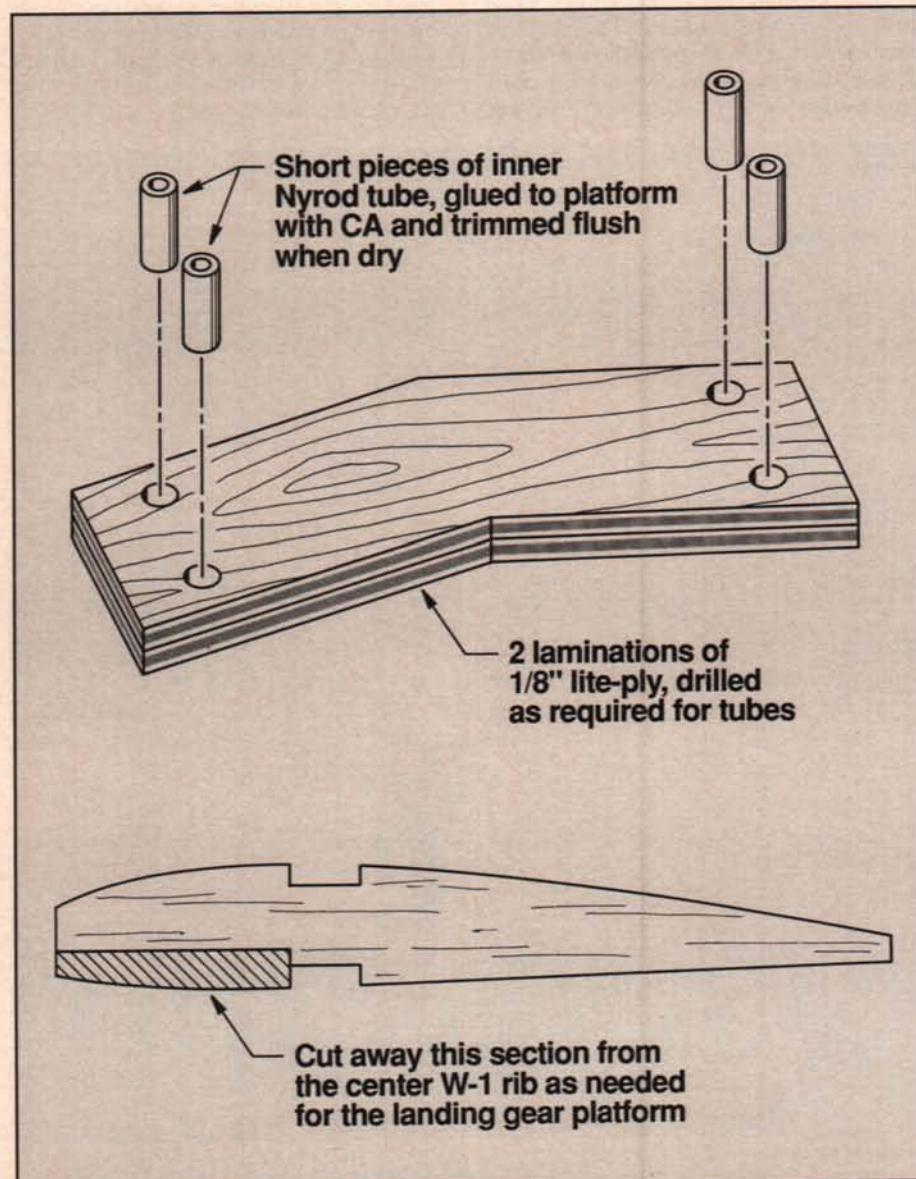
Forward part of the fuselage showing the lite-ply strips drilled and tapped for the three wing hold-down bolts.



The flying surfaces ready for covering. You can see where the gear platform fits forward of the wing spar.



Aileron servo is installed to the left of the central W-1 rib. Planking has still to be completed around the servo.



The author's mods for fitting the Baby Birdie with a Hallco aluminum landing gear—helpful when flying from rough fields.

engine sounds just great. A special fine-thread needle valve assembly was also used, which allows for more precise tuning.

With the Baby Birdie complete and ready to go, I was haunted by the thought of Murphy's law taking over and totalling the model in one great crash during its initial

flight! I decided to optimize my chances by recruiting the flier whom I have seen save models from the most extreme, gross and bizarre circumstances, and Dave Herbert was pressed into service.

As it turned out, there was nothing to worry about. Birdie tracked out on its first

*Birdie tracked out on its first hand launch straight and true and soon Herbert was showing the good pilot he is...*

hand launch straight and true and soon Herbert was showing the good pilot he is with rolls, loops, inverted passes and all you can do with an aileron/elevator ship. Only a couple of clicks of right aileron were required during the initial flight. Another club member flew the model to confirm our findings, and then I had my turn at the controls.

We all liked the way the little ship handled, but wished we had rudder control; not so much to enhance the model's performance, but rather to contend with our own field conditions. Our asphalt road runway has high curbs and we always seem to have a constant 90 degree crosswind, which tends to drive you into the curb during landings.

Hand launches are no problem; it feels sort of awkward to hold the model behind the wing, but you soon get used to it. It helps to wipe the fuselage down after each flight and to keep your hands clean, as it's difficult to hold an oily, slippery airplane at the proper attitude for launching.

In summary, the Baby Birdie looks as good in the air as it does on the ground. Put that Tee Dee and unused micro radio system to work and have a ball. If you need some help or clarification with yours, drop me a line: Jose M. Tellez, P.O. Box 733, Laguna Beach, CA 92652.

#### MANUFACTURERS MENTIONED:

- Global Quality Kits, 10725 Ellis Avenue, Fountain Valley, CA 92728-8610.
- Kustom Kraftsmanship, P.O. Box 3010, Fallbrook, CA 92028.
- Hallco, P.O. Box 38158, Urbana, OH 42078.
- Great Planes, P. O. Box 9021, Champaign, IL 61826-9021. **MB**





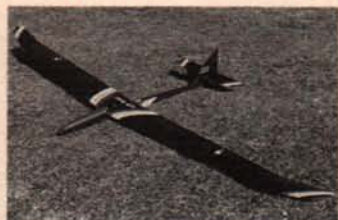
# Northeast Sailplane Products

16 Kirby Lane Williston, Vermont 05495 (802)658-9482

## Holiday Specials

### Alcyone

**\$149.95 Sale Price \$139.95!**



Designed for the intermediate pilot, the contest-proven Alcyone features a unique aileron control system designed to permit full function operation (ailerons, flaps, rudder, and elevator) with only three servos. This allows the cost-conscious modeler to build a full function airplane without the added expense of a computer radio. The Alcyone is one of the finest kits that we carry, and it is highly recommended as a first "bigger than two-meter" ship. With a 121-inch, 2-piece wing featuring a SD7032/7037 airfoil combination, the Alcyone is designed to win! The standard kit uses a wood fuselage, but a fiberglass version is available only \$45 more! We guarantee your delight with this kit or your money back!

### Alcyone 2M

**\$99.95 Sale Price \$94.95!**



Like its bigger brother, the Alcyone 2-Meter has outstanding performance and excellent kit quality. This airplane was designed in response to the extremely positive reception of the larger Alcyone. Our customers requested a 2-Meter version, and here it is! We are very pleased with the results of this design, and we are sure that our customers will be as well. Also sporting a 7032/7037 airfoil combination, the 2-Meter version of the Alcyone reacts very well in thermals. It often out-climbs higher-priced airplanes due to its low wing-loading and well designed planform. Also, the plane is very durable yet easy to build. The Alcyone 2-Meter is one of the best buys on the market!

### Sparrow

**\$99.95 Sale Price \$94.95!**



The Sparrow is taking the slope soaring industry by storm! This beautiful slope ship features the SD7080 airfoil on a 65-inch blue foam and balsa wing. The fuselage is a high-quality fiberglass unit with a removable canopy, and is one of the best-looking bodies in the air. The Sparrow's tail surfaces are pre-cut balsa sheets designed for easy installation and durability. All necessary hardware is included, and the Sparrow is very easy to build. Intended to fly in both light and moderate winds, the Sparrow is one of the most versatile airplanes available for slope soaring. This kit is a must for every slope-soaring pilot, and is an excellent gift selection!

### Dove

**\$124.95 Sale Price \$109.95!**



The Dove is our newest kit, and we couldn't be more excited about a product. We designed the Dove to be a gentle and graceful flyer, and it makes a perfect first aileron ship. The 2-Meter wing is available in either a gentle E214 airfoil, or the more aggressive SD7037. The Dove will fly in the lightest of lift, and is great for both open field thermal flying and slope soaring. It is particularly well-suited to in-land slopes due to its uncanny ability to stay up in weak lift. Although an aileron ship, the Dove requires only two servos due to an elegant and simple mixing design. Its fiberglass fuselage is easy to finish, and the full-flying two-piece stab makes the ship portable. Try the Dove...we are sure you'll love it!

### Chup-Combo

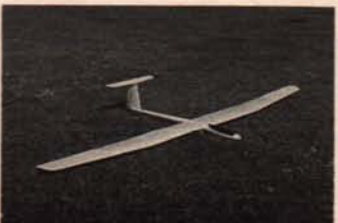
**\$95.95 Sale Price \$84.95!**



The Chup-Combo is a combination offering that features a 1.5-meter Chuperosa hand-launch kit coupled with a 2-meter wing kit. The 2-meter wing fits the fuselage included in the hand-launch kit, thus you end up with both a hand-launch and a 2-meter for the price of many 2-meters! The Chuperosa has an excellent reputation as one of the best hand-launch airplanes around. It was an AMA NATS champion, and can still tango with the best. The 2-Meter wing kit turns the Chuperosa into a very gentle thermal flyer, and can be flown by a beginner. The wings for this offering are available in either an E214 or SD7037 airfoil. The quality of this kit is so good you have to see it to believe it!

### Saturn 3.0

**\$500.00 Sale Price \$425.95!**



The Saturn is an unlimited class sailplane that combines the highest quality composite materials with state-of-the-art design and manufacturing techniques. It features ultra-strong epoxy-glass over foam wings with carbon-fiber spars. The fuselage is made of fiberglass that has been reinforced with Spectra (one of the strongest known composites). The rudder and elevator are also foam with glass covering, and a carbon fiber bell crank is included for strength and reduced tail weight. Saturn's highly efficient HQ 2.5/9 airfoil provides an impressive speed range and thermalling ability. For the person looking for a fast, high-tech competition soarer the Saturn is an excellent selection.

## Sailplane Fever is Catching!

The popularity of RC Soaring is growing at a rapid pace. Many people are discovering the joy of silent flight, and the thrill of catching a thermal or soaring on a slope. We at NSP are dedicated to providing you with the finest supplies that this hobby has to offer. From rank beginner to extreme expert, we can fulfill your needs. NSP deals exclusively in sailplanes and sailplane accessories. We carry the most diverse selection of RC soaring products in the industry, and are proud of the many happy customers we have made over the years. Our product selection includes kits, accessories, radios, and services. We offer pre-built wings for many of our kits, and can arrange to have models completely built for a reasonable fee. Also, we offer a trade-in program for people looking to upgrade, but are a little short on cash.

If you are shopping for a gift, or are not quite sure what to buy, please call us. We are here to help, and commit to you that we'll make your selection a good one or your money back! If you have never tried RC Soaring, then treat yourself to the purest form of flight! It's the BEST way to learn to fly RC, and we can help you get started!



**Sal DeFrancesco  
and  
Stan Eames**

### Shadow

**\$399.95 Sale Price \$349.95!**



The Shadow is without a doubt one of the finest kits we have ever seen (and we've seen lots of kits!) This offering features quality throughout as evident in its plans and fittings. The plans are pre-cut into manageable sizes and even include pushrod layouts. The bellcrank and horns are anodized aluminum (no one else goes THAT far!), and the design work is fantastic. This plane comes with the wings PRE-SHEETED, ailerons routed, alignment done, and features light-weight hollow fiberglass wing tips. The prefabrication on this kit alone makes its price incredible, but the engineering and performance make it a must-buy kit. The Shadow placed in the NATS this year, and was flown by world champion Joe Wurts at the LSF Championships!

### Pinnacle

**\$69.95 Sale Price \$64.95!**



The Pinnacle Hi-Start is the result of extensive research conducted by NSP regarding what makes the best Hi-Start in the eyes of the customer. We asked people what they wanted, and then we delivered. The Pinnacle features UV-protected rubber, line that is dyed high-visibility day-glo orange, top-quality hardware, a custom-designed no-tangle parachute, and the best reel that we could find. We even include clips that attach the steel stake to the reel when it is not in use. The Pinnacle is available in several models of varying strength, but all feature the same quality components. Our holiday special features our medium size model which is perfect for two-meter or standard class airplanes. We believe that you won't find a finer Hi-Start anywhere.

**Seasons Greetings  
from NSP!**





The Brown Jr. event drew a remarkable number of entries, ranging from Comet Clippers to Trenton Terrors. Lots of well-known Old Timer models seen here—you just pick 'em out.

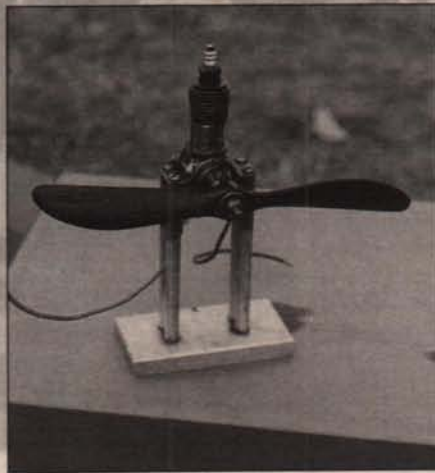
**PLUG SPARKS BY JOHN POND**

# MB GOES TO THE 'BIG ONE'

**Pond is on the road again, this time clear across the country to the 1992 SAM Champs**



Bob Rooman was thrilled to pose with his Red Zephyr and the guy who designed it, Herb Greenberg. Brown Jr. power, of course. Rooman photo.

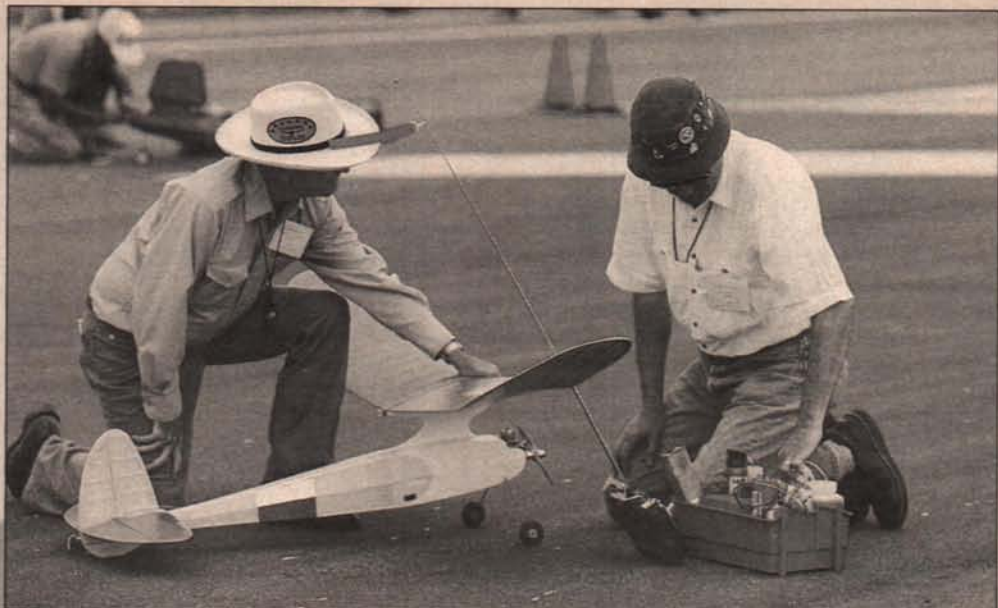


The original 1933 Brown engine of .48 cubic inch displacement, as used by Maxwell Bassett. Bill Brown ran the engine innumerable times during the week of the Champs.



Warren Weisenbach, of Cleveland, Ohio, seen with a Forster .29-powered LaTorre "Alert." Note the lightweight wheels, made from the bottoms of aluminum beverage cans.





Ed Hamler (right) came from the West Coast to place tenth in RC Class C Glow with a Fox .36 powered Playboy. Bob Rooman photo.

This writer was absolutely stunned when he realized that 1992 marked the 26th running of the Annual SAM Champs. Boy! Have we come a long way! This year's meet was again held at the Air America Flight Center in Lawrenceville, Illinois, and incorporated just about everything, from the MECA "Grando" Collectogether held on Saturday, July 4, followed by two days of free flight Nostalgia events, then four days of traditional Old Timer events, finally wrapping up Friday, July 10 with the Awards Banquet.

This was one of the longest SAM meets to date. To take everything in, one had to arrive on Friday and stick around until the following Saturday. In the case of this columnist and his buddy Bill Bowen, this meant a trip of 18 days! Nonetheless, quite a few West Coast boys showed up.

Every time it seems that interest in SAM is starting to wane, someone or some club comes up with a new idea. This year it was the Brown Junior event, as promoted by John Delagrange and his SAM 100 boys. In years past, it has been events like .020 Replica, 1/2A Texaco and 1/2A Texaco Scale



An unusual subject for FF Rubber events, the 1939 Ed Lidgard Class C Fuselage design flown by Charles Hermanek, of Decatur, Illinois.



One of the most popular rubber scale free flight subjects, a Peerless Corben Super Ace by Larry Phair, of Ypsilanti, Michigan.





An interesting Chet Lanzo design, the 1938 "Classic" flown in Large Rubber Fuselage by Bob Bienenstein, of Allen Park, Michigan.



One of the real spark plugs on the East Coast, Jack Bolton, with a Bantam .19-powered Megow Ranger. Jack lives in Pensacola, Florida, and works out of Washington, D.C.

that have aroused interest.

This year, 39 Brown Jr. models were entered and 28 made official flights, despite the terrible wind conditions. Late-comer to the O.T. game, Bob Peru, copped top honors in this unusual event.

Interest flared to such a height that Bill Brown, the original engine designer, gave out pith helmets to all entrants—no problem spotting the Brown Jr. contestants! In addition, a decal patch was issued to every model flown. To keep up the flavor of the event, Bill Brown brought out his original .48 cubic inch Brown engine mounted on a pedestal and proceeded to entertain the troops by running the engine several times during the week.

