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- COLT 40 SLT FROM U.S. AIRCORE
- THE 'FUN ONE' FROM GREAT PLANES
- P.A.W. .49 TBR DIESEL ENGINE
- WIND CRUISER II MOTORGLIDER FROM HITEC/RCD

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94501 Microlite Servo.
Weight: 0.57 oz. • Torque: 29 oz./in. Speed: 0.23 Seconds for 60° Rotation Dimensions: L: 1.07" x W: 0.50" x Ht: 1.07"

SUPER LIGHTWEIGHT!

Here's proof that good things come in small packages! The Microlite's outstanding performance belies its small size and super light weight. Its gutsy torque makes it ideal for a range of small aircraft applications, while its rugged coreless motor is fast and reliable. And twin mounting holes on an injected molded case give you terrific flexibility of installation.

Compare its performance and superior strength to servos weighing twice as much!

RUGGED AND COMPACT!

94407 Micro Ball Bearing Servo.
Weight: 0.96 oz. • Torque: 29 oz./in. • Speed: 0.25 Seconds for 60° Rotation • Dimensions: L: 1.23" x W: 0.60" x Ht: 1.23"

What do you get when you combine a lightweight and compact design with loads of punch? The ultimate in high-performance versatility! With small powered aircraft you can use the 94407 as an aileron servo, and with its small size and weight you can easily mount it inside the wing. It has terrific torque for a variety of applications, and its ball bearing shaft makes it incredibly durable. Ideal for electric helicopters!

94161 Pro Series Large Scale Ball Bearing Servo. *Weight: 2.5 oz. Torque: 135 oz./in. • Speed: 0.25 Seconds for 60° Rotation • Dimensions: L: 1.54" x W: 0.79" x Ht: 1.65"*

Got a giant scale aircraft? Here's the servo that's perfect for you. This Pro Series unit has a tough, metal gear train and metal output gear coupled with a double ball bearing output shaft. That combination helps it withstand heavy-duty use during competition and ensures longer life. Its hefty 135 oz./in. torque makes it more powerful than servos twice its size, yet its compact size lets you mount it in the same places as a standard size servo.

BUILT FOR GIANT SCALE!

92745 Micro Receiver, 72 MHz FM.
Weight: 1 oz. • Dimensions: L: 2.25" x W: 0.96 " x Ht: 0.82"

SPACE SAVER!

If you want to get the best out of your small aircraft, electrics and gliders, you have to check out this micro receiver! The new 4-channel Micro FM Dual Conversion Receiver has all the high-performance, super narrow-band features of its 8 channel big brother, the gold label 92785, but in a smaller, more compact package which still meets all AMA guidelines. What's more, its compact design features state of the art surface mounted electronics, thanks to the ingenuity of Airtronics' advanced engineering.

96332 MA-6 Speed Controller for Electric Aircraft.
Power Supply: 7.2 to 12 Volt NiCd Pack • Weight: 1.7 oz. Dimensions: L: 1.52" x W: 1.3" x Ht: 0.69"

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Electric aircraft flyers love the MA-6 speed controller. And for good reason. Just check out its range of high-performance features! Its proportional throttle control lets you take smooth and efficient command of your aircraft. It uses the latest MOS-FET technology, with a high-performance regulator for longer run time. It has B.E.C., which uses voltage with maximum efficiency by allowing the receiver to run off the motor battery and consequently eliminating the need for a separate receiver battery. And it cancels the need for an additional servo, which saves weight and space. But that's not all! An automatic Temperature Cutoff switch prevents overheating, an Arming switch guards against accidental startups and a special Brake Circuit keeps folding propellers from freewheeling, allowing them to fold back in place properly.

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Model built by Colonel Robert Thacker

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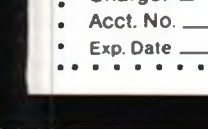

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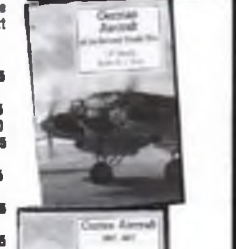

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AIR MAIL

NOW HEAR THIS

Model Builder is still looking for input for our new "Plane Talk" column. This will feature your favorite model(s), and some information about how it was built. We also want to know about your experiences, as well. If your "Plane Talk" appears in the magazine, we'll send you one of our custom *Model Builder* tee shirts FREE!

We also are looking for your vote. As mentioned in the January '93 issue, we're going to feature construction articles, with plans and paintings, of the Top Ten Aircraft from the Golden Age of Aviation (1925-1941)—as determined by you. Send us a letter or postcard with the names of your 10 favorite airplanes from this era. You'll love the results!

Send your Plane Talk or Top Ten list to *Model Builder*, 34249 Camino Capistrano, Capistrano Beach, CA 92624.

FREE FLIGHT FANCIER

I am glad you're continuing your free flight coverage. I had been considering not renewing my subscription until I saw you were continuing with free flight.

Gene Smith
Stillwater, Oklahoma

HATES JAKE

...I would like to see that stupid "Dear Jake" column cancelled.

Bill Tucker
Zillah, Washington

LOVES JAKE

...I think that the irreverent, clever "Dear Jake" is a fun part of *Model Builder*. Please don't let his stuffy critics cause you to drop him!

Cal Stewart
Okmulgee, Oklahoma

MAGAZINE BASICS

Your publisher's editorial in the January '93 issue asked for tips and opinions, so here goes.

I buy *Model Builder* only when it has a rubber-powered plan in it—in January, this was the Messerschmitt M17. I'm an independent modeler and only build rubber-powered scale. I believe RC, U-control and giant scale will eventually destroy the modeling hobby because of the loss of flying sites, dollar investment and drain on resources.

You say, "We require stories that are informative yet entertaining." Airplanes are not words, they are plans and pictures. Words are just fillers between the plans and pictures. But I couldn't be against how-to articles and descriptions of real aircraft.

A model magazine must have plans in it. To satisfy everyone, it must have plans for all enthusiasts of the hobby every month. You also should have detail plans of real aircraft at least the quality of Paul Matt or Peter Westburg monthly.

Kenneth W. Race
Cupertino, California

EGGING US ON

I have been a subscriber for over 12 years. I did consider *Model Builder* the best in the hobby. Now I wonder.

In the January issue, you said that "size and format will not change, but only be improved as necessary." Following are some "improvements":

1. You have the rare distinction among magazines to count the front cover as Page 1.

2. Total number of sheets shrank from 108 pages to 88—which at the same price amounts to a sneaky backdoor price increase of 20% without announcement.

3. When you refer to informative and learning, what happened to one of the best columns on electrics, an ever-faster-growing segment of the hobby?

4. You say 30% maximum advertising? You're joking when the same issue you say that in carries 34+%.

Enclosed is a tissue to wipe the egg off your face. Readers are not that stupid!

Paul Opp
Valencia, California

(Publisher Mark Thiffault replies: "Thanks for your subscription loyalty and I hope it continues.

"As to page numbers, Model Builder *is not unique in counting the front cover as the first page of the magazine. So does* Model Airplane News, Flying Models, Scale R/C Modeler, Ship Scale Modeler, American Space Modeling, *and even* Model Aviation Canada. *Whether an issue is termed "84 pages plus covers" or simply "88 pages" is immaterial; it's saying the same thing two different ways.*

It's true that Model Builder's *page count has decreased to 88 pages for most of the year — it did rise to 96 pages with the July '92 issue. A 108-page* Model Builder *certainly provided more reading than other magazines, but it didn't have the advertising to support it. Remember,* Model Builder *is a business—it must make a profit or it doesn't continue.*

"However, we are committed to delivering more reading than any other hobby magazine; hence our pledge to deliver 70% editorial, 30% advertising. And we've stuck to that. When advertising increases beyond 30%, we add more pages—which is why the July issue increased to 96 pages. I wish your figure of 34+% advertising in the January issue were true—it would have meant more editorial pages being added. However, that issue had 28-1/3 pages of paid advertising, hence the 88-page magazine—or "84 plus covers," if you prefer.

"And thanks for the Kleenex—I used it to wipe the sweat from Phil Bernhardt's brow, he's been working that hard on exciting new stuff. Hopefully, that will include more from Mitch Poling!")

SCRATCHED & BRUISED

I've been involved in electric-powered flight since 1977, when I built an Astro Flight "Partenavia P-68" twin-motored commuter aircraft. Of all things, I used an 8-cell, 550 mAh batter pack that by today's standards is woefully inadequate. However, I managed to fly it several times and still have it, intact, with only a few scratches and bruises.

As an electric enthusiast, I'd like to see more electric articles. And what about information from Mitch Poling?

I. Lentzner
Sarnia, Ontario, Canada
(We're working on it! Stay tuned.)

RADIO INTERRUPT

My first multi-channel radio was hand-built by Bob Dunham of Orbit Radio fame back in 1960. It lived through three "bangers" that year. All three plane owners borrowed the transmitter/receiver set, and since it was reed controlled (no proportional at that time), a highway patrol walkie-talkie locked controls in flight and down came the planes. The California Highway Patrol was sponsoring/monitoring a drag strip at the Modesto airport—must have done a lot of talking!

Neil K. Carr
Phoenix, Arizona **MB**

EZ Fun Begins at Thirty

- Mystic 30 ARF
- Zero-Sen 30 ARF
- Chipmunk 30 ARF
- P-51D Mustang 30 ARF

Mystic 30 ARF

SPECIFICATIONS:
Span: 52 in.
Area: 485 sq.in.
Engine: .25-.35 2-cycle
Radio: 4-5 channel req'd.

Suggested Retail $215.00

Only! **159.99**

- ***When your next plane has to be FAST, FUN and BEAUTIFUL...***
- ***When it has to fly on your favorite .25 to .36 two-stroke...***
- ***Then it simply has to be a Thirty Series ARF from EZ Sports Aviation!***

EZ Thirty Series ARFs feature precision crafted quality and colorful finishes that are the envy of all other manufacturers. One glance at the Chipmunk 30 tells the story on EZ scale details. Close inspection of the Mystic 30 tells the story on EZ's classic Pattern design. If action-packed warbird flying trips your trigger, then EZ's Mustang 30 and Zero 30 are for you! EZ is the innovative world leader in ARF design and manufacture. It's been that way since the beginning. It's that way today! And yes, the fun DOES begin at .30-size, but it goes on to include .40-size, .60-size, 1.20-size and even 2.40-size EZ models! Once you've tried an EZ you'll never settle for second best!

See EZ models today at your local hobby dealer.

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EZ SPORTS AVIATION Chipmunk 30 ARF

SCALE WITH SUPERB DETAIL

SPECIFICATIONS:
Span: 50 in.
Area: 387 sq.in.
Engine: .25-.35 2-cycle
Radio: 4-5 channel req'd.

LIST $215.00

Only! **159.99**

PLANE TALK

WE WANT YOU IN *MODEL BUILDER!*

Send in your favorite photos with a little information about the plane and yourself. If it's selected to run in "Plane Talk," you'll win a free custom *Model Builder* T-Shirt! Send your best to Plane Talk, c/o Model Builder, 34249 Camino Capistrano, Capistrano Beach, CA 92624.

It's no wonder that Adam DeLeon of Rapid City, South Dakota, has an interest in Russian helicopters like the Hind-D he built in winter 1991 using a photo from a magazine as a guide—he's in the U.S. Air Force, stationed at Ellsworth Air Force Base. "The Hind-D is all balsa with small pieces of plywood used at connection points," says the Airman, who's been in the hobby for six years. "This fuselage breaks down into four pieces and the pod and boom helicopter can be converted to this semi-scale look in 10 minutes." The fuselage weighs 2-1/2 pounds and goes onto a GMP Cobra with an O.S. .50 with heli ball muffler, JR gyro, and a JR Century VII radio. That raises the weight to 12 pounds and Adam says it flies pretty well at Rapid City's 3,300-foot altitude. Adam is one of 50 members of the RC Aces Club and has equal interest in airplanes and helicopters. *Adam DeLeon, 873 Dunn Ct., Ellsworth AFB, SD 57706.*

"A thousand years ago, my son, Scott, and I built a Super Sinbad together," writes Leo Smothers. "So for his 40th birthday—the same day I turned 65, by the way—I gave him this one. It's built from plans and covered with green and yellow silk. I like silk—it goes on well and makes a classy-looking model." Leo says he's never been able to get enough of airplanes or models. He's a power pilot, soaring pilot and instructor in both with thousands of hours in the air. "I never cease to be completely thrilled when I go flying or launch a model. I enjoy it all, indoor, outdoor, free flight, hand-launched gliders and some RC." *Leo Smothers, 5312 Eastwood Drive, Klamath Falls, OR 97603.*

..."Here's a snapshot that illustrates how a guy can get too much going when he's enthusiastic!" claims Hiram R. Haggett, of Cumming, Georgia. On the bench behind him is a half-done Pietenpol. The hybrid glider plane behind it needs about eight more hours of work. Behind him is the wing for his completed Kadet Senior, flown a couple of times weekly; you can see the fuse in the foreground left. Then there's the Dumas Creole Queen, a four-foot riverboat that has radio-controlled motors, rudders, tape player and lights. "I operate it on a nearby lake when it's too windy to fly the Kadet Senior," says the retired model builder, who adds, "Help! The shop is closing in on me!" *Hiram R. Haggett, 1110 Timberlake Trail, Cumming, GA 30130.*

Neil K. Carr's first model was built from a shingle in 1930, when he was 6. Since then, he's made hundreds and now he concentrates on planes shunned by most modelers due to complicated controls, etc. Pictured are the B-2 and F-117, early versions. The B-2 is a "stick and tissue" free-flight glider (tissue is MonoKote) with a 57-inch wingspan, centerline chord of 23 inches and 16-ounce weight. "The small, linear fins were not on the final design," Neil says. "They were to be 'pop up' for forward stability, but the split trailing edge (Northrop's B-49 had them) tip controls replaced rudders. At takeoff and landing speeds, the wheel well covers provide lateral stability." He notes that this size is too small for ducted fans. *Neil K. Carr, 502 W. Willetta, Phoenix, AZ 85003.*

DEAR JAKE

Advice For The Propworn

DEAR JAKE

This engine (pictured) is one of only three known to exist. I have another one in my engine collection, and I saw the other at a Model Engine Collectors meet here in Minnesota.

The engine was explained to me as a Zero Displacement Engine. It is simplicity to the highest degree. No fuel tank, thus no needle valve is needed. In fact, the head could also be discarded. Just give the prop a spin and it runs. However, we still need to do some work on the power curve.

Since I have a duplicate, I can spare this example for your use.

Tom Wilk in Duluth, MN

Dear Tom:

What a remarkable engine! It does everything you claim and more.

When I opened your package after soaking it in water over night (you can't be too careful with the kind of mail I get), I was immediately impressed with the Zero Displacement Engine. After reading your letter, I ran several tests on the engine. My findings included the following:

It started on the first flip every time, and ran for about thirty seconds at an amazingly low noise level. If it was windy, it ran even longer. In fact, when it was quite windy, it self started and ran on and on.

Fuel consumption was absolutely minimal. I attached a two-ounce tank and filled it only once. Even after hours of test running, I could not force another drop of gas into the still full tank.

I have theorized some additional benefits of the Zero Displacement Engine that might have escaped you. Have you considered its impact on multi-engine scale models? You could put four of them on a B-24 and they would run just as well and be just as quiet. But the amazing thing is that they wouldn't use any more fuel and the total displacement would still be zero! How about a Savoia-Marchetti flying boat? Twelve engines, zero fuel, and still zero total displacement!

I can't thank you enough for this wonderful engine. I've already started a Zero Wing Area monoplane to put it in.

Jake

P.S. I see you're from Duluth, the Vacation Capital of the World. Who won this year's Cow Tipping Contest?

Jake

DEAR JAKE

Sorry to bother you, but a mother worries about her son (even if he was an accident). I know you don't get family news from anyone else, so I thought it was time for an update.

Your Uncle Gaston is doing well. They've removed all the splints, including the embarrassing one, and they've turned off his electricity, so he won't be having any more vacuuming accidents.

Cousin Jeannine is out on bail and has resumed her position as a bouncer at the library.

Your nephew Carl sends his his love and the enclosed peanut husks. We're not expecting him to be released anytime soon.

Dad leaned over my shoulder a minute ago and asked who I was writing to. When I told him, he said, "Jake, who?," just like he used to when you showed him your report card.

Well, that's all for now. Good luck on your writing career. When do I win that Publishers Clearing House thing you promised?

Your Mother

Dear Mom:

Thanks for the news. Did your household pest problem clear up, or is Aunt Constance still visiting?

Love, Jake

DEAR JAKE

Blimps, balloons, dirigibles . . . they all fly because they're filled with some kind of gas that's lighter than air, right? There was even an experiment called something like the "Helio-Plane" or "Helio-Courier" back in the 30's or 40's that put some helium in the empty places of a conventional cabin monoplane.

Well, I'm no dummy, (Jake's Note: We'll see.) so I figure why not put some lighter-than-air gas in our models to make them fly better? A good iron-on covering job should be air tight, so it should be easy to pump some helium or something into the wing or tail for buoyancy.

Only problem is helium, hydrogen, etc. are expensive and kind of dangerous. Then I remembered swamp gas. Swamp gas is some kind of natural methane or something that gets emitted from rotting vegetation. It rises up from the sludge and floats off in some kind of eerie bubble that makes people think they're seeing a UFO.

Well, hey, that's free buoyancy, the way I see it. I'm only a twenty-minute drive from a swamp, so I built some swamp gas hoppers into my latest design. I've already filled them with swamp moss, algae, and other assorted green scum, and from the smell, I'm sure that rotting has already started. As soon as any bubbling starts, I'm heading for the flying field to see how it works.

What do you think? Sounds pretty infallible, doesn't it? I'll let you know how it went as soon as I log some flight time.

Sid in Socket Springs, FL

Dear Sid:

Let me see if I've got this straight. You've added, what, maybe a pound or two of hopper structure? And two or three times that many pounds of rotting roughage? So for a weight penalty of 3 to 6 pounds, you might buy a few ounces of buoyancy from all that sewer gas floating around inside your fuselage and dissolving the components of your RC set? Sounds good to me.

Have you named this airplane yet? If you plan to market the concept or your particular design, you'll need a catchy name that sums up the idea and draws attention. I've taken the liberty of employing my aircraft naming strategy for you and have come up with a suggestion. I think you should call it the "No Smoking Within 50 Feet."

Jake **MB**

over the counter

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

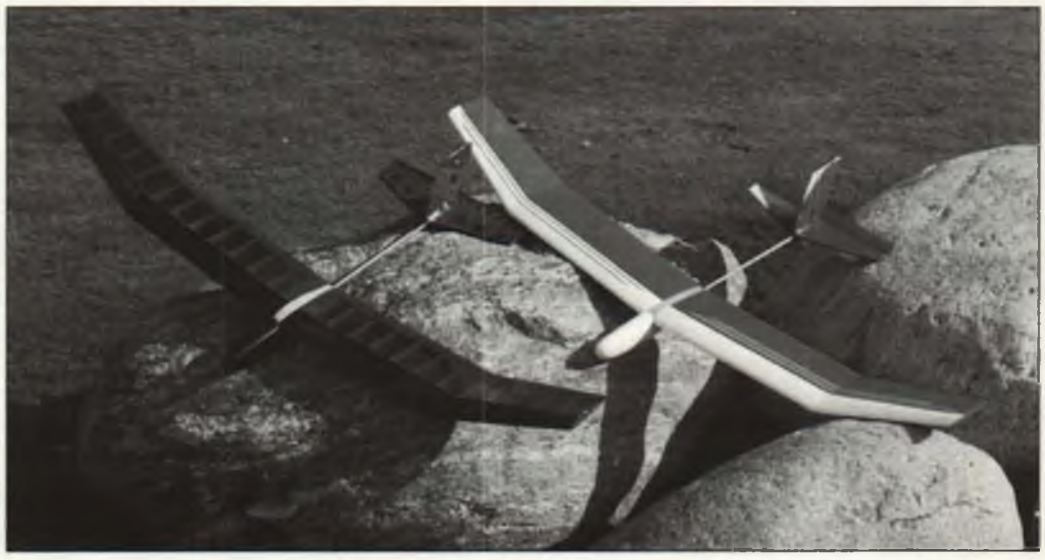
SIG'S NEW BIGGIE

Sig model designer Bruce Tharpe has added yet another to the company's Four-Star series by developing the Four-Star 120, essentially a scaled-up version of the popular Four-Star 40 low-winger. At 81 inches, it's legal for IMAA events, and is designed to handle .90-1.20 two-strokes or 1.20-1.60 four-strokes. Other specifics include a wing area of 1205 square inches, overall length of 65 inches and a flying weight of 10.5-12 pounds. The kit is available now and carries a suggested list of $179.95. Look for a Products In Use review article here in *Model Builder* in the near future. From Sig Mfg. Co., 401-7 S. Front St., Montezuma, IA 50171; (515) 623-5154.

BIG BIRD ENGINES

Also debuted at Pasadena was the line of "Panther" gasoline engines being offered by Model Aviation Technology. Available in 2.6, 3.4 and 4.4 cubic inch sizes, the engines feature a solid state capacitor discharge ignition system contained within the beautifully machined, anodized aluminum radial backplate mount. The spark advance is mechanically coupled to the carburetor for the best possible throttle response and a low, smooth idle. These engines are individually custom built and numbered, and, incredibly, come complete with a lifetime guarantee.

The engines that MAT owner Thomas Gruenebaum had on display at Pasadena were fitted with spun aluminum spinners and three-blade carbon fiber props, which are also available. Full particulars on all of these quality products can be had



THE MERLIN RC HLG

At the Pasadena IMS show a few weeks ago we visited with Merrill Farmer, who runs a small kit business called MM Glider Tech out of his home in Downey, California. His first kit offering is a 50-inch span, 280 square inch, polyhedral RC hand-launch glider called the Merlin. What sets this model apart from others is its unique pod-and-boom fuselage, made up of a fiberglass arrowshaft mated to a vacuum-formed, high-impact ABS plastic pod. The pod is actually in two pieces, the top part serving as an access hatch for the radio. The rest of the construction is all balsa, with a couple of plywood pieces thrown in for good measure. The wing ribs (S3010 airfoil), tail parts and even the shear webs are all nicely machine-cut and sanded. Full-size plans are included.

Merrill gave us a kit to be built for an upcoming Products In Use review article, but if you want to be the first in your group to own a Merlin, kits are available for $36.95 plus $5.00 S&H (and sales tax if you live in California). Uncovered, ready-built versions are also offered; call or write for details. MM Glider Tech, P.O. Box 39098, Downey, CA 90239; (310) 928-3034.

by contacting Model Aviation Technology, 12848 Touchstone Pl., Palm Beach Gardens, FL 33418; (407) 626-6955.

HOBBICO DVM

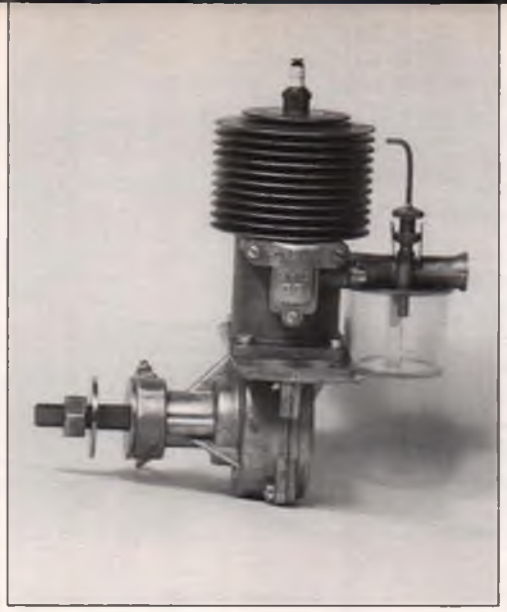
Hobbico has just come out with a neat digital voltmeter that every RCer should make part of his field kit. The unit has a built-in load for checking both the airborne and transmitter batteries, and, in addition to the voltage shown on the large LCD display, an LED on the panel glows either green or red to indicate whether or not it's safe to make "just one more flight." Outside the realm of RC systems, the DVM can be used to accurately read DC voltages up to 19.99 volts in 1/100-volt increments.

The $39.95 suggested retail price includes the unit, the required 9-volt battery and a one-year warranty on parts and workmanship. Leads are available separately; a chart included with the instructions shows which one to get for your radio system. The Hobbico DVM is distributed by Great Planes Model

Distributors, P.O. Box 9021, Champaign, IL 61826-9021.

THE FORSTER IS BACK!

Those of you involved in the Old Timer movement know that RJL Industries has for some time now been working on a replica of the



post-war vintage Forster .99 spark ignition engine. Well, the wait is over—the first batch of engines is complete and are presently being shipped. We examined one at the recent Pasadena show and must say that it is indeed a very nice piece of work, virtually impossible to tell from an original. Actually, the engine *is* an original—a "current production" version—as the castings are made from the original molds and the internal parts are faithful copies of the originals. Among the engine's many features are a two-speed breaker point setup, a ball bearing at the rear of the crankshaft, a bronze bushed conrod and an integral tank.

The RJL Forster .99 is priced at $289 and comes with a one-year warranty. A spark plug, coil, condenser and high-tension lead are not included but are available separately as a set for $29.95. S&H runs $3.50. For full particulars, contact RJL Industries, P.O. Box 5, Sierra Madre, CA 91025; (818) 359-0016.

STRONG, LIGHT-WEIGHT WHEELS

In his "Electric Power" column this month, Mitch Poling mentions the inability of those popular lightweight foam rubber wheels to support the heavier (seven pounds plus) electric models. He found the new super-light treaded scale airwheels from Kavan to be the best bet for the bigger electrics because they're stiff enough to support a heavy model without distorting while adding practically no weight at all. Hobby Lobby lists these wheels in its new Catalog 21, in seven different sizes ranging from 2 to 4 inches diameter. You can get a free copy of the catalog by calling or writing Hobby Lobby, 5614 Franklin Pike Circle, Brentwood, TN 37027; (516) 373-1444.

WEE RC

If you're into really small RC models you'll have a blast with the new two-channel "Pocket Rocket" by veteran designer Fred Reese. As usual, Fred's eye for a good-looking model really came through, the result being an irresistably cute 28-inch span flier for .020-.030 power...although, having seen one up close at Pasadena, we have no doubt that the 10-ounce model would fly very well on an .010 also. The kit, which retails for only $19.95, is complete with a foam wing and all necessary balsa parts for the fuselage and tail. Pocket Rocket kits are available now at your local hobby shop or direct from Ace R/C, 116 W. 19th St., Higginsville, MO 64037-0472; (816) 584-7121.

ONE HOT MONOCOUPE

Charles Lindberg's high-performance, one-of-a-kind Monocoupe D-145, which has been preserved and is on display at Lambert Field in St. Louis, Missouri, has been captured in 1/4-scale model form by the folks at Ikon N'wst. The ship spans 8 feet and is designed for engines on the order of the S.T. 3000, which is what powered the prototype model and reportedly did a great job of hauling its 15 pounds around in a realistic fashion. Ikon says the Monocoupe flies beautifully and handles easily on the ground—unlike the original, which had a reputation for being something of a handful, especially on landings.

The Ikon kit is of conventional wood construction and includes a fiberglass cowl, wheel pants and landing gear fairings. All wood parts are hand-cut, and most of the necessary hardware is provided. The kit is priced at $270 plus $10 S&H. A catalog describing in detail the Monocoupe and the rest of Ikon's kit line is also available for

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

$4. Order from Ikon N'wst, P.O. Box 306, Post Falls, ID 83854; (208) 773-9001.

BABY STINGER

Lanier R/C's new baby Stinger is actually called the Stinger .10, a 36-inch, four-channel, .10-.15 powered aerobat designed along the lines of its big brothers, the Lanier Stinger and Stinger 120. Construction is also basically the same—a simple wood box fuselage with molded ABS plastic upper deck parts, and a symmetrical airfoil foam core wing sheeted front and back with capstrips in between. Additional kit items include a formed aluminum landing gear, ABS cowl and wheel pants and a clear canopy. No hardware is supplied, but a list of everything needed is included in the instructions. You probably have most of the stuff on hand already, if you've been at this game for long.

From Lanier R/C, P.O. Box 458, Oakwood, GA 30566; (404) 532-6401.

TME'S LITTLE ANGEL

One of many manufacturers we enjoyed meeting at Pasadena this year was Al Tejera, of Tejera Microsystems Engineering (TME). Al was showing his new "Little Angel," a small on-board electronic device that monitors your airborne RC system batteries and keeps you constantly aware of their charge condition—either fresh, marginal or too low for safe flying—by means of three distinct beeps that don't become a nuisance until the batteries reach a dangerously low voltage. The Little Angel is a simplified version of TME's similar but more elaborate Guardian Angel, and was developed in response to the needs voiced by the Sport Flyers Association and their HobbyLab efforts to provide affordable safety products to RC modelers. It's priced at $24.95, at hobby dealers nationwide or direct from TME, Inc., P.O. Box 340608, Tampa, FL 33694; (813) 968-9510.

THORNBURG AT LARGE

In 1990 it was *Old Buzzard's Soaring Book*; now former *Model Builder* columnist Dave Thornburg has come out with *Do You Speak Model Airplane?*, a delightful one-volume history of aeromodeling in America. Starting with modeling in the Model T years, Dave progresses on through the advent of the gas engine powered models, the pre-WWII Nats, the birth of CL (including a fascinating piece on Jim Walker's patent), the Navy-sponsored Nats, the development of

FLITE LITE COMPOSITES - Designed by Mark Allen - CHAMPIONSHIP SERIES

KIT FEATURES:
Quality one-piece fuselage reinforced with Kevlar. Pre-fit canopy, with full size beds cut from 1.5 lb. virgin foam. Obechi 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 (air/flaps). Step-by-step instruction manual with computer drawn plans.

VISA/MASTERCARD ACCEPTED

Call for New Catalog of Complete Kit Line, Including All-New Handlaunch, 2-Meter, Standard Class, Open Class & 2 New Electric Designs

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
With Stab Kit
Shipping & Handling not included.
. Thermal version of current 1991 & 1992 World Champion F-3B Eagle
. Airfoil Options: RG15 or SD 8000

FALCON 880 & 800
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
Airfoil Options: S3021-3014 S7037

FALCON 550E THERMAL DURATION ELECTRIC SAILPLANE
ELECTRIC KIT FEATURES: Quality one piece, 3 oz. epoxy glass fuselage reinforced with Kevlar. Pre-fit canopy, accurate machine cut wing cores with full size beds cut from 1.5 lb. virgin foam. Obechi wood sheeting, carbon reinforcement.
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.
Will accept any 7-10 cell motor combo.
SPECIFICATIONS:
Wing Span: 80"
Airfoil: E 387
Weight: 7 cell/38 oz.
10 cell/43 oz.
NEW ELECTRIC KIT PRICE:
Standard Kit: $150.00
Pre-Sheeted Kit: $240.00
Shipping & Handling not included.

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New Production Facility: P.O. Box 311. Windsor, CA 95492. Phone/Fax 707-838-9020. 8:00 a.m. to 4:30 p.m.

RC, and so on. There's even a chapter detailing the history of the various model magazines, including *MB*. (We've already forgiven Dave for mistakenly naming Challenge Publications as *MB's* new owner!)

We thoroughly enjoyed *Do You Speak Model Airplane?* and think you will too. The softbound book comprises 320 pages, contains 50 illustrations and sells for $19.95 postpaid. Order your copy from Pony X Press, 5 Monticello Dr., Albuquerque, NM 87123, or phone (505) 299-8749 for Visa/MC orders.

FUN SCALE MESSERSCHMITT

"Large model fun the easy way—engineered for lazy builders." That's the motto behind Jim Meister's line of large Fun Scale warbirds, which now includes his latest project, the Messerschmitt Bf 109. (Others in the series are the Mustang, Corsair and Spitfire.) Jim offers plans, partial kits and complete kits for the big fighter, which spans 100 inches and is designed for engines from 2 to 5 cubic inches. Also available as optional accessories are molded plastic exhausts, gun slots, oil cooler shroud and air intake scoop; canopy, spinner and even a set of "Fun Trax" retracts. Jim has thoughtfully designed this project so that you can make it as basic or as complete as you like.

Despite the "Fun Scale" dubbing, the Messerschmitt is claimed to be quite accurate in scale outline. Construction is balsa and plywood, and the wing is designed in two pieces for easy transport. Jim offers a free catalog that describes this and the other Fun Scale warbirds in detail; write to Jim Meister, 993 C-184 S. Santa Fe, Vista, CA 92083, or call (619) 726-0154. **MB**

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BUILD A BIG ENGINE TEST STAND

Big Bird enthusiasts often find they don't have an adequate test stand for their large engines. I know of not a single test stand available commercially that will handle something on the order of a Sachs 4.2 or even a Zenoah G-38.

We have all seen a lot of homebuilt test stands, but they are usually clones of smaller ones. Most of these require that you kneel down in front of them. I don't know about you, but kneeling hurts my back and I feel off balance. Additionally, my Miller geared starter is heavier than the usual electric starter, putting an even greater strain on my back.

When you are testing an engine, it is helpful to have a place to hook up your fuel tank, ignition system and batteries, and your starter battery. A safe area to lay tools is also handy. Did you ever notice how, when you lay a tool down and turn your back, the darned thing disappears? A small plastic tool tray just for your test stand would be ideal and inexpensive.

Several years ago, former "Big Birds" columnist Al Alman gave me the idea for my test stand when he showed me his "Big Ugly Test Stand," as he called it. Because of some physical problems, Al built a test setup that did not require him to kneel or squat.

It's obvious that a good, comfortable test stand has to be of sufficient size and weight to hold up under the stress of a big engine running under full throttle. The stand must allow the engine to be mounted at a comfortable height so as to enable you to stand while starting and tuning. It should provide a tool storage area and have adequate area for support equipment.

The stand will have to be fairly heavy, otherwise the engine thrust might tip it over. Because the stand is heavy, casters to aid mobility are helpful. They can be retractable.

