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**REVIEWS:
KALT'S
'WHISPER'**

**RCD'S APOLLO
20 SERVO**



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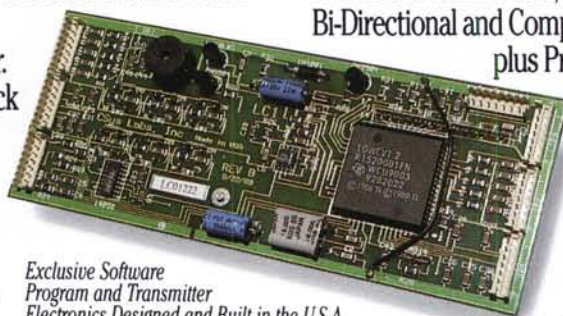
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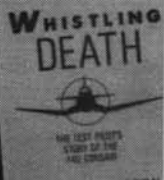
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898 West Sixteenth Street • Newport Beach, CA 92663
714/ 645-8830

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ON THE COVER

The huge RC blimp belongs to Hiroyuki Oki, president of Kalt Sangyo Co., Ltd., and Mt. Fuji in the background belongs to Japan! More info on Oki's blimp will be found in this month's "Workbench" column. See page 4. Inset, Kalt Whisper Electric, see page 36.



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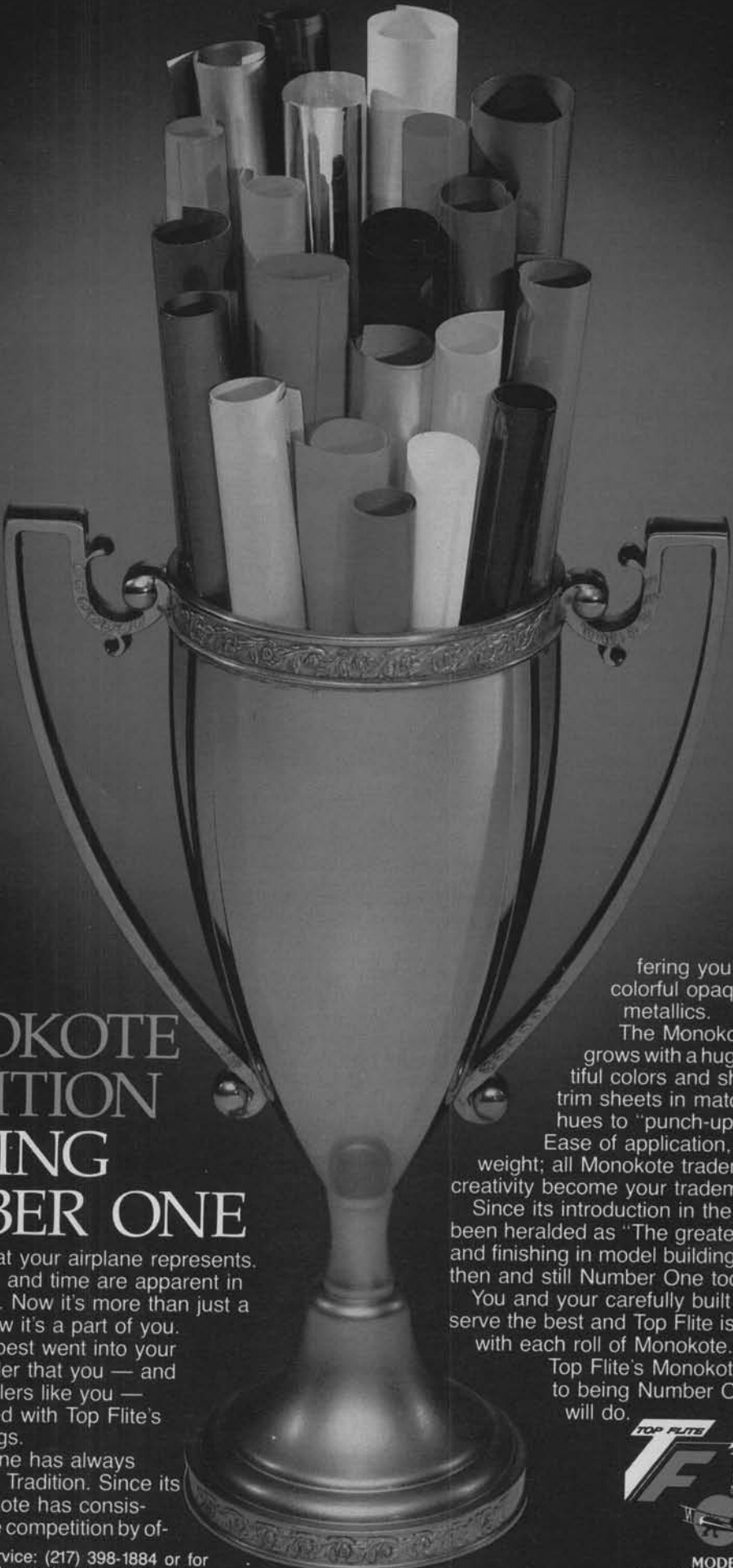
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MODEL BUILDER (ISSN 0194 7079) is published monthly by RCMB INC., 898 W. 16th St., Newport Beach, California 92663. Phone (714) 645-8830. Subscriptions: \$25.00 per year, \$47.00 for two years. Subscriptions outside the US (except APO & FPO) \$38.00 for one year, \$68.00 for two years. All payments must be in US funds, drawn on a US bank. Copyright 1991 by RCMB Inc. All rights reserved. Reproduction without permission prohibited. Change of address notices must be received six weeks before date of issue that new address takes effect. Send old address with new ... old label preferred. Duplicate issues cannot be sent. Postmaster send address changes to Model Builder, 898 W. 16th St., Newport Beach, California 92663. Second class postage paid at Newport Beach, California, and additional offices.