Not to be outdone, Herb Wahl, manufacturer of the replica Brown Jr. engines, put up a brand-new Wahl Brown motor for first prize. This is exactly what this writer has been pushing for in the Old Timer events—a thorough enjoyment of old en-

the shelters would actually take off over the parked cars. This year, we were favored by one landing on the runway!

The annual SAM Business Meeting was held on the second day of competition. The "business" is a misnomer now, as very little is brought up for the membership to discuss.

The meeting is the vehicle for inducting new members into the SAM Hall of Fame. This year, we had the following inductees: George Armstead, John Drobshoff (deceased), Carl Goldberg (deceased), Ed Lidgard, Don Lockwood, Leon Shulman, Wally Simmers, Bob Summers, Peter Sotich, Herb Wahl and John Worth.

The Champs is scheduled for the West Coast next year, but those in charge of procuring a field had no report. Larry Jenno of SAM 25 volunteered his club to run the Champs at the El Dorado Dry Lake outside of Las Vegas. By now, the average SAM member is beginning to wonder if there is any other place than southwest Nevada to

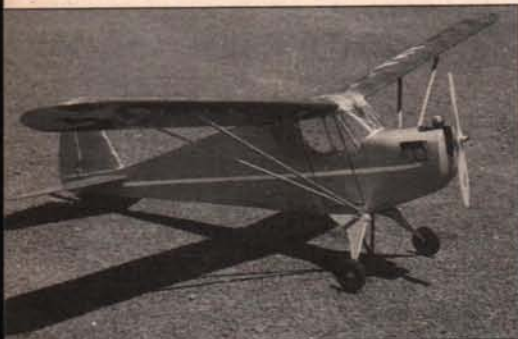
heard to say he would never vote for anything that was covered with plastic. This seems to be a hard-nosed opinion expressed by the majority, as only silk-covered models were winners.

The above attitude does not apply to silk only, as several die-hard modelers have even refused to use modern glues (aliphatic resin, two-part epoxies and the myriad cyanoacrylate glues). The preference expressed for Duco or Comet cellulose cements is amazing!

What about the flying? The grossly over-powered RC models attracted the most attention. However, most who came and flew registered good flights.

Over on the FF side of things, the winds definitely reduced the flying action. It truly was devastating to drive by the FF flight line and discover that better than 50 fliers had given up. The cornfields directly downwind were enough to daunt the boldest.

Noted, however, was a considerable dif-



The RC 1/2A Texaco Scale event drew 32 entries. Dan Schneider turned out this Aeronca Tandem, which placed 12th. Schneider photo.



Bill Brown showed up for the Brown Jr. event with a Lackey Zenith. With 39 entries the first time out, this promises to be an extremely popular special event at future SAM meets.



Here's a rare one! A Charles Guarnieri "Snooty," published in the December 1941 *Model Craftsman*. Power is a Torpedo .29. Dan Schneider builds models we like to see! Schneider photo.

gines and models. In short, FUN!

Dick Dwyer, MECA Coordinator, reports the "Grando Collecto" held at the Indiana State University auditorium was such a success that prizes given away in the drawing exceeded the number of registrants! Needless to say, a good time was had by all.

After the first two days of Nostalgia events, where we were treated to a sample of the winds to come, the SAM events got started in earnest with the days being plagued alternately with heat, humidity, wind, and thunderstorms. The winds were reminiscent of the Seguin (Texas) Champs, where

hold a SAM Champs!

To beat the fierce Nevada desert heat, it was proposed to start each day's flying at 6 a.m. and quit early. I feel this would work quite a hardship on officials, as they would have to rise by 4 a.m. to be sure the meet started on time. This reporter views this "6 a.m. fix" as rather useless, as most fliers wait until the heat builds up with the resulting winning thermals. End of soapbox.

While we are on a "gripe" kick, the Spirit of SAM Concours, a static event, revealed a rather myopic opinion of what constitutes a beautiful model. One modeler was over-

ference in the rubber models, with many selecting designs not generally used in competition. Excellent examples of this trend were Al Casano's Championship Stick Model by Tom McCoy, a 1939 Ed Lidgard Class C Fuselage Model by Charles Hermanek, and several Lanzo Classic models. Great to see these designs fly and be competitive.

When it comes to the RC events, however, the opposite is true. It has gotten to the point where 50% of the entries in any RC event are some size of Lanzo Bomber.

The writer has even succumbed to this craze, as he has an excellent flying electric



Leisure Bomber. What is the answer? With Bombers being supplemented by Playboy Seniors, there is hardly anything on the horizon for a "new" ship that would be competitive in all events.

One solution would be to adopt a handicap system similar to what was improvised by the Western Associated Modelers for FF flying scale competition. After the same model wins more than twice, it is given a percentage handicap to reduce its overall points. By the time the builder enters it for the third or fourth time, the other boys have caught up and passed him. One way of making the winner produce new models!

As Dave Lewis, newsletter editor for SAM 21, reported, there was a mixed bag of pleasant things and other things not so good. The field at Lawrenceville is excellent for RC, while the FF boys took a beating from the cornfields.

Summarizing the meet, all SAM Champs are like women; they are all good, just some are better. This writer enjoys meeting old acquaintances and making new ones. It is truly a pleasure to meet the old boys again—the Konefes brothers, Joe Elgin, George Perryman, George Armstead, Bert Pond, and a host of others. This is what makes the SAM Champs attractive. As far as I am concerned, everyone who attends is a winner and much richer for the experience.

If I missed you this time, I'll see you at the next Champs. I have only missed one in 26 years!

## RESULTS OF THE 26TH ANNUAL SAM CHAMPS—JULY 7-10, 1992

### FREE FLIGHT

#### Class A Pylon (43)

1. Don Reid (Ranger/Elfin 15) 840
2. Elmer Jordan (Interceptor/O&R 19) 434
3. John Bortnak (Alert/O.S. 15) 360
4. Wayne Cain (Playboy Jr./Arden 19) 358
5. Larry Jenno (Kerswap/Elfin 15) 354

#### Class B Pylon (39)

1. John Bortnak (Wasp/O.S. 25) 462
2. Bob Edelstein (Wasp/Forster 29) 458
3. Marcy Martin (Alert/Forster 29) 348
4. Mitch Post (Zipper/Torp 29) 326
5. James Robinson (Alert/Forster 29) 325

#### Class C Pylon (41)

1. Robert Johannes (New Ruler/O&R 60) 944
2. Marcy Martin (Alert/Forster 35) 840
3. Mitch Post (Zipper/Torp 35) 443
4. Harry Murphy (Zipper/O&R 33) 438
5. Dick Hall (Wasp/O&R 33) 408

#### Class A Fuselage (32)

1. Don Reid (So Long/Elfin 15) 355
2. John Bortnak (So Long/O.S. 15) 348
3. Sal Taibi (Dodger/Elfin 15) 344
4. Harry Murphy (Dodger/O&R 19) 339
5. Elmer Jordan (Coronet/Arden 19) 321

#### Class B Fuselage (36)

1. John Bortnak (So Long/O.S. 25) 459
2. James Robinson (Dodger/Forster 29) 353

3. Wayne Cain (Dodger/Forster 29) 323
4. Bob Edelstein (So Long/O&R 23) 300
5. Dick Patton (Dodger/Forster 29) 255

#### Class C Fuselage (31)

1. Mitch Post (Playboy/Cyke) 600
2. John Bortnak (So Long/O&R 33) 359
3. Wayne Cain (Dodger/O&R 60) 355
4. Tom Lucas (Playboy/Atwood) 346
5. Ted Dock (Dodger/Forster 35) 326

#### 30 Second Antique (30)

1. Tom Lucas (Rambler/Atwood) 568
2. John Bortnak (Flying Midget/O&R 33) 343
3. Bob Edelstein (Clipper/Cyke) 323
4. Herb Wahl (Clipper/Tiger) 303
5. Dick Hall (Scram/Cyke) 293

#### .020 Replica (58)

1. Guy Eaves (Strato Streak) 480
2. Warren Kurth (Playboy) 403
3. Sal Taibi (Strato Streak) 400
4. Ben Cleveland (Zipper) 293
5. Tony Italiano (Kerswap) 282

#### Gas Scale (20)

1. John Bortnak (Skyfarer/Cox .020) 127
2. James Robinson (Curtiss Robin/O.S. 25) 6

#### Ohisson 19/23 Cabin (18)

1. Bob Edelstein (So Long/O&R 23) 312
2. Elmer Jordan (Coronet/O&R 23) 220
3. Marcy Martin (So Long/O&R 23) 201
4. Sal Taibi (Dodger/O&R 23) 120
5. Douglas Koch (Bucc. Spcl./O&R 23) 103

continued on page 64

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# HANNAN'S HANGAR

BY BILL HANNAN

**“Variety’s the very spice of life, that gives it all its flavour.”**

Our lead-in quotation is by English poet William Cowper (1731-1800), and applies perfectly to model building. Few other hobbies offer such a wondrous variety of choices. We can choose to fly indoors or outside; in free flight, by control line or remote control. We can elect to fly gliders (hand-launched, catapult or towline); power models (motivated by rubber, CO<sub>2</sub>, compressed air, electricity or internal combustion engines). One can create original designs or produce scale models, selecting from an almost unlimited array of full-size subjects. Size options can range from diminutive shelf models through enormous projects. What’s your pleasure?

## FAC NATS

As expected, this year’s Flying Aces Club Nationals was a total success, attracting some 523 entries which logged 1,380 official flights, according to club newsletter editor Lin Reichel. Only the EAA fly-in at Oshkosh attracts more aircraft! Of the many FAC prizes awarded, *Model Builder* readers may be



The translucent charm of stick and tissue! Fine rubber-powered Albatros C-III is by Bob Howard. His father, Dick, took the photograph.

soundingly demonstrating their “Spirit of the Sky” philosophy!

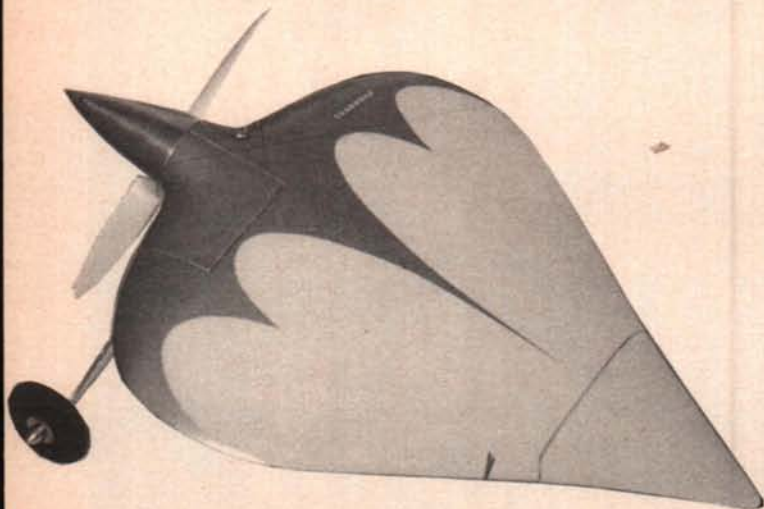
## EAA SURVEY

From the Experimental Aircraft Association’s *Wings For Tomorrow* report, via Bob Whittier, the results of a 2,000 long-time member survey: 92% of responders first became interested in aviation by age 15; and 86% expressed concern that young people are not as involved in aviation today. They see two significant challenges:

ambitious 12-year master plan to attract young people to aviation. For more information regarding this most worthy program, contact: Ed Lachendro, Young Eagles Coordinator, EAA Aviation Foundation, Box 3065, Oshkosh, WI 54903-3065.

## MODEL PHILATELY, ANYONE?

Some of our readers keep up with more than one hobby (how do they manage?), and



How’s this for radical? Wild control liner by Vern Clements actually dates back to 1953, when it won a blue ribbon for Best Workmanship in the state of Idaho.

most interested in the Walt Mooney Memorial Trophy, which was earned by Paul Boyanowski, of the Detroit Cloudbusters, for his outstanding Fokker F-32 Peanut.

Our congratulations to the Flying Aces Club for so re-



Gray Blanton’s license plate serves as backdrop for Fritz Mueller’s CO<sub>2</sub> powered RC Peck Prairie Bird. Model was made as a gift to engine manufacturer Bill Brown.

1. We need to bring more people into aviation.
  2. Future generations will not appreciate aviation as we have.
- In response, the EAA has an

stamp collecting seems quite popular. Joseph Palko specializes in finding stamps which depict model airplanes, and so far has located examples



from Hungary, Yugoslavia, Korea, The Netherlands, Poland, Romania, Russia, and Vietnam. Subjects portray everything from model gliders through RC pattern planes. Perhaps it may be time to lobby for an American model airplane postage stamp?

### LANGLEY'S STEAMER

Our column's item about Samuel Pierpont Langley's successful 1896 steam-powered tandem-winged model brought a letter from Robert Sennett, of Warsaw, Indiana. He has compiled an illustrated four-page folder about the Langley model which also features a three-view drawing of the the Aerodrome "A" aircraft of 1903. Robert offers copies to *Model Builder* readers for only 25 cents plus a stamped, pre-addressed return envelope—surely a bargain.

### SPEAKING OF THREE-VIEWS

Editor/Publisher Leonard Opdycke thinks the answer to having more drawings, especially of obscure subjects, may be at hand in the form of a computer program that can generate such drawings from a single photograph. Developed by Frank van Dalen, of Holland, it will be fully described in the November issue of *World War I Aero* magazine. This publication continues to expand, responding to the interests of full-size and model aircraft enthusiasts. The contents are much broader than its title might indicate, extending also to the pioneering days of aviation, prior to World War 1. We recommend it highly, and suggest you order a sample issue for \$4, from WWI Aero, 15 Crescent Road, Poughkeepsie, NY 12601.

### ARIZONA AIRPLANES

Dick Howard, builder of the Gee Bee R-2 framework in one of our photos, explains the conditions under which it was constructed in hotter-than-

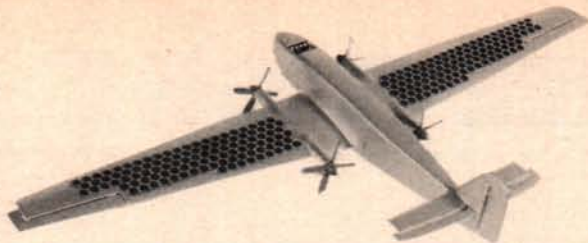
usual Arizona: "Paint dries immediately (no more painted hands), instant glue dries even before it comes out of the bottle, no more waiting for wet tissue to shrink, and certainly no need to gather firewood. Our normal temperatures exceed 100 degrees, with highs of 115 to 120 degrees. Come join the fun!"

### HANDY HINT

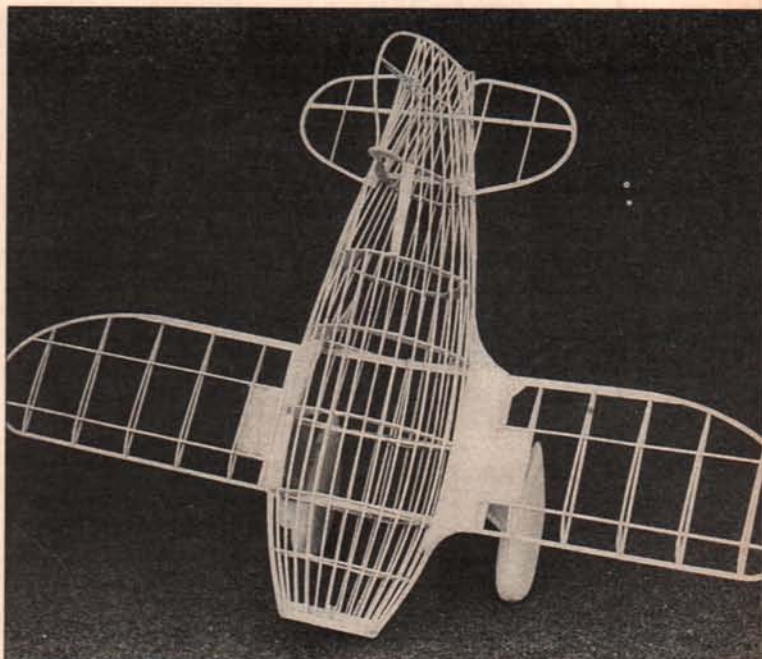
From Fritz Mueller, of Georgia, comes a different approach to coloring model aircraft. Art supply stores sell soft pastel chalk in a vast variety of colors, which can be pulverized and mixed with clear lacquer or white glue, depending upon the desired use, and bingo!—instant color. Fritz finds it particularly useful in matching faded colors during repairs to older models, and unlike most paints, the cost is extremely reasonable.

### LONG-REACH INSTRUMENTS

Two of our photos show highly specialized laproscopic surgical tools, which are also useful to model builders. For instance, they are ideal for removing bunched-up broken rubber motors from the rear of fuselages. The cutters and jaws are easily rotated and actuated remotely by the handles. These instruments were donated by Symbiosis, their manufacturer, to help raise funds for the U.S. Indoor Team, and are available from Dr. Vernon Hacker, 25599 Breckenridge Dr., Euclid, OH 44117-1807, for \$10 each. By



Nothing new under the sun? This model of a proposed solar-powered plane was designed in 1928 by A.B. Henninger, of Germany. The model was constructed by Hans-Peter Dabrowski, and the photo was supplied by Hans Justus Meier.



Dick Howard's rubber-powered free flight Gee Bee R-2, showing work-intensive structure, built under hot conditions. See text.

no coincidence, the Symbiosis firm employs several indoor model builders!

### THOUGHTS FOR THE DAY

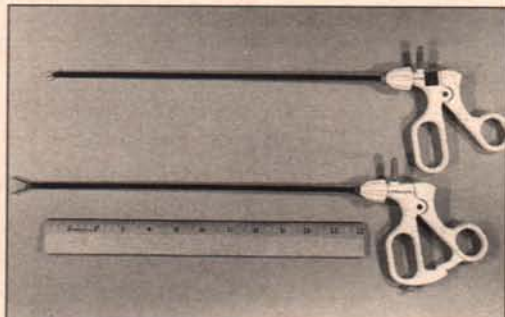
George Benson, of Mill Valley, California, says his main difficulty is wanting to "leap from project to project like a grasshopper." He thinks modelers should establish some sort of group-therapy organization, such as "Plans Anonymous."