I finally built my test stand, which ended up looking remarkably like a cabinet. It doubles as a storage place for large, heavy modeling equipment.

When I built my stand, before making any drawings or cutting any wood, I first took stock of the building materials taking up space in my garage. There were several large pieces of 3/8-, 1/2- and 3/4-inch plywood leaning against one wall, along with some 2x2s, 2x4s and 2x6s. With these I was able to build a cabinet 48 inches high by 24 inches square. It was also possible to make storage areas inside the box.

Byron's Corsair is a very fine flying plane. This one belongs to Canadian flier Ron Leavitt. It weighs 23 pounds. Power is a Sachs 4.2 with Purr Power muffler.

The corners are 2x4s and the sides are 3/8-inch plywood. I reinforced the top 6 inches with 2x6s to make the box strong enough to hold the engine. My test stand was nailed and glued together, but if I ever build another, I will use wallboard screws and glue. Wallboard screws are thinner than regular screws and have much sharper points than nails. They are easily installed with a cordless portable drill.

The shelves for the storage areas were cut from 3/4-inch plywood, with 2x2s between the 2x4s on the inside to give support and fastening surfaces for the shelves. It would be advisable to add some stabilizing feet on the bottom of the test stand, parallel to the engine thrust, if you are going to run engines over 3 cubic inches. These stabilizing boards could also be used to mount a couple of wheels, making the stand easier to move.

I left the back off the top 6 inches of the test stand, for easy access to the tool and equipment area. When I test-run an engine, I fasten the engine mount that will be used on my plane to a piece of 3/4-inch plywood using T-nuts and bolts. Then I mount the 3/4-inch plywood, with the engine attached, to the test stand—this way only two holes are required in the test stand.

You can adapt the 3/4-inch plywood plate to as many engines as you like. When you get to the point where it's full of holes, it's a simple matter to cut out a new piece and start over again.

My test stand was painted with acrylic latex housepaint, which has proven fuelproof to both alcohol/nitro and gasoline fuels.

Before you fire up a new engine, read the operating instructions that came with it. In most cases, you will find that it is not recommended to run the engine at a constant speed, even if using a rich fuel mixture. What is preferred is a fluctuating run that leaves the engine at full throttle for only a few seconds at a time. This variable throttle use allows the moving parts to break-in quickly with minimum wear.

Now that your test stand is complete and you are ready to run a big engine, here are some safety precautions to keep in mind:

- Do not run your engine without a helper. Should you have an accident, you will need help right away. Start the engine

at idle, then move behind it.

• Do not allow anyone to stand in front of or to the side of the propeller when the engine is running over 25% of full power.

• It is wise to have a good quality fire extinguisher close by, but not in the traffic area around the test stand. When the fuel tank is full, wipe up any spill and put the rags well away from the running area. Place the fuel container away from the run-up area, too.

• Use a good muffler. If your engine came without a muffler, check with Bob Davis, J'Tec or Macs. Check the model magazines for others.

• Wear ear protection, both earmuff and in-the-ear types, for the best protection.

• Safety glasses are also a must.

• It is a good idea to wear a set of heavy leather gloves, even if you are using an electric starter.

• Keep the area around your test stand clear of equipment so that there is no chance of tripping and causing injury to yourself or others.

• • •

Last summer I attended a fly-in hosted by the Puget Sound ROCS, which I commented on in a column. The reason to revisit that happy time is to relate an unusual circumstance that nearly cost my friend Curt Kendall his Balsa USA Sopwith Pup.

Curt was flying and his crew chief, Ken Howe, was watching the Pup do its thing when Kurt decided to land. As he approached, the Pup began to perform maneuvers on its own—ones that were heartstoppers for Kurt and Ken.

Kurt got the Pup on the ground with no damage, but he was ready to go on 100% oxygen. The Pup was disassembled in short order. Investigation revealed that the receiver antenna had slid out of the tube into which it had been inserted and had coiled itself neatly around the receiver!

If you use a non-conductive tube for an antenna holder inside your plane, use a spot of silicone or other adhesive at the entry point so the antenna will not slip out of its tube. It's amazing that such a simple thing can cause so many problems.

• • •

Several months ago, *Model Builder* forwarded to me one of those new Model Aviation Technology gel-cell 6-volt batteries. They are made in Germany and offer many advantages over a NiCd battery. I thought I would try it on one of my spark ignition systems first and observe its performance. I packed the battery in foam rubber, directly behind the Saito 270 engine which powers my Big Bee. Performance has been excellent. The battery charge lasts much longer than the NiCd battery I had used previously.

The recommended charger for the battery is a Radio Shack #2731650, however, an Ace C.V.C. charger would be much more versatile. The gel-cel battery has done its job well and is equivalent to a five-cell NiCd pack. ***MB***

Tom Hammond scratch-built this 116-inch span S.E.5A using a modified set of Balsa USA Sopwith Pup wings. It's powered by a Quadra 50 and weighs 30 pounds.

Budd Tamm said he liked the new Coverite 21st Century covering he used on his Concept Fleet biplane. The 18-pound plane uses an A&M 2.8 cubic inch Sachs engine.

Bill Maloney put a good old-fashioned paint job on his state-of-the-art Ultra Hots. He used a hardware store muffler that does a fine job of quieting his Quadra 42.

93 TOLEDO

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5. Deadline for entering models is 12:00 Noon on Saturday, April 3th.

All models in competition will be judged for "Best Finish," "Best Monokote," the "Directors Award for Achievement" and "Best of Show."

NOTE: The show hours are: 9 AM to 6 PM, Friday and Saturday — 9 AM to 4 PM on Sunday
— The Saturday night auction is at 7:30 PM —

ELECTRONICS CORNER

BY ELOY MAREZ

Audio Powered Recharger Mk.1 from Team APR-1 Electronics

One need not be reminded that we are currently in the midst of a world-wide energy crisis! The active RCer is well aware of this, and is actually a past master at energy management—that of getting every last minute of flying time out of his airborne NiCds before calling it a day. The careless RCer will no doubt experience a personal energy crisis now and then when, due to improper charging or extended flying, he finds that his all-important airborne NiCds have "run out of juice."

Modern electronic technology has now brought us a relief from this problem, in the way of a very clever and quite sophisticated little device, the "Audio Powered Recharger," from a relatively new company calling itself Team APR-1 Electronics. The original model now available is, not originally but nonetheless factually, dubbed the "Mark 1," herein to be referred to as the "APR-1."

How does it work? It's remarkably basic, with "why didn't I think of that?" simplicity! The APR-1 quite cleverly harnesses the audio (noise) ambient in every engine-powered RC airplane, converts it to electricity, and uses it to charge your NiCds. Now tell me, why didn't *you* think of that?

Obviously, there is a lot new here, though it actually involves only the proper application of old principles. After

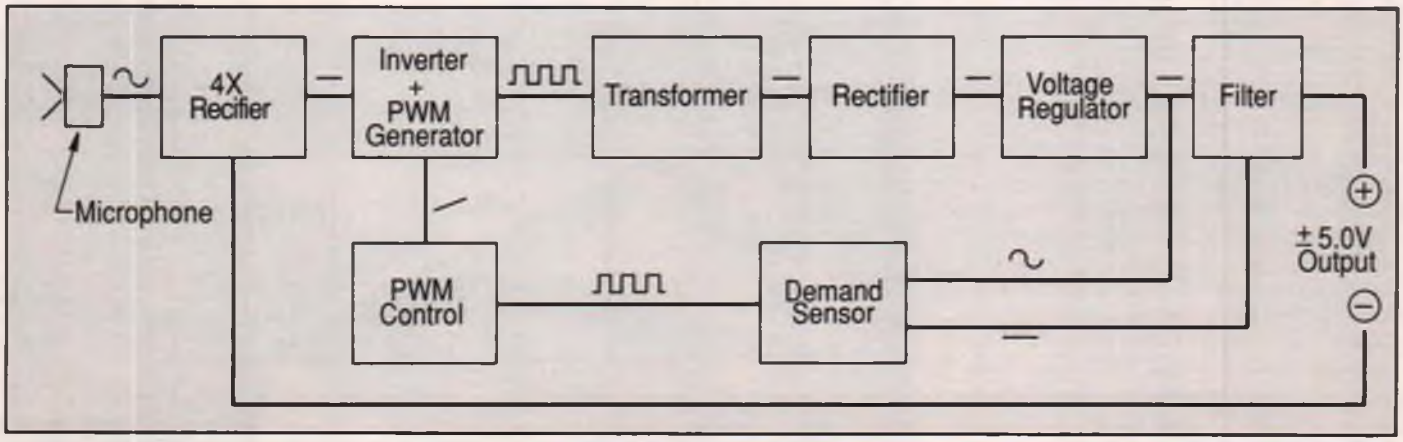
The revolutionary Audio Powered Recharger; an all-solid-state airborne device that will keep your NiCd batteries at a constant 80% state of charge. The small opening seen allows ambient engine noise to reach the internal high-output microphone.

all, the conversion of audio to electricity is not new; every time you listen to your broadcast radio or television, you are experiencing the same phenomenon. Somebody somewhere spoke into a microphone, which converted the person's voice into electrical impulses. It is these impulses, not the original voice or sound, which was transmitted by radio and converted back into audio at the receiving end.

The APR-1 is quite small, as can be seen from the accompanying photo. This first offering from this imaginative manufacturer is intended as a companion for that most common of RC airborne power sources, the 500 mAH four-cell NiCd battery. I was refused a schematic diagram; the makers are understandably playing this one close to the vest. However, a block diagram was furnished, from which we can see that circuitry somewhat similar to that being used in high-frequency

continued on page 86

Block diagram of the Audio Powered Recharger shows it to be rather complex; possible only with the modern advantages of solid-state and surface mount component circuitry.



PATTERN MODEL BUILDING TIPS

Several readers have chided me for not dispensing my fair share of building advice and basic pattern lore of late. It's true that I've been a little hesitant to regularly use these pages to provide the basic sort of "building tips" people are used to finding in modeling publications. I may be burned as a heretic for saying this, but I really do feel that hyper-detailed advice on how to correctly assemble model airplanes might actually be an overproduced commodity in the trade. A flood of testimony from a variety of experts is available on nearly every aeromodeling subject in the form of articles, books and videotapes.

Most kits come with fairly complete building instructions, which, judging by my mail, are seldom read. After all this, if an experienced modeler is still uncertain about how to accomplish a specific task, even a cursory search of the model magazine back issues gathering dust down in his workshop is likely to turn up seventeen articles relating in some fashion to the problem. I might even have written some of the articles!

Of course, beginners don't have a great many dusty back issues to call on, but most of them do have access to the archives of the new friends they've made as a result of becoming involved in the hobby or joining the local club. Besides, precision aerobatics is not exactly the quintessential RC neophyte activity. Most who join the pattern ranks are already fairly accomplished builders and fliers. After all, this *is* a column for them. Pattern flying is a large and varied subject. There have been a lot of other topics to cover.

I accept the criticism as valid. While the universal themes of "straight" and "light" always apply, some of the pattern plane construction technology currently used borders on mysterious to the uninitiated. Newcomers to pattern often come equipped with a full set of erroneous ideas implanted by the local club expert, whose claim to aerobatic guruhood is likely based on attendance (didn't actually fly, of course) at one or two contests a decade or more ago.

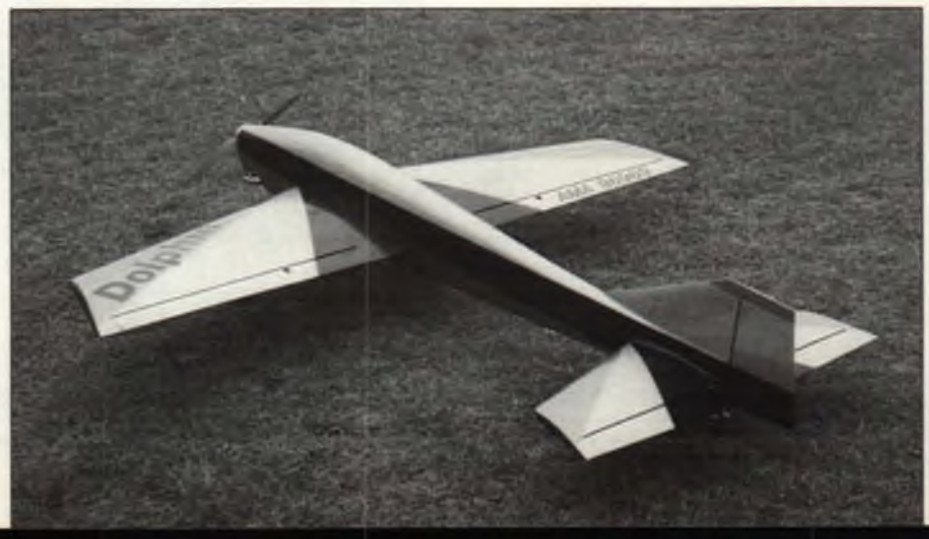
Unfortunately, even the modeling print media sometimes contributes to the situation. Pattern has changed very rapidly in recent years. Misinformed and out-of-date pronouncements about pattern are often made in passing by writers whose expertise lies in a totally different area. Tuned pipes still get called "noisy," even after pattern has stepped up and taken the point position on noise reduction. Sport ARF aircraft with wing loadings nearly double that of an average modern pattern ship are referred to as "pattern capable" by reviewers. A heavily-loaded Giant Scale dog that snaps out of loops, falls like a stone when the engine quits and may be landed safely only at the speed of sound is said to "fly like a pattern plane" by a reviewer who may be using the expression as a metaphor for "difficult to fly." These terms are often accepted as the straight and modern skinny on pattern design, but they can be confusing to those unfamiliar with pattern terminology, because pattern writers like myself may describe the same situation in different terms.

Dennis Breene's Flashback 3 original design. Y.S. 1.20, Futaba. The all-wood craft came in at 9 pounds. Photo by Dennis Breene.

Lastly, I will review a few pattern construction areas that are consistently overlooked. These problems are overlooked because they seem to be basic and minor. But even the most basic and minor problems appear complicated and major at first. This month I have solutions for a few interesting questions that come up repeatedly.

Most of the time there is no single correct way to do something. Many of those who

Bob Danks of Norwalk, California built this much-modified Boxer 1.20, which he now calls a "Dolphin." Y.S. 1.20, planked fuselage, clipped wings. Photo by Bob Danks.



write or call with a problem are confused because they've been offered multiple choice solutions from different sources. They want to know who is right. On the subject of writing stories, Rudyard Kipling once stated:

"There are nine and ninety ways,
Of constructing Tribal Lays,
and every single one of them is right!"

My answers to the following questions are the solutions that work best for me. That does not make them more correct than what works equally as well for someone else. Modeling is highly individualized. And now, the first question:

•How do you prepare a fiberglass fuselage or part for painting?

Start by taking down the raised seams with 320 or 400 wet/dry paper. Wet the paper and wrap it around a dense rubber foam sanding block. The sanding block and the wet/dry paper are available at any paint store. Next, trim the internal flanges (the edges of the openings of the belly pan top, fuselage wing saddle and/or canopy opening, etc.) to approximately 1/4 to 3/8-inch wide. Sand the sharp edges until smooth. Also, sand the edges of any other openings, such as the engine cutout or cowl intakes. Fill any obvious voids and seam imperfections with a stiff mixture of epoxy and phenolic microballoons (or a commercial equivalent, such as Sig's Epoxolite), and when the repair is dry, block wet sand it smooth in the same manner as the seams.

Assuming all of the construction work on the piece is complete, the next step is to shoot a good coat of primer. When the primer is dry, all of the pinholes will be visible. There will be some pinholes, even on a gelcoated piece. Fill the pinholes using a single-edge razor blade and any good brand of glazing or spot putty. I recommend Bondo, DuPont or Permatex (also available at the paint store).

After an hour or two, when the putty is dry, wet block sand again. This time use 400 or 500 grit. Don't worry about sanding off too much of the primer. Your finished piece will look like it has both the measles and mange, but the pinholes and sanding scratch marks will be filled. Shoot another light coat of primer. If more pinholes show up, fill and repeat. If things seem pretty smooth, wet sand with 600 grit and you're ready to shoot the base color.

•When you have a painted fiberglass fuselage and a non-removable (glued in) stab, can you still cover the stab with film? How do you handle the seam where the paint and the film covering come together?

Mask off the stab half just outside of the joining fillet, about 3/8- to 1/2-inch from the fuselage side. Do all the priming, filling, sanding and painting on the fuselage, including the trim colors. It helps from a bench rash standpoint to slip a couple of large padded envelopes (from the local office supply store) over the stab halves and tape them down.

When the fuselage is done, unmask the stabilizer halves and then remask just inside (about 1/8-inch) the paint ridge line. Carefully knock the ridge down with some 320 open coat paper and unmask. Prepare the stab halves for covering with your favorite method. Then apply a 3/8-inch wide strip of covering butted tight against the paint line, but not overlapping it. Don't sweat any tiny gaps. Using a covered iron (iron sock, T-shirt, etc.) and a medium heat setting, lap the final covering approximately 1/8-inch over the paint line and iron it down securely to the butted anchor strip. The lapped edge will stick very well to the paint. The resulting seam is neat and nearly invisible, especially when the color match between the covering and the paint is close. A contrasting trim color may also be used.

•My covering jobs always wrinkle and bubble in the sun. How can I get the stuff stuck down to stay, and how can I do those scratch-free covering jobs like the ones I see on the pattern planes the pros bring to the trade shows?

This one isn't strictly a pattern item. Many are talented with iron-on films. Your best bet is to look up a local expert and ask some questions. You will find that there are many methods, but chances are you won't find any of them printed on the directions that came with the covering.

First, seal the wood against moisture if you want the covering to stick. The cause of unstuck covering is unsealed wood. You can use clear dope for this, but I use a product designed for covering, like Balsarite or Sig Stix-It. Whatever you use, thin it with a compatible product to the consistency of water; this allows for penetration into the surface of the wood. Conduct the sealing in a well-ventilated area! After this step, sand lightly to remove fuzz.

At this point, vent the surface to be covered by poking pinholes every 1/4- to 1/8-inch. Then, iron down border strips all along the edges and cover the control surface cutouts and faces. Next, attach the final covering to the border stripping with a hot, covered iron. Pull it tight as you go. Iron

Breeding will tell! Guy Hanson, son of former *MB* pattern columnist and Tiporare/Runaround designer Dick Hanson, holds his new 1.20 design, the Elan. A kit for this fine flying machine is available direct from GyModels, (801) 968-0095. Photo by Rick Allison.

Up-and-coming FAI pilot Darrin Pierce of Provo, Utah holds his Elan prototype, dubbed the "Exciter." Y.S. 1.20-powered ship weighs only 9 pounds. Photo by Rick Allison.

Jerry Budd and friend at a recent Reno, Nevada contest. Colorful Conquest 1.20 is very visible in the air.

Former National Masters Champ Pete Callas is flying FAI these days. Nice SL-1 is Y.S. 1.20 powered.

down all the edges securely. I use a very hot, uncovered trim seal tool to go over all the edges. Finally, shrink the covering tight with a heat gun and press it to the wood gently but firmly (about 4 square inches at a time) with cotton matting or a new, soft and very clean oven mitt. Never touch a hot, uncovered iron face to the covering.

Properly done, this method actually laminates the covering to the wood surface and imparts a fair amount of extra strength. I have film-covered models that have gone through four or five flying seasons without succumbing to the "wrinklies." Trim colors can be laid down over the base color by using the pin prick method (tiny holes poked into the base covering where the trim will be applied) or by using one of the heatless trim adhesives.

•Pattern planes have really thick control surfaces. What kind of control horns am I supposed to use?

The easiest way to handle this problem is to make your own control horns. Glue predrilled and tapped hardwood dowels into the surfaces. Then screw in either threaded rods or long socket-head bolts of the appropriate size (4-40 thread works well for .60-size planes). Use the little nylon horn brackets for the clevis attachment.

An easy way to insert the dowels is to sharpen a brass tube of the same O.D. as the dowel and use it as a hole saw to remove a circular plug of balsa/foam. Cut the already drilled and tapped dowel a little long, then glue it in and sand it flush with the surface. A drill press is handy for this step, but not necessary. You may elect to run the dowel through one skin and glue it flush against the inside of the opposite skin, or you can remove a plug all the way through to the other side and sand the dowel off flush with both sides. If you choose the latter method, you can also countersink the top of the dowel for the head of the bolt, and screw it in flush from the top of the control surface. Pull-pull setups are managed easily by using a long threaded rod that projects from both sides of the dowel. In any case, it's an easy matter to cover the surface first and put the bolts/threaded rods in afterwards. Do this once, and you may never use a screw-on type nylon control horn again.

•Are there really any ARFS I can buy that are truly pattern capable?

The EZ series .60-size Supra Fly and Supra Star are very straight and light, as well as being fairly competitive in most of the pattern classes, with the possible exception of FAI F3A. They are also quite expensive, hard to find, and hard, if not impossible, to repair. Depending on how it is set up and powered, the .45-size EZ Supra Fly ARF can work fairly well up through Sportsman class. Almost any ARF will work in Novice because the Novice class is designed to be flown with almost any airplane. Generally speaking, there are no commercial ARFs currently available that I would class as being among the most competitive or desirable pattern airplanes in any class. There is a definite need for such an aircraft.

Ready-to-fly pattern planes are available from a few custom builders around the country. The quality varies from fair to excellent, but you can depend on the prices to be pretty stiff. Used pattern aircraft are another way to go, but again, the price for a good, competitive machine will be pretty high. Some kit manufacturers provide airframes that are pre-built to varying stages of completion for an extra charge.

All in all, building your own ship is still the best and least-expensive solution. **MB**

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U.S. AIRCORE'S COLT 40 SLT

Every time U.S. AirCore brings out a new model, I wonder if it will live up to the reputation for durability established by its predecessors. Well, for the past six months I have been testing this company's Colt 40 SLT sport low-wing trainer, and when it comes to surviving rough handling, this airplane is as good as any.

Before I flew it for the first time, I questioned the manufacturer's term "low-wing trainer." Does that mean it's a trainer for those who have mastered high-wing planes and now want to transition to low-wingers? Or does it mean this is a basic trainer which just happens to have a low-wing configuration? I am pleased to state that the answer to both of these questions is an unqualified yes!

As is typical of U.S. AirCore models, the Colt is made of tough "AirCore" material, a type of corrugated polypropylene, using their "Fold and Fly" technology. A nice touch here is the pre-decorated airframe, which is done in a flashy, bright red-and-white color scheme and is fully fuelproof. To combat any possible disorientation during flight, the underside of the wing has two giant solid red circles, removing any possible confusion about distinguishing top from bottom.

Using ordinary contact cement, we managed to assemble most of the model components in just one evening, with a second evening devoted to installing the engine and radio. The folding was a snap, as the fold lines come deeply marked and scored, resulting in accurate, warp-free structures throughout. The wing features a huge spar which is designed to remain intact even in the worst kind of mishap.

The Colt 40 SLT also makes use of U.S. AirCore's unique "Power Cartridge," a sturdy plywood mounting plate which holds the engine and radio in one compact unit. This slides into the fuselage on built-in rails, and is secured in place with a few pan-head screws. The Power Cartridge is intended to permit quick removal of the engine and radio for servicing or installation in another U.S. AirCore airplane.

For power, I used an O.S. .40SF ABC with standard muffler. This is an engine I would

■ TOP: With Cliff Gates handling the controls, U.S. AirCore's Colt 40 SLT heads for the sky, giving the photographer a bit of a fright in the process. ■ LEFT: The corrugated polypropylene "AirCore" material which comprises the Colt 40's structure is totally fuelproof and comes with this attractive sunburst pattern pre-printed for you—no painting or other finishing required.

COLT 40 SLT

WINGSPAN ... 64 in. (stock); 58 in. (Turbo version).
WING AREA ... 704 sq. in.
FLYING WEIGHT ... 5.75 pounds.
WING LOADING ... 18.8 oz./sq. ft.
OVERALL LENGTH ... 41 in.
POWER ... .40-.45 two-stroke, .50 four-stroke.
RADIO REQUIRED ... Four channels.
SUGGESTED RETAIL PRICE ... $119.95.
Manufactured by: U.S. AirCore, 4576 Claire Chennault, Hangar 7, Dallas, TX 75248; (214) 250-1914.

With an O.S. .40 SF ABC supplying the power, the author found the Colt 40 SLT to be surprisingly docile, living up to the manufacturer's claims of it being an excellent low-wing RC trainer. For all-out aerobatics, bolt in a piped .45, clip 6 inches off the span and set the control throws at maximum—yippee!

highly recommend for anyone starting out with a .40-size trainer, as it is easy to operate and highly dependable, with long-lasting ball bearings. Furthermore, it will serve as a powerplant for more advanced airplanes after the novice graduates from flying a basic trainer. To save costs, an O.S. .40FP engine (the plain bearing model) could also be used, but I prefer a ball bearing engine for its increased power and longevity.

The radio I installed was a Futaba 5UAP PCM with four S148 servos. Granted, this is more radio than is required for training purposes, but the extra channel just may come in handy someday, and the difference in price between a four- and five-channel system is usually only a few dollars. However, a four-channel radio can be just as reliable, and where the budget is tight, is certainly more affordable.

With the airplane complete, the CG was found to be right at the recommended point. However, if the CG had been off somewhat, a certain amount of adjustment could have been achieved by sliding the Power Cartridge forward or rearward, thus reducing or even eliminating the need to add any correcting weight.

On the first takeoff, the Colt 40 SLT really fooled me. For a rakish looking airplane, it took off like a pussycat high-wing trainer! I was expecting to have to push the sticks around to get a new, untrimmed model under control, but all I got was a slow, stable, hands-off climbout. After a couple of circles around the field, I came to the conclusion that I was flying an ideal trainer in the low-wing taildragger category. Response to aileron and elevator input was mild, to say the least, with really slow reactions and plenty of time to correct any mistakes.

Convinced that the U.S. AirCore folks weren't kidding that this Colt 40 is a trainer, I decided to find out if it could do aerobatics. It was plain that the control surface throws would have to be substantially increased to heat up the performance, as I couldn't even do a decent roll while in the trainer mode. I brought her in for a ho-hum, easy-as-pie touchdown, taxied back to the pits, and started adjusting the clevises.

With maximum throw dialed into the ailerons, elevator and rudder, I found she would do reasonable rolls and loops, and hold inverted flight, but wouldn't perform a tight snap or spin. If I really had my heart set on souping up the performance of the Colt 40 SLT, I suspect the answer would be to move the CG back somewhat, but I decided to leave that for others to try.

However, I would like to assure anyone who wants to learn to fly, and would like to bypass the high-wing trainer stage, that the Colt 40 SLT can do the job and still go on flying after crashes that would disintegrate most other airplanes. Advanced pilots can easily transform this docile pussycat into a high-performance fighter suitable for RC combat by installing a hot, piped two-stroke .45 engine and setting the surface throws at maximum.

The Colt 40 SLT is manufactured by U.S. AirCore, 4576 Claire Chennault, Hangar 7, Dallas, TX 75248, and should be available from most RC dealers.

Art Steinberg, 2267 Alta Vista Dr., Vista, CA 92084, or phone evenings at (619) 726-6636. ***MB***

WINNERS OF THE ART GROSS DROP-ET CONTEST

In the November '92 *MB* we announced a contest sponsored by Art Gross, in which suggestions for additional uses for his Drop-Ets were sought. While the main use of Drop-Ets is for the precise application of CA glue, there are actually scores of other ingenious ways to use them.

Our first winner of a *Model Builder* T-shirt is Ron Parker of Houston, Texas. Ron, who works for Texas Instruments, submitted a highly technical two-page explanation of how he uses a Drop-Et in the analysis of a semiconductor soldered into a circuit board that was powered up and functioning. His method protects the circuit board from the nitric acid, acetone and hydrofluoric acid used to open up the IC package for some high-tech photon beam analysis. To know more about this, contact me and I'll put you in touch with Ron.

Bob Austino of Vineland, New Jersey, uses a Drop-Et for applying CA accelerator. He says, "I found that it is more efficient and less wasteful to use the Drop-Ets as an accelerator applicator in most instances. It puts it right on the spot. Either pull and shape the Drop-Et with pliers or use decreasing diameter CA tubing in the end of the Drop-Et, and fill it from the accelerator bottle as you would from the CA bottle. Less messy than a spray bottle."

R.G. Lockwood of Sandy, Utah, uses a Drop-Et for applying a small, controlled amount of lubricant for fishing reels, model trains, etc.

Joe Tobin of New Milford, Connecticut, has three excellent suggestions. He writes, "I have used Drop-Ets to fill and prime a 1/2A diesel engine, add equal parts of paint and catalyst to a mixing cup, and cut the bulb off where it connects to the siphon tube and use it to cover the tip of a tube of caulk to keep it fresh."

Our next winner is Fred Maier of Warren, Pennsylvania, who feels the Drop-Ets are great for engine priming, especially the 1/2A types. But his second idea really takes the cake, as he recommends a Drop-Et for applying simulated rivets with your favorite glue.

I really liked this last winning idea from Ed Cutler of Oceanside, California. He found that Drop-Ets are the ideal way to carry five-minute epoxy in his field box for quick repairs during flying sessions. This requires two Drop-Ets, one for part A and one for part B. Because the epoxy is highly viscous and difficult to suck into the Drop-Et, he first warms the epoxy to a thin consistency with his heat gun, then fills the Drop-Et. Then he fuses the end of the Drop-Et tubes together with a match and he is now ready for any field repairs.

Thank you, gentlemen, for opening up our eyes to some of the possible uses for Art Gross Drop-Ets. Your *Model Builder* T-shirts are on the way!

TRICKLE CHARGERS ARE USELESS

Francis challenges the validity of one of RC modeling's most widely accepted practices.

In the December 1992 MD&TS column we talked in detail about trickle charging, and I expressed some opinions and recommendations, selectively quoting the General Electric Nickel Cadmium Battery Application Handbook to support my positions. After that issue came out I received a letter from Ed Westbrook, of Chelmsford, Massachusetts. Ed respectfully disagreed with my interpretation of the G.E. Handbook with regard to "overcharge" and "voltage depression" (falsely called "memory" by some).

As I first read his letter, I felt defensive, but when I went back and studied in more detail what the G.E. Handbook said, I realized I had been too hasty in arriving at my previous conclusions. Thank you, Ed.

G.E. emphasizes, in detail, the dangers of excessive charge rates, especially in overcharge, since such rates may overheat the battery and also cause high internal pressure and gas venting, both of which degrade the cells; but our RC standard 0.1C rate is not excessive, even for continuous overcharge.

Quoting the G.E. Handbook, "Overcharge is not to be considered an adverse condition. 'Overcharge' is simply a term used to describe the normal continuation of charge after the cell is fully charged." It goes on to point out, in several places, that NiCds can be left on charge or "overcharged" indefinitely at the standard 0.1C rate without harm. "Overcharge" does not mean "excessive" in this case.

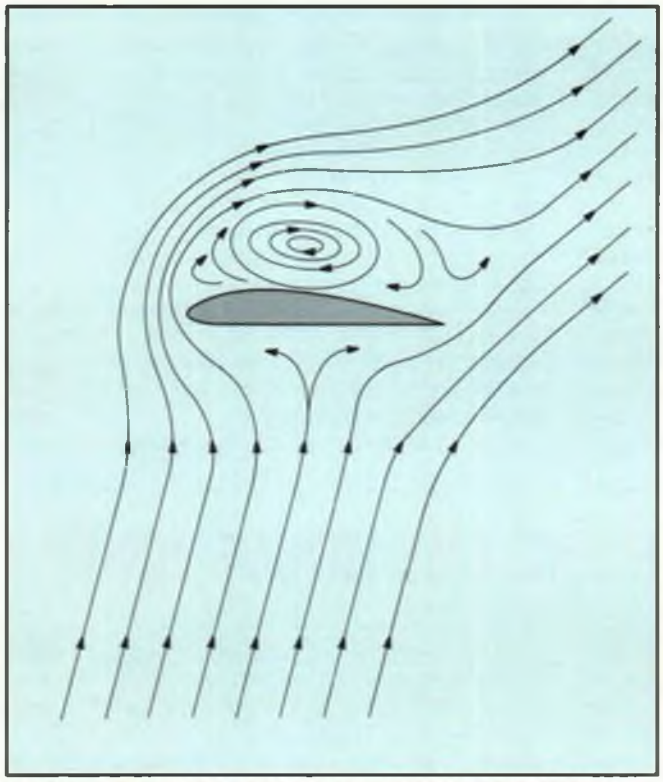
As Ed pointed out in his letter, G.E. says that voltage depression occurs from long periods of overcharge regardless of charge rate. (They do not say how long these long periods of overcharge are.) There is no indication that voltage depression is avoided by trickle charging.

A point which strikes me now, is that "voltage depression" is also *not detrimental!* It does not harm the battery, and it does not reduce the capacity (even without recycling) unless you want to split hairs over a few seconds of time to some arbitrary cutoff voltage at the knee of the curve. A battery that is fully voltage depressed due to "overcharging" will have about 0.15 volt per cell lower voltage (0.6 volt lower on a four-cell flight battery), but our radio systems will operate normally on that slightly lower voltage. Regardless of how long you leave your batteries on charge, the voltage depression will never exceed 0.15 volt per cell.

If you are a high-precision flier who wants faster servo response, then using a five-cell flight pack would make more sense than trying to avoid voltage depression. Actually, the gradual drop in voltage as the battery discharges roughly equals the drop due to voltage depression. We always live with that, and most of us are not even aware of it, except in testing our batteries.

G.E. also points out, on pages 3-7 and 3-18 of their 1986 Handbook, that charge rates below 0.05C are not recommended because they do not enable the cell to reach full capacity. Their curves show a negligible loss in capacity at the 0.05C rate, but at a 0.02C trickle rate (10 ma on a 500 mAH battery) my guess is that there could be a loss of a few percent in capacity if the battery is not topped off at the standard rate before use.