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BILL NORTHROP'S WORKBENCH

THAT COVER BLIMP!

The radio controlled blimp on the cover, with Japan's Mount Fuji in the background, belongs to our good friend Hiroyuki Oki, well-known model hobby industrialist and President of Kalt Sangyo Co., Ltd., Shizuoka, Japan. Kalt produces a first rate line of RC helicopters, the latest of which is the revolutionary electric powered and appropriately named "Whisper." A two-part review of the Whisper, built, tested, and written up by our helicopter columnist, James Wang, begins in this issue. Kalt helicopters are imported and distributed in the United States by Hobby Dynamics Distributors, Champaign, Illinois.

Oki's blimp is typical of his doing everything in a big way. It is 56 feet long, 12 feet in diameter, and weighs 200 pounds without helium. With a lifting power of 245 pounds, it is able to carry a 33-1/2 pound payload. Its two 62cc engines develop 2-1/2 hp each, and move the blimp along at a cruising speed of 16 mph, and a maximum speed of 37 mph. It can be safely flown and controlled in winds up to 13 mph. The directional control system, similar to the smaller Peck-Polymers blimp, is accomplished by horizontal and vertical rotation of the engines' thrust lines. We wonder if Oki built a hangar for the blimp so he doesn't have to deflate it after a flying session!

PUTT-PUTT PLANS?

Back in the September 1989 "Workbench" column, I put out a plea to help me recall the name of a twin-ruddered cabin rubber

A bit of tongue-in-cheek at the Toledo RC Exposition. Mike Barbee, Columbus, Ohio, showed his "Pattern Bat Super," with 36-inch span and powered by a Super Tigre 4500.



The new Polk's/Aristocraft radio system allows you to scan the 72 mHz band for a vacant frequency before turning on the transmitter. Safer and convenient for both the operator and others at the flying field. Channel 38 seems to be clear. See "What's Really New" in text.

powered model that I built from a Burd kit and flew back in the mid-thirties. It was subsequently identified by quite a few readers as the "Putt-Putt," aptly named for the mechanical device that you could install to make the model sound like it was gas powered, as the rubber motor unwound. In the November 1989 issue, I published an illus-

Although it's RC, this Anderson Pylon, covered in orange silk and finished with clear and white dope, Forster 99 powered, was a welcome and authentic sight in the Old Timer section at Toledo. By Joe Schooley, Taylor, Michigan.



tration of the Putt-Putt that was used in the old Burd ads, and asked if anyone might have the plans. No luck so far, so I'm trying again. Sure would like to find a copy of the plan for that old Burd "Putt-Putt." Can anyone dig it up?

"DIVE BOMBER"

Not long ago we were fortunate enough to catch a favorite old aviation movie on TV just in time to punch the "Record" button on our VCR as the movie was about to start on Ted Turner's TNT channel. The movie was "Dive Bomber," in original Technicolor, and filmed for the most part at San Diego's North Island Naval Air Station in about 1939-1940. It starred Errol Flynn, Fred MacMurray, and Ralph Bellamy, along with a whole flock of mouth-watering naval aircraft in all the gorgeous pre-WW II colorful paint jobs and markings, including Navy N3N trainers, Douglas Devastators, Grumman F3F biplanes, Curtiss SBC3s and 4s, and others.

It was a story about medical studies involving the effects of dive bombing and g-forces on the pilots during pull-outs in which

momentary blackouts were considered a normal hazard. Ralph Bellamy was the chief flight surgeon whose health had forced him to give up flying and concentrate on lab research, while Errol Flynn was the young doctor who had just been assigned to North Island and was soon to take flying lessons so he could become a full-fledged flight surgeon. Fred MacMurray was the hot-shot Navy pilot who, at least for the first half of the film, figured doctors had no business telling a flier what he needed to know about his health.

Hollywood managed to stick pretty close to the subject, with no love story to clutter up the plot, which was mostly a documentary on the early development of pressure suits. But what would have today's Surgeon General alternately laughing up his sleeve and climbing the walls was the incessant passing around and lighting up of cigarettes, that took place almost without exception in every scene, whether in the lab, in the cocktail lounge, in the pilots ready room, just before getting into or just after getting out of an airplane, in the midst of conferences, and comically, whenever the discussion became serious about health hazards. And what typical Hollywood movie didn't have a scene where the dying warrior/soldier/flier took a puff on a cigarette with his last gasp before going to the Great Beyond? You'd almost swear the film had been produced by Reynolds Tobacco Company instead of MGM!

Oh well, those great aviation scenes of real live Golden Era military aircraft made up for all the smokey atmosphere!

WHAT'S REALLY NEW?

Whenever we return from the Grand Daddy of them all, the Toledo RC Exposition, we're usually asked the question, "What's new?" And that always brings up another question in *our* alleged mind . . . how can a product be new *and* improved? This is a much overused phrase in the advertising world that makes little sense to me. If a product is *new*, it has not previously been available for purchase. However, if it is improved, then it must have been available previously or there couldn't be anything to improve upon! Therefore, a given product could be *new*, or it could be *improved*, but it could not be both *new and improved*. Quod erat demonstrandum (Q.E.D.)! Anyway, maybe there is nothing new in this world, as it has been said many times . . . in which case, everything must be an improvement on something that already exists (It's getting late!).