John Hodgkin, of Winston, Connecticut, has similar feelings, observing: "I just can't

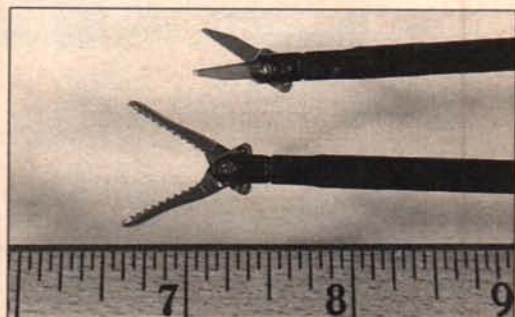
seem to build. I just collect, collect, collect! Too much of a good thing? I think the problem is that I'm in my second childhood and, true to the times, want instant gratification. I've just got to slow down and savor the pleasure of building the models."

Well, George and John, we think you have plenty of company! My approach, as my spare time and attention span diminish, is to select less complex aircraft to model. Any better ideas out there?

*continued on page 82*



These surgical tools are ideal for extracting rubber motors from models and are offered at low cost by Vernon Hacker, M.D. See text for more information.



Close-up look at the two types of surgical instruments available. Profits from tool sales help support the indoor model builders' fund.



# FREE FLIGHT

BY BOB STALICK

## Free Flight Potpourri

...a melting pot of items aeronautical...

Potpourri. It's an assortment of odds and ends that have no apparent organization. Some of you may think all of my Free Flight columns are like that, but I choose to think they tend toward an eclectic style. However, this month I find many unfinished and unrelated topics in the in-basket to share with you, so let's get started.

### DECEMBER THREE-VIEW: ELMER JORDAN'S PEE SHOOTER

This month's design comes from the prolific pages of the *CIA Informer* newsletter, as edited by Moe Whittemore. The Pee Shooter three-view was sketched by Bill Brewer, who offers full-size plans for it, as well as a previously featured Pee Wee 30 from this column, the Basic Yeller. Plans are \$5 each from Bill at 2370 Old Oxford Rd., Hamilton, OH



Joe Page's "Mini FAI" and its travel case. Model was designed by Loren Williams and published in the October 1972 *Model Builder* (Plan #10722, \$5.50). Photo by Dan Walton.

45013.

Back to the model. If you look carefully, you'll see it bears a strong resemblance to the RamRod or Texan designs from the 1950s. It is built light, with the so-called "airlite" wing and tail rib system. The model should come in well under the required 100 grams minimum, so it can be ballasted at the CG to bring it up to flying weight.



Nostalgia at its best—Bob Deshields with a Ramrod and Bob Beecroft with a Lucky Lindy, photographed by C.O. Wright at the 1992 Orbiteers Annual at Lost Hills, California.

Although the CG doesn't show on the three-view, my calculations would place it between 75% and 78%. The model should be trimmed to fly right-right by using a small amount (1/16-3/32 of an inch) wash-in on the right main wing panel. Some right rudder tab but no engine offset other than downthrust as shown will be needed.

It's a nice model for an event that started with a big push some years ago, but seems to have reached a plateau during the past two or three years. Maybe it's on account of those sometimes cantankerous little Pee Wee engines!

### DECEMBER MYSTERY MODEL

This twin-fin, single-wheel design was shown to me by fellow club member George Oldershaw. He had obtained the full-size plans from John Pond Plans Service as a potential 1/2A Nostalgia ship. I became enamored with the design because it has such clean lines and out-of-the-rut looks. Unfortunately, the stock size is a

bit on the small side (165 square inches) for anything but an early Wasp or OK Cub .049. It could be scaled up to around 220 square inches or so to fly with a Cox reed valve engine, and it should be quite competitive.

The original model did not appear as a construction project in any of the national magazines, but was kitted by a major manufacturer of the time.

If you think you know the name of the model, write it down on a postcard or in a letter and send it to *Model Builder*. If your guess is correct and is drawn at random from among the correct entries, you will win a free one-year subscription to *Model Builder*. Also, if you built this model back in the early 1950s, I would appreciate it if you would send any anecdotes or pictures in your letter, so they can be forwarded to me. Do it soon!

### SEPTEMBER MYSTERY MODEL WINNER

Frank Beatty of Granite City, Illinois scored himself a free one-year *Model Builder* sub-



scription by correctly identifying Gabriel Bedish's "Spunky" rubber ship from the December 1946 issue of *M.A.N.* It's a small, 30-incher with a two-blade folding prop, single retracting wheel and an anhedral stab being its unique design points.

### WALLACE E. "BUCKETS" JOHNSON

I received word from Hardy Brodersen in July that well-known free flighter Wallace E. "Buckets" Johnson had passed away from a massive stroke.

I saw Buckets at a couple of meets in the 1970s and was very much impressed with his models and his approach to free flight. Buckets was extraordinarily competitive. His models all seemed to have a Confederate theme to them, and they did fly well! One feature I recall vividly was how he placed the DT fuse in the middle of the stabilizer at the top center—unusual, but it did the job.

As with others who have passed through our lives, Buckets enriched many by his presence. He'll be sorely missed.

### ELEVEN TIPS FROM ED LIDGARD

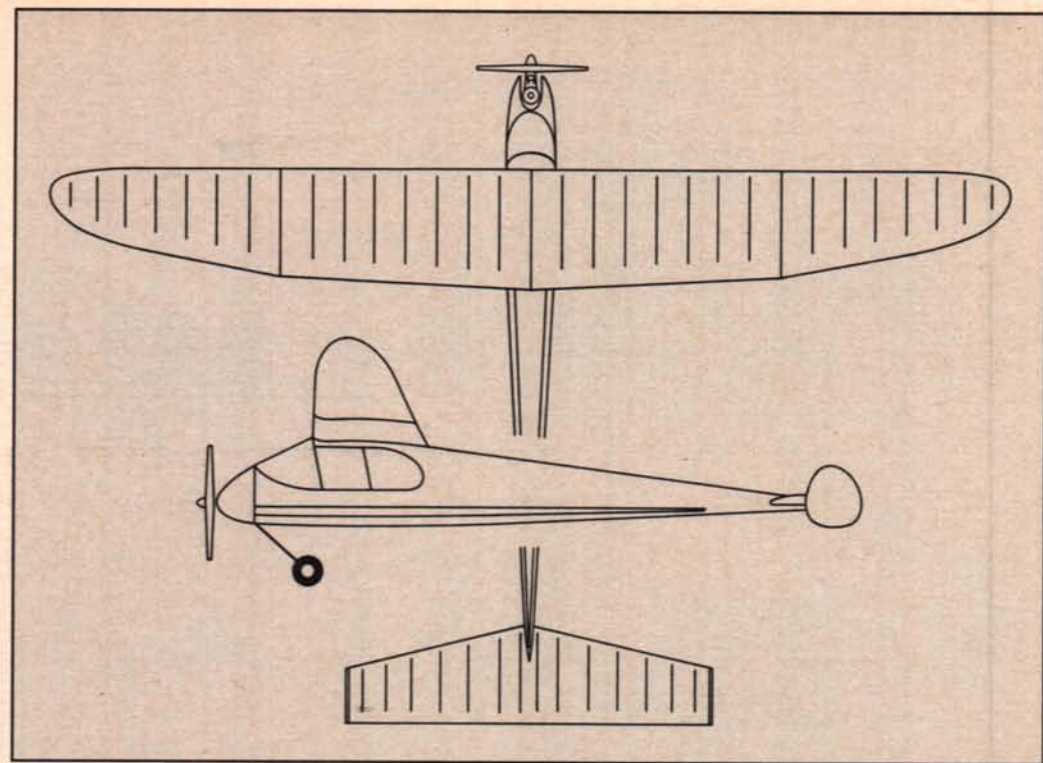
These ideas and practices come from Ed Lidgard, as printed in the *Thumb Print*, the newsletter of the Thermal Thumbers of Metro Atlanta:

"1. Find that a hole is too tight for the wire you want to use? Roll a coarse file over the wire to roughen the surface, then use this disposable wire to ream out the hole.

"2. To avoid dope running under masking tape or frisket paper, coat the edge with clear dope, let it dry, and then color dope.

"3. Silk or tissue tend to bubble on the trailing edge? Soften the area with acetone, then rub full-strength dope over the bubble until it flattens out.

"4. Field too small for full turns? Make a stick one-half the weight of the rubber motor and one-half the distance between



MYSTERY MODEL

the hook and the rear peg. Wind one-half maximum turns.

"5. Optimum thinning for applying dope to silk by the tissue flowing method is 65 to 70%.

"6. You have .055 inch wire and need a bushing? Place the wire in a piece of 3/32-inch O.D. brass tubing and crimp the tubing with cutters every 1/8-inch in three rows down its length.

"7. You need to solder a washer on a wire and there are no washers with the right size hole? Place a washer with a too-small hole on the end grain of a wood block. With an awl hammered into the washer hole, make the washer fit your wire.

"8. Silk or tissue sticking to your formers? Rub beeswax or candle wax on the formers after all gluing and sanding is done.

"9. Edges of your props getting nicked? Hold a piece of wax paper against the underside along the edge. Doing one inch at a time, run a bead of medium viscosity CA along the edge. Immediately sprinkle or blow baking soda onto the CA. Repeat to add volume, then turn over and repeat if needed.

"10. On new props, run the outside edges of the prop through a puddle of CA to harden the edges, then sand as required.

"11. When silk or tissue does not tighten properly and the first coat of dope does not help much, re-spray with water. Let dry well and re-dope."

So, there you go. All of us can take some good advice from one of the masters of the hobby. Thanks, Ed.

### NOSTALGIA BOOKS FROM FLY BY NIGHT PRESS

Interested in finding out about some of those off-the-wall Nostalgia designs with names such as Robomb X, Up 'N Atom, and Scimitar? If so, you should look into purchasing a couple of books that contain plans of these and other Nostalgia era designs. The books are titled *Nostalgia* and *Nostalgia Too*. Each book contains over 20 three-views, building tips and commentary. Cost is \$6 for *Nostalgia* and \$7.50 for *Nostalgia Too*. Order directly from Campbell's Custom Kits, 401 Executive Center Drive, Suite H-108, West Palm Beach, FL 33401. Be sure to include postage with each order. While you are at it, you might enclose another \$3.00 for Lee Campbell's latest catalog. Lee carries a large supply of free flight equipment and supplies and is the largest U.S. producer of quality free flight kits today.

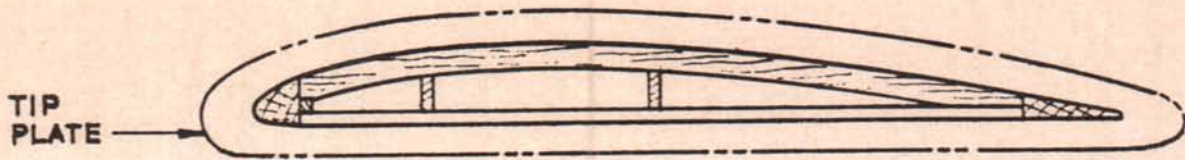
### "CLIMAX A" FULL-SIZE PLANS UPDATE

The Climax A was featured as a three-view in the September issue of *Model Builder*, and full-sized plans for several different sizes are now available from its designer, Mal MacLean. Mal has plans for the original 43-inch wingspan model as well as 56- and 77-inch wingspan sizes. If you are interested in these plans, the 43-incher goes for \$7.50; the 56-inch and 77-inch sizes sell for \$8.50 and \$9.50, respectively. All plans are shipped postpaid. Contact Mal MacLean, 195 Mason Ct., East Northport, NY 11731.

### N.W. INDOOR FREE FLIGHT CHAMPIONSHIPS

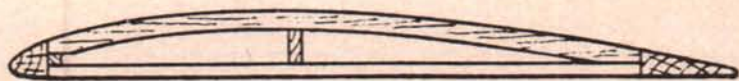
In July, I made the scenic 400-mile trip from my home in Albany, Oregon to Moscow, Idaho for the annual N.W. Indoor Free Flight Championships, held at the University of Idaho's Kibbie Dome. This building is a large (144-foot ceiling), 14,000-seat athletic complex that stages many intercollegiate activities, including football, basketball and track events. Every summer for about four days, it also serves as the location for the Indoor



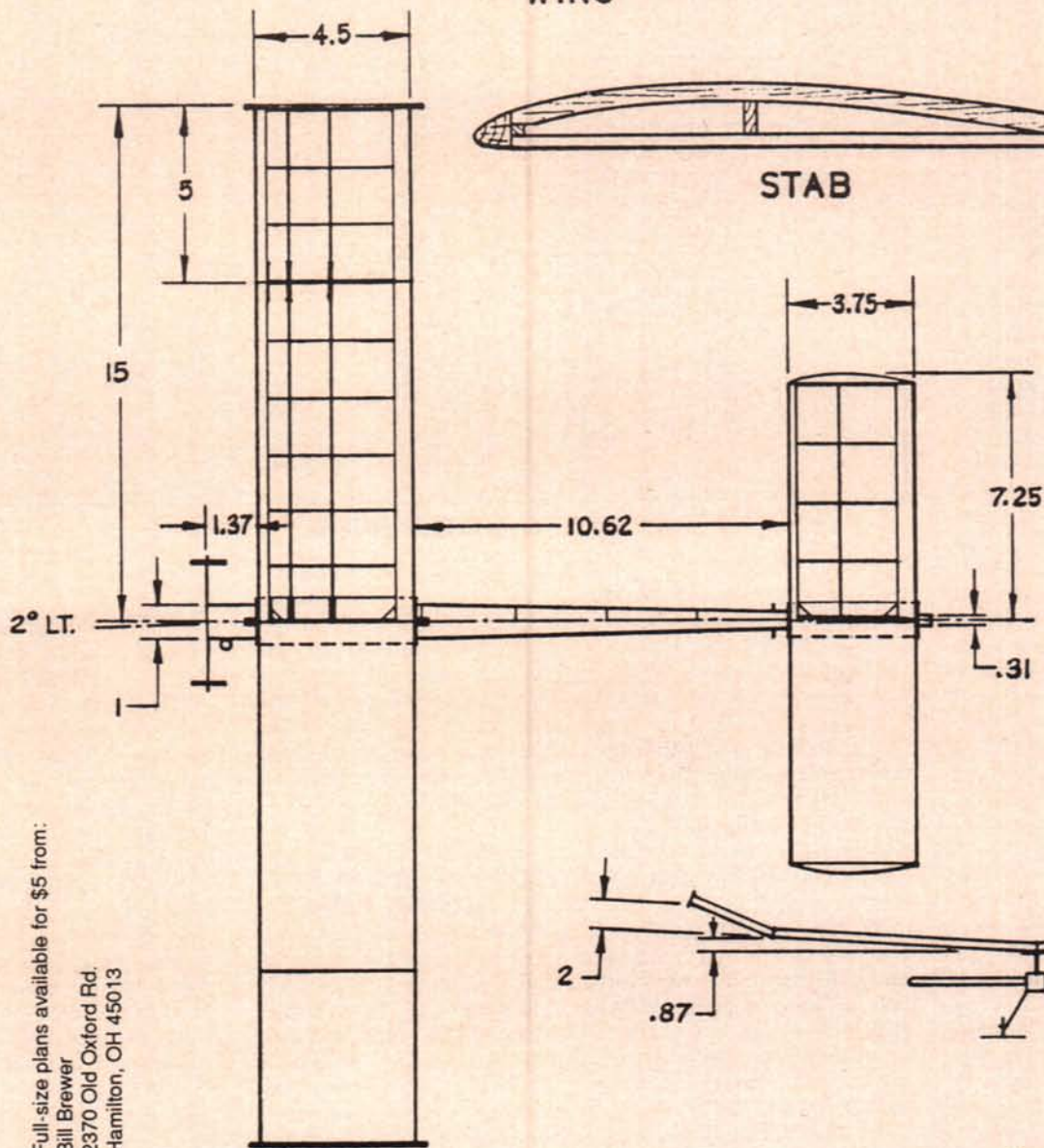


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PLATE

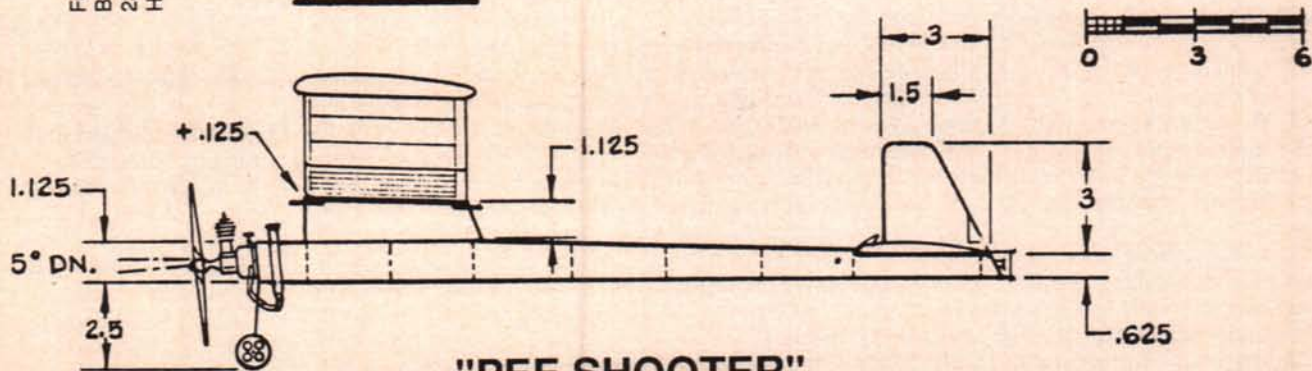
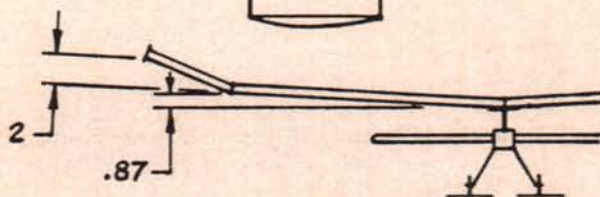
WING



STAB



Full-size plans available for \$5 from:  
Bill Brewer  
2370 Old Oxford Rd.  
Hamilton, OH 45013



"PEE SHOOTER"

Pee Wee 30 by Elmer Jordan



# FREE FLIGHT

Champs.