This all indicates to me that *trickle charging is useless.* It presents an opportunity for hobby manufacturers and cottage industries to sell us another type of hardware, but if we can believe G.E., trickle chargers serve no useful purpose for the flier. They also cause no harm, except a slight loss in capacity if we don't top off the batteries prior to flight. We don't need trickle chargers; we can leave our radios on the standard chargers indefinitely with no damage, and always be ready to fly. How is that for an about face? Oh well, we live and learn. Thanks again Ed Westbrook.



Flow diagram illustrating the vortex lift phenomenon in a "deep stall" condition.

VORTEX LIFT

In October 1991 we talked about full-scale and model airplanes that have gotten into a "deep stall" and came down vertically but flat; and slowly enough to pancake in without damage. In the March 1992 issue we discussed it again, with some *Sport Aviation* magazine references, and observed that dethermalized free flight models come down this way. Reader Jim McCulley suggested that we rig our RC models to descend this way, for safe recovery in the event of loss of control.

Jim wrote again and included copies of some articles on Witold Kasper and his "vortex lift" theories. Kasper, a fellow engineer and Pacific Northwesterner, is a maverick. He designed, built and flew some pretty impressive tailless sailplanes and ultralights over the years, and these were noted for unique low-speed or completely stalled performance. Kasper observed the "deep-stall" phenomenon and capitalized on it in his designs to do things that other airplanes could not do.

He is remembered for tumbling a glider about its own pitch axis, both forward and

continued on page 82

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BY TOM EMPEY

The 'Fun-One' From Great Planes

Ask anyone who is new to the ranks of the RC modeling fraternity what the attraction is. Of course, the answer is, it's fun! That simple truth can sometimes evade us as we gain experience and endeavor to build that precision scale ship, big bird, or ultimate pattern plane. Well friends, if you are due for a shot of adrenalin, Great Planes can fill the prescription with its relatively new offering, the "Fun-One."

This addition to Great Planes' extensive line of kits was designed by Paul Carlson, perhaps better known for his Nats-winning sailplane designs. It can serve both as a logical next step for the "new" flier who has mastered an aileron-equipped trainer, and as a hassle-free, grab-it-and-go-flying aerobatic ship for the seasoned pilot. Though there are kits on the market better designed for ultimate performance in fun-fly competition, the Fun-One could give a good accounting of itself in local club contests and is much more durable. It sure is a lot better looking, too!

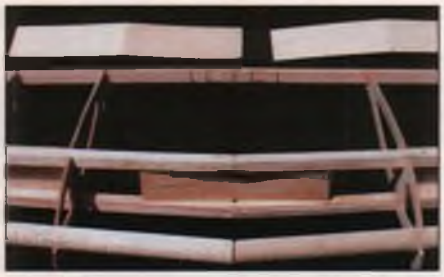
Nearly everything you need to put this plane together is in the kit It's of course up to you to provide glue, covering material, wheels, fuel tank, engine and radio, but you will find all the hardware, including the aileron linkage, engine mount, pushrods and even the new laminated hinges in the kit box. Other nice touches are rolled plans and a 40-page illustrated instruction manual.

The tail feathers are built up from stick wood over the plans. Just glue all of those square pieces together and sand off what doesn't look like an airplane. We'll get to those new "laminated" hinges later, after the covering has been applied.

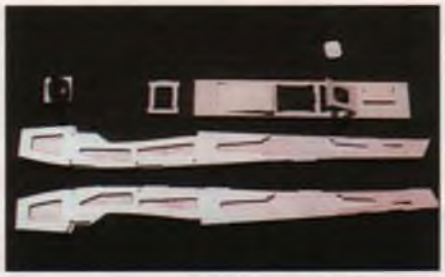
The balsa fuselage sides are made up of three die-cut pieces. Line them up over the plans and glue. Forward and rear doublers are glued to the inside of each fuselage side. Alignment of the forward doublers is an easy but critical task, as later steps key off of them. Tabs in the fuselage sides, bottom and formers allow the fuselage to be assembled "in the air."

You must now decide on the placement of the plywood landing gear mounting plate,

■ LEFT: The Fun-One's tail surfaces are as simple as built-up balsa structures can be. Also pictured here is some of the hardware provided in the kit. ■ RIGHT: Wing panels are built over the plans, elevated above the work surface by means of the jig tabs on the ribs. Note that two of the ribs don't have cutouts aft of the spar; they're die-cut for servo rails instead, for those who want to install a separate servo for each aileron. This setup, used with a computer radio, gives you the option of converting the ailerons into flaperons for even greater maneuverability.



The plywood spar joiners are installed before the center section ribs. The Fun-One's spars have pronounced sweepback; the joiners consist of a 1/8-inch plywood center piece and 1/32-inch plywood caps on the front and rear spar faces.



Fuselage sides are sheet balsa with plywood (front) and balsa (rear) doublers glued to the inside. The engineering and quality of the die-cutting are outstanding—typical of Great Planes kits.

determined by whether you're building a trike or taildragger. As an option, you could cut an extra mounting plate and glue both in. It gives you more time to decide about the landing gear and you could also use them as mounting points for floats. More fun!

The remainder of the fuselage construction is straightforward and goes quickly. If you decide to install an antenna tube in the fuselage, make sure you extend it forward of the servo mounting area, so you'll have access to it after the servos are installed.

The engineering that has been built into this kit becomes more apparent as the wing construction is started. The wing is built upside down directly over the plans, utilizing "jig tabs" on the ribs to elevate the structure off the board. Holes are die-cut into the ribs in case the builder prefers to use a wing jig. Shaped leading and trailing edges are provided and the trailing edges are notched for the ribs, making for a strong joint. Hard balsa spars with balsa doublers toward the center section, plus shear webbing and leading edge sheeting, insure that the wing will not fold, no matter how violent the maneuver. (Well, except for the infamous "Figure 9"!)

Now you must decide whether to use one or two aileron servos. You have the option of installing the servo rails in the

Tom covered his Fun-One with Solarkote, using self-adhesive Solartrim for the lettering and other decorations. It's a good idea to make the bottom different from the top, so you'll know which end is up as you recover from some of the wild maneuvers of which the Fun-One is capable.

In this dramatic photo, Tom demonstrates his superior piloting ability by knife-edging the Fun-One through a ladder—blindfolded. This is probably the only maneuver ever invented where an essential piece of safety equipment is a steel jock!

SUPER TIGRE .34 TWO-STROKE ENGINE

The engine I installed in the Fun-One was the Super Tigre .34 two-stroke. This engine is available with your choice of a steel cylinder liner or with an ABC (aluminum piston, chrome-plated brass sleeve) setup at a slightly higher price. Mine has the steel sleeve and although it looks a bit small in the Fun-One, it performs very well.

Super Tigre has manufactured model engines for decades and has maintained a reputation for powerful and beautiful model powerplants. This recent offering maintains that heritage while exhibiting refinements as well. Very apparent is the redesign of the exhaust manifold and muffler. The cylinder head is quite large and well-finned. The crankcase shows concern for lightness, which is a departure from earlier Super Tigres. Another of the identifying features of the marque is the long needle valve. Though handy for use with a cowl, I prefer to lop about half of it off in an exposed installation, to prevent it from snagging something and breaking off. The silencer design provides a lot of latitude for positioning, as it may be rotated about 180 degrees and may also be adjusted as much as one inch closer to or farther from the cylinder.

I bench-ran the engine with a 9x5 prop and 20% castor break-in fuel. Hand starts were easy and it was immediately apparent that excessive fuel consumption was not going to be a problem. Throttle response was rapid and idle was low, with no tendency to load up. After running only about six ounces of fuel through the engine, it was able to hold a wide-open setting without overheating. I switched to a 10x5 and ran a couple of tanks through it, at which point I deemed it ready to fly. ***MB***

GREAT PLANES' FUN-ONE

WINGSPAN	53 inches
WING AREA	558 square inches
FLYING WEIGHT	4-4.5 pounds
WING LOADING	16-18 ounces per square foot
OVERALL LENGTH	42 inches
RADIO REQUIRED	4 channels
ENGINE REQUIRED	.25-.40 two-stroke; .40-.60 four-stroke

■ LEFT: The basic fuselage structure goes together quickly. The stringers support the balsa turtledeck sheeting, which has yet to be applied.■ CENTER: Experienced builders can get the Fun-One framed up and ready to cover in only a few evenings. This photo shows the engine mounted upright, but Tom later laid it over on its side to get the exhaust down low—keeps the airplane cleaner. ■ RIGHT: The Super Tigre .34 looks small on the Fun-One but does a good job of hauling it around, even at the review model's flying weight of 4-1/2 pounds. Note the unique muffler, which can be pointed in any direction and can also be spaced close to or away from the engine as needed.

■ LEFT: Close-up of the wing center section, showing the aileron servo and linkage installation. Wing dowels on this model are at the trailing edge; the leading edge has two nylon bolts, held captive by the upper leading edge sheeting so they can't be lost or left behind. ■ ABOVE: The Futaba radio installation in the author's review model. Plenty of room for standard servos—these are Futaba S128s.

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wing and covering over them if you think you may want to try a computer radio later. Rather than cutting the shear webs one at a time, a shear web template is provided on the plans. This makes quick work of a tedious task. Once the wing panels are built, they are joined using a 1/8-inch plywood joiner between the spars and 1/32-inch plywood braces in front and back of the spars. You'll have to fly through the crotch of a tree to fold this wing.

Wing hold-down dowels are sandwiched between laminated half-ribs aft of the spar. You may want to install the paper servo lead tubes into the wing even if you are using a single aileron servo, in case you decide later to change to two servos.

The builder is instructed to "customize" the leading edge. For gentler low-speed flight, leave the leading edge as is. If crisp snap rolls are desired, sharpen the inner third of the leading edge slightly. Make sure both wing panels are shaped the same!

I used SolarKote as a covering material and have mixed feelings about it. It seems to have a lower overall shrink rate, so care must be taken to get the material tight over open structures. Care must also be exercised while using a heat gun, as it's easy to burn a hole through the covering. On the plus side, seams are virtually undetectable, the material is quite puncture-proof and after initial re-tightening seems to resist loosening when exposed to heat or sunlight. Trim was applied with SolarTrim. It is pressure-sensitive and is available in rolls. It is very thin, so contrasting colors can be laid over one another with an offset to create a shadow effect.

Once the covering has been applied, the control surfaces can be hinged. It wasn't all that long ago that we modelers had to exercise extreme caution while installing hinges, getting enough adhesive where needed without getting glue into the hinge joint. Most of the hinges were made of nylon, which resisted adhesion of most glues, so pinning the hinges with toothpicks was necessary.

Now all of that hassle is a thing of the past with the advent of so-called "laminated" hinges. An X-Acto blade is used to make a slit about a 1/2-inch deep and as wide as the hinge material along the centerline of the mating surfaces. Insert the hinges into the slits and push the mating surfaces together. Flex the joint to the approximate expected throw to insure that there will be no binding and apply thin CA glue until no more will wick into the joint. After the glue hardens, the hinged surface will seem stiff, but working the hinge back and forth several times will loosen things up nicely.

My engine of choice for this project was the Super Tigre .34 two-stroke, which falls somewhere in the middle of the Fun-One's recommended engine size range. The engine is quite light, but even so, the model ended up nose-heavy. I shudder to think how much lead in the tail would have been needed had I used a .40 or .45 instead of the lightweight .34! I was able to bring the model back into balance by rearranging the radio components, but the potential for nose-heaviness is something Fun-One builders should keep in mind, especially since many will no doubt be going to bigger, heavier engines than mine.

After final hookups and safety checks, it was time for one of modeling's sweetest moments—the maiden flight! I have to admit that I got into a rush—I skipped the designer's recommendations on surface throws and relied on my experience. As it turned out, I could have saved a lot of time by following instructions. I was too conservative with aileron and rudder throws while on high rate, and as a result my snap rolls became barrel rolls. The instructions said, "Rudder travel (high rate) . . . as much as possible!" The manual also gave some good information on elevator travel, cautioning that too much will result in the model snapping or rolling out of a tight loop.

After firing up the engine and making one last check for proper control response, I firewalled the throttle. After a roll of about 40 feet, the plane rotated and climbed out with authority. Even though the model weighed 4-1/2 pounds (the maximum design weight), the Super Tigre pulled it quickly to a respectable altitude. Pulling back the throttle to a fast idle, it was apparent the model was nose-heavy, so I landed in order to make adjustments to the CG and control surface throws. With the fuel tank topped off, it was time for another go at it.

This flight was different! With more surface travel and a less conservative CG, the plane made an instant personality shift. Hey, this is like it's supposed to be! Let's see what she'll do. Better yet, let's climb to about three mistakes high and *really* see what she'll do! Okay, line up with the field and pull into a tight loop. Dang, almost hit the rudder with the prop! Let's try another loop, a little wider with a snap at the top. How about a knife-edge? No problem. Gee, I wonder if she'll do a Lomcevak (that's Czech for "headache"). Maybe I had better cool it before I find out what the Czech word is for "smoking hole in the ground"!

Now is a good time to slow down and check for bad habits at low speed. I feed in up elevator as the model slows. The stall is forewarned by mushy aileron response before the nose drops. Recovery is easy with the addition of a little throttle, with little loss of altitude. Now I can bring it down a bit and try hammerheads and stall turns. It's easy to see that this plane is limited only by the pilot's ability.

Okay, let's bring her in for a landing while there is still fuel remaining. Cut the throttle on the downwind leg, make the turns to final nice and gentle, keep the wings level and feed in elevator just as she touches down. Alright! There's nothing to do now but refuel and decide whether this flight will be lazy eights and stall turns, or Lomcevaks and knife-edges. ***MB***

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FREE FLIGHT

BY BOB STALICK

Bill Lynch's 'Pegasus' F1J Record Holder

A busy month and a busy column! There's much to report on this month, so hold onto your hats and read about the events affecting the world of free flight.

APRIL THREE-VIEW: BILL LYNCH'S PEGASUS

Last year I featured Bill Lynch's Hurry Up II, which was then the F1J record holder and went on to receive NFFS honors as a Model of the Year for 1992. Now Bill has come up with an improvement on the Hurry Up, which he calls the Pegasus, and it has broken Bill's previous F1J record. How the new record came about was provided by Bill:

"Sponsored by the Sacramento-based Sierra Eagles Club, the annual two-day Sierra Cup usually brings the best to the west, literally from all over the world. The 1992 event was no exception. Some 60 top fliers representing 10 countries gathered to test their skills.

"The Sierra Cup is always well organized, with maximum consideration given to the fliers' needs. In F1J, the qualifying five rounds (two-minute maxes) are 45 minutes long and conclude at 2:45 p.m. The flyoff starts at 3 p.m. with a 15-minute launch window for each round. Typically, it's possible to get in two or more rounds per hour. Also, in keeping with the FAI format, each flier is assigned a specific starting pole position and rotates each succeeding round. Two or more timers are assigned to each position.

"By starting time, the potential field had already dropped to an even dozen. Several models had not survived the rigors of pre-contest testing, and some fliers were seen to just fold their tents and become spectators. Most entrants were flying their own creations.

"As the starting bell rang, to the uninitiated two minutes seemed easy, but the first five rounds quickly took their toll. The air wasn't good enough to make two-minute maxes a slam dunk. Still, at the end of five rounds, six fliers survived. Archer, Augustus, Davis, Hanna, Kerger and Lynch would face off for round 6, the three-minute round.

"By three o'clock, it was apparent that finding lift wasn't going to be easy, but as will often happen, a glider upwind found air, and the six took a free ride and advanced to round 7, the four-minute round. No piggyback ride this time, and flights were strung out over the fifteen-minute window. Again, all six maxed and went on to round 8, the five-minute round. By now, the air was cooling and a thin stratus had crept in from the south to cloud the sun. Each flier picked his own spot and made it.

"Round 9 was next—six minutes. At this point, finding lift would be a roll of the dice. No tell-tale signs as the Mylar streamers hung limp and the temperature dropped through the 80-degree mark. No bird dogs this time either. Then to add a bit more drama, someone among the 50 or so spectators noticed that anything over 4:28 in this round would exceed Lynch's record of 26:28. Good theater? You bet!

"The contenders picked their spots. Davis went first and then Hanna and Kerger. Augustus went early too, but both he and Kerger had overruns. Archer went somewhere in between. Lynch launched before the models overhead had made more than a turn or so. His Pegasus bunted out well over the group and settled into big right turns. Augustus retrieved his model and got back in the air just seconds before the round closed. Kerger put up his back-up model, but overran again and scored zero for the round.

"It didn't take long to see that some models weren't going to make six minutes. Without active lift, they began to settle in. Archer was down at 2:35; Augustus at 3:05; Hanna turned in a creditable 4:25; and Davis' super-light model maxed and

■ LEFT: Bill Lynch poses with his new F1J record holder and this month's featured three-view, Pegasus. Scene is Sacramento, California, at the last Sierra Cup. ■ RIGHT: Bill Lynch on his way to setting the new F1J record. Photos by Fred Terzian.

broke Lynch's record time. Bill was still very high in the air; his Pegasus DT'ed at 6:46 and was down at 9:12.

"Then there were two! Round 10 was up, seven minutes the target. It came down to Davis with his conventional six-ounce model against Lynch with his hi-tech ten-ounce model. Davis fired off first again. No air to pick. Lynch waited until Davis cleared overhead and then launched. His model bunted out well over Davis and transitioned into big, slow, time consuming turns. It was not to be for Davis this day, as he glided in at exactly 4 minutes. Lynch DT'ed at just over 6 and landed at 6:49. The early DT cost a max, but Bill had won the event and again broken his own record in doing so. The new time: 34:49. A great close to a great show."

Bill attributed the success of the Sierra Cup meet to a number of the Sierra Eagles, who worked diligently to make it a true contestant's contest. Don Hughes, Inky Davis and Ken Oliver all came in for kudos.

For further information on the Pegasus, full-size plans and an information pack are now available. The model is designed for high-performance 1cc (.060 cubic inch) engines. The cost of the plans and directions is $15.00 per set postpaid.

Bill has also redrawn plans for both the Hurry Up and the Hurry Up II. The II is suitable for engines from .049 to .060; the Hurry Up is for .049 engines. Plans for either model are $12.00 postpaid.

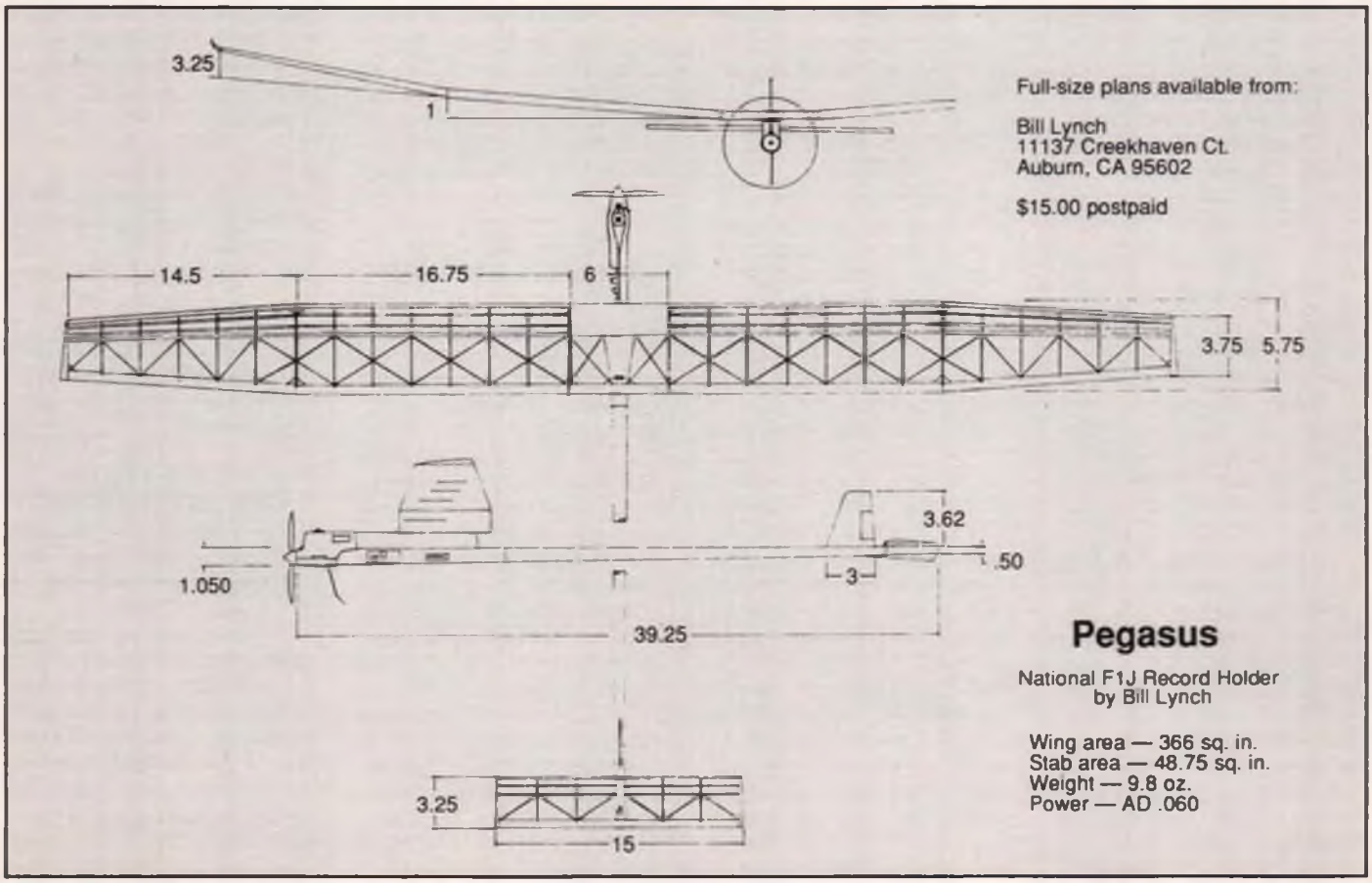
Bill has made arrangements with a local machine shop to produce some of the aluminum hardware that he uses in his Pegasus and Hurry Up designs. He is also looking into suitable sources for quality carbon fiber parts. If you are interested in finding out more about these offerings, send Bill an SASE for information.

And finally, Bill says he will be importing the complete line of AD engines. Actually, AD makes only the .06 (1cc) and the .15 (2.5cc) sizes., but if you are interested in either of these engines, drop a note to Bill at 11137 Creekhaven Court, Auburn, CA 95602.

Al Lidberg's daughter, Annie, poses with Al's mini Old Timer models, now available in kit form. From left: Trenton Terror, Playboy and Lanzo Record Breaker. Details in text.

APRIL MYSTERY MODEL

OK, so this might be considered an April Fool's model, but it *is* a free flight design, and it was published years ago in a popular U.S. model magazine. The designer was very well known for his time. The model



FREE FLIGHT

can be best described as a "reaction motor" powered free flight intended as a fun ship. With a wingspan of only 18 inches, it isn't going to make many five-minute maxes.

If you think you know the name of this little ship, send a postcard or letter to Model Builder. Do *not* send your cards and letters to me. The winner is drawn at random from among the correct entries, and receives a free one-year subscription to *Model Builder*.

JANUARY MYSTERY MODEL WINNER

The Mystery Model for January threw a higher-than-normal percentage of readers for a loop—of the 22 total entries, we received three votes for the Saturn and one each for the Totot'l and Classic. Nope, it's actually the Solar, a 1/2A ship co-designed by Craig Cusick and Howard Timlin and published in the August 1961 issue of *American Modeler*. Even by today's standards it's a modern-looking design; think how much more so it must have been when it first appeared 32 years ago!

Of the 17 correct entries, Pete Young, of Garden Grove, California, was the name that popped up as the winner of the complimentary one-year *MB* subscription. He writes:

"I built two of these while an undergrad at MIT and had lots of fun flying them from the narrow confines of the athletic fields in Cambridge. Bob (Stalick) is absolutely right when he calls the Solar one of the prettiest models ever—this plane and Al Vela's Mexi-Boy will forever remain my favorites."

To reiterate what Bob says above, when sending in your Mystery Model entries, be sure they're addressed directly to *Model Builder*, not to Bob Stalick in care of the magazine. You might want to put "Mystery Model" on the envelope so we'll know what it's about. We don't make a policy of opening mail that comes in addressed to our writers—we just send it on its way. If a last-minute MM entry comes in addressed to Bob and we send it up to him, by the time he sends it back it could be too late to be included in the drawing. It's happened before; don't let it happen to you!

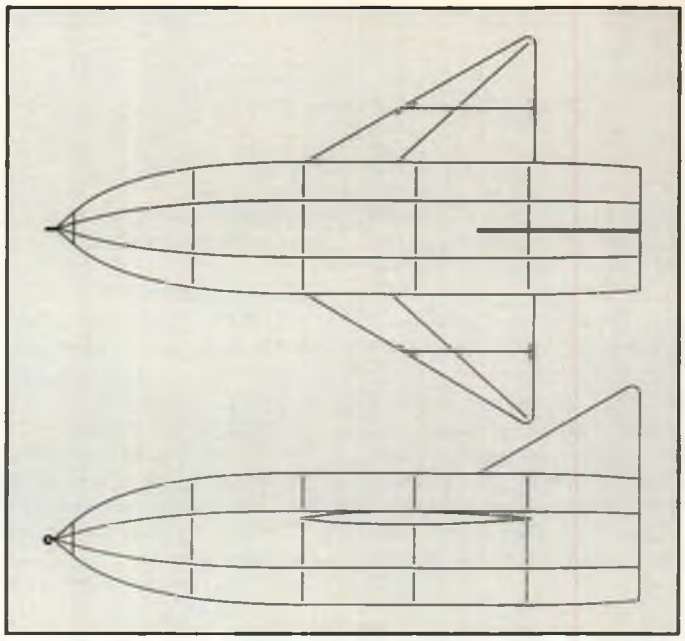
L'IL PEARL MODIFICATIONS

In the January issue I featured a three-view of an .010-powered model called the L'il Pearl. Since that article appeared I've sold about a dozen sets of full-size plans, but now I've made a couple of changes in the design. The early full-size plans don't have these corrections. The changes are as follows: 1) Reduce the washout at each wing tip from 1/16- to 1/32-inch; 2) Reduce the washin at the right main wing panel from 1/16- to 1/20-inch; 3) Reduce the fuselage length between the back of the pylon and the front stab mount from 10 to 9 inches.

Since the concept drawing appeared I have built and flown the design, and suggest these changes to improve flight characteristics and assist in trimming the model.

PLANS SOURCE BOOK

If your magazines are as organized as mine (large cardboard boxes full of magazines sorted only by title and stored in the attic), the search for a particular construction article might go on for many hours. You can save yourself a lot of time by getting a copy of Dick Gleason's catalog, *Model Plan Sources*. Dick has organized articles from practically all of the national model magazines, from well before WWII to the present, into two catalogs. One contains a listing of scale model plans and articles, the other is a listing of non-scale sources. You can look up practically any model design ever printed (if you know the name) and find out which magazine featured it and when. To make the deal even better, Dick will, for a modest fee, copy the page or pages from the magazine and send them to you.



MYSTERY MODEL

Dick also has a small selection of plans from his list of magazine articles, so if you have been unable to find what you're looking for from other sources, try Gleason Enterprises. The list of plans is included in the books. Dick readily admits that he does not have a complete registry of all of the magazines that were published, and he is still searching for some to make his listing even more up-to-date. To purchase a copy, send $2.50 per book, or $5.00 postpaid for both the scale and the non-scale books, to Dick Gleason Enterprises, 1106 10th Drive SE, Austin, MN 55912; (507) 437-3781.

NEW BOOKS WORTH BUYING

I received my copy of Dave Thornburg's new book, *Do You Speak Model Airplane?* Dave has done a nifty job of putting together a very readable, entertaining history of our hobby. Quite a number of the folks who have made this hobby so much fun appear throughout the pages. Whether your thing is free flight, control line or radio control, it's in there.

If you are interested in finding out about how some things came to be—the Academy of Model Aeronautics, National Free Flight Society, Society of Antique Modelers, the Navy Nationals, Jim Walker, how the national magazines have changed and why, the Junior problem and the heroes of modeling—it's all in there.

The book would also make a great gift for a fellow modeler, whether new to the hobby or in it for years. I enjoyed it immensely and I think you will as well. Order from Pony X-Press, 5 Monticello Drive, Albuquerque, NM 87123. The cost is $19.95, and well worth it!

• • •

You remember *Nostalgia* and *Nostalgia Too!*, don't you? If so, you'll recall that these books contained about 40 three-views from various magazines of the Nostalgia era. Now, the *The Third Nostalgia Book* is out. The format is the same as the others. All three are available from Campbell's Custom Kits; $10.00 each, plus $4.75 postage regardless of how many you order, so get the whole series. Send your order to Campbell's Custom Kits, 401 Executive Center Dr., West Palm Beach, FL 33401; (407) 686-7824.

NEWS FROM THE .010 FRONT

I've received a number of letters from readers sharing their .010 experiences, including this one from Jim Bocckinfuso:

"I began designing what I considered a good .010 plane should be. I felt that a rectangular wing is far more practical due to its simplicity. I really don't think that at the Reynolds Numbers we are dealing with in this size model, it makes much sense to get too fancy. When all was said and done, I realized that some-

thing of the lines of a small Mini-Pearl or T-Bird would be perfect, so I was going to start drawing some lines on paper when I sat down to read my favorite magazine, and there it is!"

Model Builder and I have been talking about a magazine-sponsored .010 event for this coming summer's activities. Details are still a bit sketchy, but by next month's column, they should be nailed down. If you are even remotely interested, now is the time to begin building.

LIDBERG'S NEW MINI-MODELS

Al Lidberg has been producing some beautiful scale model plans for a number of years. About a year ago, he produced some mini semi-kits of three popular Old Timers, the Buzzard Bombshell, New Ruler and Sunduster. Well, he's at it again. This time it's the Playboy Sr., the Trenton Terror and the Lanzo Record Breaker. These kits contain all of the curved balsa parts printed on select contest grade wood, a set of full-size plans and a complete set of directions. All models can be flown with rubber power, CO_2 or small electric motors. The plans show these installations. Wingspan of the models varies but averages in the neighborhood of 22 inches.

Al notes that you can purchase one kit for $6.00 plus $1.20 postage, or all three for $21.00 postpaid, in a box with rolled plans. His catalog will be included for another $1.50. The catalog contains 16 pages of offerings. Order from Al Lidberg Model Plan Service, 614 E. Fordham Ave., Tempe, AZ 85283.

A NOTE FROM JOLLY OLDE ENGLAND

In the November column I quoted an article by Harry Murphy about covering free flight models with plastic films. Shortly thereafter, I received the following from John Birnie of Gloucester, England:

"Gadzooks, young sir!

"Lightweight covering materials. Has not the information reached you from these shores? Are not the marvels of this wondrous covering material called Litespan known in our former colonies? Herewith the vital information."

The sample of Litespan included in the letter was appreciated. Litespan is a very thin plastic film available in seven colors—white, silver, black, blue, orange, yellow and red. It is a product of Solarfilm. I obtained some Litespan last summer from a Canadian friend but have yet to use it. So, John, I am aware of it. However, as I stated in the November column, I still prefer silk or tissue and dope. Still old-fashioned, I guess. ***MB***

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AN INTRO TO NAVY CARRIER

Carrier expert Orin Humphries presents a primer on one of the most demanding CL competition events.

If there's one control line competition event that incorporates a little bit of all the others, it's probably Navy Carrier.

Look at the wide range of influences: The event appeals to scale modelers because most of the planes are replicas of full-size military airplanes used in carrier operations.

There are elements of speed and racing in the technology—and piloting—involved in going fast for those high-speed timed laps and in making precise spot landings.

There are no conventional precision aerobatics, but the need to fly precisely is definitely a part of the carrier task. As far as combat goes—well, carrier's a wartime simulation, too!

To top it off, there's the appeal to mechanical tinkerers in the use of throttled engines, hook mechanisms, line sliders, flaps and so forth.

Briefly, for those who haven't seen the activity, carrier competition involves taking off from a simulated ship's deck, flying at the highest possible speed for seven laps, then flying at the slowest possible speed for seven laps. Following the timed periods, the pilot throttles down and makes an arrested landing on the deck. The high speed, low speed, landing score and static scale bonus points combine for an overall flight score.

Carrier planes don't all have to be low-wing monoplanes. John Hall's Curtiss XFTC-3 Seahawk for Profile Carrier is powered with a K&B 5.8 with O.S. 48K carb and Tatone muffler. A smooth and stable flier that John says never misses the deck. Photo by John Hall.

Over the years, we have written many articles on control line competition events.

Our "Panel of Experts" member, Orin Humphries, captured at work on one of his classic scale models. Orin helps beginners get started in Carrier in this month's column. Photo by John Thompson.

We've discussed racing, combat and precision aerobatics. However, we have not touched in detail on Navy Carrier—until now. Because the fine nuances of carrier flying are beyond my field of experience, it was deemed necessary to search for an expert to tutor me as well as the readers on this fascinating topic.

The search didn't take long. Here in the Northwest, "Mr. Carrier" is Orin Humphries of Lynnwood, Washington, who has decades of carrier and scale experience, as well as extensive knowledge of the history of military aviation. Among other things, Orin is the author of a book on the history of the American U-2 spyplane. In addition to being one of the region's top fliers, since 1979 Orin has written regular carrier articles for the *Flying Lines* regional newsletter and for several club newsletters.

Our inquiry to Orin about writing a carrier primer was answered with a thick packet of information. What follows is Part One of Orin's extensive "basic carrier" tutorial. For photographic illustration, we turned to Northwest carrier flier John Hall, who provided pictures of several examples of carrier planes. Readers desiring more information on basic carrier may want to contact Orin directly. If you do, make sure to include a self-addressed, stamped envelope and a small donation for his copying expenses.

As it turned out, our calls to Orin and John planted the seed of an idea that should provide some excellent technical information on all types of control line model aviation on a semi-regular basis over the coming months. Our two contributors this month are hereby appointed the first official members of the *Model Builder* control line Panel of Experts. See the end of the column for more details.