OK, so the *nearest thing* to being something new at the 37th Toledo RC Exposition would have to be the Polk's/Aristocraft "Valiant 8" RC system. Heaven help us when it comes to talking modern-day radio control electronics, but the first modeler to show up with one of these systems at his club's flying field is going to be real popular, because, in effect, he'll be bringing with him a very small but effective 72 mHz frequency monitor, and everyone intending to fly is

continued on page 7



ADVICE FOR THE PROPWORN— BY JAKE

Dear Jake:

The America's Cup Yacht Race is coming up in 1992, and the Australians are already hiding their new boat's keel behind canvas tarps and armed guards. So what big secret is hidden in the Aussie keel this time?

Maritimer in Monterey

Dear Maritimer:

A small turbine engine and a propeller.
Jake

• • •

Dear Jake:

I understand that at a Dear Jake Look-Alike contest held this year in Petaluma, CA, first prize was awarded to a horse. Well, actually, half a horse. Do you happen to know which half of the horse looked enough like you to take home the trophy?

Steve in Pensacola, FL

Dear Steve:

As a matter of fact, they sent me pictures of the winner. It was the horse's left half.
Jake

• • •

Dear Jake:

I'm a part-time surfer, part-time RC glider guider from southern California. One of my favorite hang-outs is Torrey Pines near San Diego. The slope soaring there is world class, and the nude beach down below never fails to provide some breathtaking scenery.

I haul my boards and my sailplanes around in an old VW Bug. The ride pretty small compared to the cargo, so there's always a board or a wing sticking out of every window.

An onshore breeze was up a couple of weekends ago. Bad for waves, good for slope lift, so I headed out to the cliff-top glider site. The wind was perfect, brisk and steady. I was enjoying a long flight with my Sea-Ray, when my Beetle rolled past me and over the cliff's edge. Guess I must've forgot to set the brake.

Anyway, with all those wings and surf boards sticking out everywhere, my VW caught the updraft and soared away down the coast toward Mexico. Bummed me out. I mean everybody knows that VW's float, but who would have thought they could fly?

Couple days ago, a shrimp fisherman from down on the Baja calls me up. Says he traced my name from my license plates and tells me my Bug is sitting on a rock about twenty miles offshore from Culiacan. There's three families of pelicans living in it and the Mexican government is getting ready to declare it a wildlife preserve.

Even if I could get it away from the Mexican conservationists, I don't think I'd want it

back with three weeks worth of pelican guano inside and out.

Got any suggestions?

Blaine in Del Mar

Dear Blaine:

Get yourself a Buick woody wagon from the forties. It will have a lot more room for your stuff, and even if you cover it with wings, fill it full of helium, and drive it over the mouth of an exploding volcano, I guarantee you the gravity guzzler won't fly.
Jake

• • •

Dear Jake:

I read in the newspaper that airports try to maintain a three mile separation between aircraft due to something called "wake turbulence." What is wake turbulence?

Brad in Butler, PA

Dear Brad:

Wake turbulence is an atmospheric disturbance that is encountered if you follow too closely behind an Irish funeral.
Jake

• • •

Dear Jake:

Been doing any air traveling, lately? You always seem to have some pretty caustic comments about the quality of service in the friendly skies.

Why don't you ride the train, like John Madden?

Business Flyer in the Big Apple

Dear Business Flyer:

John Madden rides around in a bus, not a train, complete with driver, personal staff, and a cook. Maybe two cooks, from the size of him. But I can't wave my hands and talk about running backs looking out through their helmet earholes after a good tackle, so I have to put up with the airlines.

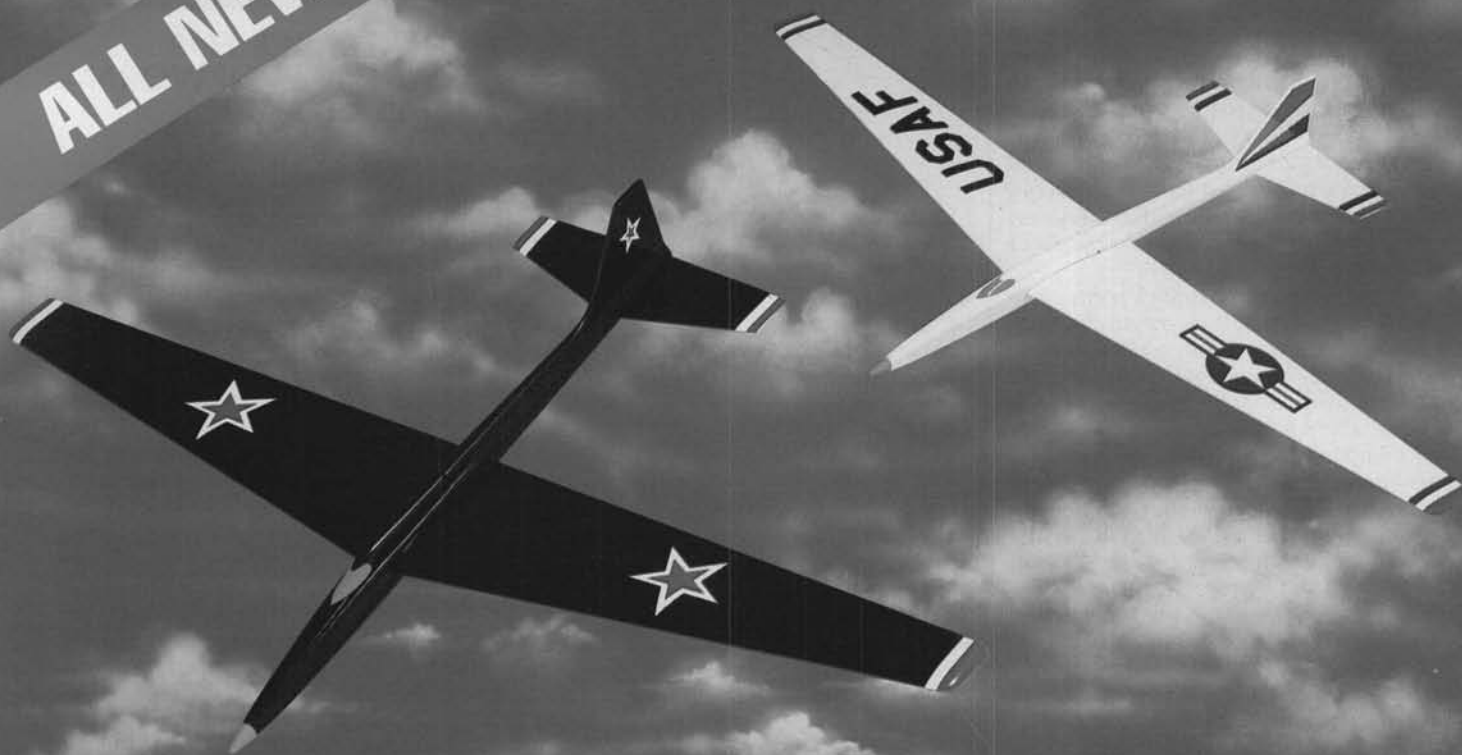
My most recent trip was on a 757. Do you know how the 7-5-7 got its name? It comes from the idea of cramming 75 people into a space that would hold 57 people comfortably. 75 is also the Brinell hardness rating of the seats, and 57 is the number of different names they have for the same omelet.