This year, the Indoor Champs drew over 40 contestants from around the U.S. to fly in the quiet and calm that characterizes the dome. As a magazine correspondent, my task was to talk to the fliers, take some pictures, and send an article to *Model Builder* about the event. Unknown to me, however, my camera had developed some serious problems, and when I went to the photo developer to retrieve my film after returning home, I got the word—"film unexposed." No pictures!

So, without photos, it is very difficult to describe the competition and the location, so let me leave you with my impressions. The Kibbie Dome is a wonderful place to fly indoor models—some say it is one of the two or three best available places in the world. The Indoor Championships at the Dome occurs every summer, thanks

to the work done by contest organizer and contest director, Andrew Tagliafico. Contestants who have flown there seem to keep coming back each year, so it must be a good place for competition.

You might wish to head to Moscow, Idaho next summer just to take in the meet. It's a part of the country most of the readers of this column may not have ever seen, and it's worth seeing. I plan to head back next year myself—with two cameras.

## UPDATES ON THE .010 EVENT

In the past couple of Free Flight columns, I have extolled the fun quotient of .010 free flight modeling, even proposing that some form of .010 event be established as a competition class. I've received several letters and phone calls from people who enjoy the class and have some experience with it.

Bill Saunders, of Virginia, a member of the Brainbusters, called with some of his experiences. Bill sponsors an .010 event annually for the Brainbusters. He noted that fliers who have come to compete have brought small-sized Zeeks, Ramrods, Pogos and other Nostalgia era designs. An eyedropper fuel tank is used, and a formula for engine run and flight time is used to determine the scores. They use one-minute maxes, and engine runs of six or seven seconds are typical. Bill promised to send me some pix from the 1992 version of this event, and if he does, you will see them here in *Model Builder*.

I also received a nice letter, plus a video, of .010 activities in Southern California. Dan Walton was the correspondent and noted in his letter, "The models are light, simple, fly well, and are almost crash-

proof. They bounce rather than break. When you are a 'poor' teenager, these factors are important. I've found that any 1/2A design cut down to 1/2 size gives good results. My first was a 1/2-sized Starduster look-alike."

It appears that some interest in the event lives out there in the readership. I'll keep pursuing the event and reporting to you on what I find. If any of you have developed plans that you have tried, send a copy to me for possible printing in the column. Thanks for your help, Bill and Dan.

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A new catalog and sample just arrived a couple of days ago from Matt and Gail Gewain, owners of Composite Structures

*continued on page 85*

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## Review: TSK Fivestar 30

If price is no object, this chopper may be just the ticket for those who appreciate a truly first-class product.

BY JAMES WANG



This TSK Fivestar 30 belongs to Reza Fetami of Beverly Hills, California. Construction is all metal, and the canopy is high-quality fiberglass. The TSK 30 has a very soft flapping main rotor and heavy Hiller control paddles, which makes it one of the most stable model helicopters on the market. The cyclic response is slow, smooth and mellow, which makes it relaxing to fly, but less aerobatic.

This month we will look at one of the most expensive—and highest quality—30-size RC model helicopters, the TSK Fivestar 30. The model was first introduced in 1991, but because of its retail price of around \$800, only a few of them have made it across the ocean from Japan. The one that we will examine here belongs to my friend Michael Jones, and was built by MB flight test team member David Franklin. The canopy was painted by Mike Forester. David did the flight tests and the flight evaluation.

The TSK model helicopter company has been producing model helicopters in Japan for over a decade, however, only in recent years has the name TSK become well-known in the U.S. TSK has always concentrated on the high end of the model helicopter market. Its 60-size model helicopters typically range in price from \$1,000 to \$2,000. They are mostly designed for smooth FAI-style competition flying.

TSK made its first worldwide appearance at the 1985 F3C World Championships in Canada. Shigetada Taya used TSK

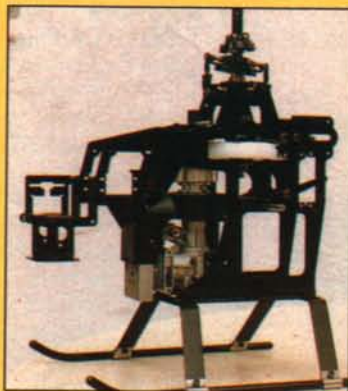


# helicopter world

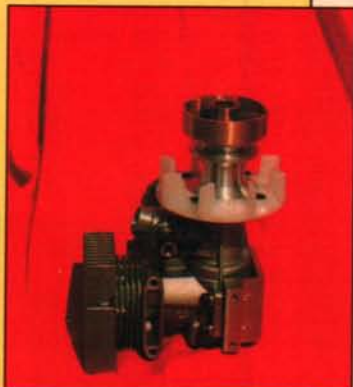
mechanics to win the competition. Robert Gorham, a 1991 USA F3C team member, now regularly flies a 60-size TSK. I watched Robert's Blackstar fly, and must say it was extremely smooth (see the October '91 *Model Builder* for photos and a discussion). Even at 12-1/2 pounds gross weight, the Blackstar was trucking along at 85 mph (I clocked it with a radar). The other popular 60-size TSK model is the Ace. I have flown Ray Powell's Ace—it is very smooth. TSK models have that smooth, slow cyclic response which exemplifies Japanese F3C contest machines. If you are a sport flier or a hotdog flier, you may find the response too slow for your liking.

The TSK Fivestar 30 is of all-metal construction. It really flies like a scaled-down 60-size FAI contest machine. The controls are smooth and slow. I have always believed the Kyosho Concept 30 DX to be the easiest model helicopter to hover, but David thinks the Fivestar is even easier.

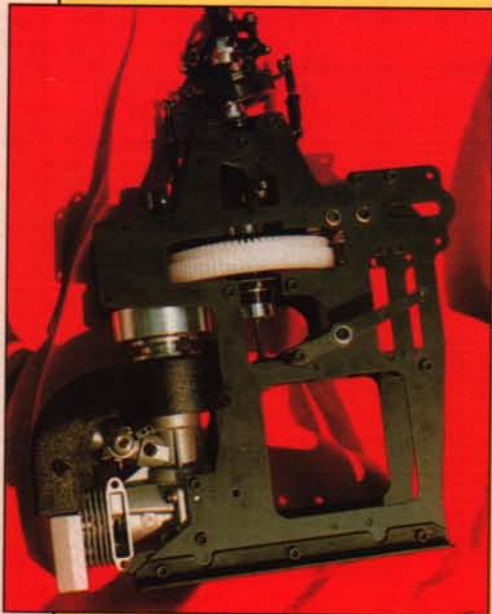
Like the Concept, the Fivestar has an individual flapping main rotor blade design. The blade flapping restraint is even softer than the Concept. The cyclic response is therefore very mellow—



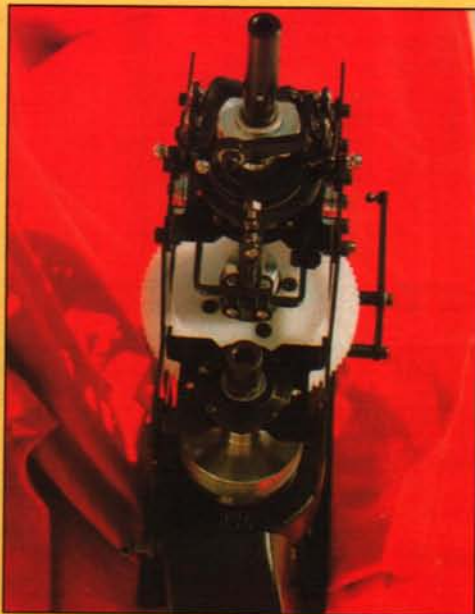
The side frames, servo tray, landing gear, and washplate are all anodized aluminum. The O.S. 32H engine faces forward. A square fuel tank goes underneath the main rotor shaft and can be easily seen during hover.



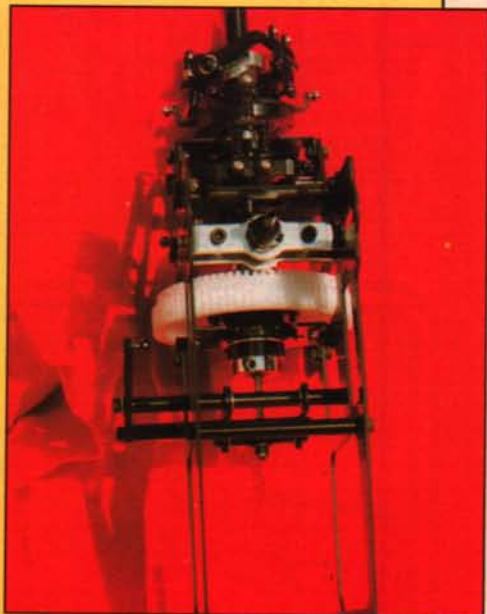
The cooling fan and centrifugal clutch on the O.S. 32H. Our author says this is one of the best-made clutches he has seen. It is polished and gold anodized.



The engine, cooling shroud, centrifugal clutch bell, machine-cut plastic main gear, and washplate. Notice the 90-degree angle piece bolted to the sideframe to accept the landing gear struts.



Front/top view of the TSK mechanics. It shows the cooling shroud, clutch bell, and the clutch shaft. Notice how wide apart the two sideframes are—nearly two inches. This makes the mechanics module extremely rigid. Notice also that the shaft is hollow. Every bellcrank has a ball bearing, and all the control balls are metal.



Rear view of the TSK 30 mechanics. Notice the shiny autorotation hub below the main gear. You can see the pinion gear for the tail rotor drive riding on top of the main gear. Notice that the fore/aft linkage for the washplate uses two side-by-side ball links.

David says the first time he tried to loop the model, it almost went into the ground because the fore/aft cyclic was so soft. The roll was also very slow. David says he definitely does *not* recommend the Fivestar for all-out hotdogging.

The model is extremely easy to fly, but its high price makes it an expensive beginner's model. The design is very sophisticated. In many cases, David and I think it may even be over-engineered. There are bellcranks and ball bearings everywhere. For instance, instead of connecting the tail rotor control directly to the servo via a single pushrod, as is commonly done, the Fivestar uses an intermediate bellcrank with bearings. It also uses two plastic ball links on each side of the washplate for fore/aft cyclic control.

The sideframes are flat, 2mm aluminum plates bolted together with formers and blocks. For mounting the landing gear struts, the

*continued on page 86*



You're looking at the most solid 30-size model rotor head available. Of all-metal construction, it's almost bulletproof. The Bell-Hiller mixing arm on the blade pitch control arm is located out of line with the blade flapping axis, which gives some Delta-3 effect.



## PLUG SPARKS continued from page 55

### "Slag" Engine (11)

1. Bob Edelstein (Ranger/Rogers 35) 337
2. Jim Kutkuhn (Playboy Jr./Judco) 201

### Small Rubber Stick (42)

1. Raymond Factor (Gollywock) 821
2. Don Reid (Gollywock) 780
3. George Perryman (Casano) 743
4. Dan Smith (Gollywock) 530
5. Tom McCoy (Casano) 528

### Large Rubber Stick (37)

1. Richard Thompson (Wallenhorst) 540
2. Joe McCay (Stickler) 504
3. Bob Watson (Lanzo) 470
4. Don Reid (Smith 1941) 360
5. George Perryman (Lanzo) 324

### Small Rubber Fuselage (41)

1. Don Reid (Double Feature) 540
2. George Perryman (Jabberwock) 522
3. Ray Factor (Crusader) 345
4. Bill Jackson (Sparky) 342
5. Hank Sperzel (Lanzo) 298

### Large Rubber Fuselage (40)

1. George Perryman (Lanzo) 1080
2. Don Reid (Korda DT) 780
3. Bob Watson (Lanzo) 753
4. Joe McCay (Sharpshooter) 511
5. Joe Konefes (Classic) 503

### 1937 Wakefield (19)

1. George Perryman (Ying) 510
2. John O'Leary (Lanzo Duplex) 360
3. Joe McCay (Mayfly II) 355
4. Cliff Betz (Judge) 342
5. Bob Moulton (Lanzo Duplex) 302

### Rubber Scale (16)

1. Bud Brown (Puss Moth) 274
2. Dan Smith (Puss Moth) 232
3. John Bortnak (Skyfarer) 188
4. Bob Moulton (Cessna C-34) 162
5. Don Kuglar (Puss Moth) 157

### Commercial Rubber (34)

1. Don Reid (Korda) 360
2. Ed Konefes (Convertible) 337
3. Bill Jackson (TBD) 275
4. Anton Telford (Miss Canada Sr.) 220
5. Hank Sperzel (1933 Lanzo) 219

### Twin Pusher (12)

1. George Perryman (Burnham) 214
2. Richard Thompson (Manulkin) 202
3. Bob Moulton (Zaic) 158
4. Otto Curth (Simmers) 155
5. Ray Factor (Simmers) 110

### Compressed Air (7)

1. Ed Mate (X-Fighter) 360
2. Joe Konefes (Airstick) 352
3. Ed Konefes (Huff & Duff) 290
4. Frank Vassalo (Friendly Flyer) 253
5. Andy Vassalo (No-Name) 182

### Hand Launched Glider (45)

1. Guy Eaves (Hervat) 360
2. Denny Dock (Zoomer) 346
3. Bill Schlarb (Vartanian) 305
4. George Hillard (Hervat) 300
5. Don Hockaday (Hugulet) 255

### Catapult Glider (43)

1. Ralph Schlarb (Vartanian) 297
2. Bill Schlarb (Vartanian) 292
3. Bob Bienenstein (Vartanian) 183
4. David Dobbs (Cue Ball) 181
5. Ben Strauss (Belsky) 160

## RADIO CONTROL

### Class A Ignition (36)

1. Fred Mulholland (Playboy/Elfin) 1314
2. Ed Shilen (Yankee/Elfin) 1260
3. Eut Tileston (Corsair/Elfin) 1216
4. Walt Geary (Chief/Elfin) 1110
5. Miguel Salvador (Playboy/Elfin) 1027

### Class B Ignition (41)

1. Larry Davidson (Bomber/McCoy 29) 1498
2. Joe Percy (Bomber/K&B 29) 1482
3. Pete Rafferty (Bomber/Torp 29) 1446
4. Art White (Bomber/Forster 29) 1436
5. Robert Walter (Playboy/Forster 29) 1258

### Class C Ignition (65)

1. Larry Davidson (Playboy/O&R 60) 1556
2. Jim Lobb (Bomber/Orwick 64) 1543
3. Bruce Norman (Theoradical/O&R 60) 1497
4. Joe Percy (Josephine/O&R 60) 1253
5. L.A. Johnston (Sailplane/Edco) 1213

### Class A Glow (31)

1. Bob Peru (Kerswap/K&B 19) 1444
2. Bruce Norman (Kerswap/S.T. 19) 1320
3. Miguel Salvador (Kerswap/K&B 19) 1260
4. Fred Mulholland (Bomber/K&B 19) 1258
5. Walt Geary (Playboy/O.S. 15) 1113

### Class B Glow (38)

1. Pete Rafferty (Bomber/K&B 29) 1188
2. L.A. Johnston (Blitzkrieg/HB 25) 1136
3. Bill Tibbs (Bomber/K&B 29) 1125
4. Eut Tileston (Cub/Ohlsson 29) 1114
5. Jim Lobb (Bomber/S.T. 29) 1109

### Class C Glow

1. Fred Mulholland (Lanzo/K&B 35) 1612
2. Dale Tower (Bomber/Nelson 40) 1605
3. Bob Peru (Playboy/S.T. 35) 1591
4. Eut Tileston (Taylor Cub/Nelson 40) 1586
5. Tom Botkin (Bomber/Rossi 40) 1575

### Antique (26)

1. L.A. Johnston (Dallaire/Fox) 1751
2. Joe Percy (Cumulus/Rossi 60) 1666
3. Bruce Norman (RC-1/O.S. 60) 1513
4. Chuck Hutton (Dallaire/O.S. 61) 1386
5. Jack Beatley (Bomber/O.S. 61) 1312

### Pure Antique (45)

1. Lamoine Schrock (Bomber/McCoy 60) 1612
2. Don Bishop (Bomber/Edco 65) 1583
3. Joe Page (no info) 1529
4. David Robinett (Bomber/Edco 65) 1506
5. Walt Geary (Bomber/Anderson) 1474



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### 1/2A Texaco (83)

1. Joe Page (Playboy) 1698
2. Jim Clem (Playboy) 1688
3. Lamoine Schrock (New Ruler) 1624
4. Eut Tileston (Scorpion) 1602
5. Ed Hamler (Quaker) 1494

### Texaco (58)

1. Tom Botkin (Bomber/O.S. 60) 3211
2. Larry Davidson (Bomber/O.S. 60) 3192
3. Joe Percy (Bomber/O.S. 61) 2741
4. Pete Rafferty (Bomber/Irvine 40) 2047
5. Ed Shilen (Racer/O.S. 61) 2042

### Ohlsson 23 (12)

1. Jim Reynolds (Playboy) 766
2. Walt Geary (Zipper) 559
3. Art White (Bomber) 523
4. Jack Archibald (Zipper) 465
5. Walter Conrad (Anderson) 459

### Ohlsson Sideport (31)

1. Eut Tileston (Taylor Cub) 1260
2. Jim Reynolds (Clipper) 1218
3. Dale Tower (Bomber) 1209
4. Art White (Kloud King) 1157
5. Chuck Hutton (Kloud King) 1109

### 1/2A Texaco Scale (32)

1. Walt Geary (Cessna AW) 1646
2. Arthur Milan (Avro) 1249
3. Larry Latowski (Luton Minor) 1003
4. Ed Hamler (Avro 560) 983
5. Harold Ericksen (T-Craft) 755

### Brown Jr. (39)

1. Bob Peru (Kloud Queen) 697
2. Skip Williams (Air Chief) 668
3. Tom Williams (RC-1) 558
4. Tom Botkin (Clipper) 443
5. Joe Page (Cumulus) 408

### Electric 05 (15)

1. Dale Tower (Bomber/Astro) 1551
2. George Chapick (Bomber/Astro) 1260
3. Pete Rafferty (Bomber/Astro) 889
4. Fred Mulholland (Bomber/Astro) 800
5. John Pond (Bomber/Leisure) 758

### Spirit of SAM Concours

1. Jim Reynolds (Dallaire)
2. Jack Bolton (no info)
3. Bob Larsh (Zipper)
4. Walt Geary (Clipper)
5. Eut Tileston (Westerner)

### Perpetual Trophy Awards

Feather Merchant—Harry Murphy  
Ohlsson Trophy—Jim Reynolds  
Twin Pusher—George Perryman  
Class C FF Cabin—Mitch Post  
30 Sec. Antique FF—Tom Lucas  
Texaco RC—Tom Botkin  
Worst Crash—Joe Beshar  
Compressed Air—Joe Konefes

### Overall Champs

FF Gas Events—John Bortnak  
FF Rubber Events—Don Reid  
RC Events—Larry Davidson **MB**



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# EEE-Z-FLI PYLONAIR

The latest creation to spring from the author's EEE-Z-FLI drawing board, a racer-like sportster for four channels and .25-.30 power.