But now, class, pay attention. Professor Humphries has approached the podium:

THE NAVY CARRIER EVENT

The Navy Carrier event is virtually guaranteed to have a pilot's adrenaline pumping at the max throughout the flight. Let's get some perspective on the event and talk about what it feels like to fly carrier.

At the end of World War II, the Navy did a study and found that their very best pilots had almost all been modelers as kids. In order to keep a steady supply of people with this background coming up, and also to stack the deck in favor of the kids' later choosing a naval career over the other services, the Navy invented and sponsored

Carrier decks can be a fairly simple arrangement. This one, used by the Seattle Skyraiders, is wood laid out on the pavement, with eyelets to hold the arresting cords, and sandbags to hold the cords tight. The pilot splashed this landing. John Thompson photo.

Another style of deck, which stands a few inches above the ground. This is the Eugene Prop Spinners deck, complete with conning tower. Again, eyelets and sandbags hold cords aloft at the far end of the deck. Photo by John Thompson.

the control line carrier model flying event around 1952. Their philosophy was to choose a practical scale fitting our hobby and to value realism.

The size chosen was 1/20 scale, using the typical fleet carrier of the day as a reference. That's why the deck we use is about 40 feet long. The deck elevator on the real carrier had a size that naturally limited how big a plane could use it. At 1/20 scale, this put our wingspan at 44 inches maximum, and this is why the limit exists in two of the present CL classes. Early rules forbade anything that would lead to unrealistic flight characteristics, although we have since evolved away from part of that.

Carrier is probably the second most fascinating thing you can watch in CL, the first being, perhaps, combat. Carrier sails in a sea of adrenalin. It pulls you from one extreme to another, leaving you exhausted. Exhilarated, but pooped! First you have to take off from a short space and go full bore for seven laps that pass very quickly. Keeping a fire-breathing behemoth below 20 feet and not letting any part of it touch the "water" is not simple. Anything that is not deck is termed water, which equals crash, which equals end of flight score. Your mind does not wander—the plane pulls hard on the lines.

You next slow it down to zero line tension and try to get your pulse under 200. Now you must monitor the wind's changes constantly. The plane moves oddly and the gust that just hit it hits you five seconds later. Get your hook and whatever down; don't lose it in the process. Slow it to the point of almost falling out of the sky. Practice a couple of laps. Time slows to a crawl.

When you are ready, you must take your concentration off the plane and signal the judge. That's risky. Your slow time starts a lap afterwards. Really stretches your anxiety. Now you must keep the plane relatively close to the water without touching it. You must keep the engine running but as slow at possible at all cost.

You cannot imagine how long seven laps of low speed in the wind is, friends—ya gotta be there. For your first season, it will be hard to remember what lap you're on during low speed. One thing it is not, and that is boring. It is as boring as doing chin-ups on the pipes in the schoolyard in the deep of winter, touching your tongue to the pipe between your hands and having it freeze there.

After you get through that ordeal, you usually speed up a bit to settle your nerves for a couple of laps. You must next line up for your landing, because you have wandered off your spot. Your buddy signals when your bird is aligned with the middle of the deck, so it won't be shredded by the eyes at the edges holding the ropes. You don't have to worry about that in stunt, do you? We carrier pilots have to land in 5 percent of the circle regardless of the wind direction. You must signal your intention to come aboard and have a rope in your hook on the next pass, or points start coming off, five points for each successive overflight of the deck.

You have just spent the longest laps in your life keeping the motor running and not touching the water. Now, you must Jekyll & Hyde it. You have to shut the motor down and put the nose down toward the water roughly 90 degrees out from your touchdown point. You cannot even see the deck from there.

You follow the plane down. The engine is slower as the plane gets closer to the water. Down, down, no deck in sight. The wind changes. You correct but overshoot. You correct that. Now, there is no room for error. Down, closer, you are now only knee-high off the water and crash is imminent. Suddenly, the deck slips in from nowhere into your tunnel vision and the plane traps.

Freeze! Count five. Don't move. Many times, out of a feeling of relief, we have dropped our hands to our sides and inadvertently jerked our plane off the deck. That's a "crash" to a green judge, though not legally so.

Everything in the flight is opposite from what you have just concentrated on. You are jerked around from one thing to another without enough time to acclimatize. The carrier pilot is one heavily challenged aviator.

FLYING CARRIER

There is an apprenticeship to be served with any event. In carrier it amounts to a minimum of three years flying experience with the same airplane. (In speed it may be greater than 10 years.) Your other experience has little or no value here. *continued*

The unofficial .15 Carrier event is popular in some regions, including the Northwest. John Hall's Midwest P-40 uses a Cox Conquest .15 for power. Photo by John Hall.

■ LEFT: John Hall's Sterling A2D-1 Skyshark for .15 Carrier, with a Cox Conquest .15, is the Northwest record holder at 194 points. It's a rugged, good-flying plane. ■ RIGHT: Hall's Curtiss S82C Helldiver is a typical Profile Carrier model, built from a Goldberg P-40 kit and modified. K&B 5.8 power with an O.S. 4BK carb. K&B muffler (mufflers are allowed in Northwest contests). APC 9x7 prop, goes 90 mph on 60% nitro fuel. John has many contest wins with this relatively simple plane—no complicated line sliders or other tricks. Photos by John Hall.

Until you have flown carrier for that long, you will not know what is a good equipment decision and what is not, and why. Your piloting skills will not be high enough for you to use the high-zoot equipment you will see on the planes of the older sailors.

In fact, if you fly anything other than a Ringmaster-like plane with only throttle, hook and elevator for working items, you will lose it. You can't drive an Indy 500 car without serving an apprenticeship, and it's the same in carrier.

Certainly the greatest source of bad results in this event is when people try to skip the apprenticeship. The second greatest source of woe and bloody lessons comes from the effort some people seem to put into *avoiding* learning the rules for this event.

The huge engine head gives away this Corsair's status as a Class II Carrier plane, powered by a .60. This one is flown by Orin Humphries. Photo by John Thompson.

You can't just read the section once or twice. You have to commit it to memory.

Let me leave some basic piloting tips:

Don't claw for altitude during takeoff. Do what the stunt pilots do—that is, trace the path you want your plane to take with your hand extended to arm's length. When stunt pilots do a figure-eight, the elbow is straight, and their hand moves through a small figure-eight. The hand is always on the line of sight to the plane. In your carrier takeoff, when the plane is released, move your outstretched hand, which always covers the airplane, along the surface of the deck until it has traveled 75 percent of the way to the bow. At that point simply move your hand along a gentle climb path and the plane will be right there. You don't even have to bend your wrist.

Once airborne, bring the handle in close to your chest like the race pilots. This helps your score by reducing the distance the plane travels. During low speed, stretch your arm out long again, increasing the plane's travel distance.

Have someone line you up for landing. Landing is a state of mind. Nine out of 10 pilots blow it because they are really just trying to fly low over the deck and maybe get lucky by grabbing a rope. That's two things: spectating and flying. You must *pilot* the plane, not watch. You must *land* on the deck, not fly along it.

Land by the numbers: 1) 180 degrees out, you're stable at head height and no more speed than necessary to keep the lines tight anywhere on the circle; 2) At 90 degrees, throttle back to a little above idle, put the nose down 1-1/2 degrees; 3) Arms locked straight, both hands on the handle; 4) At 45 degrees, you are belt buckle high; 5) At 30 degrees, idle the engine and slowly, smoothly, deliberately move your arms and handle toward your knees. This move guarantees that you will land rather than fly along the deck. When the model traps, freeze and count, like I said before. You can't see the deck until step 5, so you must rely on a mental picture of where it is. There is no way you can make a correction once you can see the deck. Never try to save a bad approach—go around.

You don't need a deck to practice landings. Put your flight kit dead downwind on the edge of the circle. Say that is where the last rope is. On each flight, shoot touch-and-go's in the 20 feet preceding your kit. Get to where you can touch only your hook to the ground on three out of eight passes.

Your first plane and engine must be simple and middle-of-the-road. Reliability and flyability are the primary goals. The other guys will have to foray to the ragged edge of the envelope to beat you, and most of them will splash in that hairy regime.

Use any modern .32 to .35 suction-fed engine and have nothing on your plane but throttle, hook and elevator. Starting in .15 Carrier, if it is flown in your region, is the cheapest way to see if you will like this activity. For something larger, a Goldberg Shoestring Stunter with the wingtips, fuselage and tail changed to resemble the outlines of a full-size carrier fighter is excellent. Bring a three-view or borrow one at the contest.

In this opener, I have tried to re-create the feeling of flying carrier. It is not to scare you off. It's just that, if you are looking for something to fly where you will NEVER go to sleep at the handle, try this. You will, of course, walk before you run. Just don't do what so many of us do and try to bypass the apprenticeship and ignore the rulebook. You won't know what is good equipment or what is a good way to approach it for three years. Start in .15 Carrier or with a Shoestring as described above.

For more information about Navy Carrier, write Orin Humphries at 19805 48th

continued on page 85

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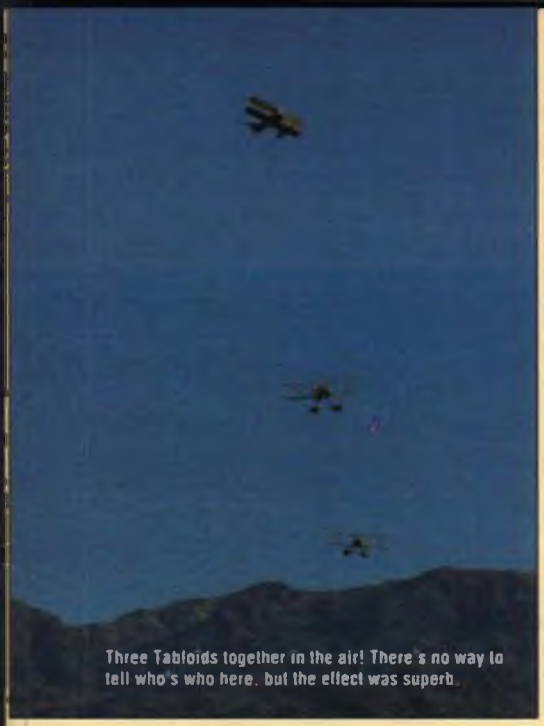
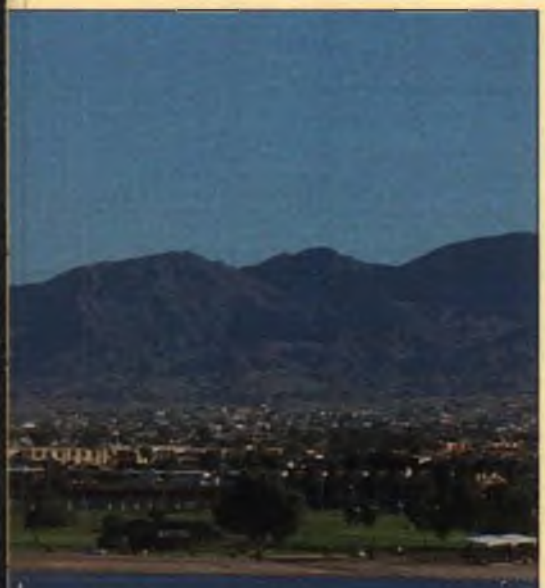
A broad shot of the Lake Havasu beach very early on Saturday morning, indicating just a part of the crowd gathered.

Part of the line-up of airplanes during the flotation trials. Full-size Schneider Cup racers were required to prove their seaworthiness by floating at a mooring for an extended period. The models at Havasu were awarded extra points for doing the same, giving spectators a chance to view and photograph them in a realistic setting. In the background is the Nautical Inn, headquarters for the meet.



Three Tabloids together in the air! There's no way to tell who's who here, but the effect was superb.



THE FOURTH ANNUAL SCHNEIDER CUP RE-ENACTMENT

BY BOB BENJAMIN

At Monaco in April, 1913, Maurice Prevost flew a float-equipped Deperdussin monoplane around 28 laps of a course laid out over the waters of the Bay of Roguebrun, at an average speed of about 61 mph, to win for France the first Schneider Cup competition. Prevost's airplane, powered by a twin-row, 14-cylinder Gnome rotary engine of 160 horsepower, was a converted version of the speed record holding Deperdussin landplane, optimistically prepared for Schneider Cup competition at a time when floatplane/flying boat design was at a precariously tentative stage.

By 1931, when the Schneider Cup was retired permanently to England on the occasion of that country's winning it three times in succession in five years, the winning Supermarine S.6B was the finely tuned culmination of a years-long series of airplane designs especially created for Schneider Cup competition. Using an experimental Rolls-Royce "R" engine capable of producing 2,350 horsepower for limited periods, the S.6B was flown by John Boothman to complete the race at an average lap speed of about 340 mph.

Conceived in 1912 by French industrialist Jacques Schneider to promote development of water-based aircraft with an emphasis on commercial practicality, the Schneider Cup race evolved into a speed competition for floatplanes with international prestige at stake. The only serious competitors were England, France, Italy and the United States, each of which won on at least one occasion.

To this day, the Schneider Cup holds a special mystique for lovers of airplanes and aviation lore. While the concept of a racing floatplane may seem somehow self-contradictory, it is a historical fact that the 1931 Schneider Cup winning S.6B was, at 340.08 mph over a measured course, the fastest airplane anywhere in the world at that time. Shortly thereafter, the same airplane with an uprated engine became the first to exceed 400 mph. In 1934, the Italian Macchi-Castoldi MC-72 set a world record for piston-powered hydroplanes (water-based airplanes) of 440.68 mph, which has never been surpassed.

THE SCHNEIDER CUP RE-ENACTMENT

In November, 1989, the Desert Hawks RC Club of Lake Havasu City, Arizona, sponsored a re-creation of the Schneider Cup races in model form. Having had several years of experience in organizing events for RC model floatplanes in the form of the already-established London Bridge Seaplane Classic, the club knew what was necessary to run a successful event.

Schneider Cup Re-Enactment chairman and chief motivator Bob Martin wanted to accomplish several things. The idea was to

An interested crowd in the pit area surrounds Ralph Burton and his Short Bristow Crusader, a beautifully built aircraft that was unfortunately lost in a crash during a heat race.

create an entirely new model event that would be both a competition and an attraction that would command the attention of the general public.

The requirement for large models was included for several reasons. On rough water, making takeoffs and landings with smaller models is a questionable proposition. Also, it has been shown repeatedly that larger models make a far better impression on the non-modeling public than do smaller ones. With this in mind, a minimum wingspan of 85 inches was adopted. This has resulted in virtually all entries being 1/4-scale or larger, and has guaranteed that the models are easy to see even when in flight far out over the lake. Entries must be scale models of aircraft which were designed specifically for the Schneider Cup races, resulting in a list of over 90 individual airplanes that are acceptable to be entered as Re-Enactment competitors.

During the time when preparations were being made for the 1992 event, there were about ten sources of plans and components such as fiberglass fuselages available for eligible aircraft. While this sort of logistic support gives the interested model builder a place to start, it's just not the same as being able to order a complete kit for the aircraft of your choice.

Compounding the challenge is the obscurity of most of the designs that were built for the full-scale races. The majority of them appeared as single examples, or in groups of a very few variants on a design. None had any commercial application and only a handful existed in military counterpart versions that actually entered production and saw service. The result is that in spite of the impact they had on the evolution of aircraft design, virtually all of the Schneider Cup airplanes are themselves obscure, little-known types on which little research material is available.

ORGANIZATION AND RULES

The Desert Hawks R/C Club invested considerable effort in developing a unique set of rules for the Schneider Cup Re-Enactment at Lake Havasu. Although it is a scale event, it is also a race and at the same time a historic re-creation. As such, it demands special attention. The requirements of the historic full-scale Schneider Cup competition, although they were modified in some details over the years, remained essentially the same in intent. Competing aircraft were required to prove seaworthiness by floating at a mooring for a specified time and were expected to be able to taxi under good control over reasonable distances onto and from the race course.

Above all, the Schneider Cup competition was a race, with the winner determined by the fastest average speed around an over-water course. Because the Schneider Cup competition extended over a period of 18 years of very active development in aviation technology, there is a wide disparity in the speeds of the aircraft that competed. The problem of wide disparity in model speeds was solved by adding a time trial flight task, which is separate from the usual scale flight performance task common to all scale contests.

A target speed for each entry is based on the official average speed recorded by the full-scale aircraft in cases where the subject actually completed a Schneider Cup race. A scale factor identical to that of the model is applied to produce the target speed. For instance, a 1/4-scale model, with a scale factor of 0.25, replicating a full-scale airplane that averaged 200 mph, would be assigned a target of 200x0.25 or 50 mph. Target speeds for models of full-size aircraft which did not begin or complete a race are set at 80% of the speed of the winner of that year's race.

In the case of early aircraft whose target speed would be so low as to place the models in jeopardy in strong winds, a minimum target of 30 mph is assigned. Speed is determined by timing three sequential passes upwind and downwind past a pair of offshore buoys 500 feet apart. The passes are averaged. Each percent deviation from the target speed results in a loss of one point from a maximum of 50.

With the problem of scale speed attended to in the time trials, the performance of the model in the multiple-plane heats on the triangular race course becomes the basis for judging realism in flight, just as in a more conventional scale competition. The effect on the viewing public, modelers and non-modelers alike, is spectacular. Throughout several days of flying, several models of like vintage were frequently on the course together. These large models, flown over a course several hundred feet or more offshore by experienced pilots, gave a convincing impression of a full-scale air race.

Scoring in the multiple-plane heats is based on flight realism in the five categories of taxi and takeoff, consistent altitude at or below 80 feet, maintenance of a consistent, realistic speed, adherence to the race course, and landing and return taxi, with a maximum possible score of 50 points. Six heats were flown, with an average of the best five counted. This score was added to the time trial score, the static score, and the token 5 points for flotation, for a maximum possible score of 205 points.

That the unique rules indeed provide a fair means of organizing the competition becomes clear when the final standings are examined. The long-argued discussion of the advantages of fast, heavy airplanes when flown against slow, light ones in windy conditions seems academic in the case of the 1992 Schneider Cup Re-Enactment.

The top five places tell the tale. Bill Curry's Supermarine S.4 took 1st with a score of 131.3, which is perhaps not surprising until you learn that 2nd went to the McClung/Skoglund Deperdussin with 125.0. This slow, light floater beat the 3rd place Macchi 67, which came in at 119.6. In 4th and 5th places were the two Sopwith Tabloids built and flown in turn by Ian McInnes and Roy Slater. This set of relative standings was achieved under circumstances of strong winds and rough water.

THE FLYING

Seventeen airplanes were entered in the 1992 Schneider Cup Re-Enactment, although we saw several others in the convention center area of the Nautical Inn, where the static judging and social activities took place, that appeared not to have been entered officially. In addition, there were several non-Schneider scale models equipped with floats that were brought to participate in the Giant Scale Float-Fly that was added for the first time this year. These airplanes were invited to encourage increased participation in the event by interested modelers who might not have a Schneider Cup airplane ready. These models were given several opportunities to fly between heats of the competition.

A wide variety of Schneider Cup aircraft was represented. This year the entire span of the race era was covered, with the 1913 race represented by the McClung/Skoglund Deperdussin, and the 1931 contest by a Supermarine S.6B built by Terry Parsons of Newport Beach, California. Unfortunately, the S.6B was one of the aircraft that was not judged or flown.

Sadly, there was a high attrition rate at this year's event. Several aircraft were put out of action beyond immediate repair by crashes, although most of them, we were assured, would return to fly again. Several others were flown during only a few of the six race heats in deference to the less-than-ideal wind and water conditions.

All flying on Friday was cancelled due to increasing strong winds and rough white-capped water that lasted all day. The time trials were re-scheduled and flown at the beginning of the first heats on Saturday morning, by which time the wind had changed direction and dropped to a more moderate level. Nonetheless, an odd situation persisted which made flying difficult at best for the lighter airplanes.

Moderate waves on the order of 6 inches in height ran the length of the takeoff area perpendicular to the direction of flight, but as aircraft cleared the water, they left the shelter of the shoreline and abruptly encountered a strong crosswind, which put several of them up on a wingtip and in the water. Although conditions on Sunday were much improved, those entrants who had been put into the water and were unable to complete Saturday's heats or who had elected to wait for safer conditions were unable to complete enough heats to post a competitive score. In spite of this, much good flying was seen on Sunday.

For additional information on future Re-Enactment plans or on availability of plans, components or reference data, you are invited to write for information to: Schneider Cup Association, Attn. Bob Martin, 1520-B Corona Drive, Lake Havasu City, AZ 86403. ***MB***

■ LEFT: Perhaps the most interesting airplane was this French CAMS 38 built by Dick Lucas and Lan Mace. The full-size aircraft never raced successfully, dropping out of the 1923 race with a structural failure. The model, which had the highest static score of the competition (82.3 points), uses traditional balsa construction, including over 100 wing ribs built up from 1/8 square balsa! Covering is Stits fabric and paint, power is an A&M Sachs 4.2 turning a 24x10 pusher prop. Dick says the model is very tricky to take off from rough water, and he and Lan sat out several heats when high waves would have put the model in peril. ■ ABOVE: A Sopwith makes a clean getaway. All of the 1914 Tabloids were about the same size and were impossible to tell apart once they got away from the beach.

One of the retrieval boats provided by the Desert Hawks R/C Club picks up Ralph Burton's ill-fated Short Bristow Crusader after an aborted takeoff attempt. Note the special platform rigged to the bow to allow pickup of the models with minimum risk.

Part of the Saturday evening social festivities. A costume party for vintage Schneider Cup era clothing was featured. The vehicle is a 1934 Rolls Royce provided for the occasion by McCulloch Realty of Lake Havasu City, one of the area businesses that was very supportive of the event. Costume winners Cheryl and Rick Elder are at left of the Curtiss F6C3, whose builder, J. Paul Lussier, stands behind it.

The 1913 Deperdussin entered by Bob McClung and built by Dick Skoglund, who also did the flying. It's been flown in every Schneider Cup Re-Enactment since the first, and has never missed a single heat in any of those events! One of the lighter entries at only 16 pounds, the Dep spans 90 inches and flies realistically with an O.S. 1.08 two-stroke. Dick built the model with fully functional wing warp control as per the original, but doesn't use it most of the time, as he found the model handles very well on rudder alone.

■ LEFT: Marjoe Bunney working on his 1/3-scale 1915 "Schneider Baby." RAF roundels and the addition of ailerons distinguish it from the earlier 1913/1914 Tabloids. This airplane has been at Havasu since the first Schneider Cup Re-Enactment in 1989, although it didn't fly during the 1990 gathering. Like the full-size Tabloid, takeoffs with the model nearly always consist of two or three bounces at flying speed, after which it becomes safely airborne. Marjoe placed 6th with the 46-pound, Quadra 100-powered replica.
■ RIGHT: Absolutely gorgeous 1929 Macchi 67 garnered a 3rd place win for builder Matt Pearson and pilot Dan Egelhoff. Built to 1/3.3 scale, the model spans 107 inches, weighs just over 50 pounds, and is pulled by a Quadra 100 turning a 24x12 prop. Matt built his own molds for the fiberglass fuselage and float shells; wings are foam cores with fiberglass skins. Paint is automotive acrylic enamel. Dan says the airplane is very easy to fly, and has in fact flown the Schneider Cup course inverted with no problem!

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STEVE WITTMAN'S VW RACER

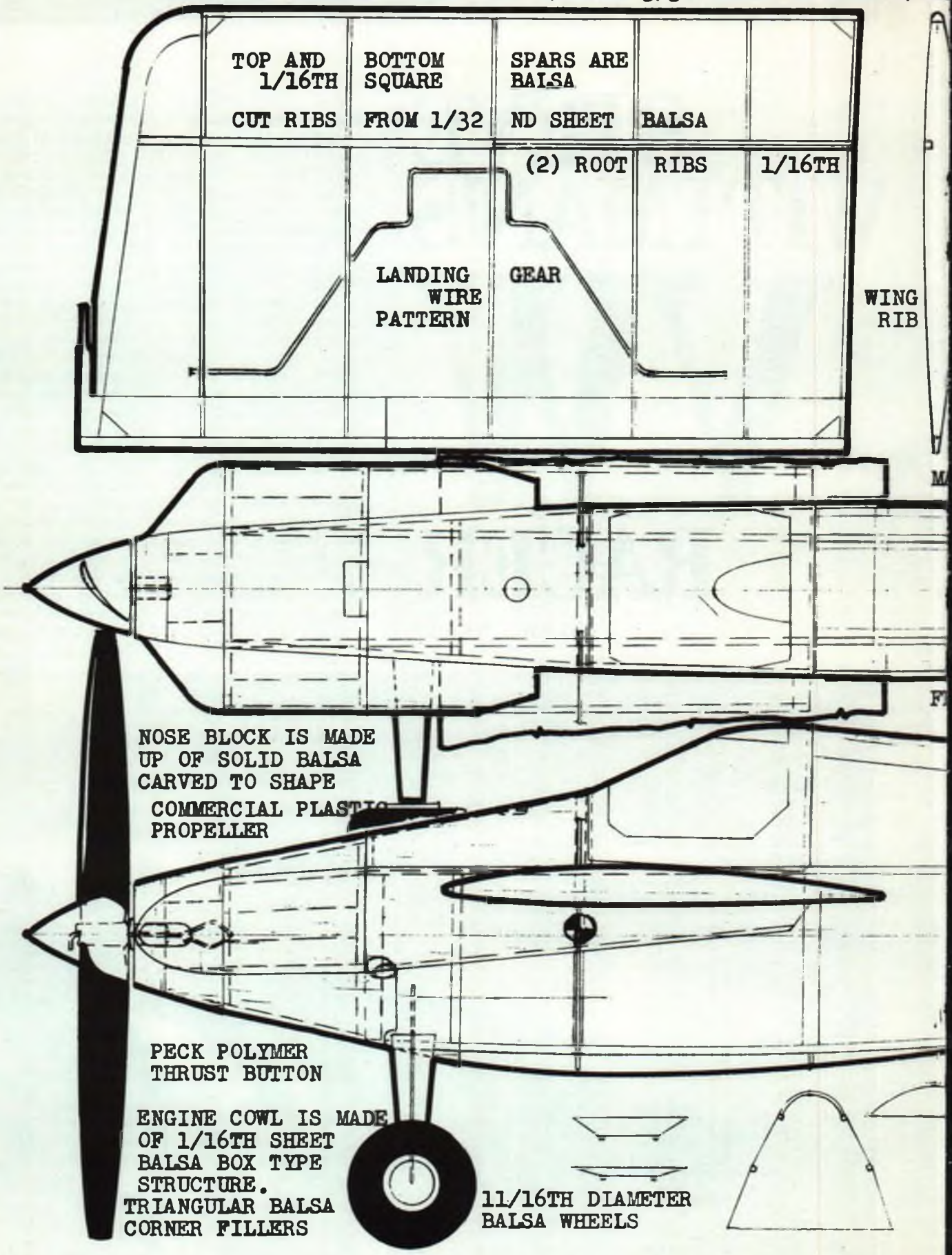
BY WALT MOONEY

To anyone who has even the slightest interest in aviation, Steve Wittman needs no introduction. This racing pilot from Oshkosh, Wisconsin has been building winning racers for more than 40 years, and is still piloting them in races wherever a race is promoted. His designs are famous for being light, simple and fast. They are also famous because they do not follow the "French curve" smoothness approach to aerodynamic efficiency. Thus, his airplanes have not always *looked* fast, but they have always *been* fast.

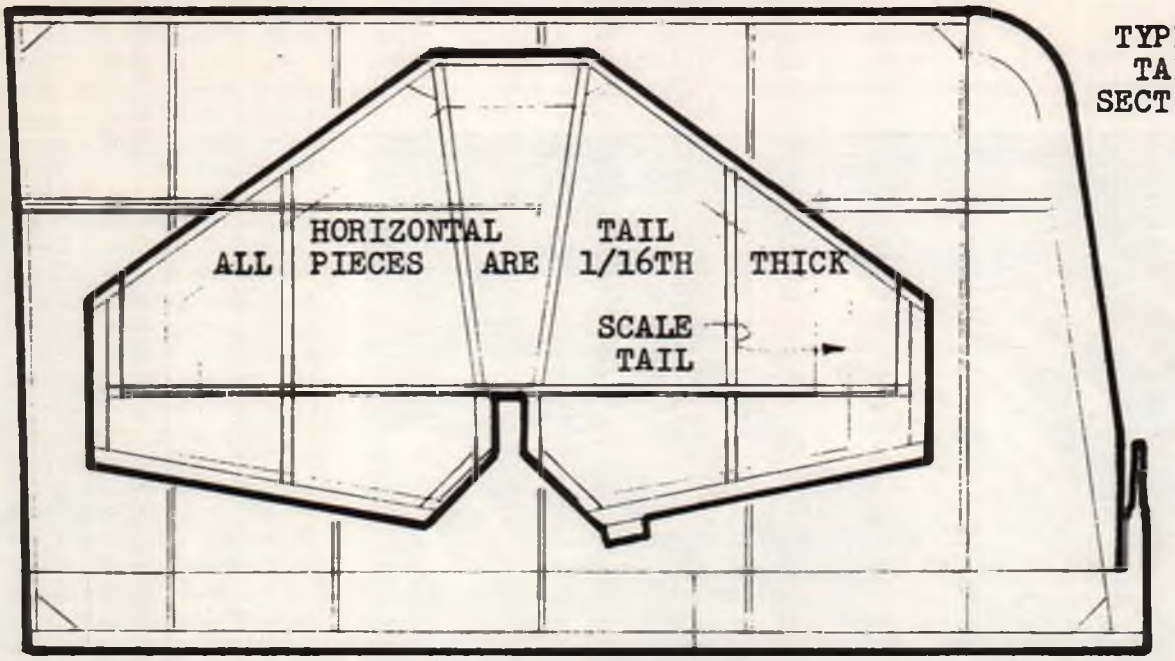
This VW-powered racer is in Wittman's best tradition. It is a boxy, angular airplane. By using wire bracing, the wing can be made much lighter and thinner. Keeping a racer as light as possible is important, because a considerable portion of the drag of any airplane is induced by the amount of lift developed to hold the airplane up. The lower the weight, the more quickly the airplane will accelerate, both on the initial takeoff and after each pylon turn.