My flight was lovely. They charged me four dollars for a piece of hose so I could connect my "free" headset to my seat's audio panel. The four bucks was to watch the movie. I told them I didn't want to watch the movie, just listen to the music on the other channels. Turns out it was also four bucks to not watch the movie. Wound up being a bargain, though. They showed Rocky VII. It was well worth four bucks not to watch it.

Nice meal, too. Something yellow, some-

continued on page 7

ALL NEW



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- 37 inch fuselage length
- Semi-symmetrical airfoil
- Wingeron/Pitcheron
 - Fight weight from 20 oz.
 - 2 channel radio system

- Rubber nose cone
 - Protective carrying case
 - Electronic control mixing
 - Replacement parts
- Just charge the batteries and you are ready to fly.

To place an order or more information, please call or write to:

R. C. Products 7044 Arlington Ave.,
Riverside, CA 92503 (714) 351-9715

For a demonstration video, send check or money order for \$15.00 to: R. C. Products 7044 Arlington Ave., Riverside, CA 92503. In CA, add 6 1/2% sales tax. Include name, address, city, state and zip code. Allow 6-8 weeks for delivery.

WORKBENCH *Continued from page 5*

gonna want to know what frequencies, or AMA channels, are busy at any given moment. He'll be so busy he'll be damn lucky to get to fly! Read on.

At first appearance, the Valiant 8 RC system seems to be just another two-stick transmitter, receiver, servos, and battery/switch harness radio set. But... the transmitter and receiver have no crystals... it's synthesised (say that with a mouth full of dry crackers!). Alright, all you characters in the back of the room who were diddling with RC back when Kraft Systems came out with the synthesized transmitter. The Kraft radio was immediately dubbed the "dial-a-crash" system by the usual alarmists who couldn't think beyond their very stubby noses. They envisioned a transmitter that could be turned on and dialed through all the available frequencies of the time, shooting everything down that came in range. It couldn't. But the real problem was that for each and every frequency you could call up on the transmitter, you had to have a different crystal equipped receiver to pick up the signal.

As we said, the Valiant looks just like any other radio set, except for one little cord about three feet long, with a small connector plug on each end. You plug one end of this cord into a jack that is wired into the airborne harness and mounted on the side of your model. The other end is plugged into the transmitter. When you do this, the RF portion of the transmitter circuitry is cut off, i.e., if you turn on the transmitter, no radio signal goes out. Also, the system is now in the scanning mode, and whatever frequency it happened to be last programmed for will be first indicated on the transmitter screen. Let's say it's channel 38. The screen will indicate that channel, and if the frequency is not in use, everything is calm. However, if the frequency is in use, if another transmitter is putting out a signal on that frequency, or channel, an L.E.D. on the Valiant transmitter will begin flashing, accompanied by an audible buzzer beeping intermittently. In other words, "the line is busy!" If it's busy, you move a transmitter control stick up or down to go through the channel numbers.

When you're done checking, you know what channels are open and which ones are occupied. Go to the frequency pin board and make your selection or find out who has your favorite frequency... if you really must have it. By the way, if you happen to pull the plug in your transmitter when it's tuned to an occupied frequency, you'll find that it's automatically locked out... you can't inadvertently shoot someone down!

When you have dialed... oops, shouldn't really use that word... when you have selected the frequency you want, and have the pin in your possession, you can pull the connecting cord plugs from the transmitter and receiver. Both have been electronically programmed to the frequency of the pin you now have clipped to your tranny antenna, and you can go about your flying.

Incidentally, hobby dealers are going to love this radio. When it comes to stocking, if they have 10 radios, they'll in effect have 500 frequencies available for their customers. You know... 50 channels per radio, times 10 radios. What could be more accommodating for customers... and more convenient for dealers?

By the way, the radio is scheduled to be available around Labor Day, and we'll have a more technical description of it for you as soon as possible. The icing on the cake is that the price will list in the \$350 category. Later versions will include capability for

programming and storing several aircraft trim settings, plus other bells and whistles. But for now, the main objective is to get this interesting concept into the hands of the average modeler as soon as possible.

Oh, and if you're that first guy in the club to own one, everybody's gonna offer you a free ride to the field, as long as you bring your Valiant. Then you can just sit there and scan frequencies so everyone else can fly without interference! Isn't it nice to be so popular?