BY AL WHEELER

The Pylonair is an easy-to-build, real fun airplane. It looks great (my opinion), is an outstanding flier and has a unique "see through" feature that makes it a useful teaching aid to new and prospective entries into the RC fraternity, as well as interested spectators at mall shows and other public showings.

How often do you hear questions about how the radio works? *What makes the controls move? What are servos? Where is the gas tank? Do you have a battery and a radio receiver, etc.?* The "see through" feature of the Pylonair answers all of these questions literally at a glance. The entire top quarter, from the

firewall back to the canopy, may be covered in clear or tinted plastic, the fuselage diameter being such that a two-liter soda bottle fits like a glove! Turn on the radio, operate the controls, and all those many questions are answered. Seeing is the best teaching medium you can find!

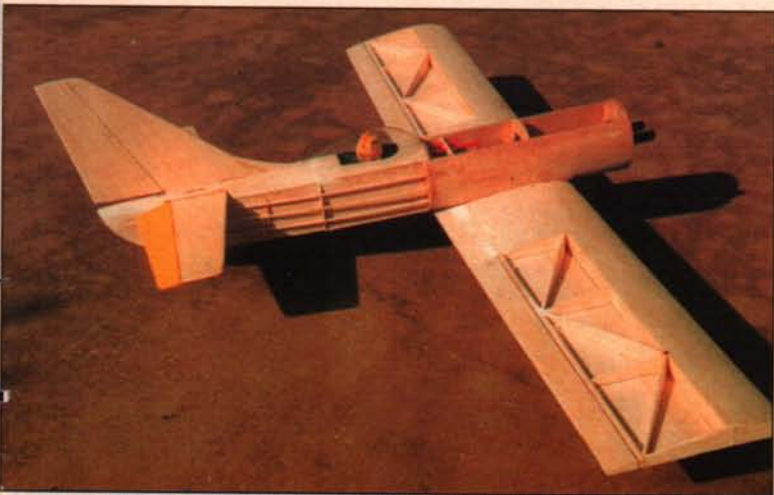
If you prefer the big-engine, long-nose racer look, paint the cover to match or, better yet, make a second cover of soft aluminum for flying and keep the plastic "see through" for show. The Pylonair is fast, quite aerobatic and still retains the "polite" takeoff and landing characteristics common to the EEE-Z-FLI line of aircraft.



Right: Al's 1990 prototype looks more like an Unlimited racer than the current model. Aft end has a slightly different shape than shown on the plans.







Uncovered framework reveals construction typical of AI's other EEE-Z-FLI efforts. Design can be easily modified with an open cockpit, slightly reshaped vertical tail and wingtips, etc., to create your own customized look. Be creative!

### GENERAL NOTES

As with any building project, assembly goes faster if all the parts are available as you need them, so spend an evening cut-

structions together; something unclear in one may be defined in the other. The entire construction of the Pylonair is pretty straightforward and should not present any difficult areas.

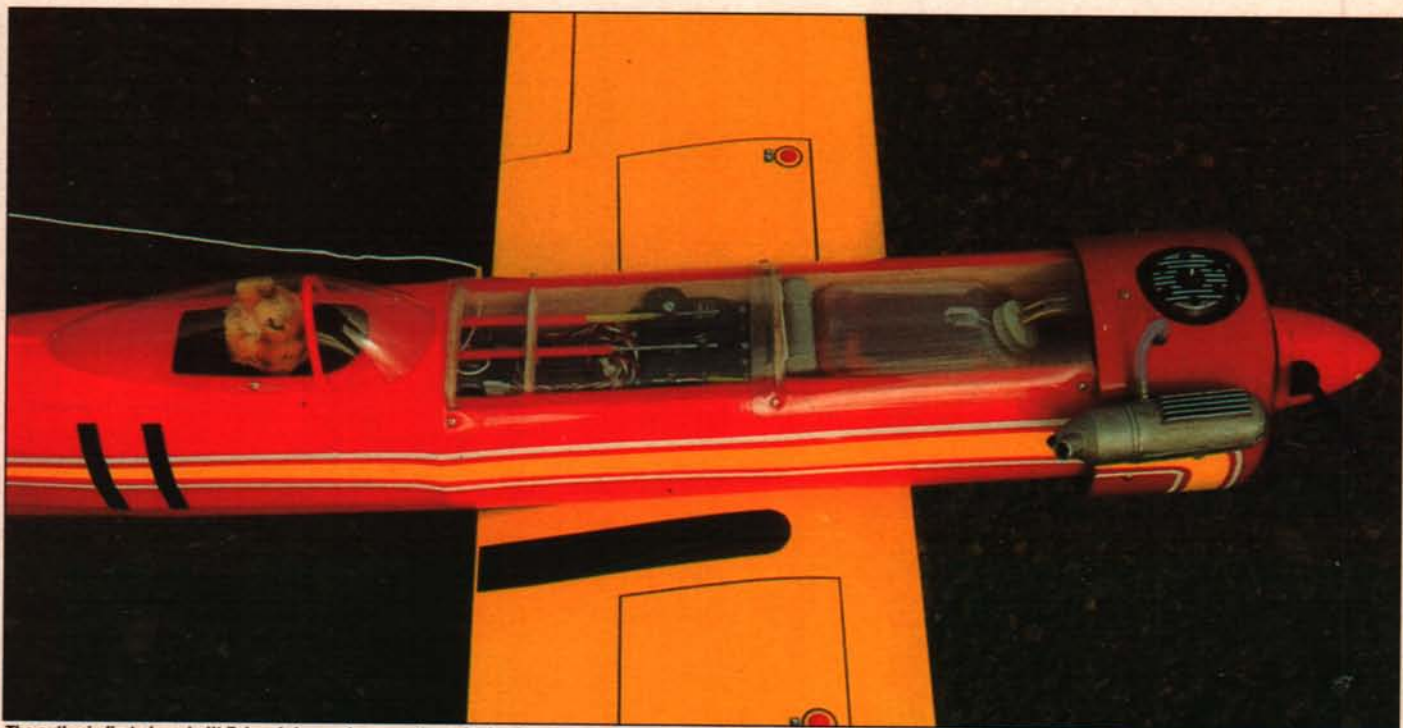
is completed to fit the dorsal. Sand all surfaces and put aside for final fit prior to covering.

### FUSELAGE

Make the FS-1 fuselage sides.

ment as this is where bananas are born!

Starting at B1 (firewall), attach all the F series formers. Note that F2 and F4 mount back-to-back with the stringer



The author's first plans-built Pylonair has a clear see-through plastic upper deck—useful for showing the internal layout and workings of the RC system to interested non-modelers. The area could also be covered with thin sheet aluminum or plywood, secured with screws so as to be removable and painted to match the rest of the fuselage.

ting out parts. As for equipment, the plans and building instructions denote the products used by the writer. Building methods may be varied at the builder's discretion, but radical departure from the plans and accompanying instructions is not recommended. The type of wing construction shown is very rigid and resists corrective warping, so *build it flat*.

Work the plans and the in-

### TAIL SURFACES

All tail surfaces are constructed of medium balsa. The elevators are joined with a hardwood dowel. Align the elevators with the stabilizer and mark and cut the hinge slots. Cement the hinges into the stabilizer only. Do the same with the fin and rudder. The fin rests on the top of the stabilizer, so it is best to wait until the fuselage

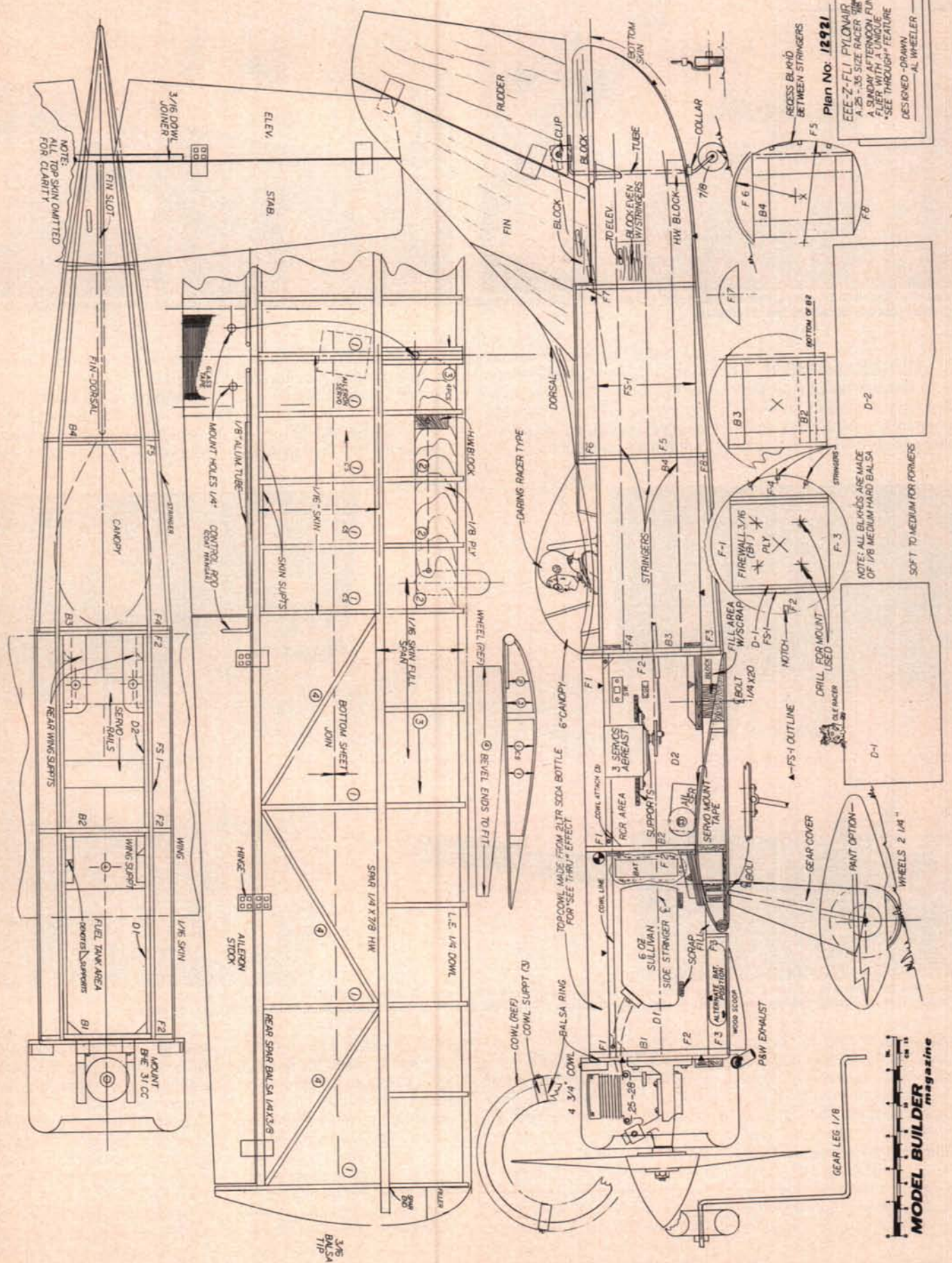
Install doublers D1 and D2, leaving a space for the firewall (B1) and former B2. Be sure to make a right and left side! Now cement B2 in the slot between triangular strips in the corners.

When the cement is dry, pull the fuselage aft ends together, assure they are square, secure them with clothespins and cement the joint. Former B4 can be installed at this time also. Exercise care with the align-

notches cut in F4. After the stringers are installed, make and install support shims between the stringers and the fuselage sides at station F7. The fore and aft wing supports (of 3/16-inch plywood) can now be epoxied in place, along with their triangular supports.

Notch the top of F6 and F7 for the 3/16 square stringer, glue it in place and cover the top from F6 to F7 with 1/16-inch





NOTE: ALL TOP SKIN OMITTED FOR CLARITY

Plan No: 12921  
 EEE-Z-FLI PYLONAIR  
 A 28" - 35" SIZE RACER  
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MODEL BUILDER magazine

GEAR LEG 1/8"

WHEELS 2 1/4"

DRILL FOR MOUNT USED

NOTCH

FS-1 OUTLINE

1/4" X 20"

D-1

FS-1

F-1

B-1

D-1

FS-1

F-1

B-1

D-1

FS-1

F-1

B-1

D-1

FS-1

F-1

B-1

D-1

FS-1

F-1

B-1

D-1

FS-1

F-1

B-1

D-1

FS-1

F-1

B-1

D-1

FS-1

F-1

B-1

D-1

FS-1

F-1

B-1

D-1



sheet, with the bottom edges cemented to the top edge of FS-1 on each side. Do the same from B1 back to B3. Install the cockpit floor and sheet the area from the front of F6 to the forward edge of the rear F1. The cockpit opening will be cut out when the canopy is fitted; that way you will be sure the opening isn't too big.

Add the three stringers on each side; taper the rear edge to blend with the fuselage sides. Mark, drill and install the blind nuts for your engine mount. Trial fit your engine and mark and drill all necessary holes in the firewall. Make the balsa cowl mounting ring that goes on the firewall face and cement it in place.

Now that the engine mount blind nuts are installed, the bottom 1/16 inch skin in front of the wing can be installed. Trim it to blend with the bottom of the side skins at the bottom of FS-1.

Install the hardwood tail wheel support block between the fuselage sides and sand it flush at the bottom. The aft fuselage bottom may now be finished, using a 3/16-inch square stringer and 1/16 balsa sheet as was done on the top.

Using the stabilizer or a piece of scrap in the stabilizer mounting position, form the wooden blocks that complete the fuselage top. Cut the forward block to allow the fin to seat on the stabilizer top. Temporarily slip the fin in position and fit the dorsal to the fuselage top, then cement the dorsal to the fin and sand the edges round.

Drill the hole for the tail wheel strut tube and glue it in place. Make the 90-degree bend at the top of the wire, insert it through the tube, slide on the collar and form the bottom bends. The airplane driver's opening may now be cut out, either to fit a canopy or in the shape of an open cockpit. Give the entire fuselage a good sanding and put it aside.

## WING

Start by edge joining the bottom sheets, which extend full chord. Laying the bottom skin on the plans, mark the locations of spars, all ribs and reinforcement plates. Now the wing construction can be done on the top of the bottom skins.

Cement the front and rear spars in place, then install all of the No. 1 ribs. Note that those in the center section (five in each half) are marked 1cs. They are 1/16-inch lower than those outboard to accommodate the 1/16-inch top sheeting. Install the skin supports between the 1cs ribs, against the front face of the rear spar and flush with the top of the ribs.

The No. 4 ribs may now be installed—trim and bevel the ends for a good fit. They should be even with the top of the rear spar and 1/16-inch above the top of the front spar. Install the remaining No. 2 and No. 3 ribs. With the wing on a flat surface and the leading edge on the edge of the work surface, use a round file and open up the leading edge ribs to accept the leading edge dowel. Work the file through several ribs at

a time and file the openings so the dowel will bottom on the lower skin. A good contact here is important. When satisfied with the fit, cement the dowel in place, assuring a good bond to the lower bottom skin and each rib.

Use epoxy to install the plywood landing gear support and the hardwood block. Drill a 1/8-inch hole through the block and plywood as shown. The center section is now sheeted with 1/16-inch balsa from the front face of the rear spar to the mid point of the front spar top. Assure a good bond to each rib and the skin supports on the front of the rear spar.

Cut a strip of 1/16-inch balsa to fit from the rear face of the front spar to about 1/4-inch beyond the leading edge. Because the center section sheeting extends to the center of the front spar, you will have to notch the leading edge sheet as indicated. When satisfied with the fit, cement the leading edge sheet in place, assuring a good bond with the spar, all ribs and the leading edge dowel. Use tape to hold it in place until dry. Cut the excess from the leading edge and sand it to fair in with the dowel; do likewise to the lower skin leading edge. The aileron stock can now be fitted on top of the bottom skin aft of the rear spar. When fitted, cement the aileron stock to the bottom skins flush against the rear spar, but *do not cement it to the spar!*

When dry, cut off the entire section from the rear spar aft. Cut off the aileron from what will be the fixed center portion. Bevel the aileron leading edge from the center line (hinge point) to allow for up and down travel. Groove the front edge of the inboard section to accommodate the aileron control rod tube. Cement the tubing in place, and with the wing on a flat surface, cement the center trailing edge back on, assuring that it is flat with the bottom of the wing. Align the aileron with the rear spar and mark and cut the aileron hinge slots, centered on the aileron leading edge. Cement the hinges into the rear spar only.

Drill the control rod hole in the aileron at the inboard end. Bend the inboard (servo) end of the aileron control rod, insert it through the tube from the butt end, and

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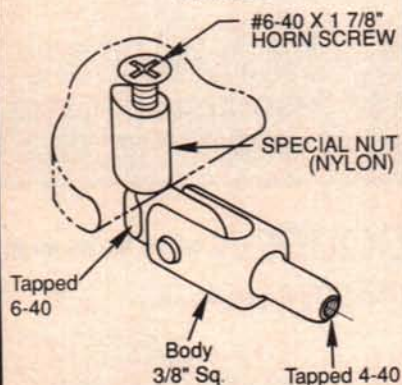
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bend the aileron end. Slide the aileron onto the hinges and the control rod, and check for ease of travel both up and down. You may have to make a notch in the top edge of the rear spar to allow clearance for the control rod in the up position. Also, the aileron leading edge will require a groove from the control rod hole to the inboard end to assure free movement.

The wingtip, top brace and forward filler may be added and sanded to shape.