There are two intentional deviations from scale in the model; the area of the horizontal tail has been increased slightly, and the dihedral has been increased from nothing to 1/8-inch. The wing has been designed to use wire bracing just like the full-size racer. Note that the top longerons are spread wider apart than the bottom longerons. Thus, the wing contacts the fuselage structure only along the upper longeron. Without the wire bracing (monofilament fishing line), the wing attachment would be somewhat fragile. Although this method adds some complexity to the usual approach of just cementing the root rib to a flat fuselage side, it offers the advantage of being able to adjust the dihedral by rerigging the bracing—a simple job with monofilament, which can be shrunk with the application of a

MAKE THE LEADING EDGES FROM 1/16 BY 3/32 BALSA OR FROM 1/16

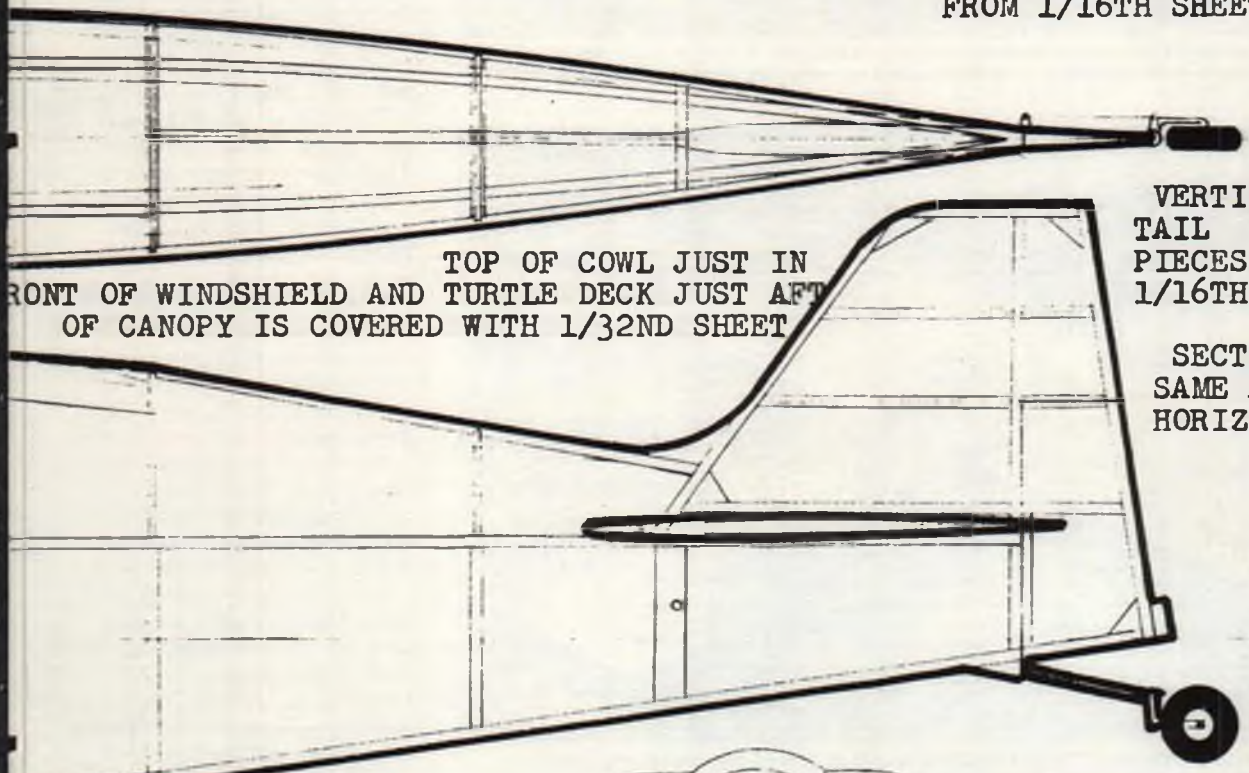


TH DIAMETER BIRCH DOWEL MAKE TIPS FROM 1/16TH SHEET BALSA



TYPICAL TAIL SECTION

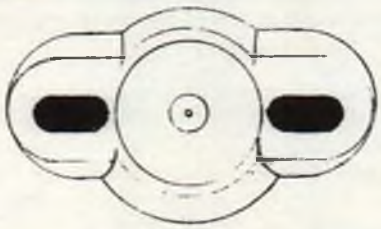
AKE TRAILING EDGES FROM 1/16TH BY 1/8TH BALSA CUT TRIANGULAR GUSSETS FROM 1/16TH SHEET



TOP OF COWL JUST IN FRONT OF WINDSHIELD AND TURTLE DECK JUST AFT OF CANOPY IS COVERED WITH 1/32ND SHEET

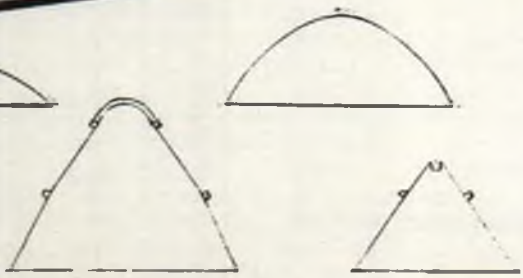
VERTICAL TAIL ALL PIECES ARE 1/16TH THICK

SECTION SAME AS HORIZONTAL



DIHEDRAL IS 1/8" UNDER EACH WINGTIP

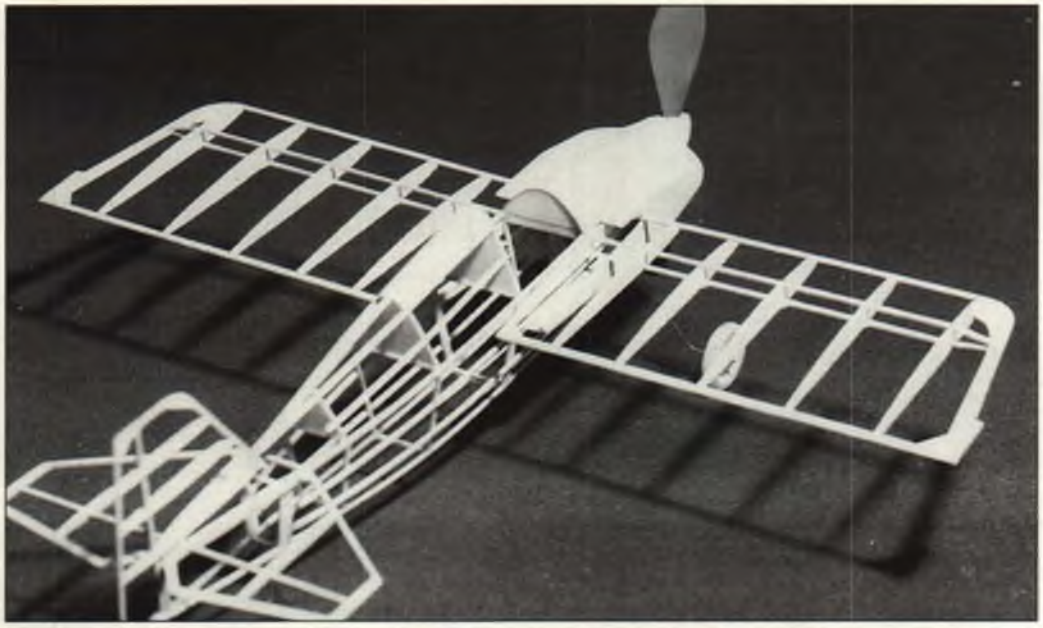
LONGERONS & STRINGERS 1/16TH SQUARE BALSA



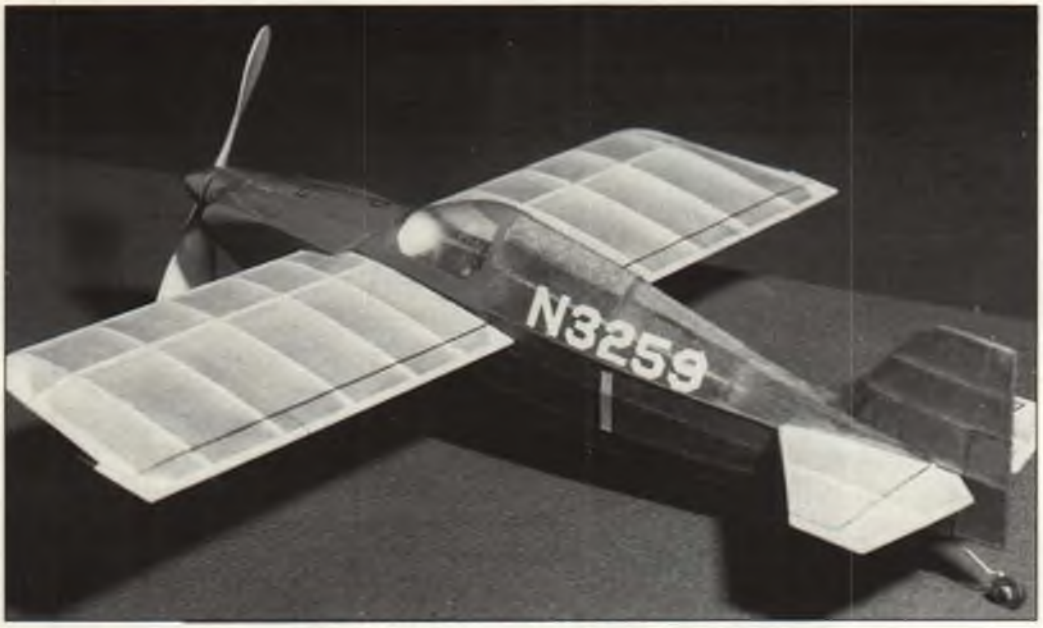
"STEVE WITTMAN'S VW POWERED RACER"
IN PEANUT SCALE
BY Walt Mooney

little heat.

If most of your Peanut flying is done outdoors, I'd recommend following the wood sizes called out on the plan. The model in the pictures, however, was built with 1/20 square instead of 1/16, and 1/20 sheet instead of 1/16 sheet. This results in a considerable reduction in weight. This special size wood is available by mail from Peck-Polymers, P.O. Box 710399-MB, Santee, CA 92072. For more information, send $3.00 for their complete catalog.



Framework shot reveals the simple construction of Steve Wittman's famous VW-powered racer. The only tough part may be the sheeting around the cowl. The long tail moment (makes for a long motor run) and low aspect ratio, large-area wings are evident in this photo.



The only deviations from scale are a slight increase in tail area and a bit of dihedral added to the otherwise flat wing. Colors are a green fuselage and fin, yellow wings and stab.

The structure on this model is fairly standard, but there are subtle differences that warrant special discussion. The airfoil section of the wing is not flat-bottomed. I chose to use a scale-like (semi-symmetrical) airfoil that has a very small pitching moment. When the wing is built over the plans, the trailing edge must be supported above the plan by about 1/16-inch.

The fuselage basic structure consists of two sides built over the plan, removed from the plan, cemented together at the tail post, and then separated from each other by a series of cross pieces at the location of each upright, to make a common box structure. It's important to note, however, that this fuselage box is not rectangular in cross-section, but trapezoidal. That is, the upper longerons are farther apart than the lower ones. Care is required in making this basic assembly. Because of the difference in width, fuselage sides that are assembled over the plan will curve upwards at the tail, resulting in a little nose-up adjustment of the tail. This happened in the case of the model in the photos, and was left that way with no noticeable change in the shape. If you want to compensate for this, you can, during assembly of the sides over the plans, shift the longerons at the tailpost downwards 1/16 of an inch.

The nose contours, except at the very front, are angular and generally straight-lined. Therefore, on this model, the cowl has been built up of sheet balsa; 1/16 sheet was used between the first two fuselage stations, and 1/32 sheet was used from there aft. The cross-section of the nose block requires that you fill the inside corners of the forward part of the cowling with 1/4-inch square triangular stock so that the very front of the cowling just aft of the nose block can be carved to the rounded shape of the noseblock.

The landing gear wire comes out of the fuselage about 3/16 of an inch up from the bottom. To install it, cut a narrow notch in the lower structure and then fill the notch after cementing the wire in place.

The vertical tail is an integral part of the fuselage structure. The top center stringer cements to the vertical tail leading edge and a small sheet balsa fillet makes the curved fairing between the stringer and the fin. Fuselage and fin covering is continuous. This means that the horizontal tail must be covered and installed before the vertical tail can be installed and the top of the fuselage covered.

My propeller spinner was carved from block balsa and hollowed out. It was then epoxied to a Peck-Polymers 4-3/4 inch diameter plastic propeller, aften installing the prop hook. Usually I put a winding loop on the front of the prop, but I felt this would louse up the looks of the spinner, so for mechanical winding, the noseblock must be removed and the rubber disconnected from the prop hook. This is a little less convenient, but I've seen a lot of photos of modelers holding propellers in their mouths while winding, so I do it too, while winding this one!

Wittman's color scheme is green on the fuselage and vertical tail, with yellow wings, horizontal tail and trim. The correct numbers show in the photos. ***MB***

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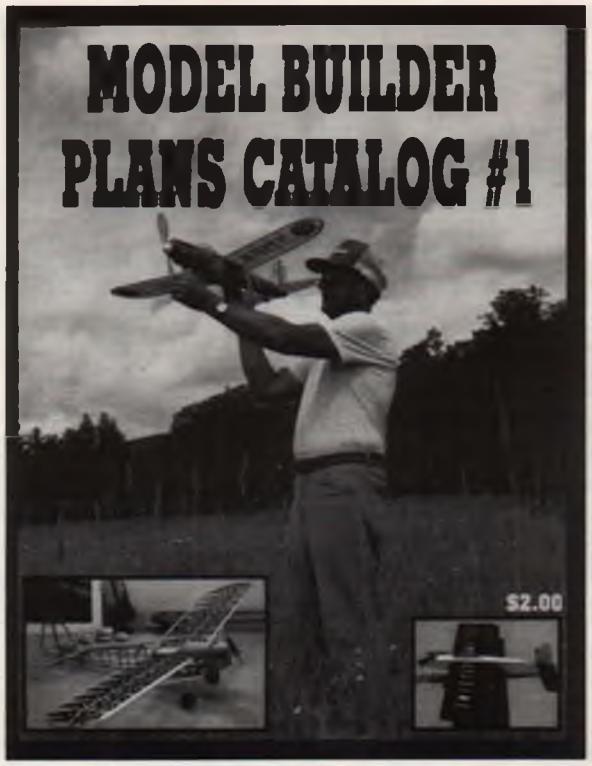

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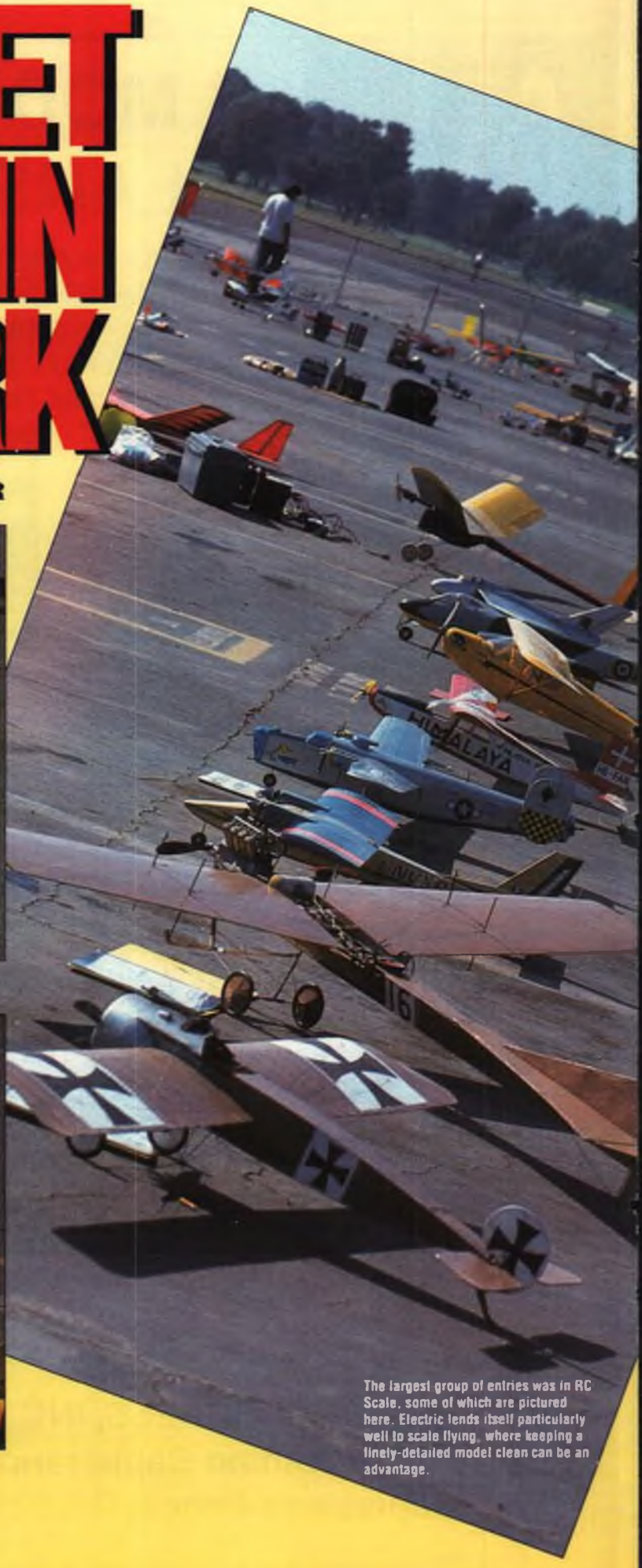
ASTRO CHAMPS 1992

PART II: A QUIET DAY IN THE PARK

BY JOHN LUPPERGER

A group of CL Scale entries ready for the flight line.

Pylon entries tend to look alike as the event has become very specialized. The Midwest Aero-Lectric was coerced into flying to even out the rounds.



The largest group of entries was in RC Scale, some of which are pictured here. Electric lends itself particularly well to scale flying, where keeping a finely-detailed model clean can be an advantage.

Grant Hiestand's 1st place finishing CL Scale J-3 Cub was modified from the Goldberg kit. Power is supplied by a geared Astro 25 on 14 cells. Throttle control is supplied by a JS Custom Electrics servo driver operating an Astro 205 ESC. Electronic auxiliary controls for CL models were covered in detail in the April and May 1992 CL columns by John Thompson.

Bill Barber with his "Rock It A Go Go" E-30 model. Span is 38 inches with 90 squares at a flying weight of 60 grams. Bill's model uses a VL HY-70 power system, as did most of the other E-30 entries.

The rather unique-looking entries in the Astro Cargo event. Most entries had spans of about 160 inches with undercambered airfoils.

In May of '92, the soaring portion of the annual Astro Champs took place in Costa Mesa, California, where electric Old Timers and electric sailplanes (with a round or two of pylon) showed off their quick climbing and soaring abilities. In November, the second half of the '92 Astro Champs gave pilots the chance to show spectators what "power" electrics could do in eight different events. So, 50-plus entries showed up at Mile Square Park in Fountain Valley for a little fun and "A Quiet Day in the Park."

The officially contested events included RC Precision Aerobatics, with 11 entries; RC Sport Scale, 15 entries; RC 7-Cell Pylon, 6 entries; Astro Cargo, 6 entries; FF E-30, 5 entries; FF Scale, 2 entries; CL Stunt, 2 entries; and CL Scale, 7 entries.

With this many events taking place it was difficult to cover everything. Therefore, I took a lot of photos and will let them tell the overall story, while going into detail on just a few of the events and a few notable models. Information on the models that trophied are in the chart, with specifications to give you a good idea of what makes for a winning combination. (N/A means that information on this spec or model was not available.)

The most popular events in number of entries were Scale and Pattern. These two events really showcase what electric has become. In Scale, there was everything from WWI fighters to early jets, and Pattern included models powered by Astro 05s all the way up to Keller 100 cobalts on 27 cells!

Bruce McAvinew flew a beautiful,

■ LEFT: Gloster Meteor ducted fan twin by Bill Young seemed to be a bit of a handful to fly, but the twin Astro 15 powered model looked quite good once it got on step. Bill also had a smaller CL version of the same model, which was proxy-flown by Tony Naccarato. ■ CENTER: Bruce McAvinew's RC Scale 1st place finishing B-24 was a real attention-getter with its four Astro 020 ferrite motors. Clean, reliable electric power is a natural for multi-engine models like this. ■ RIGHT: Addie Naccarato's 3rd place finishing CL Scale Curtiss Pusher has a lot of charm. Model is powered by an Astro 035 on six cells.

Steve Neu took an easy victory in Pattern with his Keller 100 powered Thunder Tiger Champion 45L ARF.

Bill Young's 2nd place finishing DH Swallow was powered by an Astro 15 turning a 7x6 duct-enclosed prop. Model's performance was lively and its sound was like a supercharged vacuum cleaner!

One of the most unusual entries in RC Scale was Bob Ortman's Northrop N9M-A. The scratch-built model uses an NACA 65, 3-019 airfoil and is powered by two Astro 6T 05s. Model has retracts, is fast and surprisingly stable.

small B-24 Liberator to 1st place in RC Scale. The B-24 was powered by four of Astro Flight's old ferrite 020s. The sound of the four props running in unison was quite unusual, and the little 020s hauled the 54-ounce model with authority. Many spectators seemed surprised to see a scratch-built, four-engine bomber at an electric meet, and there was much speculation about how well it would fly. Yet, this type of model makes perfect sense for an electric. You never have to worry about an engine dying, as all four motors work from the same power source. Therefore, when you run out of juice, all four motors lose power at the same time...no individual flame-outs.

Also notable in Scale were two early British ducted fan jet models, both complete with retracts, by magazine columnist Bill Young. Both models scored very high in static and put in some respectable flights. Of the two models, the DH Swallow flying wing appeared to be the better flying ship. The homemade fan is made from a 7x6 prop inside the duct. This is better suited to an electric motor's power capability than most commercially available "wet power" fans. Although not on par with a fuel-powered model, the Swallow flew quite well and was a favorite among spectators and other competitors.

Bill's Gloster Meteor used the same type of motor/fan setup and was a bit more of a handful to fly. According to Bill, this twin fan jet needed a better pilot than himself. It appeared that the fan units would cavitate when subjected to too high an angle of attack. However, when the model was kept on step, it appeared to have plenty of flying power and moved along a decent rate of speed.

CONTESTANT	MODEL	TYPE	AIRFOIL
RC PATTERN			
1. Steve Neu	Champion 45L	ARF	Symmet.
2. Steve Manganelli	Calypso	ARTC	N/A
3. Bill Young	Quickie 500	scratch	semi-sym.
RC SCALE			
1. Bruce McAvinew	B-24 Liberator	scratch	Clark-Y
2. Bill Young	DH Swallow	scratch	semi-sym.
3. Steve Ciambrone	Partenavia P-68	kit	Eppler 195
RC 7-CELL PYLON			
1. Jerry Bridgeman	Viper	scratch	MH32
2. Steve Neu	CAD-Cat	scratch	HQ 1.8
3. Troy Peterson	Viper	scratch	MH32
ASTRO CARGO			
1. Chuck Hollinger	Maxi-Fli	scratch	Wortmann
2. Joe Ballasch	High Plains Lifter	scratch	Grant
3. Tim Beegan	The Spirit	scratch	Spica
FF E-36			
1. Larry Hargrave	No name	scratch	undercam.
2. James Hanson	Electric Eagle	scratch	flat-bottom
3. Art Welland	ZAP-4	scratch	N/A
FF SCALE			
1. Ferrell Papic	MIG-15	scratch	N/A
2. Richard Drake	Fike-E	scratch	flat-bottom
CL STUNT			
1. Tony Naccarato	N/A	N/A	N/A
2. Addie Naccarato	Prancer	scratch	symmet.
CL SCALE			
1. Grant Hiestand	J-3 Piper Cub	kit	flat-bottom
2. Fred Cronenwett	Fairchild PT-19	ARF	semi-sym.
3. Addie Naccarato	1911 Curtiss Push.	kit	N/A

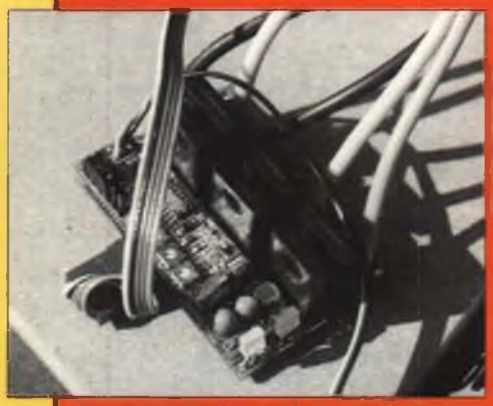
An exciting breakthrough in electric power technology:

AVEOX BRUSHLESS MOTORS

BY JOHN LUPPERGER

A new motor technology was debuted at the '92 Astro Champs. Although not entered in the competition, Aveox, Inc. was demonstrating its new *brushless DC motor*. If the motor that David Palombo (president of Aveox) and Willet Tuitele (sales and marketing) were demonstrating lives up to performance claims, we may be seeing the biggest advancement to electric flight since it was first tried!

The Aveox motor that was being demonstrated at the Astro Champs—note the absence of brush holders. This seven-cell motor is physically about the same size as the "05" motors currently on the market.



The Aveox electronic controller, an essential companion item to the brushless motor. It electronically does the current switching through the motor windings that the brushes and commutator do in a "regular" DC motor.

The Aveox brushless motor has a shaft with a permanent magnet mounted to it; the wire windings are attached to the motor case. Current through the windings is electronically switched by the power transistors in the special controller which is also part of the system. Sensors tell the controller which winds to turn on. This type of motor is known as a "moving magnet" design.

Because there are no brushes and therefore no arcing, radio noise and interference are eliminated. No arcing also means less heat is generated and you are no longer limited by the rpm capabilities of the brushes, thus allowing greater motor rpm. There is also no brush drag to slow the motor. All of this leads to greater efficiency—as high as 94%.

Efficiency is also gained in the fact that a greater volume of windings can be packed into the same case size as a brush motor. Because the windings are attached to the case, heat is directed outward and the case itself acts as a heatsink. A lower running temperature means longer runs and less wasted energy. The reduced parts count means less maintenance, which means that other than possibly wearing out a pair of bearings, a brushless motor that is two years old would perform just as well as the day it was bought!

The development phase of these revolutionary motors has just been completed and production should start early this year. As the prototype motors and motor controllers become available, *Model Builder*, in conjunction with Aveox, will test them under field conditions and let you know how this new phase in electric flight develops. MB

Joe Ballasch's High Plains Lifter takes off on its 2nd place cargo flight with 9 pounds 7 ounces of lead. Joe used two speed reduction drives in tandem to turn a monster 24x20 prop.

At 11 feet 3 inches, Ed Erlurth's Beardmore inflexible bomber was the biggest model entered. Three Astro 05s provide plenty of power for the 9-pound model.

Jim Hanson's 2nd place finishing VL HY-70 powered E-30 model weighs in at just over 2 ounces.

Steve Neu scored a very impressive win in RC Pattern with an off-the-shelf ARF model. Steve's Thunder Tiger Champion 45L ARF had plenty of motive power provided by a Keller 100 on 27 cells. Not only were Steve's pattern flying skills clearly the best, but the Champion 45L seemed to take better to electric power and its associated weight than many of the other models. Although the 45L normally weighs about 5-1/2 pounds, at 7 pounds the model had good vertical performance and level flight speeds that were approaching those of a "wet power" model.

Although six of the 11 entries in Pattern were Great Planes Electro Streaks (all powered by Astro 05s), it was quite obvious that the models with larger powerplants would rule the day. The 05-equipped models did not have enough power for vertical maneuvers and were not as steady as the larger models. Once again, this brings home the point that larger electrics fly better!

The event that seemed to draw the most spectator interest was Astro Cargo. In this event, each contestant tries to lift more weight than his competitors. Sounds fairly easy, but the constraints on the model make this a very challenging event. Each model must be powered with a stock production run Astro 05 (six- or seven-turn) on seven NiCd cells of any capacity. The model's wingspan cannot be over 100 inches, and the total projected area (including fuselage, wing and stab) cannot exceed 1200 square inches. The model must have an internal cargo bay measuring a minimum of 2x3x5 inches. The flight regime calls for the model to lift off within a marked 200-foot area, stay airborne for a minimum of one minute, touch down within the same 200-foot area, and remain upright after landing.

All of the models were scratch-built, had high-lift airfoils, gear drives and showed a great deal of ingenuity. The 1st and 2nd place models were rather unique in their design and engineering.

Chuck Hollinger's Maxi-Fli took 1st place with four flights carrying progressively higher weight to max out at 10-1/4 pounds. The Maxi-Fli has a fiberglass fuselage (carved foam, glassed over, then foam removed), built-up wing and tail surfaces, an Astro 6T geared 05, and Micafilm covering. On Chuck's final flight, the Maxi-Fli easily lifted off in the designated area and started to circle the field to attain his required airborne time. At the far end of the field, the model (which was at full throttle from the beginning of its flight) started to circle and was actually climbing in lift! This was at a flying weight of 228 ounces and a wing loading of 33.5 ounces per square foot. Pretty impressive for a seven-cell, 05-powered model!

Joe Ballasch took my vote for the model with the most character. His High Plains Lifter had a clever name and the character to go with it. The construction and design were reminiscent of a covered wagon, yet it had all of the necessary ingredients to be a top-notch cargo model. Joe used a Grant airfoil, which is highly undercambered, and a four-wheel landing gear for good ground handling.

The most unusual feature of the High Plains Lifter was its double speed reduction drive. Joe had a regular Astro gear drive on his motor, and then a second, older Astro belt-drive system mounted to the front of the first one. This gave the 05 motor the capability of turning a huge 24x20 prop at about 1500 rpm. Joe's last official flight was at 9 pounds 7 ounces. If the Lifter had had a bit more dihedral to make it more controllable and easier to turn, Joe would have given Chuck Hollinger a real run for his money.

The "Quiet Day In The Park" turned out to be a very exciting day for electrics. A special thanks to Dale Lemmons (main organizer), Ross Thomas (field CD), Maxine Thomas (scorekeeper), and all the other people who made the event possible. There were trophies for the top three finishers in each class and tons of manufacturer-donated prizes. At times the event seemed to run a bit slow, but all who participated had a great time. At the 1993 Astro Champs you can bet you'll see even more exciting models and the latest in electric flight capability on display! ***MB***

SPAN (IN.)	AREA (SQ. IN.)	WEIGHT (OZ.)	WG. LOADG. (OZ./SQ.FT.)	MOTOR	CELLS	PROP	SPEED	RADIO CONTROL
84	525	112	30.7	Keller 100 direct	27	12x8	Neu homemade	Airtronics w/ATRCS
78	750	132	25.3	Keller 100 direct	28	12x8/9	Neu homemade	Airtronics Vision
50	50	80	25.3	Astro 25 geared	18	11x10	Astro 205	Ace MicroPro II
60	N/A	54	N/A	Astro Ferrite 020x4 direct	18	N/A	Ballasch	Futaba 7
50	600	96	21.2	Astro 15 direct	16	7x6	Astro 205	Ace MicroPro II
48	480	78	22.8	Gold Fire Ferrite	14	7x5	Astro 205	Ace MicroPro II
35	200	37	26.6	Astro 6T/direct	7	6.5x6.5	relay	Airtronics Vision
30	180	35	28.6	Astro 6T/direct	7	6.5x6.5	Neu homemade	N/A
35	200	37	26.6	Astro 6T/direct	7	6.5x6.5	relay	Airtronics Vanguard 4
90	900	64	9.4	Astro 6T/geared	7	Freudenth.	Ballasch	Airtronics Vanguard 4
100	875	N/A	N/A	Astro 6T/geared	7	24x20	Ballasch	Airtronics Vanguard 6
94	1010	77	10.9	Astro 6T/geared	7	14x7	relay	Airtronics Vanguard 4
29	N/A	1.94	N/A	VL HY-70	2	Plastic	N/A	
30	100	2.12	3.1	VL HY-70	2	Plastic	N/A	
30	110	2.12	2.8	VL HY-70	2	Plastic	N/A	
18	102	4	5.6	Tamiya	6	Homde. tne	N/A	
16	75	1.34	2.6	Mini-motor	3	Comet pins.	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
30	270	N/A	N/A	Kyosho AP-29	6	7x4	N/A	
78.5	736	122	23.8	Astro 25/geared	14	12x8	Astro 205	
64	700	120	26.3	Astro 035/geared	21	12x8	Astro 205	
N/A	N/A	N/A	N/A	Astro 035/direct	6	5-1/2	N/A	

Chuck Hollinger with his winning Maxi-Fli Astro Cargo model. Chuck's model lifted 10-1/4 pounds of lead—in addition to its 4-pound empty weight—and could easily have carried more!

GETTING STARTED IN CLIMB AND GLIDE

The AMA's provisional event No. 703 offers a way to get involved in an enjoyable competition that requires no expensive high-tech equipment.

BY GLENN GRESENS

"Climb and Glide" is a provisional contest event that first appeared on the modeling scene when rules for Event No. 703 were published in the 1990/91 AMA Rulebook. The original rules featured a complex timing system called "Ratio Scoring" that proved to be unpopular. This problem was corrected in the latest rules, given on page 154 of the '92-'93 Rulebook, and the new event is attracting a wider following among RC fliers.

The basic idea is to launch your engine-powered RC model, climb as high as you can comfortably see it, shut the engine down and then stay aloft for 15 minutes. To make this more difficult, the rules require that the engine be shut off after a run of no more than one minute. A contest official is provided by the CD to see that this restriction is observed. The person also monitors the balance of the flight and notifies the contestant if, and when, the 15-minute max is achieved.

Engine size is limited to .25 cu. in. two-strokes and .40 cu. in. four-strokes. The only other restriction on the airplane is a minimum weight of 8 ounces per square foot of wing area.

The rules suggest that contests be flown in "rounds," as is the usual practice in RC soaring contests, but the CD is allowed to waive such formalities and in most C&G contests, the fliers crank up and launch whenever their frequency is available and they feel lucky. C&G flights usually cover a wide area and proceed at low speed, except in the climbing phase, so many planes can be flown simultaneously with minimal danger of midairs.

The Big Shadow gets away on another long flight, designer Van Hereford on the sticks. After a minute at this angle of climb the ship is literally a speck and you'll be grateful to have to shut the engine down. Dark, opaque colors on the bottom of the wing and stab will help you keep the model in sight at altitude. A max flight is 15 minutes, so you still have quite a bit of flying to do after the engine quits. It's pretty relaxed flying, though, because there's no penalty for overflying the max time and no landing circle to hit.

Climb and Glide action at a contest in Baton Rouge, Louisiana late last year. Jack Cockerham of Houston, Texas launches an Olympic 650 converted for C&G flying by Jim Skinner of the Baton Rouge RC Club. Manning the watch is another Texan, Ben Beerbower.

The manpower needed for contest organization and management is also minimal, and as full-time radio control is required, almost any RC field is okay for C&G competition. A CD and two or three timers can handle 20 or more fliers.

Where do you get a plane for Climb and Glide flying? For scratch builders, Van Hereford's "Big Shadow" is a good bet. The basic layout and force arrangement has been thoroughly tested in several sizes. Plans for Van's original Shadow, which is a very successful 1/2A-powered RC Duration flier, were published in the August '92 issue of *Model Builder*. The C&G version is larger and stronger, and with a well-tweaked Fox 15BB, its power-to-weight ratio is much higher. The ease of construction and good flying characteristics of the 1/2A design have been successfully transferred to the larger version so RC modelers with building and flying experience should have no trouble building and flying the Big Shadow.

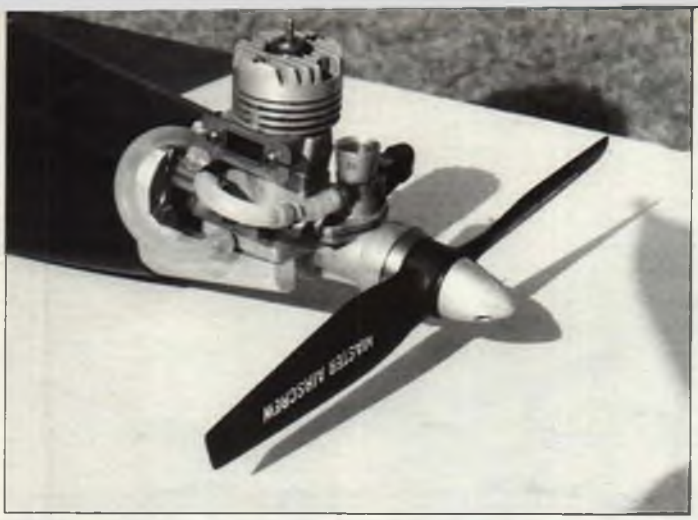
BIG SHADOW SPECIFICATIONS

WINGSPAN	83 in.
WING AREA	648 sq. in.
FLYING WEIGHT	36 oz.
WING LOADING	8 oz./sq. ft.
OVERALL LENGTH	40 in.
POWER	Fox .15BB
RADIO	Three channels required (rudder, elevator, engine cutoff).

A good .15 or .20 engine will take the Big Shadow up like a rocket, and a simple three-channel radio will keep everything under control. The plans are more or less self-explanatory, so step-by-step instructions are not included in this article.

There are other ways for would-be C&G fliers to get the necessary equipment. In fact, many modelers already have a potential C&G model. That old two-meter glider that's been hanging around the shop will be very competitive with a strong .15 engine or maybe a not-so-strong .20. Larger gliders, in the 100-inch wingspan

Gale Helms, an expert modeler in many categories, with his unnamed original design C&G model. Gale belongs to the Baton Rouge RC Club.



■ LEFT: The business end of Gale Helms' model sports a Fox .1588 with a 5/16-inch bore venturi and crankcase pressure setup—note that the engine mounting lug has been drilled and tapped for the pressure fitting. ■ RIGHT: Another Olympic 650 converted to C&G flying, this one by Patrick Beard of Baton Rouge.