MB

DEAR JAKE *Continued from page 5*

thing brown, some long-deceased lettuce, and a square of generic cake (also available in 57 different names). But at least it was a hot meal. The butter, the salad dressing, and the plastic flatware were all nicely heated.

But enough. I probably was just in a bad mood. Maybe it was because my seat had been assigned to two other people by the infallible computer. I'm sure my sour experiences are just random bad luck, and that the majority of airline passengers just revel in the delight of their airborne adventures.

In fact, how about writing me with your accounts of those pleasurable air junkets that always seem to elude me? I bet it will change my mind about air travel entirely.

Jake **MB**

1300 R/C BLIMP	FUN TO FLY	RUBBER POWER KITS-SUPPLIES	
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2-3 CH	2-3 CH	LACY	300 PLANS, TISSUE, MANY MORE KITS, CO2 ENGINES,
2-3 CH	2-3 CH	COUGER	HUNGERFORD SILK & STEEL SPOKED WHEELS
2-3 CH	2-3 CH	COMPLETE CATALOG \$2.00	COMPLETE CATALOG \$2.00
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OVER THE COUNTER



The Diabolo from Hostetler Plans.



The Field Box ESV, by Astrodata.

The Heli-Pad, from Image Products, Inc.



Wendell Hostetler's Plans, 1041 Heatherwood Lane, Orrville, OH 44667, phone (216) 682-8896, announces release of its latest design, the "Diabolo." The model, and plans, are at 35% scale, which results in the following specifications; span, 97 inches, length 75 inches, wing area 1515 sq. in., weight 18 to 21 pounds, and power to be four to six hp.

In addition to the plans, the following accessories are available; cowl, windshield, dural landing gear, decals, and custom kits.

The plans are on two 42 by 100-inch sheets, and include a special three-view sheet. The price for the plans is \$29.50 plus \$3.50 shipping in the USA. Send an S.A.S.E. for list of additional plans and information.

• • •

Following up on the very successful BATgraph on-board Expanded Scale Voltmeter (ESV), James L. Wardrope Astrodata, 421 S.W. Blakely Court, Bend, Oregon

97702, phones (503) 389-2359 and (800) 323-5492, is following up with the "Field Box ESV." This unit is similar in operation to the on-board ESV, but also includes a voltage/load-capacity relationship with a push-to-test (P.T.T.) switch. In order to accurately monitor your flight battery from the charge connector on your receiver's wiring harness, a load is required to emulate your servos' current draw. Of course, the on-board BATgraph unit is reading conditions under the actual servo load. Calibration of the Field Box ESV is made at 4.75, and three different simulating loads are available: 175 ma, 250 ma, and 450 ma. Free info sheets are available. The introductory price of the Field Box ESV is \$29.95 plus \$2.00 shipping and handling. Check your hobby dealer first, or order direct using the 800 number.

• • •

Hobby Lobby International is right on stream with the latest sales tool; VHS video tapes of their latest kit models in action, along with close-up looks at the kits, motors, props, batteries, and speed controls. Airplane flights are kept close to the ground for better viewing of flight characteristics. The video tapes are \$9.00 each, full price, no additional handling or shipping charges added. They can be kept, or returned when you're through with them for a credit of \$6.00 each.

Video 1 includes the "Uhu," "Elektro Junior ARF," and the "Pink."

Video 2 includes the "Sunfly," the "Race Rat," and the "High Speed."

Video 3 includes the "Freshman" and "Graduate."

Video 4 includes the following race boats; "Key West," "Systems," and "Cobra."

Order any or all of these tapes by phone, on your credit card, (615) 373-1444, or write to Hobby Lobby at 5614 Franklin Pike Circle, Brentwood, TN 37027, and be sure to mention that your read about them in *Model Builder*.

• • •

The 21st century is still a little over eight years away, but Coverite, 420 Babylon Rd., Horsham, PA 19044, phone (215) 672-6720, FAX (215) 672-9801, is getting ready for it now, with three new products that you'll be quite used to by the time the year 2000 comes around; 21st Century Paint (Tm), 21st Century Film (Tm), and 21st Century Fabric (Tm).

The paint is fuelproof overnight; can be recoated in as little as 30 seconds; is totally pick-it-up dry in 15 minutes; virtually run-proof because of the patented Spraygun nozzle; extremely flexible; and insensitive to hot, cold, or humid weather.

The covering film has a broad temperature range, and can be stuck down at temperatures under 200 degrees, and up to 400 without burning; the advanced polyester film is flexible, allowing attachment to small compound curves; can be repositioned without separation of the adhesive coating;

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.

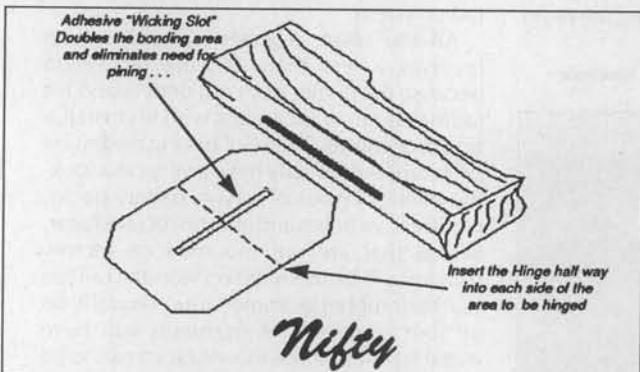


The P-51-1A by Bell Model Aircraft Co.



JARMAC's Tilt Arbor 4" Table Saw.

Duane Cole's Clipped Wing Taylorcraft, from Bell Model Aircraft Co.