Now do the other half of the wing. When you are ready to join the halves, block sand the butt ends carefully so that they mate perfectly with both tips raised 3/4-inch off the board. When satisfied with the fit, punch several holes in each butt rib using a compass point or similar tool to allow the epoxy to penetrate. Using five-minute epoxy, join the halves on a flat surface; no need to build in a right or left roll at this point. Round the tips and smooth up the entire wing—it helps to eliminate those unsightly little lumps that detract from an otherwise neat covering job.

### WING-TO-FUSELAGE FITTING

The bottom surfaces of the fuselage side skins have to be carefully trimmed to allow the wing to seat at the bottom of the fuselage sides and doublers. Leave a little extra material and finish with a narrow sanding block. When satisfied with the fit, locate the three wing mounting bolt holes on the bottom surface of the wing and drill them out to 5/32-inch. Drill these holes perpendicular to the lower wing surface.

Put the wing in place on the fuselage, square it up and, using the holes already drilled in the wing as pilots, drill the 5/32 holes through the wing attachment pads.

Remove the wing and drill out the holes in the pads with a No. 7 drill, then tap 1/4-20. Open the holes in the wing to 1/4-inch and trial fit the wing. Fiberglass tape can now be applied to the center section of the wing, top and bottom. With the tape smoothed out flat, pour on liberal amounts of CA+ and squeegee it through the cloth. When the glue has dried, open up the mounting bolt holes with an X-acto knife.

### COVERING & FINAL ASSEMBLY

The choice of covering material is yours. All of my EEE-Z-FLI efforts are covered and trimmed with Top Flite Super MonoKote. After covering, re-open the hinge slots and trial fit the hinges. Mask around the cockpit area and do the interior in flat black, either brush or spray. Trim should be applied prior to assembly, as the surfaces are easier to handle.

Install the stabilizer, fin and dorsal, and the elevators, in that order, making sure that everything is lined up properly and the elevators move freely, followed by the wood block fairings on each side of the fin, and finally the rudder.

When installing the three fuselage ser-

vos, face the center one aft and the outside ones forward. This gives adequate arm or wheel clearance. Connect the pushrods to control horns on the elevator and rudder. Install the fuel tank, engine mount and engine. Trial fit the cowl and trim it as necessary to clear the muffler. Cut a hole in the top for access to the glow plug.

The aileron servo can now be installed and hooked up to the aileron control rods. Check the operation and adjust as required. Invert the wing and install the landing gear. Align them parallel with the leading edge and secure them to the bottom of the wing with nylon landing gear straps.

Strut fairings are made from soft aluminum as shown; bend each one 90 degrees at the top and secure with two No. 3 screws. If wheel pants are used, the fairings can be shortened to fit. To give the heavy strut look, use fuel tubing slid up the wire and painted silver. Wheels are your choice, secured with standard wheel collars.

Install the wing and you have an airplane standing on its own feet; the light at the end of the tunnel is starting to show! If you have finished the two liters of soda you can make a pattern to fit the top of the fuselage. Allow about 3/16-inch below the top of FS-1 on each side for attachment. Two sections of the soda bottle will be required, joined over the center F1. If you use aluminum, one piece will make the entire length.

The canopy can be fitted and installed, or the windshield and headrest if you are doing the open version. The canopy is held on with a No. 3 screw on each side. Provide a small piece of plywood on the inside of the cockpit edge for it to screw into.

With the aircraft level, 0 degrees at the top of the stabilizer, the wing should be at +1 degree. If needed, shims may be installed at the bottom edge of FS-1. Control travel should be 1/2-inch up and down elevator, 3/4-inch right and left rudder, and 1/4-inch up and down aileron. With the rudder at neutral, the aircraft, when pushed, should roll straight on the ground; adjust if required by bending the wire.

Check the balance; it should be slightly nose down when supported at the point shown. Correction can be made by carefully moving the battery. Do not try to fly a tail heavy airplane!

### FLYING

Taxi the aircraft around to check the ground handling. Line up into the wind and apply enough throttle to get it rolling straight, then add the rest of the power. The prototype tracks straight with a little right rudder, the tail comes up with neutral trim and the bird will fly itself off as it gains enough speed.

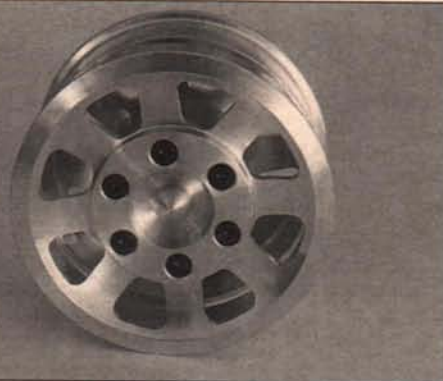
Make a trim flight around the pattern and check the stall characteristics. The Pylonair glides well and the flare and landing are pretty routine. You will find the rollout to be straight with little correction, and in no time you will be making neat touch-and-gos.

Enjoy! **MB**



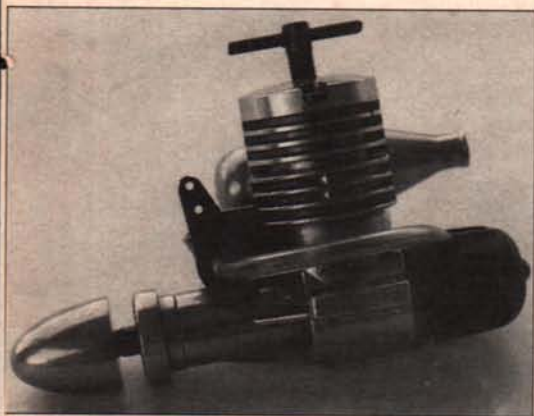
## COUNTER continued from page 12

the plastic ones found in Byron kits. They have the eight-spoke pattern found on most full-scale U.S. warbirds, are reamed for a 1/4-inch axle and weigh just under 6 ounces apiece, minus the tires



(which are not included). Each wheel is made in two halves, held together with six socket-head machine screws. We've seen 'em—they're beautifully machined, with the kind of finish and precision possible only on CNC equipment.

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Ed Carlson of Carlson Engine Imports is handling the new 1cc and 1.5cc (.06 and .09 cubic inch) AM RC diesels produced in England by Premier Engineering. Identical in external size and weight, both feature Schnuerle porting and side exhaust, and are claimed to put out about 20% more power than their predecessors. Muffler, spinner nut and detachable backplate fuel tank are all standard equipment, as is a full one-year guarantee.

The AM .06 and .09 diesels are priced at \$55 and \$60 respectively, plus \$3 per order for postage and handling. Full particulars and a complete catalog (\$1) are available from Carlson Engine Imports, 814 E. Marconi Ave., Phoenix, AZ 85022-3112, or call (602) 863-1684. **MB**

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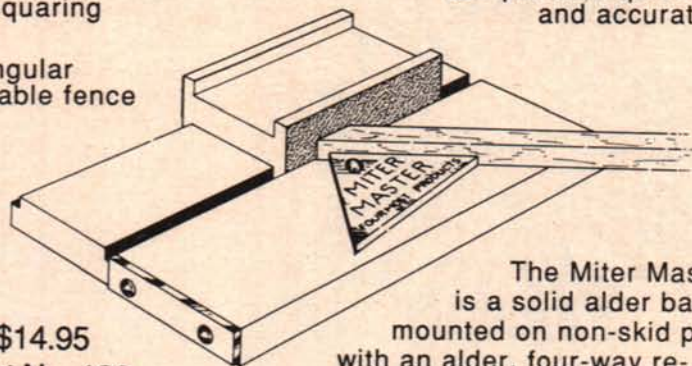
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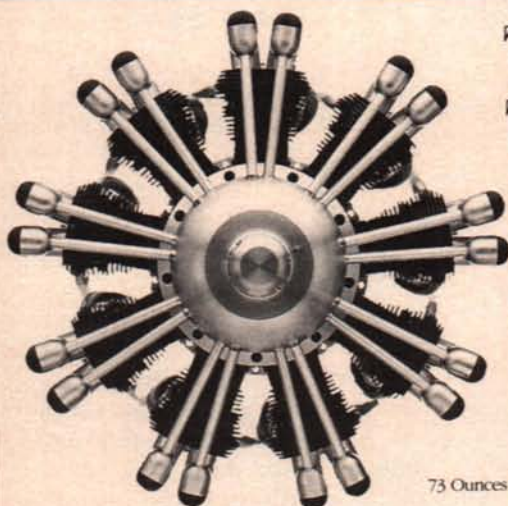
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## TURBO continued from page 25

require sanding to shape. Simple and easy, just the way I like!

### COVERING

I have seen other wingeron models fly and know that they are capable of a very (make that very) fast roll rate. I wanted to come up with a finish to help with orientation, hence the "Moo" covering job.

For covering, the instructions specify MonoKote. I don't know if this is due to the "open" structure (sheet and capstrips) of the stock wing, but since my wing was fully sheeted, I used SolarKote instead. I have found this to be an excellent covering for sheeted wings, sheet tail surfaces and fuselages, as it adheres well and doesn't bubble up when the model is exposed to heat (such as in a closed car). I covered the bottom of the fuselage, the wing and the stab in black, and the fuselage sides and top, top of the wing and top of the stab in white. I then cut out odd shapes in black and applied them over the white surfaces. It is really surprising how difficult it is to come up with an eye-appealing (at least to my eye), non-pattern pattern.

The only difficulty I encountered was with the vertical tail surface, which was made of very light wood. The 3/32-inch balsa surface was virtually impossible to get covered without warpage. I ended up stripping it and cutting out two 1/2-inch wide strips, which were replaced with hard 3/32-inch cross-grain balsa. This provided sufficient stiffness that the next covering attempt went without a hitch.

### FINAL ASSEMBLY AND RADIO INSTALLATION

The servos are mounted in the fuselage between the wing panels. I used two Futaba S3002 servos for the elevator and wingerons. Large spruce rails are provided for the installation of the servos and also serve to strengthen the fuselage considerably. Small diameter cable is recommended for the elevator pushrod, but I decided to make one out of threaded rod and a 1/8-inch hardwood dowel. It is a straight shot from the servo to the elevator horn, which makes for an easy installation.

Although the fuselage is relatively small, my seven-channel receiver fit, albeit without foam padding. Airborne battery is limited to a 250 mAH flat pack or smaller, as a larger pack will not fit.

After the tail surfaces were glued on the fuselage I hooked up the elevator pushrod to a mini nylon horn assembly that came out of a small electric ARF. The kit supplies a plywood horn that is glued into a slot in the elevator. I have used these before, but for durability I prefer the nylon horn with backplate.

A very nice touch (which I plan to incorporate in future slope models) is the 1/64-inch plywood skid as supplied with



double-stick tape. This makes a very durable, unobtrusive skid that really protects the fuselage bottom. I added a servo mounting screw at the front, just to make sure the skid stayed in place.

### FLYING

Now for the really fun part! The first flight was in a light wind, but I just couldn't wait for better conditions (and would you believe, it had been cloudy, foggy or raining for almost two weeks straight here in sunny Southern California!). I set the wingeron throw at 1-1/2 inches (right in the middle of the recommended 1 to 2 inches), and the elevator at about 3/4-inch (1/2-inch recommended, but I like a lot of pitch control).

A gentle push and the Turbo was on its way. The only trim the model required was a couple of clicks of down and she was moving out. About the only other ships able to stay up in the light lift were of the two-meter floater type. However, the Turbo seemed quite at home as long as I didn't get too rambunctious in the turns.

Since that first day in light air, I've had the opportunity to fly the Turbo in a variety of wind strengths. Believe me, it handles the heavier air even better! I was quite impressed with the Turbo's roll rate, smooth and powerful elevator response, and carry-through after completing a maneuver. The roll rate is fantastic, yet the Turbo is very smooth and not at all twitchy around neutral.

During one of these sessions when the

wind and lift were really cooking, I started stringing rolls together out of a dive. First two, then three, and finally with a little coaching (more like harassment) from some flying buddies, I strung out four consecutive rolls. The Turbo actually was carrying enough speed that I believe a more skilled pilot could have squeezed out a fifth roll. The Turbo's roll rate has to be seen to be really appreciated.

During this flying session I also tried inside loops going directly into a roll, split-S, or Immelman. You can really string the maneuvers together with the Turbo. I also did a couple of sloppy outside loops—no fault of the Turbo, it's just not a maneuver I feel comfortable doing with a glider.

The really neat thing about all the gyrating aerobatics I was performing was that it only took a click or two of up trim to slow the Turbo right down. I could then leisurely float around the slope while gaining altitude along with the polyhedral floaters. This is a very versatile ship!

### CONCLUSION

The Turbo S is a simple-to-build sloper capable of performing many tasks on the slope. It can be used for easy-going flying, aileron training, or "hot-dogging" aerobatics. At \$59.95 retail, it seems a little pricey for a small model, but the finished ship makes it easy to forget the original outlay. On a scale of 1 to 10, I'd definitely rate it a 9-1/2+! **MB**

### SCALE continued from page 39

looked like a tremendous piece of apple pie. Later I got a call from Dr. Tse of Yellow Aircraft, who asked me to see what I could do with it. I installed the equipment and hooked up the gear doors. I set up the throttles and engines—just basically fine tuned it, and then I flew it. Since then we have installed a drag chute and disc brakes. It's a little difficult to see what attitude it's in, but as long as you keep up with it, it's okay."

**MB:** *What is its wingspan and fuselage length? Did you ever measure it?*

**Bob:** "It's about the size of the Yellow Aircraft F-14."

**MB:** *It appears to fly quite well.*

**Bob:** "Yes, it flies very well. Unfortunately, we have had three engines blow up in this plane already, all three on takeoff. The last one was just a couple of days ago, when I was experimenting with an aft CG. The left engine blew on takeoff, I turned down wind, slow, aft CG, full up elevator and a little bit of aileron turn. I thought it was a goner, but it just pancaked in! It was perfect! The single engine capability is extremely good. When both engines are running, it flies like a pattern ship. It is extremely easy to land. It is solid, very solid."

**MB:** *Who designed this model?*

**Bob:** "The designer works for Lockheed in

their model shop. The model is all fiberglass and comes in two halves, top and bottom. The equipment is installed in the bottom half and then the top half is mated to the bottom."

*(In my column of September '92, I wrote about a variable geometry exhaust nozzle for ducted fans. Bob Fiorenze has been test flying this device. Here are his findings to date):*

**MB:** *How is the flight testing going?*

**Bob:** "It is working real well. What I've found so far is that in the air, when you pinch it down, it seems to speed up the airplane, but it does other things that I never even realized would happen. On the ground, if you close it and raise the throttle to, say, 1/3 throttle, the plane just sits there static and doesn't move. If you open it from the extreme closed position to the extreme open position, the plane starts to move automatically, so with that, we did some takeoff tests. Normally the test aircraft will take off in around 250 feet. With the cone installed and fully open, the plane takes off in about 200 feet, which is 20% less."

"Another nice thing about it is during final approach, if you close it down, it acts like an airbrake. It slows the plane down tremendously. I was amazed! In fact, you don't want to leave it closed and go around, because you're not going to have much thrust. It will probably react as if you went

*continued on page 81*

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# TRICKLE CHARGING EXPLAINED

Everything you need to know to keep your radio system's batteries in top shape and ready to go at all times.

**W**e wrote about nickel-cadmium batteries in the February and March 1990 columns of MD&TS, and earlier, in the July 1988 issue. In those articles we dispelled the myth of NiCd "memory," and showed how to determine the amount of charge remaining in a battery by measuring its no-load voltage. Now for the latest.

A "trickle charge" is a low-level charge designed to prevent the gradual loss of charge in storage by self-discharge, which occurs in all batteries. During the first day after we charge a NiCd it loses about 9% of its capacity by self-discharge. In a week it will have lost about 22%, and in a month it will have lost nearly 50% of its charge.

But if we leave our batteries on trickle charge after charging, they will always be completely charged and ready to pump electrons at full pressure. No more having to remember to test and/or charge the batteries if we think we may want to fly the next day.

Beautiful! Trickle charging has been mentioned in the model literature a little in the last year, and some trickle-charge equipment has appeared. Why has it taken us so long to arrive at this very logical practice? As I recall, the battery manufacturers didn't previously recommend trickle charging or "floating" a nickel-cadmium battery on a slow charger indefinitely. I don't know why. Maybe earlier batteries didn't like it, and maybe the engineers hadn't conducted tests to see what would happen.

At any rate, trickle charging works, it's good for the batteries, and it certainly makes life easier for RC modelers and should reduce the "re-kitting" rate significantly.

My copy of the GE Nickel-Cadmium Battery Application Handbook mentions trickle charging only twice in its 340 pages, but it defines a trickle charge as anything from a 0.02C to a 0.1C charge rate, where "C" stands for the capacity of the battery. From that, one might conclude that anything less than 0.02C may not keep up with self-discharge, so the battery would still very slowly discharge.

You will recall that 0.1C is the recom-

mended standard charging rate for NiCds. All of the commercial RC receiver and transmitter battery chargers charge at or

for very extended periods of time, particularly at elevated temperatures, may develop a shortcoming called voltage depression. This depressed voltage effect is an electrically reversible condition and disappears when the cell is completely discharged and recharged. It appears only on the first discharge following an overcharge. Partway through the discharge the voltage will suddenly decrease about 0.15 volt per cell. This misleads the observer into believing that the discharge is at the knee of the normal discharge curve and erroneously concluding that the cell 'remembers' and delivers only the amount of capacity previously repetitively used."

When I wrote about this two and a half years ago, I invited any readers who had technical proof of battery memory to send me the data. I didn't receive any.

As I interpret the technical manuals, at charge currents above the recommended 0.1C charge rate, voltage depression will occur from excessive overcharging. But if the charge rate is less than 0.1C, voltage depression will not occur regardless of how long the

battery is left on charge. This explains the broad range of rates for trickle charging in the GE handbook. Charging at rates above 0.1C can cause voltage depression, and below 0.02C may not keep the battery charged.

The GE handbook also shows a range of standard charge rates from 0.05C to 0.1C. Our radio manufacturers appear to have chosen the upper end of this range for the design of their chargers, to give a fair charge overnight and a full charge in about 16 hours. (I know, 50 mA times 10 hours equals 500 mA, but the battery is not 100% efficient, so we have to put in more than we can take out. Also, the charge current drops off as the battery charges.)