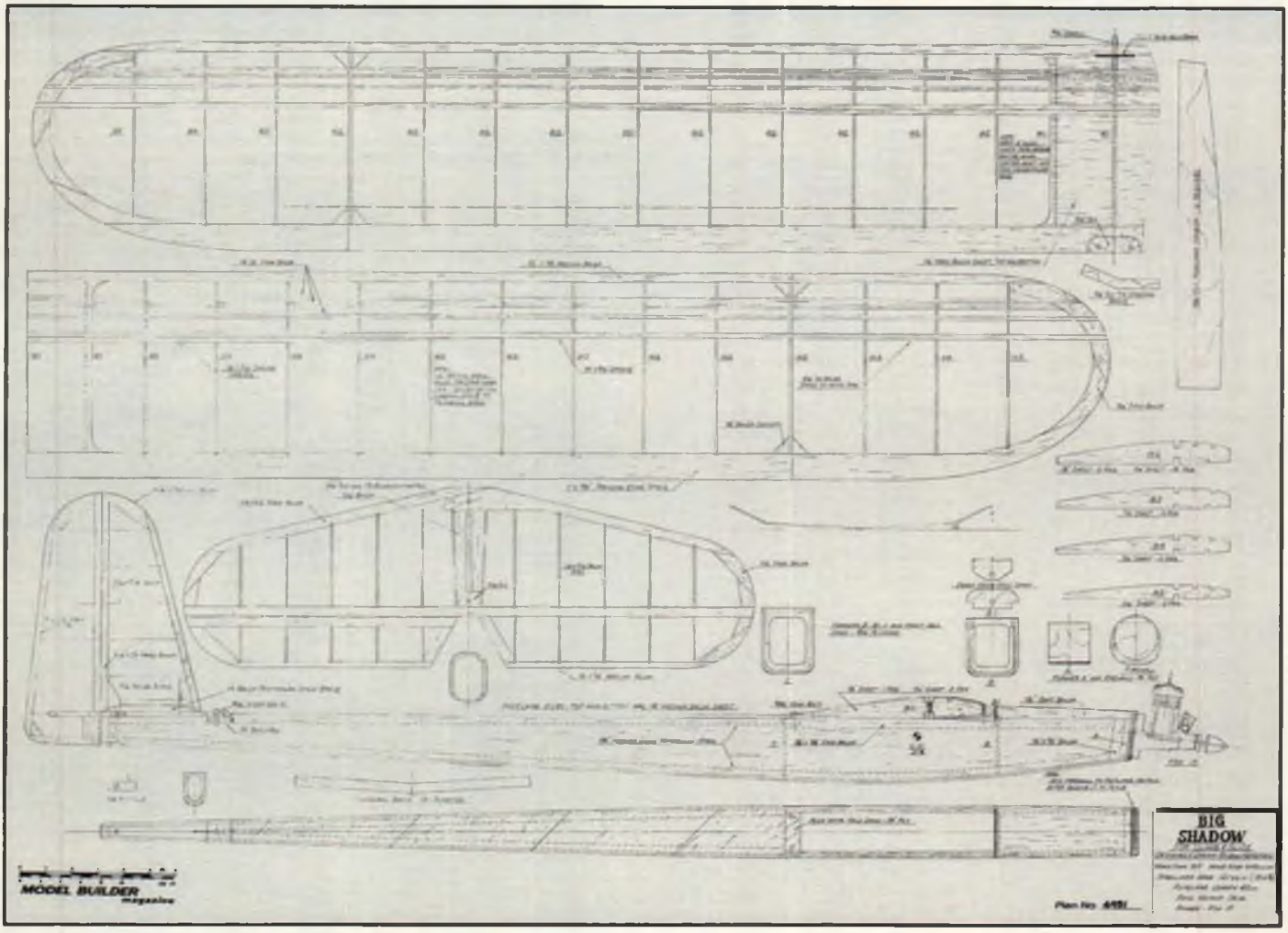
range, work well with .25-sized engines. Smaller engines can be mounted with strap-on power pods, but nose-mounted engines are more efficient in the climbing mode and offer much less drag in the glide.

Most glider kits in the 68- to 100-inch wingspan range can be modified for C&G work by shortening the nose and installing a plywood firewall with a radial engine mount. Some glider plans show an optional engine installation, while others may need a few plywood doublers and corner blocks to secure the engine mount.

For those who decide to modify an existing plane, the question that immediately arises is, "How much of the nose do I chop off?" A good way to come up with the answer is to move the radio and batteries as far back in the fuselage as possible, then strap the engine and its mount on the nose with rubber bands and slide it around until the proper CG is restored. In practice, the length of the nose is usually not critical, as the radio components can be shifted to adjust the CG. Hopefully, as Climb and Glide gains in popularity, kit manufacturers will develop special C&G versions of their proven designs.

Almost any RC model can be flown in C&G contests, but powered gliders are needed for serious competition. The term "serious," when applied to modeling competition, often means that the contestant must invest many dollars in state-of-the-art equipment and devote untold man-hours to polishing his skill, before he can aspire to excellence in whatever modeling category he has chosen.

At first glance, the formula



for success in C&G would appear to be to get a special racing engine, polish its guts, file its prop and use plenty of nitro. *Man, this baby will get me up there with the buzzards in a heartbeat,* chuckles the "serious" flier. And so it will. Fortunately for the old boy with a standard engine, a minute is considerably more than a heartbeat, and if his plane and engine are well matched, he will also be among the buzzards when he shuts down the power.

At this point, the horsepower race is over and both contestants are very high with one minute on the clock. With 14 minutes to go, both planes are now gliders and a completely different set of flight parameters will determine the winner. Super-light structures utilizing high-tech laminates and complex fabrication techniques would seem to be in order, and serious builders can certainly produce very light, very strong airframes using state-of-the-art techniques and materials.

Once again, however, the good old boy with a two-meter glider and a Fox .15 is saved by the C&G rules. A super-light airframe is no bargain if a hefty chunk of lead is needed to meet the specified 8 ounces per square foot wing loading. Even with the engine included, most two-meter gliders can be built within the weight requirement, including the appropriate engine, with only minor revisions to the standard kit, so complex structures based on high-tech materials are not needed to be competitive. Dedicated engine grinders and super-builders will always be hard to beat in any contest, but there is a place for lesser mortals in Climb and Glide.

The power limits and wing loading requirements for C&G are comparable to rules developed and thoroughly tested in hundreds of SAM Old Timer RC Assist contests. The durability and flyability of planes designed to these criteria are known quantities. O.T. pilots are usually very good at finding and using thermals, and antique planes with RC aboard can be very competitive against modern designs in C&G contests.

So-called "sport fliers," whose experience might be limited to heavier and faster models, will require a word of caution at this point. The aircraft specifications for Climb and Glide have been established to provide a model that will climb very rapidly under power and glide very efficiently when the power is shut down. To achieve these goals, the immutable laws of physics require a trade-off in maneuverability, but fortunately, there is no need for high-speed maneuvering in the C&G flight envelope.

Rule No. 1 is, therefore: "Point the nose up and keep it there until the engine stops." The Big Shadow has been designed to handle any maneuver that might occur within the C&G flight envelope, and modern gliders are designed to withstand high-G launches. Loops and rolls under power, however, should be avoided with any air-

continued on page 77

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THE SOARING MAILBAG

Pancho Morris is certainly no stranger to the soaring community of Dallas, Texas. You can find him actively flying with the Soaring League of North Texas on Sundays, and working behind the cash register of The Hobby Counter hobby shop almost anytime else. Pancho has been an active model builder for many years and has been published in the hobby press on more than one occasion.

Back in early summer 1992, Pancho hatched another great idea: a two-meter version of the Airtronics Legend. Pancho explains:

"Hey Bill, I thought I'd send a photo of my new two-meter Legend. The picture is of both the big one and the small one.

"I used a Falcon 600 fuselage and foam cores cut to the Airtronics Whisper 2M planform. Much of the rest is just like the big Legend. It flies very well, just what you would expect a two-meter version of the big one to fly like."

Anyone interested in this kind of scratch building project can get a Falcon 600 fuselage from Flite Lite Composites for $70.00 plus shipping and handling. As for foam cores ... yer on yer own.

■ ABOVE: Sal DeFrancesco (left) of Northeast Sailplane Products came all the way from Vermont to attend the Visalia meet. Blayne Chastain (right) of Tekoa: Center of Design, one of Sal's many vendors, helps him display some of the products for which NSP is famous. Sal holds NSP's imported ARF Grifter, Blayne holds the unlimited class Shadow and standard class Shadow. Foreground: fiberglass fuselages, an NSP Alcyone, and Tekoa's Feather Cut foam wing core cutter. Contact NSP at (802) 658-9482 for catalog availability info. ■ LEFT: Gail and Matt Gewain of Composite Structures Technology had a booth at Visalia. Along with reduced prices on composite stuff, they showed super-light unidirectional C/F cloth, V-bag equipment, and most notably, how-to books on the subject of composite structures. Contact CST at (800) 338-1278.

GRECO TECHNOLOGIES UPDATES

Greco Technologies is a technical and management consulting firm which provides services such as product R&D, redesign, product development, production consulting, marketing and advertising. Their main clients are aeronautic and aerospace contractors. Expertise is definitely technical in nature as the principal engineer,

■ FAR LEFT: The first FAI-F3B World Champion, Skip Miller, confers with Ron Vann, new owner of Flite Lite Composites, about the molded-wing F3B Eagle which took the top two places at the last World Championships. Randy Spencer, 1993 USA F3B team member, will be flying this design at the next World Champs. ■ ABOVE: Keith Schwemmer (118th at Visalia) had lots of good things to say about his original V-tail Legend spin-off. Wing spans 100 inches with about 886 squares of area. Foam cores have a built-up 1/8-inch plywood and balsa I-beam spar capped with 3/16-inch spruce and carbon fiber. ■ LEFT: Penn State Alumnist and world famous airfoil designer Michael Selig poses at the recent LSF Nats with his new original design sailplane featuring an airfoil shaped fuselage, swept-back and bent-up wingtips, and an all-flying stab. Finished a very respectable 8th in Standard Class. Photo by Dr. Paul Clark.

Gregory Chun, is well versed in CAD and CASE, while he and other engineers on the staff are obviously well versed in aerodynamics, specifically related to model sailplanes. Most (if not all) of these engineers are dedicated model builders.

I've received three product updates from this relatively new company over the last six months. The following is a brief summary of what this company now offers the RC sailplane buff.

•Thermal Modi

The Thermal Modi is an ARF thermal duration version of the company's first sailplane, the F3B-capable, all-fiberglass Modi 900. The fuselage shared by both designs is 50 inches long and is molded out of epoxy fiberglass and Kevlar. The Kevlar is added in two strips along the tailboom for added strength and to help reduce stress fractures.

The new model features blue foam cores and "laminated wood" which is strengthened with unidirectional carbon fiber and fiberglass cloth. The root ribs and sub-ribs within the cores are hefty 1/4-inch plywood. The outer finish of the wood veneer resembles a piece of fine furniture.

The wing design is derived from the popular triple-taper Schuemann planform. This shape approaches the ideal elliptical outline with the added benefits of sweep, which may prevent high-attack-angle tip stalls from traversing the entire semi-span of the wing, thus reducing drag and preventing embarrassing drops from the sky.

Several airfoils are offered for the Thermal Modi: the S3021 for good overall contest performance, the SD7037 for a broader speed range with greater emphasis on low-speed flight, and the RG-15 for the advanced pilot looking for a speed range biased toward high speed flight. All three airfoils can benefit from camber changing, especially the latter two.

The wing joiner rod is a 1/2-inch carbon fiber rod laminated within a brass tube, giving it "the tensile strength of steel at a fraction of the weight." The flaps and ailerons have efficient aluminum arrowshaft knuckle hinges with Teflon inserts for friction-reducing hinge points, and they come

■ LEFT: Winners of the 19th Annual Visalia Fall Soaring Festival, from left: 1st, Ben Clerx; 2nd, Norm Timbs, Jr.; 3rd, Skip Miller; 4th, George Joy; 5th, Scott Condon; 6th, Brad Clasen; 7th, Richard Burns; 8th, Blayne Chastain; 9th, Randy Spencer; and 10th, Roger Lackey. And not a rudder-elevator ship among them! ■ ABOVE: Pancho Morris of Dallas, Texas, sends us a look at his new original design two-meter (foreground) based on the overall layout of the Airtronics Legend (background), a Falcon 600 fuselage, and custom foam core wings. Flies great!

Dean Aldinger and his original design ship based on a David Mesa fuselage. Wing features the RG12 airfoil (more camber than an RG15) which Dean says has a more critical stall than the Selig 3021, which prevents it from being "horsed around." Model spans 120 inches and weighs 76 ounces, for an 11-ounce wing loading.

Jim Parsons and his DCU Wind Storm, finished just a week before the Visalia meet. Jim says it's an excellent flier, very smooth, and it finds lift for you easily. Features an SD7037 airfoil in the main panels with 1/2% less mean camber in the outer tip panels. The three-meter span model has 1075 square inches of area for a slightly less than 12-ounce loading.

factory pre-installed. Control horns are machined from 1/16-inch aluminum. The bellcrank is also 1/16-inch aluminum with a precision bearing to prevent slop and friction in the all-moving, SD8020-airfoiled, foam core stabilator.

Specifications for the Thermal Modi are: 116 inch span, 949 square inch wing area, 82 ounce weight, 12.44 ounce wing loading, and 13.1:1 aspect ratio wing.

• **Molded Modi**

This is a *molded* version of the Modi 900 F3B model. The wing skins are a lamination of fiberglass and high-compression polyurethane foam and come out in the exact shape of the mold. The obvious advantage is the higher degree of quality and accuracy, plus the wings come out pre-finished with a base coat of paint which has been sprayed into the molds. A special technique is used to eliminate mold flashing around the edges of the wing. Very little finishing work remains.

The wing spar is made of high-compression polyurethane foam with carbon fiber laminate caps and is wrapped with Kevlar and fiberglass. The wing joiner is a carbon fiber rod that fits into a carbon fiber receiver tube in the wing. Arrowshaft knuckle hinges with Teflon inserts, aluminum control horns, etc., are the same as the Thermal Modi. The wing airfoil is the RG-15.

The ARF Molded Modi specs are the same as for the Thermal Modi with the exception of the increased weight—96 ounces, which bumps the wing loading up to 14.56 ounces per square foot.

• **Duration Modi**

This latest version of the Modi series is specifically designed to excel at weak-lift thermal duration and spot landings. It has a very low flying weight (65 ounces) and low wing loading (10.8 ounces) to go with its excellent choice of thermal duration airfoils: S3021 or SD7037.

The fuselage is the same as the other two, but the stabs and rudder are built up from balsa to reduce weight. Wings are lighter too because they are white foam veneered with obechi. Spars are "almost the entire length of the wing and have the addition of a fiberglass shear web for added strength."

In the Duration Modi, Greco feels it has achieved the lightest possible airframe consistent with the need for strength. Large flaps and a light wing loading allow for very slow approaches and stop-on-a-dime spot landings.

The Duration Modi is a kit, which saves the modeler a bundle of money over ARF versions. Comprehensive drawings, detailed instructions and extensive hardware and materials packages are included.

Specs for the Duration Modi are: 106 inch span, 860 square inch wing area, approximate flying weight of 65 ounces and approximate wing loading 10.8 ounces.

To request further info, contact Greco at P.O. Box 10, South Pasadena, CA 91031-0010, or call (818) 680-2070 during business hours; FAX is (818) 405-2984.

■ ABOVE: Brian Agnew's new "Banshee" sailplanes which did exceptionally well in Standard (1st place) and Open classes at the LSF Nats. Photo by Dr. Paul Clark.
■ RIGHT: Manny Tau, of Greco Technologies, poses near the cliffs of Torrey Pines during a pause in the action at a local slope race. Sailplane is the new Molded Modi 900 with RG-15 airfoil—details in text.

FUTURE FLIGHT KW100 PRICE REDUCTION

A recent press release from Rollin Klingberg tells of a new lower price on the Klingberg Wing 100 kit. The new price is now $154.95, down from $219.95. The only difference is that you now have to join the wing skin sheets yourself, a task that was previously done at the factory. If you want further info about this neat, big flying wing, contact Future Flight at 1256 Prescott Ave., Sunnyvale, CA 94089; (408) 735-8260 (voice or FAX) for details.

ANSWERS FROM AN EXPERT

A press release from Don Edberg's company, Dynamic Modeling, informs us of some very useful info regarding the differences between all of those expensive computer radios currently in production. It comes in the form of a chart showing which radios have which features. Those radios include the Airtronics Infinity 600, Vision 8SP and Control Systems Labs Vision 8SP Upgrade; Futaba's original (1992 and before) Super 7 and 9VAP "1024"; Ace R/C's Micropro; and JR Propo's x-347. The chart takes up four 8-1/2x11-inch pages and includes a fifth page containing Don's opinions on which is the best choice of radio for many different types of fliers. It's great stuff that can help you choose the best big-bucks radio for your particular needs.

Considering all of the research and typesetting that went into this chart, I'd say the $2.00 (or seven 1st class stamps) price tag is the best bargain in the hobby business!

If you include an extra buck (or four extra 1st class stamps) and request a "Servo Conversion Chart," Don will also send you a handy diagram showing the various brands of servo connectors and their polarities, along with a one-page letter explaining how to convert any servo to any other

brand's receiver, etc. What a bargain!

Contact Dynamic Modeling, 4922 Rochelle, Irvine, CA 92714. Cash or stamp payment ($2.00 or $1.00) includes CA resident taxes; check-with-orders send $2.17 or $1.08 to cover CA sales tax. Return postage is included in the price.

SPEAKING OF SERVOS, LOOK AT JR

JR truly does have some of the best servos on the market for sailplane use. Their metal-geared micro servos (305 and 311) have been a standard for years. At .50x1.12x1.17 inches, they easily fit into many glider wings that other servos would not.

Well, now there is a 28-page servo guide booklet that you can get free of charge from Hobby Dynamics/Horizon Hobby Distributors, 4105 Fieldstone Rd., Champaign, IL 61821. The booklet describes in detail the entire servo line (15 servos), from the new micro 341 with its double-size, strip-resistant nylon gears to the monster power FET-boosted 605.

If you have a JR x-347 radio (as many glider guiders do), or if you have Futaba receivers or aileron extensions with "J" type connectors, you can use JR servos without modification to the connector. By beveling the corners of the plastic connector housing, and by observing proper signal/polarity order (by popping and swapping pins), you can use JR servos with Airtronics receivers. JR servos are very versatile and of very high quality. You can't go wrong.

VISALIA'S TOP TEN FINISHERS

Top dog at the 19th Annual Visalia Fall Soaring Festival was Ben Clerx, an airline pilot by profession and a very disciplined model flier. Ben flies with the Harbor Soaring Society in Costa Mesa, California, where he has been club president. His Flite Lite Falcon 880 was purchased in 1989, the first year of Falcon 880 production. It shows many signs of wear, including a cracked and patched tailboom, patched and scratched MonoKote, extra ounces of epoxy ballast, etc., but it still flies great. And you sure can't deny that after that many years, one does get to know a plane inside and out (last year he finished 4th with the same plane!) His final score this year was 2407.

Second at the FSF was Norm Timbs, Jr., of Timbs Engineering fame. Norm's original design, the Incipiter, is a kit prototype which he will eventually sell along with his quality winches, custom turnarounds, winch safety power switches, etc. His final score was 2382. Norm flies with the San Luis Obispo Thermal Hunters (SLOTH) club.

Third was Skip Miller of Boulder, Colorado, the world's first World Champion F3B pilot. Skip flew an Airtronics Legend. His final score was 2367.

Fourth was George Joy of the Torrey Pines Gulls, who flew a Flite Lite Composites Falcon 880. His final score was 2363.

Fifth was Scott Condon, also of the Torrey Pines Gulls. He flew an Airtronics Legend. His final score was 2307.

Sixth was Brad Clasen of the Modesto RC Club. He flew a new Flite Lite Composites Thermal Eagle. His final score was 2306.

Seventh place went to Richard Burns of the Pasadena (CA) Soaring Society. He flew what I believe is his original creation. His final score was 2304.

Eighth place belonged to Blayne Chastain after a flyoff with Randy Spencer. His Tekoa: Center of Design unlimited class Shadow (which he helps market) flew very nicely for him. I got a few minutes of stick time on this new ship after the contest and was very impressed. His final score this was 2298.

Ninth place was Randy Spencer of the Soaring Union of Los Angeles (SULA) flying a Greco Technologies Thermal Modi. His final score was also 2298.

Finally, tenth place was taken by Roger Lackey of the Harbor Soaring Society, flying a Flite Lite Thermal Eagle. His final score was 2290.

TIME TO GO THERMAL

Thanks for your product updates and contributions to the cause and betterment of model soaring. I can be reached at 3610 Amberwood Ct., Lake Elsinore, CA 92530; (909) 245-1702. I prefer phone calls between 6:30 p.m. and 9:00 p.m. weekdays, or pot luck on weekends. ***MB***

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CONVERTING GAS ARFS TO ELECTRIC

While at the Weilmunster electric meet here in Germany late last year, I saw a pattern model that's significant because it is typical of the trends I think electric pattern will follow. Arthur Kunkler's creation looks and flies like a pattern plane, using a Keller 80/9 motor on 24 cells. Helmut Galensky flew a similar design, the Akrobat, to 2nd place, also with a 24-cell power system.

But there are no kits or ARF planes in the U.S. specifically designed for 20 cells or more. Steve Neu has had success with a commonly available ARF designed for gas, the Thunder Tiger Champion 45L. Span is 55.6 inches; area is 623 square inches. The fuselage is wood, and the wing is a sheeted foam core. It is a taildragger, the configuration I prefer for larger electrics.

Steve uses a Keller 100/8 motor (similar to the Astro 60 FAI) and 27 Sanyo 900-mAH cells to turn a big 12x8 APC prop. (The Keller 100/8 has now been replaced by the Keller 740/6, available from Robbe.) No retracts are used, and the flying weight is 6.5 to 7 pounds.

The battery is installed under the wing and held in place by foam. The static current draw is 22 amps. Usual flights are five minutes, with good vertical performance.

Another possibility mentioned to me by Steve is the Javelin, an ARF sold by Cermark, 107 Edward Drive, Fullerton, CA 92633.

• • •

If you are planning to use a gas ARF as an electric, I recommend that you fly it first "as is"—then see what difference the changes outlined below make. I think you will be pleased.

I have been flying a Royal 40S ARF with a Keller 50/24 motor, 10x7 Graupner prop, and 24 1400-mAH Sanyo SCR cells. It is a good performer. Rolls and loops are good and the climb is fast, much like gas. Vertical performance is not as good as I would like—no vertical rolls yet!

I flew the plane for awhile in its stock "out of the box" form. The Keller motor fit nicely in the motor mount supplied, a hose clamp holding it in place. But then some problems came up, so I made some modifications. Now it is a taildragger. The Ace R/C 4-40 aluminum gear is ideal; the original tricycle wire gear was too light for a 7-1/2 pound model. It bent so much in one of my hard landings that the motor mount

continued on page 80

Arthur Kunkler with his original design Oreon electric pattern ship, which took 1st place at Weilmunster. Uses 24 cells, Keller 80/9 motor.

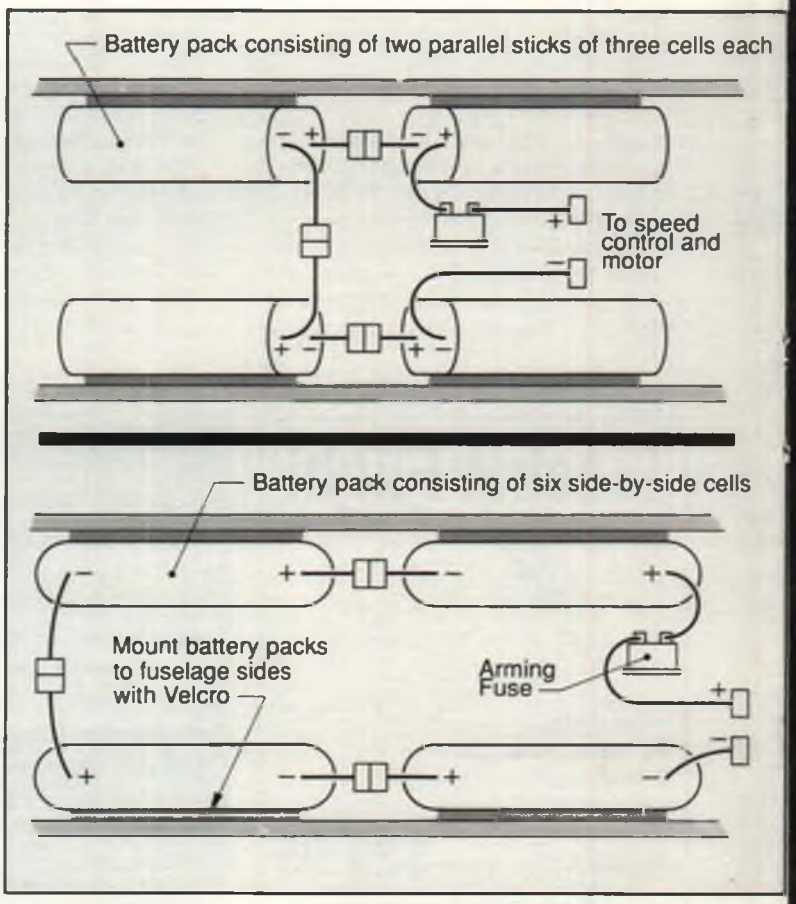

Diagram showing how Mitch hooks up and mounts multiple six-cell battery packs in his bigger electric models. He strongly recommends using a fuse, which doubles as an arming switch.

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P.A.W. .49 TBR DIESEL

After many years of producing their highly regarded small and medium size model diesel engines, Gig and Tony Eifflander of Progress Aero Works have moved into the unique and interesting area of larger displacement model diesels. The first of these, the P.A.W. .60 (10cc), arrived on the scene two years ago and, at 22 ounces, weighs twice as much as the previous largest P.A.W. diesel, the .35 (5.7cc). As such, it is a large, massive machine that gives the appearance of being able to produce high torque at low rpm. The thought of such a large *diesel* also conjures up unpleasant images of much mayhem while hand-starting! However, no sooner had the engine proven its performance with those who tried it (at the same time erasing all fears of vicious starting characteristics) than the Eifflander duo spotted another significant hole in their engine size range, and the P.A.W. .49 diesel was born.

The new .49 is available only in TBR (twin ball race) form, with either an RC

■ **RIGHT: Simple, straight-line, robust design is typical of P.A.W. engines. Note the radial cylinder porting, similar to that of the small Cox engines. P.A.W. engines are sold here in the U.S. by Eric Clutton—see his ad under "P.A.W. Diesels" elsewhere in this issue.** ■ **BELOW: Parts breakdown reveals the P.A.W.'s basic, no-frills internal design and construction. In the left foreground is the disassembled RC carb, on the right is the CL-type venturi. Cast iron piston runs in a hardened steel cylinder, and the crankshaft is supported by dual ball bearings. Properly treated, this engine should last forever!**

throttle or open venturi for CL flying. The latter has a larger bore than the RC carb, which, as shown in the power graph, yields greater all-around performance.

Recommended propellers for both the .49 and .60 range from an 11x5 all the way up to an 18x6. The diesel's advantage of variable ignition timing, controlled by adjusting the engine world. One thing a P.A.W. will not be affected by is thermal distortion as a result of asymmetrical heat flow around the cylinder!

The porting layout is efficient enough to ensure that fuel charge loss through the exhaust ports is low, and as can be seen in the chart, makes possible a very small difference between the Exhaust and Transfer timings (5 degrees Blowdown). The robust hardened steel cylinder has a thick enough wall that the fuel transfer ports can be milled within them (see parts breakdown photo), making for a very simple lower crankcase casting. The piston and contra-piston are both cast iron.

The P.A.W. .49 TBR comes with one of that company's unique one-piece cast aluminum mufflers, which clamps between the crankcase and the aluminum cylinder fin/head piece. The muffler is keyed by the four cylinder bolts and can be positioned as shown or on either side of the engine. Prop is held on by a standard 1/4-28 bolt that screws into the crankshaft.

contra-piston at the top of the cylinder, allows even larger props to be used if gentler or quieter performance is needed, but be aware that the power levels do begin to drop off somewhat below 4,000 rpm.

MECHANICAL DETAILS

The .49 TBR bears P.A.W.'s unmistakable style of construction, and except for the slight difference in physical size and a few small details, it's almost identical to the .60. Externally, P.A.W. engines remain classically simple, clearly robust and in their own unique way, quite handsome.

Internally, the new .49's design features remain essentially unchanged. The use of symmetrical radial two-stroke porting (four transfer and four exhaust ports, spaced equally around the cylinder) is still favored, with no suggestion of any move toward the asymmetrical Schnuerle porting used almost exclusively elsewhere in the model

The connecting rod is machined from aluminum bar stock, turned to a constant diameter between the top and bottom ends. The wrist pin end is very wide for maximum bearing surface area. Neither end is fitted with bronze bushings.

The one-piece steel crankshaft has a 10mm induction bore and the front end is drilled and tapped for a standard 1/4-28 bolt for the propeller. As mentioned, the shaft rides on dual ball bearings. Thrust loads are taken by the front bearing, which is captured by a threaded aluminum ring that screws into the crankcase just ahead of

SPECIFICATIONS

CAPACITY ..... .4735 cu. in.
BORE ..... .8935 in.
STROKE ..... .756 in.
STROKE/BORE RATIO ..... .846:1.
TIMING PERIODS: Exhaust 130°; Transfer 120°; Front induction opens 46° ABDC and closes 36° ATDC; Total period 170°; Blowdown 5°.
COMBUSTION VOLUME: .543cc @ 10,500 rpm; 1.00 cc @ 4,200 rpm.
COMPRESSION RATIOS: Geometric 15.27:1 @ 10,500 rpm, 8.81:1 @ 4,200 rpm; Effective 12.8:1 @ 10,500 rpm, 7.4:1 @ 4,200 rpm.
EXHAUST PORT HEIGHT ..... .132 in.
CYLINDER HEAD SQUISH ..... .028 in. @ 10,500 rpm; .073 in @ 4,200 rpm.
CYLINDER HEAD SQUISH ANGLE ..... 6°.
SQUISH BAND WIDTH ..... .184 in.
CARBURETOR BORE ..... .306 in. (RC); .335 in. (CL).
CRANKSHAFT DIAMETER ..... .590 in.
ENGINE HEIGHT ..... 3.73 in.
WIDTH ..... 2.23 in.
LENGTH ..... 3.64 in. (backplate to prop driver).
WIDTH BETWEEN BEARERS ..... 1.453 in.
WEIGHT .... 17.6 oz. (bare); 18.1 oz. (with muffler).

PERFORMANCE

MAXIMUM BHP: .88 @ 13,200 rpm (open exhaust and CL venturi); .74 @ 11,282 rpm (open exhaust and RC carb); .71 @ 10,666 rpm (muffler and RC carb).
MAXIMUM TORQUE: 85 oz./in. (open exhaust and CL venturi); 83 oz./in. (open exhaust and RC carb); 82 oz./in. (muffler and RC carb).

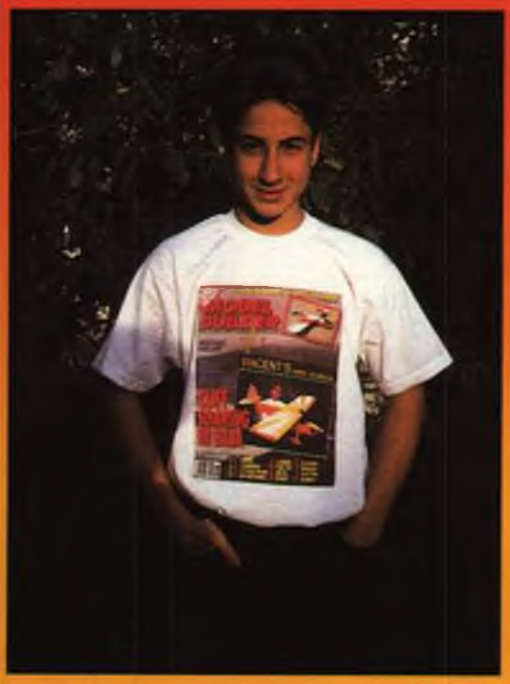
RPM ON STANDARD PROPS

	Open exhaust, RC carb	Muffler, RC carb
20x6 Zinger	4,178	4,154
16x12 APC	4,628	4,537
16x6 Airflow	5,820	5,754
15x8 APC	6,158	6,032
13.5x12.5 APC	6,194	6,057
16x5 Zinger	6,211	6,120
14x7 Graupner	6,705	6,570
14x8 Airflow	6,870	6,750
13x6 Top Flite	8,416	8,285
13x6 MK	8,638	8,563
12x6 Graupner	9,521	9,473
11x6 Graupner	10,720	10,470
11x5 Top Flite	11,100	10,778

PERFORMANCE EQUIVALENTS

	Open exhaust, CL venturi	Muffler, RC carb
BHP/cu. in.	1.86	1.50
BHP/lb.	.73	.63
Oz. in./cu. in.	179.50	173.20
Oz. in./lb.	77.30	72.50

Manufactured by Progress Aero Works, Macclesfield, United Kingdom. Imported and sold in the U.S. by Eric Clutton, 913 Cedar Lane, Tullahoma, TN 37388.