Nifty Hinge from Sonic-Tronics.

shines like a high-gloss paint job, but doesn't look like plastic; sticks well to wood and itself; and is unaffected by glow, diesel, or gasoline fuels.

The iron-on, pre-painted fabric covering material adheres well to wood and to itself; goes around curves and wing tips without wrinkles; can be repositioned without adhesive coat separation; is lightweight and thin; can be trimmed with itself, paint, or decals, without any surface preparation; requires no protective coating from glow, diesel, or gasoline fuels; and shrinks extremely well.

Short of creating a covering material that will jump on an airframe, stick itself down, then trim and shrink itself, all upon voice command, it would appear that Coverite has the situation well in hand!

Announced as a must for RC helicopter enthusiasts, Image Products, P.O. Box 566125, Dallas, TX 75356, phones (214) 699-1234 or (800) 448-3488, offers the Heli-Pad. This is a multi-purpose pad with a 20-inch square magnetic surface to prevent loss of small metal parts while working on your chopper. It also acts as a starting pad, to keep the helicopter dirt and scratch-free at the flying field, and it can also be used as a reference point for practicing autos and hovering, etc. because of its fluorescent orange finish. It is lightweight, durable, has a non-slip backing, and accommodates up to 60-size helicopters. Price is \$14.95 plus \$3.50 shipping and handling.

JARMAC Inc., P.O. Box 2785, Springfield, IL 62708, phone (217) 789-7290, producers of bench-top power tools for the hobbyist, has introduced a modified version of its Four-Inch Tilt Arbor Table Saw. This version includes a four-inch fine-tooth blade with support cup washers. In addition to leaving a smooth, clean edge on wood, it will also cut non-ferrous metals, such as that used in stained glass projects. Contact JARMAC for more information, and tell them where you read about it!

Lake Hobbies in San Marcos, California, really started something a few years ago, with its unique control surface hinge material that is glued in place with thin cyanoacrylate and is virtually impossible to pull apart. Production and sales of the "Easy Hinge," as it is called, was taken over by Sig Mfg. Co. Since then, several companies have come up with other versions of the hinge. One of the most successful has been the "Nifty Hinge" as produced and marketed by Sonic-Tronics Inc., 7865 Mill Road, Elkins Park, PA 19117, phone (215) 635-6520, FAX (215) 635-4951. In fact, the Nifty Hinge has been chosen by numerous model aircraft kit manufacturers to be part of the hardware package included with their RC kits.

Special features of the Nifty Hinge, and also the latest "Nifty Lite" hinge, include the "wicking slot," which provides an easy

application point for the thin CA glue and also provides a locking effect on the hinge for even more strength and eliminates the need for pinning. The other feature is the beveled corners of the hinge, which make it easier to insert in the slot you have cut for it . . . particularly when you're trying to assemble a stab and elevator with six or eight hinges to match up with the slots!

For more information on the Nifty and Nifty Lite hinges, contact Hank at Sonic-Tronics and tell him we sent ya!

Bell Model Aircraft Co., 650 Pine Crest Drive, Largo, Florida 34640, phone (813) 584-4003, is a relatively new company offering free flight rubber scale kits and plans. The kits are designed for the discriminating builder, and include contest balsa, molded canopies, plastic prop, all hardware, lightweight tissue, complete decal sets, and of course, detailed plans with instructions and documentation. Most of the 20 plans currently available are of WW II aircraft, including the rare North American P-51H Mustang. Spans for fighters are in the 20 to 24-inch span range, while the B-17G is 45-3/8 inches. Scales vary. The catalog is available for \$1.50 postpaid.

Two of the newest kits include Duane Cole's Clipped Wing Taylorcraft at 29-1/2 inch span, and the North American P-51-1A Mustang, at 23-5/8 inch span. These kits retail for \$24.95 and \$21.95 respectively, plus shipping.

MB

BE GOOD TO YOUR RADIO!

Last month you were advised to visit the local flying field so that you could observe the radio systems that are providing the best service. Generally speaking, that is good advice. However, the manner in which equipment is used is of

equal importance.

A trip to the local flying field will allow you to observe air-frame interiors before and after flying sessions, and an opportunity to determine how the radio systems are being used or abused. If the person using the radio

system has not read the operating instructions through several times, nor thoroughly understood them, there is a good possibility that the system is being abused or that the owner is not receiving full benefit from the radio system.

All too often, a superior radio system receives a less than glowing reputation because the owner does not understand his radio system, or is careless with his installation procedures. The pilot having the fewest problems will usually have a very neat looking interior layout of servos, battery packs, receivers, switches and other associated gear. Servos that are not mounted on factory mounts will be mounted on wooden rails so that their rubber grommets touch equally on all four corners. The grommets will have metal ferrules for the mounting screws to go through. The screws will have a washer under the head. The servo cases will not touch the rails, but will have at least one thirty-second of an inch clearance at each end between case and rail. Servo leads should be protected from sharp edges or other areas that could lead to premature wear.

If you have cycled your batteries and used an E.S.V. to check them, but failed to wrap them in at least one-half inch of good quality foam rubber, then you may expect problems. S.R. Batteries is the only manufacturer that has the internal connections of their batteries welded. All batteries should be wrapped in at least one-half inch of good quality foam, particularly if the internal connections are not welded. The receiver should also be wrapped in one-half inch

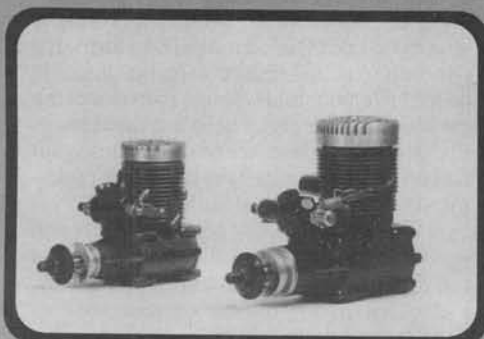
Walt Ryrick's "Rode Runner," from a Fun Fly kit, has an R.C.D. receiver that has an entire flawless flying season under its belt. Walt's big smile tells the whole story.