But the 0.1C charge rate, which is pretty universally used, unfortunately pushes the lower limit on the development of voltage depression from overcharging. If our chargers worked at, say, 0.08C, a full charge would require 20 hours instead of 16, but we could leave it on at this rate indefinitely.



Some of the author's trickle chargers.

close to the 0.1C rate for the standard 500 mA capacity cells. One-tenth of 500 is 50 milliamperes, which is therefore the standard charging current.

By the way, if you decide you need larger cells, either for a big model or for more flights, remember that the larger cells will have to be charged proportionally longer on the standard charger, or you will have to use a charger designed to provide a 0.1C rate for the larger battery.

## NICD "MEMORY"

What modelers erroneously used to call NiCd "memory" is now known to be only a reduction in load voltage and is due to overcharging. A NiCd's capacity is not reduced by using only part of the charge repeatedly and recharging each time, as some modelers thought.

Let me quote the General Electric Handbook: "Memory—misnomer for 'voltage depression.' Cells exposed to overcharge



Note that this rate is both in the published trickle range and in the standard charging range.

I decided a year or more ago to convert my operations to trickle charging, and I love it! Just prior to that I had lost an airplane due to a dead battery—I thought I had enough charge for the day's flying, but didn't. Now all of my batteries are always completely charged and I don't have to worry about it.

### HOW TO TRICKLE CHARGE

As you can see in the photograph, I have an Ace R/C AT2000 auto-trickle dual NiCd charger. It will charge both the transmitter and receiver battery at the same time for about 17 hours, then reduce them both to a continuous trickle charge of 10 milliamps. One of the outputs also has an adjustable charging rate. Nice unit, but I fly more than one airplane.

Rather than invest in more such gear, I decided to do some home modification on my standard chargers. To reduce the output of any charger, simply install a resistor in series with some part of the circuit. It can be either in the primary circuit of the charger transformer (in the power input cord), or in the rectified secondary circuit of the charger (in the output cord to the battery).

In the middle of the photo you can see a standard Futaba system charger with a resistor and miniature switch inserted in the power input cord. This reduces both the transmitter and the receiver output rates together, with only the one circuit change. In the front of the photo is a similar resistor and switch inserted in the output cord of a McDaniel NiStarter charger. I use a 25 or 30mA trickle current on that one.

Calculating the value of the needed resistors by Ohm's Law would seem simple, but isn't, for a variety of reasons that we won't get into. I found the sizes I wanted by current testing after rough Ohm's Law calculations. The values I'm using are 47 ohms in series with the output cord on the NiStarter, and 5.6K ohms in series with the power input cords on my Futaba chargers.

When it is closed, the switch shorts out the resistor, so the charge rate is then the standard 0.1C. When the switch is open, the resistor drops the charge current to a low 0.02C trickle. Radio Shack has a number of subminiature SPST switches that will do the job.

You can use a series resistor without the resistor-shortening switch if you are willing to dedicate that charger to low charge rates. Without the switch, I would recommend you use around a 1.5K-ohm resistor in series with the charger power input cord. The charge current will then be high enough to

fully charge a discharged battery in around 30 hours, yet be safely in the middle of the trickle range.

The big cylindrical lump in the back of the photo is an adjustable autotransformer (Variac or Powerstat), which reduces the input voltage to a standard charger plugged into it to any desired trickle level. Actually, it can even boost the voltage somewhat above 120, to give a higher-than-standard charging current. (I also use this autotransformer as a power supply for hot-wire foam cutting.)

So trickle charging can be done in many ways. My tests show that even at the 10mA trickle currents I'm using, discharged batteries do get charged, albeit slowly. I usually don't fly more than once a week, and not very many flights in a day. I find that in that mode, I never need to use the standard charging rates at all. When I get home from the field I put all of my batteries on trickle

The voltage is around 1.40 volts or greater immediately after charging, but it rather rapidly drops to around 1.30 volts after a little use. From there on the drop in voltage is fairly linear with use. That is, the no-load voltage indicates the remaining charge in the cell. As you can see, when the no-load voltage is down to 1.20, the cell is effectively discharged. In the example shown on the curve, if the no-load voltage measures 1.31, we see that about 40% of the charge in the cell remains. For convenience, on the right side of the curve, I have put in the voltages for our standard four-cell receiver batteries and eight-cell transmitter batteries.

Notice that we are talking about voltage to three figures of accuracy. A plain pointer-type (analog) voltmeter or multimeter isn't going to be accurate enough and it can't be read closely enough. Digital meters read to the closest hundredth or thousandth of a volt in the lower ranges, and are very accurate and repeatable. I also have expanded scale voltmeters, but I don't consider them nearly as good as or as versatile as digital meters for battery testing.

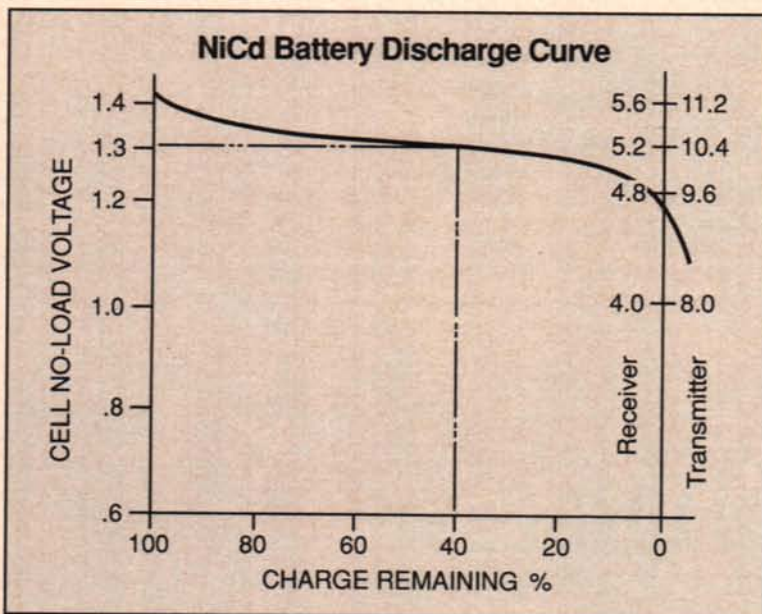
If you have an old Accu-Tach, you have a digital voltmeter. Are you using the voltmeter part of it? In addition to an Accu-Tach, I have an inexpensive Sears digital multimeter that measures to a thousand volts AC or DC, current to 200mA, and resistance to 20 meg ohms. Radio Shack also has good inexpensive ones—their #22-188 at \$37 is fine. Most digital meters even sort out the polarity for you, so you don't need to worry about getting the right lead on the right terminal.

You will notice that I keep using the term "no-load voltage," which means the same as open-circuit voltage. The "load" voltage that appears across the cell or battery while it is powering a radio or otherwise doing its thing is lower because of the voltage loss inside the cell due to its internal resistance.

On the other hand, the voltage during charge is considerably higher than the no-load voltage, because here the effect of the internal resistance adds to the no-load voltage. Also, you should measure the no-load voltage when it is stable. It takes some minutes after use or after charging for the voltage to adjust to its steady-state value. Note that the capacity-remaining test illustrated in the drawing is a no-load test. Load-voltage testing of batteries is also common, and has some advantages.

### LOAD-VOLTAGE BATTERY TESTING

Even with trickle charging, batteries will eventually wear out or go bad for other reasons. Therefore, to play safe, we should test them frequently, especially after a num-



charge and forget them. Before I get around to flying again, they are all fully charged and eager to go back to the field.

On a 12-volt lead-acid starter battery, trickle charging is almost a must. Unlike NiCds, lead-acid batteries are rapidly damaged if not kept charged. A number of automatic 12-volt chargers are available which go to trickle when the charge is complete. Kept charged, lead-acid batteries may last 10 years or more. Try trickle charging on everything—you will soon decide never to be without it again. It is the greatest thing since CA glue.

### NICD BATTERY TESTING

As most of you know, to find out roughly how much charge remains in a NiCd battery, we may measure its voltage. In the event that I have picked up a reader or two in the last three years, let me repeat a bit of what I covered in February 1990.

The illustration accompanying this article shows the approximate no-load voltage for a nickel-cadmium cell over its discharge range.



ber of flights on one charge. Load-voltage testing and no-load-voltage testing both work, but the load-voltage method is a little more useful because it will reveal other battery problems in addition to amount of charge. For instance, a high-resistance cell, a bad solder joint, or a nearly frayed-through stranded wire may produce a low load voltage even if the battery is completely charged.

I use the "transmitter" and "receiver" test terminals of my Accu-Tach digital voltmeter section to test the batteries under load. The Accu-Tach has built-in load resistors to apply loads to these two batteries, roughly comparable to the loads they see in flight. The receiver and transmitter battery test resistors are 20 ohms and 40 ohms, respectively. These load values (about 250 milliamps on each battery) may be standard on most commercial flight and transmitter battery testers.

If you don't have an Accu-Tach or other loading battery tester, you can shunt any digital voltmeter with these resistor values yourself. A little arithmetic tells us that the receiver resistor needs to be 2 watts or more and the transmitter resistor at least 3 watts, if they are going to be used for battery discharging as well as for testing. An easy way to do this is to connect two 20-ohm, 2-watt resistors in series for the transmitter test, and bypass one of them for the receiver battery test. In addition to being big enough,

these power resistors also need to be located where they can dissipate the heat they will generate.

The selection of go/no-go voltages, above which you can fly without recharging, is of course subjective. The decision involves how many flights you intend to put in, the kind of flying (how much servo activity), the length of the flights, the amount of ground testing likely, and how large a safety factor you need for comfort. That involves the degree of assurance you have on how much charge that battery still has when it shows a given load voltage.

For instance, I know I can get in one more flight if the load voltage on the receiver battery is 4.78 or above, and if the transmitter load voltage is 9.50 or above. If you don't trust my numbers, test-discharge the batteries through the resistors, one at a time, record the voltage at frequent time intervals, plot yourself some curves, and you will be able to see, for your batteries, the use time remaining from any selected test voltage reading.

#### NICD STORAGE

According to the GE Nickel-Cadmium Battery Application Handbook (1986), "Nickel-cadmium batteries can be stored in either the charged or discharged state." Some model columnists preach a different line, saying that you should always keep your NiCds charged or they will deteriorate.

I suspect that many such doomsayers are still thinking in terms of lead-acid batteries. Different chemistry makes it essential that lead batteries be kept charged.

Another explanation for the keep-NiCds-charged advice is that discharged NiCds are more apt to develop permanent shorts. The theory is that if a short forms in a fully charged cell, there may be enough energy in it to "zap" or fuse away the short and restore the cell. Could be, in some cases, but we can frequently zap away shorts by an externally applied momentary shot of a few amperes charging current regardless of whether the short occurred when the battery was charged or discharged.

Let me again quote from the GE Handbook: "A primary cause of electrical shorts in the cell is degradation of the separator material. Degradation is cumulative. The rate of separator degradation is a function of the integral of cell temperature over time." In other words, if you really want to extend the life of your NiCds, keep them in a cool place (down to freezing).

Quoting further: "If the cell voltage can be increased enough by high charge currents, the shunting current is sometimes of sufficient magnitude to burn off or clear a short, providing a brief extension of life." Note the word "brief." That cell will be living on borrowed time. I have zapped many sick batteries successfully, but such a "repaired" battery bears watching. To zap a four- or five-cell flight battery with a shorted cell, I put the battery directly across my 12-volt starter battery for a second or two, making sure the polarity is plus to plus.

Even though GE says don't worry about keeping your NiCds charged during storage, trickle charging may be a little better for them and it means the batteries are always charged and ready to fly.

Don't wear them (and yourself) out by frequently deep-cycling them. To quote again, "When a cell is fully exercised in every cycle, the active materials in the electrodes are worked more, causing degradation to occur earlier than in the same cell undergoing less exercise."

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## MINI STICK continued from page 45

face of the center triangle on the prop jig. Draw a thin centerline lengthwise along the back of each prop blade and cement the prop spar to each blade along this line. The

## COVERING THE MODEL

The model is covered with a thin plastic called Ultra Film, available from several indoor specialty sources. Tape a 12x16-inch piece of the film to a sheet of smooth artboard with a small strip of Scotch tape at each

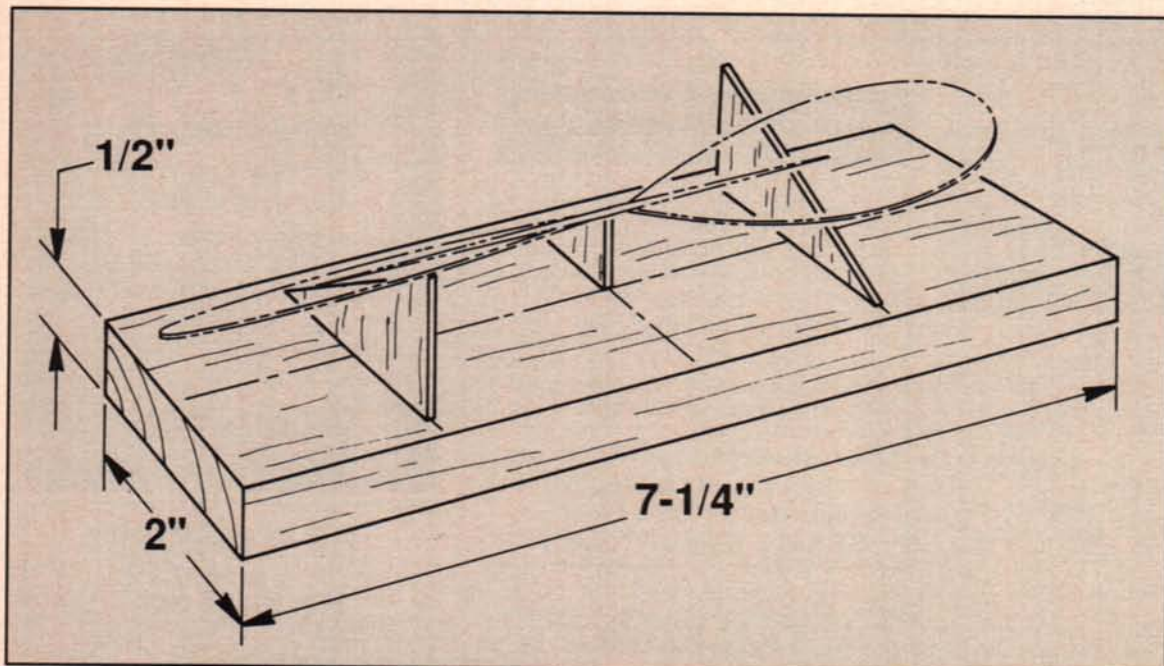
corner of the film—not drum tight and not sloppy loose. Paint the topside of the wing framework with Ultra Film cement and allow it to dry.

Place the wing topside down on the film. Using a fine brush dipped in thinner, apply thinner to the coated frame. Hold the frame

down with weights or your hand to steady it while applying the thinner. The thinner will soften the cement coating and make it adhere to the film. Run the wetted brush along the ribs on top also.

After the film is completely attached to the wing, trim it away on the outside with a hot wire cutter (micro cautery tool) or a new, sharp blade. The hot wire cutter and disposal scalpels can be ordered from Dr. Vernon Hacker, 25599 Breckenridge Dr., Euclid, OH 44177. Several blades and the hot wire tool will cost you

*continued on page 83*



The propeller blades are glued to the prop spar using this simple fixture to keep everything properly aligned.

outboard portion of the blade should extend 1-11/16 inches beyond the end of the spar. Make sure each prop blade is resting its leading and trailing edges on the triangle on each side of the fixture. When dry, the prop shaft can be cut away from the center triangle.

The prop is now ready to be joined to the motor stick. Cut the prop shaft loose from the hub. Straighten the wire and thread it back through the hub. Run the shaft through the two holes in the prop hanger. Place a small Teflon washer onto the shaft just ahead of the prop hanger, then slide the shaft back through the hole in the prop spar. Re-bend the shaft and cement it to the hub as before. Finally, check to make sure the prop is balanced and tracking true.

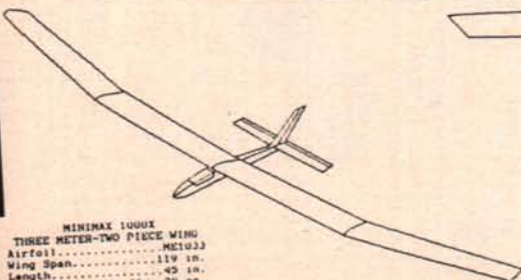
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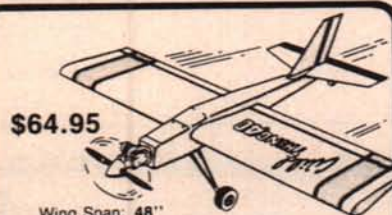
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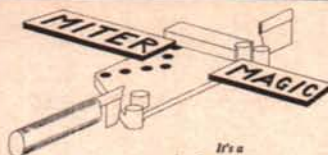
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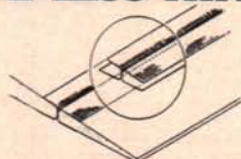
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## ELECTRONICS continued from page 31

are carried by many dealers around the country—if all else fails, order direct from Ace R/C, 116 W. 19th St., P.O. Box 511, Higginsville, MO 64037.

## TALKING ABOUT ACE R/C

In the September column we discussed how to connect the CD-4069 IC to invert the signal pulse from a common positive pulse receiver so that it would drive older-style negative-pulse ProLine servos. I since received a letter from Bud Wolfe, of Scottsdale, Arizona, to remind me that:

"The easiest way is to buy a pulse inverter from Ace R/C. They cost only \$3.30 (or \$2.30 in kit form). I've been a long-time ProLine user and the pulse inverters work fine."

I knew that! I guess we can all use a reminder now and then—thanks, Bud. Another thing to remember is that pulse inverters, mine or Ace R/C's, work both ways. That is, while they will convert a positive to a negative pulse as required in the cases just discussed, they will also do the opposite, just in case you want to use newer positive-pulse servos with a older negative-pulse ProLine.

## REGARDING PAST ARTICLES

A lot of paper gets mailed out of here every month, most of it in answer to requests for information that I have listed as having on hand and which I have not included in the column in its entirety. There are two reasons for such a move on my part: 1) I don't consider it to be of general interest, or 2) it is simply too long for the space allotted me. I don't hesitate one minute to invest two envelopes and two stamps to obtain information which I want or need, and don't feel at all hesitant to ask you to do the same.