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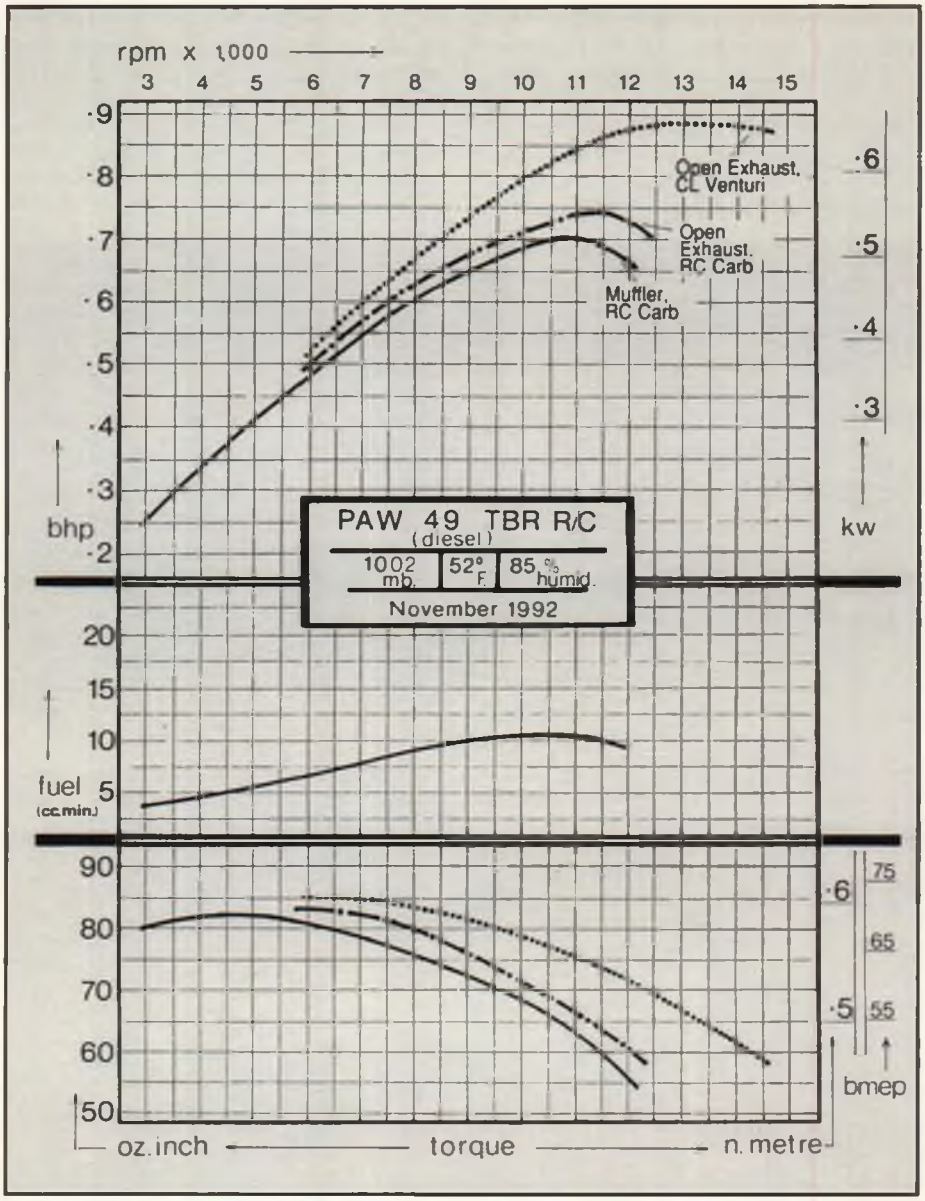

the bearing.

The backplate is typical P.A.W., i.e., a threaded round barstock piece that screws into the back of the crankcase.

The unique one-piece cast aluminum muffler design used on other P.A.W. engines is also used on the .49, and being clamped between the cylinder head and crankcase, is as robust and foolproof a unit as possible. In addition, it can be positioned around the cylinder in 90-degree increments to suit your particular installation.

PERFORMANCE

As is the case with all P.A.W. engines, the .49 received for testing had been run for a limited time before leaving the factory, and so the initial starts were easy, the needle valve and compression screw being in their nominally correct positions as received.

A wide range of propeller sizes was used during the recommended break-in period. The range of compression ratio adjustment from highest to lowest rpm (approximately 3,100 to 14,600) was about 1-1/2 turns, which from previous measurements indicates a compression ratio range from about 8:1 at low speed and up to 16:1 at high speed. By contrast, a full-size diesel engine is usually up around 22:1. No doubt the highly volatile ether that makes up 1/3 of model diesel fuel's total content allows the model diesel to operate at lower compression ratios.

To start the engine cold, it's necessary to first increase the compression ratio by up to 1 full turn (sometimes more) above the hot-running setting, just to get the engine to fire. Once the engine starts it will begin to warm up quickly and you must back off the compression setting until the engine begins to misfire, then increase compression slowly only until the engine runs steadily again, no more. As the engine warms you will need to reduce compression further, *always aiming for the minimum compression setting that produces a steady run,* until the engine temperature stabilizes—this should take about 30 seconds, depending on the weather, engine cooling, fuel being used,

etc. Failure to reduce compression sufficiently will leave the engine in a hard, laboring condition that could lead to serious damage.

Clearly, familiarizing yourself with the compression control and the interacting needle valve is best done on the bench, not in a model. The recommended break-in running is more easily done on the bench anyway.

The fuel used for the following tests consisted of 15 percent castor oil, 50 percent kerosene, 33 percent ether, and 2 percent amyl nitrate. This mixture is recommended by P.A.W. for contest flying; for break-in or sport flying, better lubrication is provided by increasing the castor oil content—up to 30 percent initially, dropping to 20 percent at the completion of break-in—and decreasing the kerosene content appropriately.

Test 1: Open exhaust, RC carburetor

In this configuration, the P.A.W. .49 produced a maximum torque of 83 oz./in. at 5,867 rpm, with a fairly pronounced drop in horsepower past 11,500 rpm.

Test 2: Open exhaust, CL venturi

The bore through the standard CL-type venturi is 23 percent larger in cross-sectional area than that of the RC carb, which accounts for the 20 percent power increase—largely by rpm release. However, it should be noted that at the more normal RC operating rpm of 8,000, horsepower is up by only 8 percent or so.

Test 3: Standard muffler, RC carburetor

Power figures with the muffler installed are naturally lower than the open-exhaust figures of the previous two tests. At that same 8,000 rpm area, though, a typical rpm loss would only be around 300—a price worth paying for the combined advantages of having a muffler and adjustable throttle. Useful propeller sizes are a 16x6 Airflow at 5,754 rpm, a 14x7 Graupner at 6,570, and a 13x6 Top Flite at 8,285, all being nicely poised between the maximum torque and maximum horsepower points...which is not a bad place to operate most model engines, because regardless of whether the rpm rises or falls, gains in either torque or horsepower will follow.

Fuel consumption was measured only in Test 3 and reconfirmed the diesel's frugal nature as compared to a glow engine, with 7cc per minute being used at around 6,000 rpm.

Idle speeds were, as usual, affected by propeller size and weight. Using a 16x6 Airflow, idle speeds down to 1,900 rpm were reached, with pick-up to maximum rpm acceptably clean.

SUMMARY

The gradual emergence of the large model diesel engine is an interesting phenomenon which has, in part, been helped along by today's need for quieter powerplants. A high-torque, low-rpm engine such as the P.A.W. .49 TBR diesel fits perfectly into the "low rpm = low noise" equation. In any event, the outcome adds a welcome variety to modelers' options. The P.A.W. .49 is a relaxed, workmanlike machine offering practical motive power to the sport and competition flier.

AVAILABILITY

P.A.W. diesels are available in the U.S. from Eric Clutton, 913 Cedar Lane, Tullahoma, TN 37388. In addition to complete engines, Eric stocks a full line of replacement parts, fuel, fuel ingredients, etc. all described in the catalog/info brochure which he sells for $1.00. For $11.50, he offers a book entitled *Doctor Diesel's Diary*, a valuable reference work containing everything you would ever want to know about model aircraft diesel engines. ***MB***

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1939 A. T. Sportster 50"*	$35.96
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1940 Buzzard Bombshell 50" span kit*	$35.96
1937 Air Chief 61"	$37.76
1940 New Ruler 74"	$74.72
1939 Thermic 100 Glider (100" Span Old Timer Sailplane--modifications shown for R/C)	$88.23

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1939 Korda Waka 44"	$20.12
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1941 Brigidier 58"	$42.79
1941 Super Quaker 78"	$78.40
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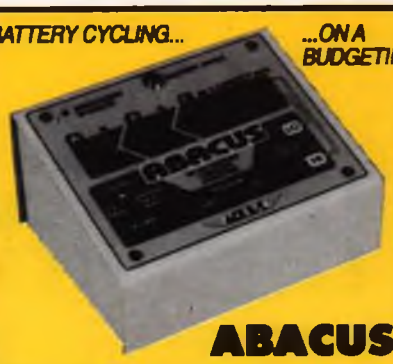

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BY W.H. GEBHART

Hitec/RCD Wind Cruiser II Motorglider

Hitec/RCD is a name known throughout the RC modeling industry for quality radio control systems and related accessories. What is less well known is that this same company distributes an entrant in the electric motorglider category, the Wind Cruiser II.

The model comes complete, lacking only a radio system and NiCd pack. The fuselage is blow molded polypropylene and the prop, motor, servo/battery tray and control rods are already installed. The balsa wing and stab components are preconstructed and covered with Oracover.

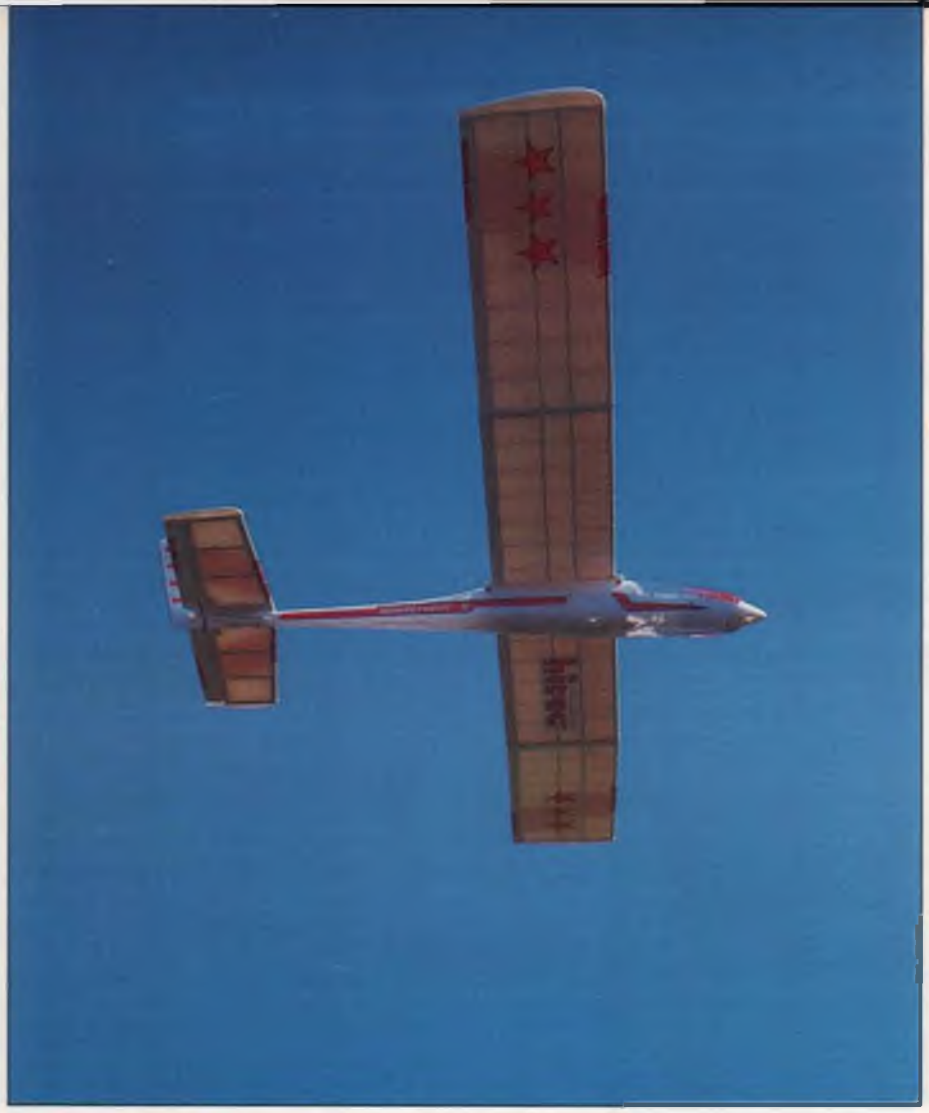
Those with previous modeling experience will be able to build the Wind Cruiser II quickly, with the leanest tool box and only the most basic modeling skills required. The instruction manual consists of a single sheet of paper and may be considered inadequate for the beginner, so hopefully the following discussion will help make its billing as "a trainer, a good first plane for the beginner" come true.

The Wind Cruiser II's fuselage is made of a very durable blow-molded thermoplastic, which is good because as a trainer the airplane will be asked to withstand some extraordinary landings. Start by inspecting the installed components. The motor is clamped to a built-up plywood cradle that is in turn fastened to the plastic fuselage with small screws. I found that the spinner backplate was rubbing against the fuselage, but this was easily remedied by shaving a bit of wood from the cradle and moving the motor forward a bit.

While you're in the cockpit area, consider installing a retaining strap across the width of the fuselage to prevent the battery pack from sliding forward. My pilot figure was obliterated when the battery pack shot forward during a hard landing. For that matter, you may want to forget the pilot entirely, to provide a clear view of the motor and equipment installation without having to remove the canopy.

One of the main attractions of the Wind Cruiser II is that the wing panels and tail assembly come preconstructed and covered. However, this doesn't release you from the obligation of checking the work.

Author's daughter Kiara displaying the Wind Cruiser II.



Chances are, there will be some wrinkles in one or more of the surfaces, or the tape hinge or a seam may be loose. These are common with heat-shrink plastic films and are easily eliminated with a little help from a heat gun and a sealing iron.

Be sure to check that the wing panels are flat and true. Being a flat bottom airfoil, this can be done by placing the individual sections on a flat surface. If any of the corners are sticking up, you have a warp. You will need to perform an exaggerated-opposite-twist maneuver on the panel and use the heat gun to take out the wrinkles you've introduced.

You may want to go one step further and put a *deliberate* twist or warp into the outer wing panels, so that with the leading edge and root (inboard) rib flat on the table, the trailing edge at the tip is about 1/4-inch above the surface. The amount is not too important; what *is* important is making sure that both panels have the same degree of twist, i.e., the height of the wingtip trailing edge above the board must be the same for both panels. This deliberate warp is called "washout"; it makes for much gentler all-around stall characteristics and will prevent the model from falling off to one side or the other when the wing is stalled.

Now you can epoxy the tip panels to the center panel, using the plywood dihedral joiners to tie everything together into a strong, one-piece structure. You may need to dress the mating surfaces with a sanding block to guarantee a tight fit. The dihedral must match on both sides, with the tips being 4 inches above the horizontal.

Like the wing, the tail assembly components come ready-built and covered with Oracover. The horizontal stabilizer and elevators are already tape-hinged together. A recess for the wire joiner between the right and left elevator needs to be cut into the stabilizer, otherwise the elevator won't actuate downward. CA glue should be applied to the ends of the joiner where it enters the balsa, to stiffen the area.

Locations for the control horns are clearly marked in the instructions. Be sure that the line of holes in the horn line up with the hinge line; this way you will get equal control surface throw in both directions.

The two straight pins found in the parts bag are the rudder hinge pins. After you insert one into a hinge pair, bend it over. When gluing the hinges in place (epoxy is recommended), make sure the bent pin portion gets glued into the hinge slot also so it can't fall out later. Also, make sure the rudder is located 1/4-inch below the top edge of the fin to clear the fairing end cap that will be glued to the top of the fin.

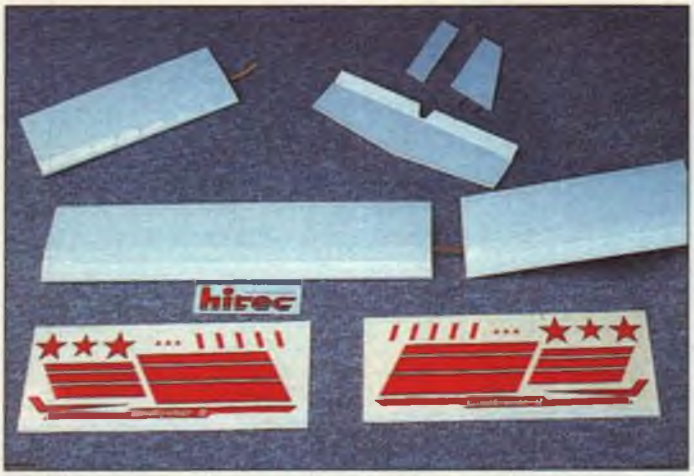
After mounting the tail assembly on the fuselage, and with the wing rubber banded in place, sight forward from the tail and confirm that the vertical stabilizer is perpendicular to the horizontal stabilizer and that the pair are true in relation to the wing. I had to shim the stab mounting platform to

The Hitec/RCD Focus 4 AM dual-conversion transmitter. The Focus system is a reliable, affordable setup ideally suited to the Wind Cruiser II.

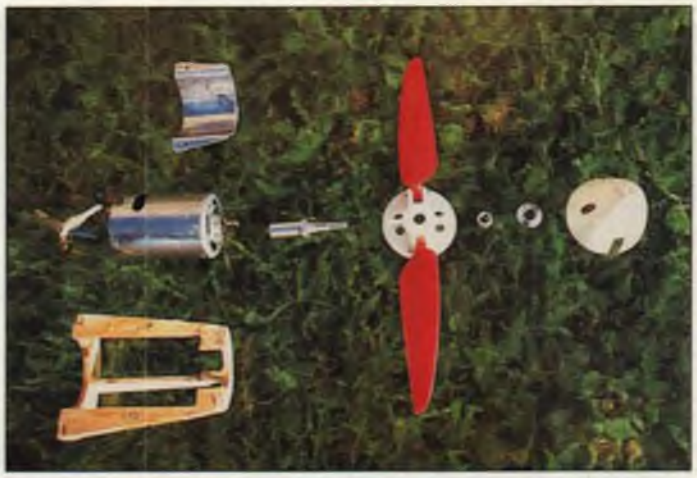
HITEC WIND CRUISER II ELECTRIC MOTORGLIDER

SPAN	65 inches.
LENGTH	38 inches.
WING AREA	3.34 square feet.
WEIGHT RTF	43.7 ounces.
WING LOADING	13 ounces per square foot.
MOTOR	Mabuchi RS-550SH.
PROP	8x3.5 plastic folder.
BATTERY	Six or seven cells required (not included).
RADIO SYSTEM	Minimum of three channels required.
SUGGESTED RETAIL	$145.95.

DISTRIBUTOR: Hitec/RCD USA, 9419 Abraham Way, Santee, CA 92071; (619) 449-1112.



Basic wing and stab components are supplied already built and covered with white Oracover. Self-stick decals come on the two large sheets in the foreground.



Motor, prop and spinner components. All of this is pre-installed at the factory, but was removed for this photo.

Close-up of the cockpit area with the canopy removed. Notice the author's battery retaining strap spanning the back of the cockpit. Cooling air holes in the spinner and fuselage are essential, as the motor does get warm.

Fuselage with the receiver, speed control and battery pack ready to go in. Battery pack rests on a plywood tray, above the receiver and speed control, and is held in place with a Velcro strap.

true up the review model's tailfeathers.

I also had to provide washers to back up the knurled brass stab hold-down nuts because I ran out of thread before the stabilizer was tight to the fuselage. While you're at it, put a lock washer in there, too.

Hitec/RCD supplied the ideal companion radio system for the Wind Cruiser II, the Focus 4 AM. It comes complete with transmitter and micro receiver, NiCds for both, charger, and three HS-300 standard servos. The transmitter has full servo reversing switches. An optional item you will need that does not come with the radio is a motor control unit—in my case, the Hitec/RCD SP-1003, an on-off control for three- or four-channel systems. It's a BEC unit with automatic motor cutoff, which means it's designed to run the radio off of the motor battery (no separate radio battery needed) and will automatically cut off power to the motor when the battery voltage drops to a predetermined point. Until that point is reached, you have full control of the motor and can turn it on and off at will.

The Focus system's most interesting and unique feature is that it is a dual-conversion AM system, the only such system on the market as far as I'm aware. This involves a sophisticated filtering process that uses two crystals in the receiver. The operating bandwidth is 8 khz, rather than the FCC permitted 20 khz, which eliminates pager interference (their frequencies are typically 10 khz wide).

Radio installation went without a hitch. Mount the receiver and speed control using Velcro; servo mounting tape doesn't work well with a flat receiver and a curved fuselage. The mounting holes for the on-off and motor arming switch are already cut, but you may have to open the motor arming switch hole a little to get it to fit.

Running the antenna wire through the exit hole at the tail end of the fuselage sounds tough but is actually quite simple. I merely ran a piece of monofilament through the hole from the outside, into the battery compartment, taped the antenna wire to it and pulled it back through.

Power was provided by Parma International in the form of loose cells that I assembled into two packs, one with six cells, the other with seven. The six-cell pack proved to be just adequate. After testing with the seven-cell pack I never went back.

Checking the throttle stick (while keeping all body parts away from the prop area), you should find that the motor engages at about mid-throw, so that you have some "bump it" leeway.

All that remains now is to cut out and install the plastic wingtips. Epoxy is suggested for this job, but I simply used white vinyl electrical tape, as it helps to blend the edge of the wingtip into the wing panel. I also taped the dihedral seams, more for aesthetics than anything else.

The preflight check consists of the usual items—making sure the control surfaces move in the proper direction and do not have too much throw (1/2-inch of rudder travel in each direction and 1/4-inch of up and down elevator is fine for a novice flier's first flights); making sure everything is fastened down or attached securely; making sure the radio passes a range check as described in the owner's manual; and checking the model's balance.

To do the latter, first put the completely assembled model on a flat, hard surface, hold the wing level, then let it go. You'll be able to tell if the model is close to being in lateral balance by how quickly it tips to one side or the other. A very slight imbalance is nothing to worry about—you won't notice

it in flight. A more severe imbalance should be corrected by adding some sort of ballast to the light wing tip, possibly inside the plastic tip itself if you taped them on as I did.

More important to a successful first flight is getting the longitudinal balance or "CG" correct as shown in the exploded drawing on the instruction sheet. At the point indicated, the assembled model with the battery pack aboard should balance with the fuselage level or nose slightly down. Shift the battery pack fore or aft to adjust this.

The timing of this review coincided with a vacation I had planned to the Hawaiian island of Maui. I felt the island would provide a nice backdrop and maybe some good flying conditions, so I took along the unassembled kit, the radio and the few tools needed to put everything together and did all of the assembly after I arrived.

Maui is made up of two distinct volcanos whose lava flows merge in the middle, forming a rough figure eight. The younger volcano, Haleakala, rises over 10,000 feet above sea level and retains the classic cone shape of the textbook volcano.

A few telephone calls revealed that a group of RC glider fliers meet regularly at Poli Poli Park, located in an area known as the Upcountry, about halfway up the side of Haleakala. It wasn't long after my arrival in Maui that I showed up at the site with Wind Cruiser in hand, ready to have a go at electric motorgliding.

Conditions were promising, with cool ocean breezes reaching the steep pastures. The Wind Cruiser II took to the air with a modest heave, climbing to altitude, laboring a bit with only the six-cell pack for power. The wind was flukey and after watching some earlier flights I knew not to expect any strong lift. Sure enough, there wasn't any, so after several minutes in the air, it was time to set up an approach. I came in a little hot and that's when the battery pack met the motor, eliminating the pilot figure.

I put the seven-cell pack in for the following launch and there was a noticeable improvement in the climb. By now the thermals were better, as evidenced by the good flight times of some of the other gliders. In these conditions, the Wind Cruiser II will stay up indefinitely, the length of the flight being limited only by your airborne battery.

On subsequent flights, I was able to test the Wind Cruiser II in conditions varying from calm to winds over 15 knots. I find the Wind Cruiser II to be a solid performer. It flies well in a full range of wind conditions and is surprisingly stable in wind. It does need the seventh cell in its battery pack to provide enough power for two or three high climb-outs. The weight of the extra cell has a negligible effect on the model's performance.

The Wind Cruiser II is durable, economical and easy to assemble. Being a motorglider, it's versatile, needing no launching equipment or ideal lift conditions. This could be the one for you! ***MB***

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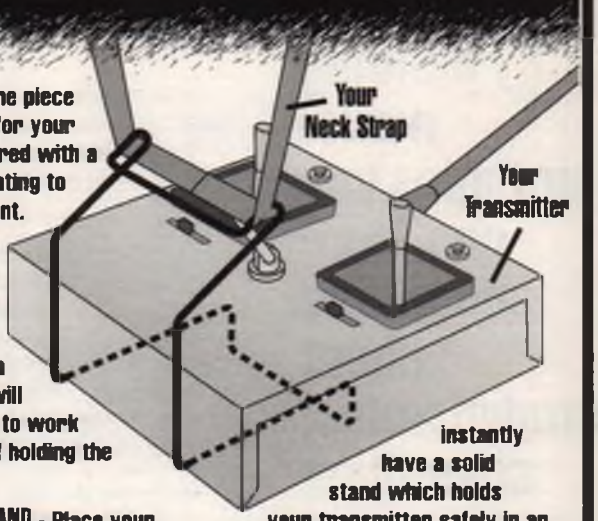

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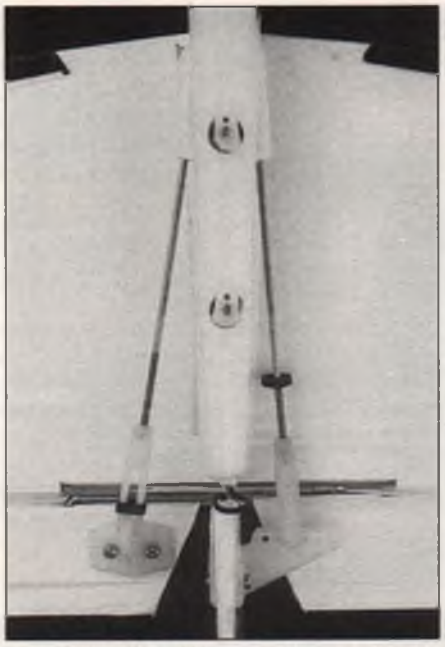

■ ABOVE: The stabilizer assembly as seen from the underside. Notice the cutout for the elevator joiner and the black band clevis keepers (one off, one in place). ■ RIGHT: Hitec CG 315 peak detection 12-volt DC battery charger with seven-cell Panasonic P-170 SCR battery pack.

HANNAN'S HANGAR

BY BILL HANNAN

"By building model airplanes you can learn something about aerodynamics, something about engineering, and a lot about yourself."

Our quotation this month is by Sir Lionel Cheetwell, via Jerry Bockius, of Norwich, Connecticut.

Our features about women in aviation have been well received, and have resulted in more contributions. One of our photos shows 13-year-old Tosha Norlander and her Gnome RC glider. Reader W. Lucas Jones taught her to fly, and she quickly gained skill enough to set a Class B thermal duration record. This feat attracted the attention of Jack Albrecht of Airtronics, who donated one of his company's radios to her.

A top-grade student, Tosha finds time for model building on weekends and evenings, and her current project is a Top Flite Wrist-O-Crat from a kit given to her by former *Model Builder* columnist Dave Thornburg. More power to her!

BASEMENT BONANZA

David F. Lynch, Jr., of Wayne, Pennsylvania, used to build models during the 1940s, at a time when many manufacturers were producing kits. Unlike most youngsters, however, David saved all of these kits. Now retired, he recently sent the collection to his son, also named Dave, in California, and it was our pleasure to examine the treasure trove. The variety is quite remarkable, including such brand names as Ace Whitman, AMCO (a division of Comet), Capitol, Comet, Hi-Flier (best known for their kites), Megow, Joe Ott and others. It was a treat seeing these products, some of which were not familiar to me, simply because they were not marketed in the Montana hometowns of my youth.

Contents of a typical 1940s kit included plans, printed and strip wood, partially-carved propeller, and colored tissue for covering. And all this for only 10 cents!

A tower of treasures! An assorted stack of model airplane kits which have been stored in a Pennsylvania basement since the 1940s. More in text.

Although a few featured traditional balsa construction, many were of World War II issue, and because of the balsa shortage at the time, contained hardwood and cardboard parts. Judging by the hardness of the printed wood, it is easy to understand how potential model builders might have become discouraged! On the other hand, that may have been the very reason these kits survived unbuilt.

One of the kits, by Laminated Art Products Inc., actually featured die-cut parts, but not the typical bulkheads and ribs one might expect. Instead, the kit yielded three non-flying models which were laminated to shape entirely from dozens of cardboard components.

Also amazing, in terms of today's inflationary costs, were the prices on these kits, which ranged from a low of 5 cents (yes!) to a 36-inch span model which sold for 50 cents. The majority of the offerings were of the 10-, 15- and 25-cent variety, which often included plans, wood, tissue, machine-cut propeller (or a cardboard substitute), rubber "gum-band," a tiny tube of glue (never enough!), hardwood wheels and thrust button, propeller hook, brass thrust washers and (sometimes) colored stick-on markings.

The AMCO 10-center shown in one of our photos serves as an indication of the wartime conditions, being called one in a "Victory Series," with red, white and blue boxes bearing a big symbolic V and the Morse Code equivalent: dot-dot-dot-dash. The Bell Airacobra on the box front has the old red-ball-in-star insignia, and has no relationship to the box contents, which is Art Chester's Racer. Also on the box is this admonition: "For Victory, Buy United States War Bonds and Stamps. Save this carton, cardboard is needed to help win the war."

Our thanks to David F. Lynch, Jr. and his son, David Lynch III, for saving all of this precious cardboard, and for allowing us to share the nos-

talgia with our readers.

OF MODEL GYROS

Although model and full-size autogyros (spelled *Autogiro* only if licensed by inventor Juan de la Cierva) date back to the 1920s, very few are presently seen in action. Although mechanically much simpler than helicopters, they are complex aerodynamically, and making models of them fly dependably can be a frustrating challenge. While the "cheater" variety, employing large fixed wings in addition to rotors, are no particular challenge, wingless examples are another matter entirely.

Bob Bender, of New York, incorporates push-pull propellers for his indoor model gyros, which nullify the usual rolling tendencies inherent in such designs. Although still in the experimental stages, Bob's models have exceeded 40 seconds duration.

Our in-flight photo is of Georges Chaulet's "Boomerang" radio controlled autogyro, taken during a slow-speed flyby. The Enya .15-powered, 40-ounce craft has an RC-actuated throttle, rudder and elevator. To date, 30 flights averaging about six minutes each have been achieved. Georges, who has been a rotorcraft fan for many years, is hard at work on a model autogyro book, and we eagerly look forward to reviewing it.

Bob Bender, of New York, with two of his wingless autogyros. Contra-rotating push-pull propellers nullify rolling tendencies. Photo by Ed Whitten.

MINI-STICKS, MAXI RESULTS

Mike Colling, of England, reports that the 1992 Living Room Stick Model Postal Contest attracted 117 entrants, representing 11 different countries. Flights were conducted in sites with ceilings as low as 8 feet and as high as 62 feet, apparently confirming the efficiency of the equalizing scoring system employed.

Ken Johnson's comprehensive article in the December 1992 *Model Builder* will tell you how to build one of these tiny (7-inch span) fliers, and you can receive complete contest rules if you will send three International Reply Coupons (obtained at a local post office) to Mike Colling, 403 Mossy Lea Road, Wrightington, Wigan, WN6 9SB, Lancaster, England.

The 17th Annual Belgian International indoor model meet is scheduled for August 26-29. Categories include FAI events such as F1D Microfilm, F1L Beginner, F1L EZB, plus the new FAI-recognized Scale classes of F4F Peanut, F4E CO_2 and Electric and F4D Rubber Scale. Although proxy entries are, strangely, not permitted by official FAI rules, the Pistachio Scale class, being unofficial, is still open to proxy flying, and such entries are warmly encouraged.

Full information, if you may be able to attend or care to send a Pistachio, may be obtained by sending three International Reply Coupons to F.L. Van Hauwaert, Grand Place 1, Bte 52, 4400 Flemalle, Belgium.

SPORT AVIATION FOR KIDS

The Experimental Aviation Association, noting the rapid decline in aviation interest among children, is doing something about it! Recently launched was the EAA Sport Aviation Club aimed specifically at youngsters. Among the benefits are a fine, full-color magazine called *Sport Aviation for Kids*, a membership card, patch and decal. The first magazine issue features spectacular photos of a lady wing-walker in action; Dave Coulier, a star of TV's "Full House," describing his interest in aviation; and an article about race driver Mario Andretti's involvement with ultralight airplanes.

Explained is the EAA Young Eagles, an ambitious program intended to provide airplane rides for one million kids, and hopefully to inspire them to explore aviation, from building models to planning a future career. And yes, there is a section devoted to models, rang-

Tosha Norlander, of Albuquerque, New Mexico, displays her record-holding two-meter Gnome RC glider. W. Lucas Jones photo.

Vern McIntosh, of Portage, Michigan, with his fine reproduction 1922 Ideal Everyboy's Model Aeroplane. And it flies!

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Do you put your underwear on over your pants?

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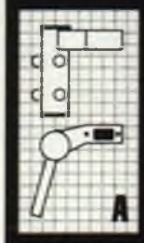

Superior quality and unparalleled performance has made Slimline mufflers the choice of champions. Slimline offers the widest selection of "machined to fit" in-cowl mufflers that bolt on to each specific engine.

(A) Slimline's new GIANT SCALE Mufflers are designed for inverted engine applications, they wrap around the rear of the engine, while providing lower noise and great performance.

(B) Slimline's LOW-NOISE, PITTS STYLE Mufflers are designed for side mounted engine applications, they maintain a low level exhaust note similar to 4-cycle sound.

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Good flight photos of true wingless model autogyros are rare. This RC "Boomerang" by Georges Chaulet, of France, can fly as slow as 12 miles per hour.

ing from static scale plastics through rubber-powered free flights to RC. Future editions may include actual model construction plans by well-known designers.