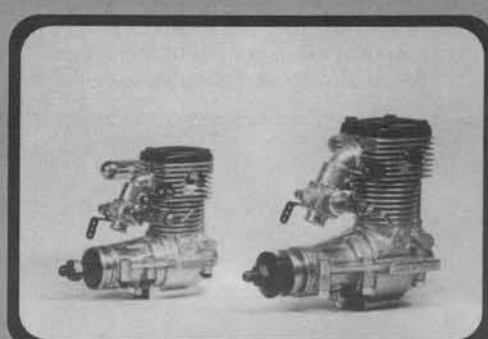
A Pa-12 Super Cruiser makes a very nice first giant scale subject. This one is powered by a Saito 90 twin, and has an 85-inch wing span. Photo by Walt Ryrick.



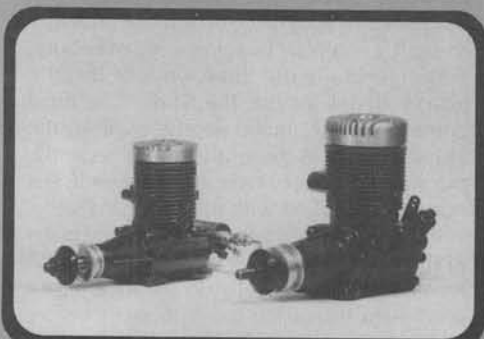
ULTRA PRECISION, HIGH PERFORMANCE ENGINES FROM AUSTRIA



40 & 61 Front intake Gold Cup



VT 21 & 49 Four Cycle

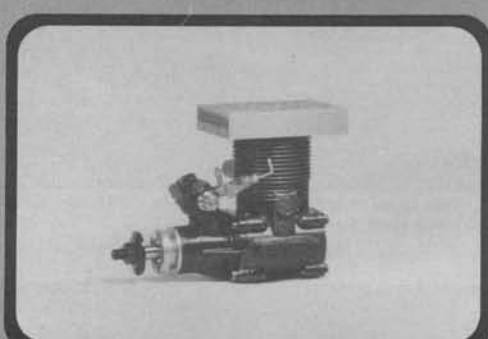


40 & 61 Rear intake Gold Cup

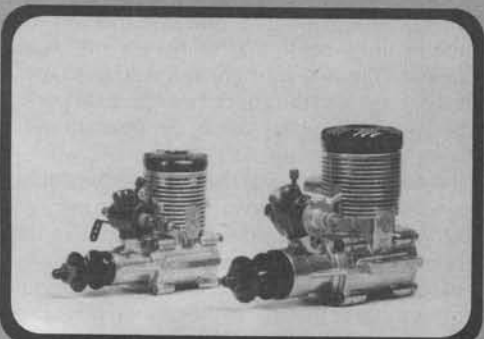
HP is well known for their ultra high quality and design innovations. A leader of model engine technology since the mid 1960's, they pioneered Schnuerle porting and rotary four cycle valves.

HP engines are produced with the latest computer controlled machinery and the finest materials available assuring you of unsurpassed quality. All engines feature hardened steel crankshafts supported by dual ball bearings, true hard chrome cylinder bores, low expansion cast pistons, forged con rods bushed at both ends, and high pressure alloy case castings.

The Gold Cup series have a special black "thermex" coating to dissipate heat and are available in both ABC and ringed versions. Silver Stars are available ringed only. Of course both are Schnuerle ported.



61 Front intake Gold Cup Heli



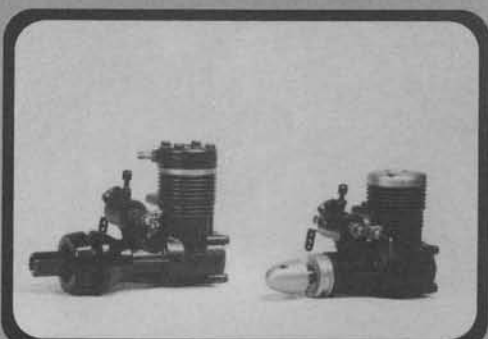
40 & 61 Front intake Silver Star

The VT series of four cycles feature overhead rotary valves for smooth, quiet, trouble free operation. This ABC valving is supported by roller bearings never requires adjustment. With no valve float or valve spring tension to overcome you get more power and RPM's.

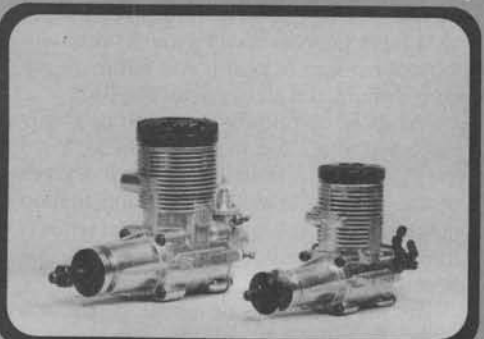
HP is American owned by R/L Industries, so parts, service and technical assistance are just a phone call away with the owners of the factory, not just an importer or distributor.