But again, that is for information that I have offered previously, though I do fill a lot of requests for miscellaneous schematics or information which readers ask for on the chance that I have it available. I usually don't mind doing this, as in most cases I know that the information is simply not available anywhere else, at any cost.

However, I cannot fill the requests—two or three of which come in every week—for copies of previous articles of mine which have appeared previously here in MB. I have even had requests for such from issues still in the hobby shops! But the fact is that MB is a copyrighted publication, and under the law, once my articles, or anyone else's, have been published, copyrighted and paid for, they are no longer ours. Therefore I cannot legally send you a copy, even though it credits me as the writer. Oh, I'm sure that MB is not going to sue me for running off a copy or two now and then, but fair is fair and takes all parties involved. Besides, my time is limited, and I'd rather spend it providing you with information not otherwise available—the more current stuff is still there in MB's back issue sales.

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## SCALE continued from page 73

from idle to only half throttle. I find it controls the landing a little bit also.

"We have about seventy flights with the test plane, just trying to break the device to see where the weak spots are. This way, if it breaks, the manufacturer can beef up the failed areas. But so far, nothing has really happened to it. It works very simply with one pushrod going to one servo. On this particular test plane, the diameter goes from 2-3/4 inches to around 4-1/8 inches."

### FREEZER WRAP TEMPLATES

In the Strictly Scale column in the September '92 issue of *Model Builder*, I described how to make templates using freezer wrap paper. I received a letter from Jim Coffin, of Annandale, Virginia, who tried this method and improved upon it. Here is what Jim had to say:

"I read your building tips and decided to give the freezer wrap pattern idea a try. I build mostly Old Timer and Nostalgia free flight models from scratch or from plans and have been using photocopies of the parts shown on the plans for patterns. I also don't trace as accurately as I once did.

"In the case of the freezer wrap, I found that with a bit of luck, it would run through the copier and return an accurate pattern from the plan image. Of course, you may have to adjust the machine a bit to insure

accuracy and cut and paste copies of plan sections together to make the best use of your pattern paper.

"I ironed these directly onto the wood with my wife's laundry iron set at the bottom end of the steam setting. It is important to use a piece of tissue paper, the kind found in shirt wrappings, between the iron and photocopy patterns, otherwise some of the pattern will bleed off onto the iron and reappear on your dress shirts. I haven't tried a MonoKote iron yet, but it should work as well."

Thanks, Jim, for the letter—I will certainly give the copier idea a try. Yes, many modelers do "cross train." This is one of the reasons I like *Model Builder*, because it reports on all aspects of our model aircraft hobby.

### FREE PLUG DEPARTMENT

Back in June, I received a sample of Sig's new pushrod connectors, but because I was away from home during June and July, this is the first chance I've had to mention them.

Basically, this is the same type of connector with which we are all familiar, with two noteworthy improvements over the standard types. First, the set screw is a standard 4-40 socket-head bolt instead of a slotted screw, which means no more holes in the bottom of your fuselage from slipped screwdrivers! Second, the connector body is hex-shaped so you can grip it with pliers or a small wrench while tightening the set screw, which means no more twisted

pushrod wires or cables!

People have told me that pushrod connectors of this type are no good, come off in flight, etc. I have been using pushrod connectors for many years and have yet to experience a failure. They will not fail if installed properly. Be careful when installing them on the thicker servo arms; enough of the connector post must protrude through the servo arm for the nylon retainer to lock onto. If you are leery of using this device because of the nylon retainer, there is a metal retainer called a "Star Lock" that can be used in place of the nylon one. The metal retainer can only be removed by cutting it off. I use the metal retainers on the control surface pushrod connectors and the nylon retainers on the throttle and nose wheel steering pushrod connectors.

I used this type of pushrod connector on my Byron warbird that was flown in the Striking Back Show from 1985 through 1989. During the '89 show I dumb-thumbed the plane and totally destroyed it. It hit so hard that the 4.2 cu. in. Sachs-Dolmar engine was pushed back into the cockpit, but not one pushrod connector failed! One pushrod wire was wrapped around one servo arm and two servo arms were broken off, yet the pushrod connectors were still attached to the servo arms. There's no question that these connectors are more than strong enough to do their job, and they also make pushrod installation and adjustment at the servo much easier and quicker. **MB**

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When responding to any of our mentions, kindly tell 'em *Model Builders* sent you. Thank you!

**GEE BEES AGAIN**

When Delmar Benjamin flew his replica Gee Bee R-2 racer to the Great New England Air Show in July, he was greeted by members of the Granville family, whose relatives built the original Gee Bees. Additionally, Gee Bee designer Howell "Pete" Miller and his wife, Dotti, were on hand to share in the festivities, according to author/model builder Henry Haffke. Other notables on hand included Jim Jenkins, with his full-size Gee Bee E reproduction; Tana Benjamin, Delmar's wife, and their two daughters; Tom Nallen, who with his associates recently produced a historical video on the Gee Bees; and R-2 reproduction co-builder Steve Wolf.

High point of the show was Delmar's flight demonstration, which included knife-edge passes the full length of the runway, four-point rolls, barrel rolls and more. As Henry Haffke put it: "Delmar is a fantastic pilot... I have seen most of the best in recent years and have never seen anyone nearly so smooth—and he does it in a Gee Bee—utterly fantastic. Gave me goosebumps, and the entire audience was ecstatic."

Reader Fred Komlosy, who saw the Gee Bee R-2 fly earlier in Florida, had these reactions: "Pilot Delmar Benjamin is impressive. He runs it around on the ground like a go-cart and in the air like a Pitts Special. The knife-edge flight is particularly impressive—it went the whole length of the runway at the same height—no arc or sagging. He does it all—eight-point rolls, inverted flight and so forth. A whole bunch of myths went out the window, although landings seemed to command Delmar's respect."

**SIGN-OFF**

We wind up this month's column with this quotation from the late Wilfred J. Berube, from Bob Whittier's new book, *Mon Reve (My Dream)*: "I'd rather work around an airport, airplanes and aviators just for the fun of it than get a million dollars a year for doing something I did not like!" **MB**

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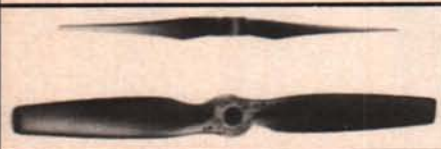
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## MINI STICK *continued from page 77*

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Next, the dihedral must be added. Make a cut halfway through the center of the leading and trailing edges of the wing. Press upward on either side of the cut. Prop up one side of the wing to obtain the one-inch dihedral and cement the joint. The left wing panel should have 1/4-inch of wash-in at the tip—that is, the trailing edge of the wing is 1/4-inch lower than the leading edge at the tip.

Use these same techniques to cover the tail surfaces, and you're ready for final assembly.

(An alternate method of covering is to use the spray cement technique. The topside of the wing and tail framework is *lightly* sprayed from about 20 inches with 3M Super 77 adhesive. The wing frame is then pressed topside down on the covering film. Light pressure along the outline will assure good adhesion. Trim away the excess film with a blade or hot wire.)

Mount the wing on 1/32-inch round or square posts. Glue the tail surfaces to the tail boom. Attach the rubber motor to the front and rear hooks. Holding one finger just under the motor stick, balance the fuselage until it's horizontal. Mark this spot with a pen. Measure 3/8-inch to the rear and mark this spot; this will be the center of gravity. Mount the wing posts so that the center of the wing chord is over this spot. Add approximately 1/16-inch positive incidence to the wing, meaning that the leading edge of the wing is slightly higher than the trailing edge.

### FLIGHT TESTING THE MINI STICK

Using a .020x10-inch rubber motor, test the model to see what the flight pattern is like. It should turn to the left in 10-foot circles and should climb gently. The wings should be near horizontal. If the plane spins in to the left, add wash-in to the left wingtip. If it does not turn tight enough, add stab tilt (left side higher than the right). You can do this by gently twisting the tail boom while breathing on it.

Fly your Mini Stick in dead air only—no open doors or windows and no air conditioners running. Good flying!

### SOURCES FOR INDOOR SUPPLIES

Indoor Model Supply, Box 5211, Salem, OR 97304; handles a complete array of indoor supplies, including thrust bearings, Teflon washers, rubber and even a Mini Stick kit. An 18-page catalog is \$1.00.

Micro-X, Box 1063, Lorain, OH 44055; complete indoor supplies, catalog is \$1.50.

Raymond B. Harlan, 15 Happy Hollow Rd., Wayland, MA 01778; various indoor supplies including covering materials, thrust bearings and a really great rubber stripper.

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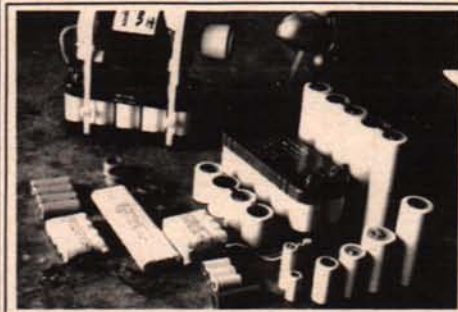
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**WANTED:** Leisure electric kits "Lanzo Bomber" & "Playboy." Frank Oliveto, 21307 Brierstone, Harper Woods, MI 48225; (313) 884-2874.

## SOARING continued from page 42

Falcon 550E is one of the lowest I've seen. It handles thermal turns with grace and precision. Because of its ample aileron differential, there is no tendency towards adverse yaw at any speed. When banked up and turning, very little or no corrective aileron is needed to maintain the bank angle. This one's a pussycat to fly.

Stalls are definite, mild, quickly recovered, and occur at very slow speeds. The

only stalls we experienced were the ones we purposely initiated to see if they existed. Not once did we tip stall the plane in all the test flying we did.

Our test plane's JR Propo x-347 transmitter's mixing abilities were used to augment the 3° of downthrust built into this particular Falcon 550E's fuselage (more downthrust can be added if you prefer). As the throttle is advanced, as much as 5% down elevator is electronically mixed into the tail servo. We found this to be nearly perfect, although a tad on the nose-high side.

I hope this mini-review has given you some valuable new product information concerning a group of hot new electric motorglider products, and the revitalization of an existing company. Tell 'em you read it in *Model Builder*!

I welcome your comments and suggestions. My phone is on the hook for your queries from 6:30 p.m. to 9:30 p.m. weekdays or potluck on weekends at (714) 245-1702. Green air and cumulus clouds! Have fun. **MB**



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Technology. The sample is uni-directional carbon fiber fabric at a weight of only 2.25 ounces per square yard. The cross thread is spun carbon every 1/4-inch, and the material is smooth and easy to handle. Cost is \$5.00 per linear foot (8.25 inches wide and .002-inch thick). CST also now has fiberglass cloth at an all-time low price, in many sizes and thicknesses.

These are just two of the new products that CST has added to its rather large catalog. You have no excuse to be unfamiliar with their products, which includes vacuum bagging supplies and equipment, epoxies, adhesives, Rohacell foam and many other exotic building supplies for the contemporary modeler.

You can obtain the price list by sending a business-size SASE envelope (52 cents postage). For a complete information kit including product catalog, price list, reprints of carbon fiber articles, and a \$5 gift certificate good on the first order, send \$3.00 to Composite Structures Technology, Dept. D-29, P.O. Box 4615, Lancaster, CA 93539.

### THAT'S IT DEPARTMENT

Another month has come and gone. Ac-

ording to the cover of this issue of *Model Builder*, it's now December. However, I am writing this column in August. You will receive this issue in November. Very confusing, isn't it? At any rate, for most of us, the contest flying season will be about over as

this is being read, so it must be time to start thinking about next year. Next month, I will present a few ideas for your consideration as you plan for the 1993 outdoor contest season. Until then, dream up a thermal for both of us. **MB**

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for the AMA's RC Duration event, but it makes a great sport model as well. All-wood construction, for Cox reed-valve .049 engines.

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## HELICOPTER continued from page 63

bottoms of the sideframes do not have the usual 90-degree bend; a separate 90-degree angle piece is bolted onto each sideframe instead. There is very little plastic used in the model. The landing gear struts, servo tray, and rotor head are of all-metal construction, with a corresponding increase in weight—about half a pound heavier than the Concept 30.

The fuel tank is located close to the main rotor shaft, hence, a change in the fuel level has a minimal effect on the CG. The fuel level can be seen readily in flight.

Interestingly, the Fivestar kit includes a muffler, but does not include main rotor blades. David used a pair of wooden Shuttle rotor blades, which work well. I suggest you also try a pair of the fiberglass 30-size Shogun blades that yours truly designed for the Concept 30. These blades have a unique blade tip design that enhances performance. (I have recently done some more flight tests with the Shogun 30 blades. They give a very stable hover, have excellent inverted flight characteristics, and do great autorotations. But in high speed forward flight, the model

still exhibits some pitch-up tendency. The wooden Ninja blades show slightly less pitch-up tendency, but they have less inertia than the Shogun blades.) Due to the soft flapping main rotor head design, the Fivestar 30 does have a slight pitch-up tendency in fast forward flight.

The Fivestar's canopy is quite large and presents considerable frontal drag area. It is a very high quality fiberglass piece and looks just like the TSK Kaiser 60 canopy. The pod on either side of the canopy is for looks only and serves no useful purpose. David thinks that at full throttle the TSK Fivestar 30 is about 5 mph faster than the Kyosho Concept 30 SX; both were powered by O.S. 32H engines. The slightly faster straightaway speed could be due to the TSK's extra weight. I think my buddy Ray Hostetler may disagree.

In summary, the TSK Fivestar 30 is quite expensive, but the machined parts and kit quality are truly impeccable. Every metal part is well-finished and flawless. The metal swashplate and the mixing unit are A+ quality. The teeth on the white plastic main gear are machine cut, rather than molded. The parts are built to last.

In flight, it's very stable and smooth. The other popular 30-size helicopters also fly very well and are even better suited for hotdogging, but owning and building a TSK 30 gives you that "collector" feeling.

TSK helicopters are available in the U.S. from the following sources:

- Vortex R/C Helicopters, 1374 Logan Ave., Costa Mesa, CA 92626; (714) 751-6212.

- TSK/USA, 2973 Harbor Blvd., Suite 340, Costa Mesa, CA 92626; (714) 662-2640.

- Hobbies and Helis, 507 Main Street, Fort Lee, NJ 07024; (201) 947-5470.

- Helicopter World, 521 Sinclair Frontage Road, Milpitas, CA 95035; (408) 942-9521.

James Wang, 7365 Main Street, Apt. 106, Stratford, CT 06497. **MB**



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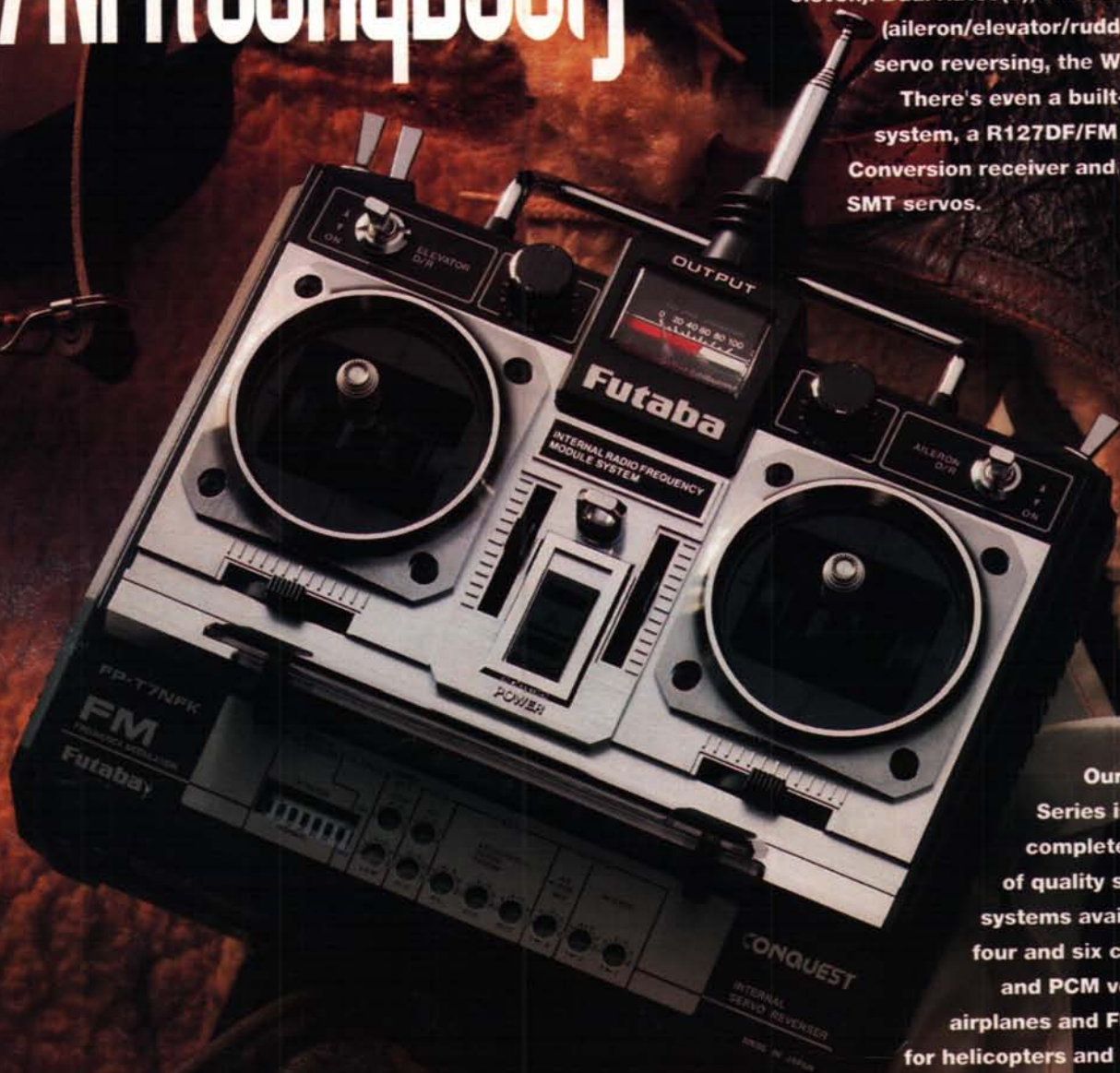


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