A membership would make an excellent gift to some young potential aviator, and the cost is only $15, to Sport Aviation Club, P.O. Box 3086, Oshkosh, WI 54903-3086.

SPEAKING OF BEGINNERS

Larry Conover, former co-editor of the fondly recalled *Sig Air-Modeler* magazine, now offers various items intended for novice modelers, including a booklet entitled *How to Adjust and Control Free Flight Model Planes*, three different Study Guides, and 15 different model plans, including catapult gliders, rubber-powered "stick" models, a profile Jungmeister and others, all at reasonable prices. Send $1 for the complete catalog to Conover Model Works, Box 628, Longmont, CO 80502.

NEW LOCATION

Diels Engineering, Inc., manufacturer of rubber-powered model kits and plans, has relocated. Their new catalog featuring more than 60 plans and 16 kits, including the brand-new North American O-47 and Messerschmitt Bf-109E, is available at $2. Write To Diels Engineering, Inc., P.O. Box 263, Amherst, OH 44001.

EVENT FOR KIDS

We were pleased to receive a letter from Mark Garvey, a most talented gentleman who, because of his work among hospitalized children, has become known as "Mr. Mercy." Mark was invited by a Cedar Rapids, Iowa Science Station to conduct a program, *Fooling Around with Flight*, for grade-school kids. A batch of beginner models including Uncle Sam biplanes and AMA Cubs were obtained from Sig Manufacturing Company, as well as a box of Whitewings paper gliders.

Although only eight people pre-registered, some 42 folks, ranging in age from 5 years to grandfathers, arrived for the fly-in! And yes, there was a good representation of females, too. One girl, Nicole, confided to Mark, "My mom *made* me come. I thought airplanes were boring, but this is *fun*!" **MB**

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12 X 11.5	7	7.95
12 X 12	7	7.95
12 X 12.5	7	7.95
12 X 12N	7	7.95
12 X 13	7	7.95
12 X 13N	7	7.95
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12.5 X 10	7	7.95
12.5 X 11	7	7.95
12.5 X 11.5	7	7.95
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PLUG SPARKS

BY JOHN POND

The Swedish Old Timer Champs

This month we are featuring a report on the 28th annual Swedish Old Timer Champs held last August at Rinkaby, Shane, in the southern part of Sweden. Sven-Olov Linden also reports that their publication, *Old Timer*, has been produced for more than 20 years. Such an enviable length of production is due mainly to the efforts of Sven and his buddy, Sten Persson, not to mention the help emanating from their clubmates in Halmsted.

The Swedish organization, with over 200 members, is quite fortunate to have most of its older modelers still in action. Such is the case of Sune Stark, seen in Photo No. 1 with his original Wakefield model that was built for the 1950 Wakefield World Championships in Finland. The model did not quite suit Sune, so a different arrangement with a two-skein motor was built and used to win the 1951 Wakefield Champs.

The model shown is no slouch—Sune has the model in good trim and made three maxes. Needless to say, he won, but was closely pressed by Sigurd Isaacson, seen watching with some agitation as the final max flight by Sune meant a 2nd place to him.

Sune entered his first Wakefield Champs in 1938. *Aeromodeller* magazine, in its

Photo No. 1. Longtime Wakefield competitor, Sune Stark, seen launching his original 1950 Wakefield at the 1992 Swedish O.T. Champs. Models last a long time in Sweden! B. Dahlquist photo.

Photo No. 2. Ake Roggentin, now 75 and as active as ever, with a replica of his 1938 Wakefield. Photo by Sven-Olov Linden.

Photo No. 3. Classic takeoff by this Joe Erhardt Wakefield by Helge Wannberg. Placed 5th at the Swedish O.T. Champs. B. Dahlquist photo.

Photo No. 4. Start of the winning flight in the Classic Wakefield event in Sweden—Lennart Hansson launching a Lanzo Duplex. B. Dahlquist photo.

SWEDISH CHAMPS RESULTS

Class A Rubber 0-50 cm
1. Sigurd Isaacson, TI-39, 478
2. Georg Tornkvist, TI-39, 276
3. Helge Wannberg, HEWA M1, 211

Class B Rubber 50-75 cm
1. Anders Hakansson, Vastanvind, 462
2. Anders Hakansson, Landegren, 449
3. Paul Rasmussen, Kadet, 375

Class C Rubber 75-100 cm
1. Anders Hakansson, Landegren Spec, 392
2. Georg Tornkvist, Hugin, 369
3. Lars Ljungberg, Postis, 344

Class D Wakefield
1. Sune Stark, Wakefield-50, 450
2. Sigurd Isaacson, Rimfaxe, 436
3. Lennart Hansson, Lanzo Duplex, 407

Twin Pusher
1. Tomas Hultgren, Lauge-23, 471
2. Sigurd Isaacson, Kummer-33, 469
3. Tomas Hultgren, P.E.G.-24, 463
4. Sigurd Isaacson, Lauder-12, 452
5. Georg Tornkvist, Manulkin, 316

Class F Power, 15 cu. in. Limit
1. Leif Sundvall, Zeek, 509
2. Gunnar Stedt, Zeek, 451
3. Gunnar Stedt, Civy Boy, 432

Class S1 Glider 0-100 cm
1. Sigurd Isaacson, Sunnanvind 2, 354
2. Kurt Sandberg, HW-43, 349
3. Gunnar Stedt, Flygfisken, 303

Class S2 Glider 100-250 cm
1. Nils-Olof Gustavsson, Oden, 490
2. Sven Ostlund, Meteor 20, 452
3. Arne Berglin, Skyway, 350

Class FAI Glider Ar 1950-55
1. Lars Larsson, Bernfest, 402
2. Lars Anderson, Skymaster, 311
3. Bengt Andersson, Odenmans, 237

report of the meet in France, made mention of the unusual design featuring a long, flat center section wing. The model demonstrated an outstanding climb for its time and placed respectably. Of course, who was going to beat Jim Cahill with his outstanding flight of 30 minutes plus?

Photo No. 2 is a shot of Ake Roggentin of Stockholm, with a replica of his 1938 Wakefield. As early as 1937, Ake's model made a superb flight of 37 minutes, unfortunately listed as an unofficial flight.

Photo No. 3 is one of the best demonstrations of a true unassisted takeoff as required in the Wakefield event. The model is an American design by Joe Erhardt (who won in 1930-31), reproduced by Helge Wannberg. In the special Wakefield Classic event, the model placed 5th. There's certainly a lot of interest in the very early Wakefield designs! It is interesting to note the takeoff board setup—reminds me of the early eastern U.S. contests. This setup was seen many times in the Chicago area and in particular at the 1940-41 Nationals.

Photo No. 4 is another good shot of an unassisted takeoff, this time by a Lanzo Duplex built by Lennart Hansson. Lennart was able to take time from his duties as Contest Director to fly in the Wakefield Classic event. Hansson's No. 1 assistant C.D. is his wife, Berit, seen watching her husband's last and winning flight. We could use more of these combinations in American competitions!

Seen in Photo No. 5 is, as far as this writer is aware, the first Old Timer radio controlled model being flown in Sweden. Ingvar Claesson built this German design, the HS-100, which originally appeared in 1937. Inasmuch as there was no event for it at the Swedish O.T. Champs, this red-and-white silked model was flown strictly for demonstration. It won't be long before the O.T. RC events become quite popular!

Photo No. 6. A good group of renowned modelers showed up for the first Joe Elgin Commemorative—from left, Mike Granieri, Dick Korda, Bob Peru and Joe Elgin holding his Playboy Sr.

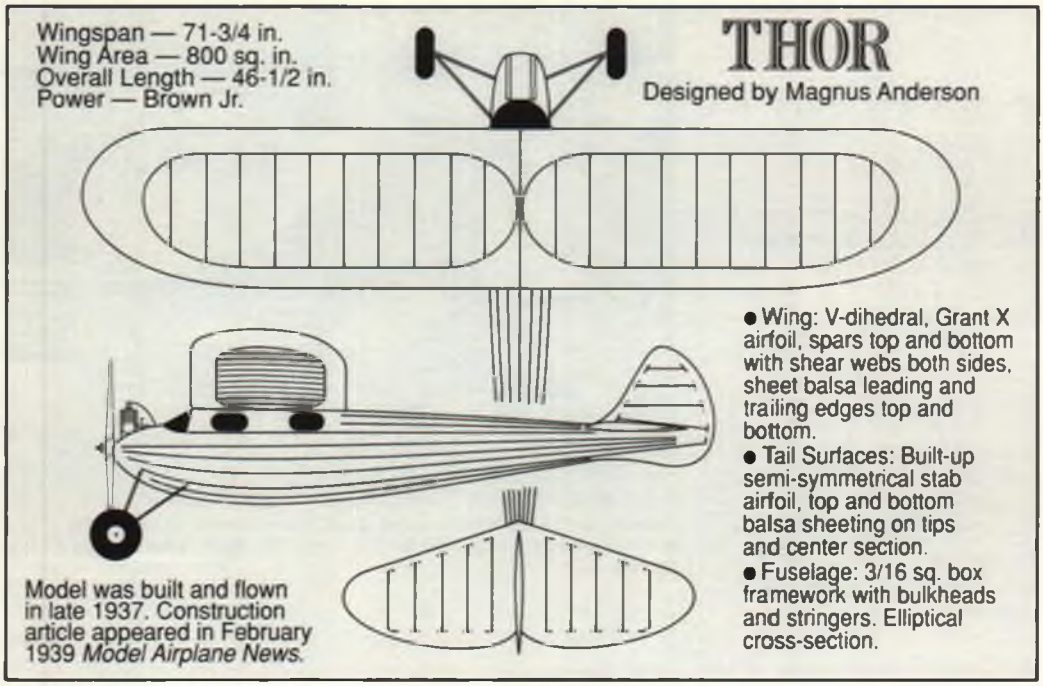
MODEL OF THE MONTH

In line with the growing popularity of the Brown Jr. event and the possibility of it being held at the upcoming SAM Champs at Taft, California, we present a little-seen model, the Thor, as designed and built by Magnus Anderson.

While most modelers regard this design as an Old Timer because of the February 1939 publishing date in *Model Airplane News*, this model is truly an Antique, having won or placed in numerous pre-1939 contests. As a matter of interest, this model first came to this writer's attention when a photo of it was published in the September 1938 issue of *Life* magazine. At that time, *Life* was publishing a series of events they called "Life Goes To A Party." In that particular issue, they featured a write-up and numerous photos, including one of the Thor, taken at a contest held at Creedmore. This model, originally powered by a Brown Jr. engine, was an excellent performer.

The design followed contemporary features pioneered by Ben Shereshaw, such as balsa sheeting on the wing leading and trailing edges. Shereshaw's typically graceful wingtips and elevator sections were also slavishly reproduced in the design. The fuselage featured a box framework made into an elliptical section by the generous use of formers and stringers.

■ **RIGHT: Photo No. 5. One of the first O.T. RC models seen in Sweden is this HS-100 built and flown by Ingvar Claesson.**
■ **FAR RIGHT: Photo No. 7. A 1911 Bleriot for 1/2A Texaco Scale, built by Joe Elgin.**



MODEL OF THE MONTH

The more modern format of short nose and long tail moment were adopted. To round out the design, a lifting tail was employed to help keep the nose down when zooming off the ground.

organizing this three-day meet, a novel feature was introduced in that it was held in the middle of the week, Tuesday through Thursday. As Bucky pointed out, "We are mostly old goats so we don't need to wait for a weekend off from work to attend a meet."

Photo No. 8. Fred Mulholland of Florida with his prize-winning Anderson "Thor." It's this month's featured design—see text.

JOE ELGIN COMMEMORATIVE

Ohio's Bucky Walter came up with the idea recently of holding a meet named in honor of fellow SAM 39 member Joe Elgin, who is responsible for the famous Playboy series of models kitted by Cleveland. In

Although the contest was held in honor of Joe Elgin, Joe managed to upstage the contest promoters by bringing Dick Korda with him. Photo No. 6 shows a group of famous modelers surrounding Elgin's famous Playboy design: from left, Mike Granieri, Dick Korda, Bob Peru and of course, Elgin.

Elgin entered this contest himself and flew quite a bit over the three days. Joe also donated a special trophy for the best performing Elgin design. It was no great surprise to see top O.T. RC flier Larry Davidson win with a good flying Playboy.

We should point out that Joe likes all phases of modeling. Photo No. 7, showing a Blériot monoplane he built for 1/2A Texaco Scale, is a good sample of his enthusiasm. This event has aroused everyone's interest. This writer looks forward to the next SAM Champs, which should feature the largest number of entries in the 1/2A Texaco Scale and Brown Jr. events. If one were to judge the popularity of these events from the results of the last SAM Champs at Lawrenceville, the majority of SAM members want low-competition fun!

Inasmuch as we are featuring the Magnus Anderson "Thor" as the Model of the Month, we would be remiss if we didn't feature Photo No. 8 showing Fred Mulholland with his RC version of this famous design. The model flies so well that Bucky Walter christened it "The Terror of the Contest."

When it came to winning events, Fred Mulholland won four 1st places, three 2nd places, and one 3rd. Although Fred was the top flier, Larry Davidson turned in some outstanding performances, winning one 1st, two 2nds, and four 3rd places.

OBIT NOTICE

Vincent Montgomery Tyrrell, otherwise known as "Monty," is gone. What a shock to this writer as I regarded him as a true friend, albeit living 8,000 miles away in Australia. When I bunked with him at Wakerie (site of the MAAA Nationals) in April of 1992, Monty seemed to be in the best of health, participating in the Nationals Events.

Monty's proudest moment in the U.S. was during the AMA Nationals, held at Reno, Nevada—he won the CL O.T. Stunt Ignition event and placed in the glow event. Monty is seen in Photo No. 9 flying his O.T. RC Playboy at the Nats.

Monty died at the tender age of 70. Even then, he was optimistic about all forms of model aviation, even to the point of buying a new house devoted in large part to models. I will remember November 27 for a long time! ***MB***

Photo No. 9. The late Australian O.T. enthusiast Monty Tyrrell at the 1984 Reno AMA Nats. Photo by Art Schroder.

CLIMB & GLIDE cont. from page 55

frame designed for soaring flight.

The strength and stability of the Big Shadow was thoroughly tested one summer afternoon when I launched what was supposed to be a routine practice flight with designer Van Hereford at the controls. The launch was approximately straight ahead with the wings level, and it became immediately apparent that the radio wasn't working. While the launcher and the pilot wondered helplessly if the switch was "on," the plane flew across approximately 300 yards of open field toward the distant treeline. Naturally, the engine performed ferociously over the entire distance. The wingtips were seen to flutter violently just before the plane entered the dark forest at about shoulder height. Damage was limited to a pulverized wing.

A spare wing was bolted on and the next flight was launched with the switch firmly in the "on" position. Which brings us to Rule No. 2: "Always energize and test the control system before starting the engine."

Rule No. 3 is: "Provide the most dependable engine control system you can devise." It is uncomfortable to find your plane at the limit of your eyesight with the engine still going strong. Engine control should not be a problem with modern RC carburetors, as they can usually be adjusted to provide a positive shutoff. Fuel tanks should be sized for not much more than a one-minute run to provide a back-up to the RC system.

There are three proven ways for getting started in Climb and Glide: Order the plans from *Model Builder* Plans Service and build a Big Shadow; modify an existing glider; or build a new one with the appropriate engine in the nose. For those who enjoy design work, the simple but effective C&G aircraft specifications will provide a challenging arena for the exercise of creative talent. And while it hasn't been done yet, at least to our knowledge, there is no reason why the new ARF gliders and electric sailplanes can't be modified for Climb and Glide by those who love to fly and hate to build.

In any modeling contest worthy of the name, careful preparation and sharp flying will always be hard to beat, but in Climb and Glide, the need for expensive equipment and endless practice has been eliminated. Sport modelers as well as serious competitors are participating in the new event and hopefully, a combined event for both C&G and its little brother, RC Duration, can be scheduled for the 1993 Nats. Meanwhile, RC clubs in search of contest events that can be staged with a minimum of manpower and expense should check out Events 702 and 703 on the last two pages of the '92-'93 AMA Rulebook.

Van Hereford, the designer of the Big Shadow, would be glad to hear from anyone interested in more information on the new airplane or the new contest event. Write to him at 1855 So. Woodhaven, Baton Rouge, LA 70815. ***MB***

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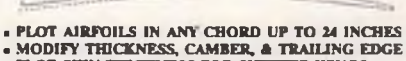

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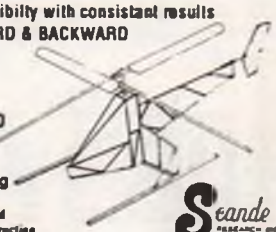

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ELECTRIC POWER cont. from page 60

was knocked out.

The lightweight foam tires were a problem, too. They couldn't handle the landing or takeoff stresses and would distort. I tried another brand of lightweight foam tires and did no better. I finally tried some lightweight treaded style tires from Kavan and these solved the problem.

While I was at it, I removed the firewall (which you don't need in an electric), then sheeted the top and bottom of the nose cheeks and installed pine blocks for a motor mount. The change dropped almost 8 ounces from the flying weight, which is now 7.16 pounds. The wing area is 580 square inches, with a wing loading of 28 ounces per square foot—a little on the high side. Surprisingly, the plane likes to "float" on landings and I often overshoot.

• • •

I have seen some recent articles on electrics that say arming switches and/or fuses are not needed. Don't believe it! The premise that these authors make is that we all know what we're doing, and we can turn off the motor with the radio or hold onto the model until the batteries run down. For those who are perfect, and never make mistakes, this might be true. I am not perfect, and I do make mistakes. When problems come up, I am very glad that I have a fuse in the plane. I use it as an arming switch as well. I doubt that I will ever go back to using a separate arming switch. Arming switches can be accidentally flipped on. A removed fuse is the ultimate protection. If it is in your hand or pocket, the motor isn't going to turn on.

There are a couple of ways to use fuses as arming switches. One is to make a permanent plug-in unit mounted in the model. Sermos offers such a unit, or you can make your own. The other way, which I use a lot, is to cut a slot in the side of the fuselage. Allow enough wiring to pull the fuse out the side, then unplug it. It helps to have a tab on the fuse to pull on. I use fiberglass tape, but string would do just as well. My favorite fuse is the 30-amp automotive fuse. It has the least resistance, but will blow if the motor is stalled. It's what I use on the Royal 40S.

Use an arming fuse. There will be a day when you will be glad you did!

I am using the Astro 205 speed control in the Royal 40S. This is an outstanding throttle, one of the very best I have used. I recommend it very highly for electrics. It is suitable for any size, up to and including the 60 (32 cells). I tried several brands of throttles before I used the Astro. Glitching, overheating, shutdown, and power losses were what I got. The 205 is not inexpensive, but you get your money's worth.

Battery placement and wiring have been challenging for me on the 18-cell and larger planes. Most fliers here in Germany make a single pack of cells. The pack is a stick of flat or square cross-section. The stick packs are easy to connect to the wiring in the model, and they are easy to remove. If you have just one airplane or power system, this is probably the way to go.

For sport fliers who have a wide range of planes, however, the stick poses a problem—it is a lot of cells tied up in one plane. I like to use six-cell Sanyo SCR packs that are sold for offroad car racing. These are relatively inexpensive—less than $20—and perform very well. I use the packs in series to get 12 cells, 18 cells, and 24 cells. The packs come in two configurations, either two parallel sticks of three cells each, or six cells placed side-by-side. This makes a difference for the connection layout. The drawings show how I do the layout and connections for each type. The packs are held to the fuselage side by Velcro, which works well.

The down side of this is that three or four packs are very awkward to work with in the small space available in the fuselage. It is hard to get the packs in, hard to get the connections made and hard to get the packs out again. As I prefer to charge my packs outside the model, I have to do this after every flight.

There has to be a better way that will still keep the original advantage of separable packs that can be used in many planes. Ideas that occur to me are: packs that Velcro together to make a single pack; a mounting plate that holds all the packs and handles as a single unit; and a box that holds all the packs and handles as a single unit.

Do you have some other ideas or ways that you use for easy installation of multiple battery packs? I'd like to hear about them!

• • •

I went to the Electro-Fly at Koblenz last June and saw the ParaPlane Sport in action. This was the subject of a very good review in the August 1992 issue of Model Builder, and I would like to second the report.

The ParaPlane flew well in a 10-mph breeze, did five-minute flights, and delighted the crowd. It is fun to watch in the air. I was impressed with the performance and with how easy it appeared to be to fly. It would make a good choice for those looking for something different. It is sold by Electric R/C Corp., 5801 Magnolia, Pennsauken, NJ 08109, for $230, or $395 with radio, battery and peak detector charger.

• • •

Enjoy electric flying! My address is 7100 CSW/MC, Box 734 PSC 18, APO AE 09220 for the 29-cent U.S. stamp, or Normannenweg 20, D-6200 Wiesbaden-Biebrich, Germany for international postage. ***MB***

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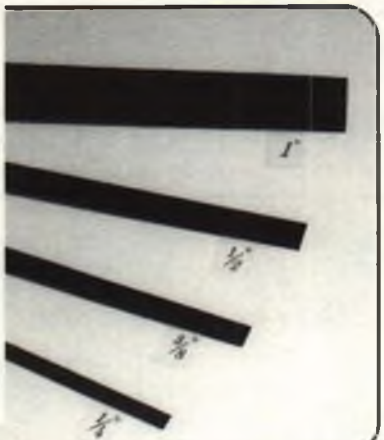

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MODEL DESIGN *cont. from page 24*

backward, at airshows, just a few feet off the ground. Remarkably, he is still alive! I saw a Kasperwing ultralight piloted by Steve Grossruck fly inside the Seattle Kingdome. That feat was also wild. I could almost reach out and touch the wingtip from my upper-level seat as it flew by.

But, to get to the point, Kasper says that the remarkably low descent rate achieved by some planes in a deep stall is due to "vortex lift." The figure presented here is similar to ones in the July 1973 and January 1976 articles in *Sport Aviation* magazine. This figure illustrates vortex lift on a conventional wing in near-vertical descent at extremely high angles of attack. For those of you who may wonder how a horizontal wing can be at a high angle of attack, remember that angle of attack is the angle between the wing reference chordline and the airflow; in this case, an angle of 75 degrees. But—the wing is not stalled!

I don't have any of Kasper's technical papers, so I don't know just how he explains it; this is my explanation.

A vortex is established above the upper surface of the wing, approximately as shown. Any vortex has a lower pressure in the center due to the centrifugal force of the rotating air mass. Tornados don't *blow* the roofs off of buildings, they *vacuum* them off by the very low pressure at the eye of the vortex. The buildings explode into the suddenly lowered barometric pressure region.

The flow over the top of the vortex above this wing has a long curved path, due to the presence of the vortex under it. It is like the flow over a very thick, highly cambered airfoil. Therefore it has a large Bernoulli effect, resulting in a high lift coefficient. The flow over the top maintains the rotation of the vortex, and the low pressure in the vortex couples the Bernoulli lift to the wing. The flow separated from the upper surface when the wing was first stalled, but it is now reattached and lifting again, through the vortex. The vortex is a connecting link in the lift chain.

Until the vortex is established over the wing (in some planes it cannot be established, at least without varying the configuration), the descent rate is high in deep stall. Once the vortex is rolling, however, the lift increases phenomenally, and the descent rate goes way down. With a lifting vortex the word "stalled" is really not applicable. There is again upper-surface flow and lift, propped up by the vortex.

With no vortex the Kasper model BKB-1A sailplane descended in a stall at 600 feet per minute. When the stick was pulled farther back the vortex established itself and the sink rate dropped to 200 feet per minute! In a wind tunnel in Stockholm, a vortex lift coefficient of 5.5 has been achieved! NASA-Langley wind tunnel test data wasn't as impressive, but definitely showed the effect.

Parachutes also must use vortex lift, since

they operate at much higher coefficients than can be accounted for by flat-plate drag. I speculate that a vertically descending parachute has a toroidal vortex (like a smoke ring) above it, which scrubs and attaches the flow to the canopy of the chute.

The main body of aerodynamicists appear to have largely ignored vortex lift, and perhaps they should. Beside parachutes, its usefulness may be quite limited. It would be an option for recovering RC models, however. Jim McCulley, Rte. 6, Box 45, Warrenton, VA 22186, would be happy to discuss such RC recovery with you. This column will publish any interesting results you get.

COMPETITION, ANYONE?

The philosophy of competition was brought to mind by a conversation I had with Dan Rutherford at the field last fall. Dan and I agreed that most just-for-fun model flying events evolve into cutthroat competition events. A good current example is the "Fun-Fly." A few years ago it meant that a group of modelers just got together to fly and have fun. Then, supposedly to have more fun, the leaders of such affairs began to include a few informal low-key, fly-whatever-you-have contest events. These were unusual and fun things like seeing how many loops one could do in a given time, or how low a limbo ribbon one could fly under.

But man is basically a competitive animal. Fliers brought the best-suited airplane they had to such events. Some of them practiced ahead of time. They argued about the rules. The designer types among them designed special airplanes for these special events. Look at the ads for Fun-Fly airplanes these days. They look ridiculous and they fly even more ridiculously. They are specialized to the extreme. Are Fun-Flys still fun? For those interested in that type of competition, yes, but they are no longer the relaxed meeting of a group of guys who just wanted to fly together. The so-called "Fun-Fly" is now just as competitive as any other contest.

Recognizing that competitive people are sometimes disliked, especially by those who can't beat them, I want you to know that I don't have a competitive bone in my body. I do have a shelf full of trophies, including a national championship and a 1st place in an international competition in Europe, but that was a long time ago. These days I'm a pussycat—or am I?

I am no longer interested in contests (partly because I'm not a top-notch flier, and I suffer from the slower reflexes of age). I'm also no longer interested in building beautiful scale airplanes and entering them in shows (partly because I'm old and lazy, and because I never was good at finishing). However, I have to admit that I am still a very competitive guy.

My competition these days is more mental than physical. I love to write this column and show off what I know (unfortunately, I sometimes show off what I *don't* know). I enjoy a good technical argument. We talked about

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the "windmill sailing cart" in this column a year or two back. The disagreements as to whether it could work or not produced mental competition of the first order, and I really loved the competitive debates I had with some of you on it.

We may not lose our competitive spirit with age, but the types of competition that give us satisfaction change with age. In my own case I realize that at least one reason I love to design and build is that I am competing with myself and with other designers—trying to make better airplanes than either I or they have built before.

I'm also competing with nature and the passage of time. One of Murphy's laws says, "The things that can go wrong will," but I take exception to that law. I'm competing with Murphy to keep that from happening as much as I can. When something difficult goes right for me, I win a point over Murphy. As I get older I also compete with Father Time to do as much as I can and to do the best I can with what I have left. Murphy and Father Time are going to win in the end, but my competitive spirit permits me to ignore that fact.

G-LOADS

Previously in MD&TS we have talked about how strong the wings on our models need to be in terms of Gs or load factors. I recently received a technical paper from engineer Jim Stevens, titled *Predictions of G-Loads*. It is an interesting piece of work. Jim is a frequent correspondent of this column and has been a visitor to MD&TS headquarters in the Seattle area. His article points out certain errors in conventional thinking on load factors and he is of the opinion that some modelers overdesign (and therefore create overweight models) as a result.

Jim contends that the formulas conventionally used to compute G-loads at the bottom of a pullout can give unrealistic values because they omit consideration of the constraints imposed by the aerodynamic characteristics of the model and the time required to execute the maneuver. With the help of W.L. Gray, a retired Boeing engineer, he has produced a number of formulas and a comprehensive chart which shows the relationship between G-loads, pullout entry speeds, pullout radii, execution times, and wing loading/lift characteristics. I considered publishing the chart, but decided against it because it would be of little use or interest to less-technical modelers. However, those who do have an interest in the subject can obtain the data from Jim Stevens, 12937 19th Ave., White Rock B.C. V4A 8P2, Canada.

He states a couple of facts in the article which I found surprising. In a perfectly circular loop, with the plane just making it over the top (zero G at the top), and neglecting any thrust and aerodynamic drag on the way down, the load will be exactly 6 Gs at the bottom of the loop (including the 1 G of

ADVERTISER INDEX

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gravity) regardless of the radius.

His other observation is that immediately after a stall, if the initial velocity is zero and the nose is straight down, again neglecting drag and thrust, the pullout would be exactly 3 Gs at the bottom when level flight is reached, again regardless of the radius.

I checked the math. It is true. The independence from pullout radius in these special cases results from the fact that here the velocity is proportional to the radius, since gravity is the only energy source. In the general case, however, the G-force due to centrifugal force is proportional to the square of the velocity and inversely proportional to the radius.

Jim's conclusions are that with no aerobatics, we need a load factor of 4-5 (a wing stressed for 4 or 5 Gs), for mild aerobatics 6-8, and for wild aerobatics, 9-11. Design and build that way and your wings won't buckle and you won't be carrying around excessive weight in the structure.

Remember that, in theory, under pure conditions, you can't loop at less than 6 Gs or recover from a whip stall with less than 3 Gs. Don't do aerobatics with a wing that wasn't designed for it. May your wings be with you.

PARTING WORDS

Smart is believing only half of what we read; brilliant is knowing which half to believe. ***MB***

CONTROL LINE *continued from page 36*

Ave. W., No. A101, Lynnwood, WA 98036. If there's a sufficient expression of reader interest, future editions of this column may contain more of Orin's "basic carrier" series, which goes into considerable detail.

For still more information on Navy Carrier model aviation, join the Navy Carrier Society. Dues are $6 per year and can be sent to secretary-treasurer Bill Bischoff, 7550 Christie Lane, Dallas, TX 75249.

As mentioned above, Orin Humphries and John Hall are the first official appointees to our Panel of Experts. In reality, however, we have frequently called on fliers with knowledge beyond your columnist's expertise to provide technical information, often in response to questions received from readers. We'll be doing that in a number of upcoming columns.

The "how to get started" series will continue later this year with a contribution from Panel of Experts member Mike Hazel on getting started in speed. Again, with some expression of reader interest, it may be time to return to topics covered earlier on racing, stunt and combat.

Another column coming up soon will feature a discussion by Don McClave on precision aerobatics design parameters. Longtime readers will recall Don's excellent discussion of Old Time Stunt in a past issue.

• • •

The featured newsletter this month is a new one that showed up in the mailbag during 1992: *The Wire Flyer,* published monthly by the Central Florida Control Line Association.

Editor Bob Jones assembles a wide-ranging variety of national and club news, technical tips and how-to articles. There's a contest calendar, classified ads, contest flyers, pictures of airplanes, rules for local events, etc. The July 1992 edition features notes on some canard stunt planes built by Bob Jones.

Florida fliers interested in joining the CFCLA may want to drop in on the club's meetings on the last Tuesday of each month at 7:30 p.m. at Neff Machinery, 4333 John Young Parkway, Orlando. It's suggested that people planning to attend call a club officer to verify the time and location.

The club's president is Larry Barickman, vice-president is Tom Rounds, secretary is Rick Jones, treasurer is Jim Mitchell. Contact Editor Bob Jones at (407) 699-4183.

As always, technical tips, club news, contest information and photos are welcomed. Write John Thompson, 1145 Birch Ave., Cottage Grove, OR 97424. When sending correspondence that requires a personal response, please include a self-addressed, stamped envelope. ***MB***

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ELECTRONICS *continued from page 17*

regenerative speed controls and switching power supplies, both highly efficient units in their own rights, have been successfully married into this welcome application.

Within the block diagram, we see first a high-output microphone, whose output is coupled to a voltage-quadrupling DC rectifier. This output is then fed into an inverter, which generates AC pulses of a length and rate as determined by the companion Pulse Width Modulator (PWM) generator. Following that is a transformer/rectifier, designed to deliver the required level of DC, followed by a voltage regulator and filter. To control the recharging current as required by the battery, a Demand Sensor drives the PWM Control, whose output is coupled back to and adjusts the output of the PWM Generator. Thus, not only does the APR-1 recharge the airborne NiCd battery, it senses the battery's state of charge and varies the rate necessary to keep the battery at no less than 80% capacity.

Why 80%? Why not 100%? Well, the designers claim that this value is readily attainable with currently available components and technology at reasonable cost, and that maintaining a higher charge level, at increased cost, does not seem at all advantageous. Assuming that the engine is running most of the time you are in the air, the battery charge will never drop below the 80% level; most of our flying is done with far less capacity than that. It is also obvious that we no longer have to equip those large multi-servo airplanes with larger batteries; the garden variety 500-mAH units, aided by an APR-1, will provide more than enough electrical power in one day for even the most active flier.

This is all well and good for the nitro-burners, but, some will ask, "What about the rest of us, the electric and soaring crowd?" Patience, my flying friends. Future models of the APR-1 that will take care of your power requirements are claimed to be currently under development. As in most cases, such electronic breakthrough devices are built around existing components, until the concept is proven and the market is established. At that time, the maker is able to design to greater efficiency around special and proprietary components. We have all heard the "swooshing" sound made by a glider, and electric-powered planes definitely make noise, even though it is only a fraction of that made by even a small engine-driven plane. For those applications, a special microphone is being developed that will produce a greater output at the frequency of these noises, and all of the electronics are supposedly being compressed into a single proprietary integrated circuit. The possibilities are almost endless, with the ultimate, not considered impossible, being a completely self-contained powered unit with the only battery involved being more like the memory-retention units now used in computers and other microprocessor-controlled devices.

An APR-1 to power an electric model? Again, the third generation being considered seems to point in that direction. The only negative now seen is that a small noisemaker might have to he incorporated in the model; a simple fixed plastic tab touched by another prop-mounted tab as they rotate would suffice. The frequency could be adjusted to be outside the range of human hearing if necessary, but actually an infinitesimal amount of noise seems like a small price to pay for unlimited electric powered flying, doesn't it? Sure beats what we have now.

Price? Surprisingly low. For that and for all currently available information about the APR-1 and all future developments, please contact Team APR-1 Electronics—see their ad on page 81 of this issue! ***MB***

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"Tadpole" courtesy of Joe Gerber

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NARROW BAND

[Not Shown: 7UAFS Narrow Band FM]

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