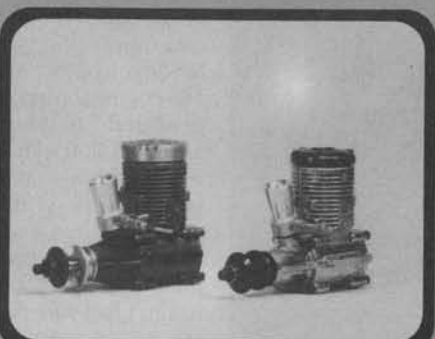
**HIGH PERFORMANCE
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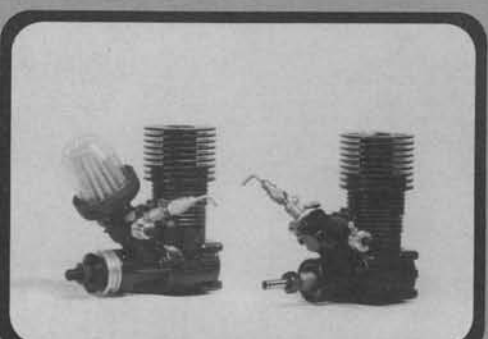
20 Gold Cup Marine & Aero



40 & 61 Rear intake Silver Star



40 GC & SS Control line



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minimum of good quality foam rubber. The receiver case should not touch any part of the air frame. The antenna should be routed away from all other electrical leads, a vertical mount is ideal, but often impractical.

The great majority of radio systems are

still using the popular Noble switch to activate their systems. Du-Bro, Rocket City, and several other companies make practical holders for these switches. I thought that was it for switches, until I bought my Multiplex radio system. The Multiplex system is supplied with an excellent switch and harness that has an integral charge hook up, which makes a very neat exterior appearance.

Modern radio sets of good quality will give years of excellent service if we just add a little care and learn to read the provided instructions until we understand them.

One of our local pattern flyers, who is planning to use larger size planes for his competition machines, purchased a new O.S. BGX-1. The fellow was complaining that he could not get the engine to turn up and run smoothly. A week or so later I was talking on the phone with Dave Abbe, Hi-Tec chief engineer, mentor, and all around good fellow, when the subject of the O.S. engine came up. I related the pattern flier's tale of woe. Dave informed me that he has learned that the BGX-1 should not be operated with too much oil in the fuel; twelve percent oil is optimum. The engine is not designed for high rpm, but is designed for larger propellers. The engine should be propped to turn around 8,000 rpm. It would seem that if you tried to set this engine up like a .60 pattern engine, a poor running engine could result. I feel sure that the BGX-1 will run well and fly a giant pattern plane very nicely when used in the proper power envelope. Does anyone else have any experience with this engine that they

would care to share with us?

GETTING THE PROPER SETUP

How is your tail-dragger Big Bird handling on the ground? Does it feel touchy when you taxi? Does it make jerky turns that wind up in a 360-degree wing tip-dragging fiasco? Are your takeoffs less than down the center line, often ending in a ground loop?

If the preceding scene describes your takeoffs and landings, take heart, your piloting skills may not be at fault. The answer is very likely your landing gear, tail wheel and rudder setup. The main landing gear for a tail-dragger is not usually supplied with any toe-in. Toe-in simply means that each wheel points at the centerline of the aircraft so that if lines were drawn through a top view of the wheels, the lines would converge in front of the plane. Two or three degrees of toe-in will usually calm your take-off down to an arrow straight, centerline hugging thing of beauty.

We generally use three types of landing gear material for our Big Birds. The most common is the music wire gear, then the aluminum sheet gear, and more recently, the glass composite type. All work well, but none are supplied with toe-in.

It is quite easy to bend the wire type gears to the correct toe-in. A large vise and K&S type bender will usually do the trick. It is a good idea to get the toe-in correct before you wrap and solder the gear together.

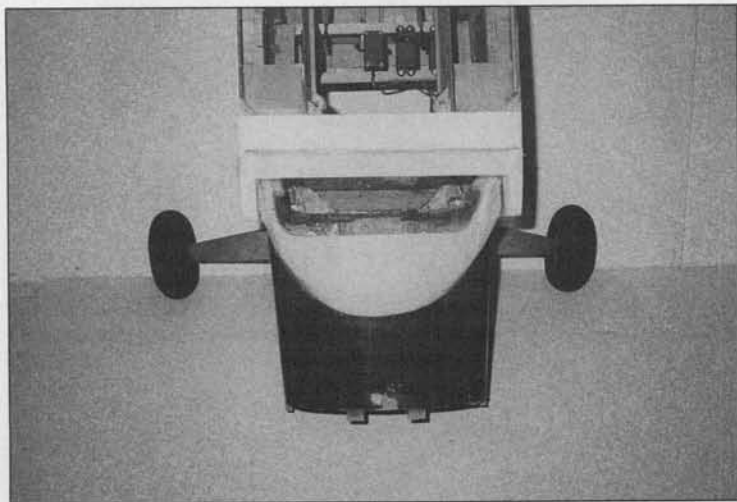
It is slightly more difficult to obtain toe-in to the axles on aluminum gear. The C.B. or Du-Bro bolt-on axles install easily on the sheet metal type gear, and one method to toe-in the wheels that works for me, has been to file two washers to a wedge shape for each side of the gear where the axle goes through. The wheel side of the gear should have the thick side of the washer aft, while the nut side of the gear should have the thick side of the washer forward. It may be necessary to relieve the sides of the axle hole to allow the axle to achieve the desired angle of toe-in. It's also a good idea to super glue the washer to the gear in the desired position before permanently bolting on the axle.

If you wish to purchase formed sheet aluminum landing gears, Ace R/C makes several sturdy units. Abell Hobby and Manufacturing also has various sizes of sheet aluminum gears and will provide you with the correct size of gear if you tell them the type, weight and size of your Big Bird.

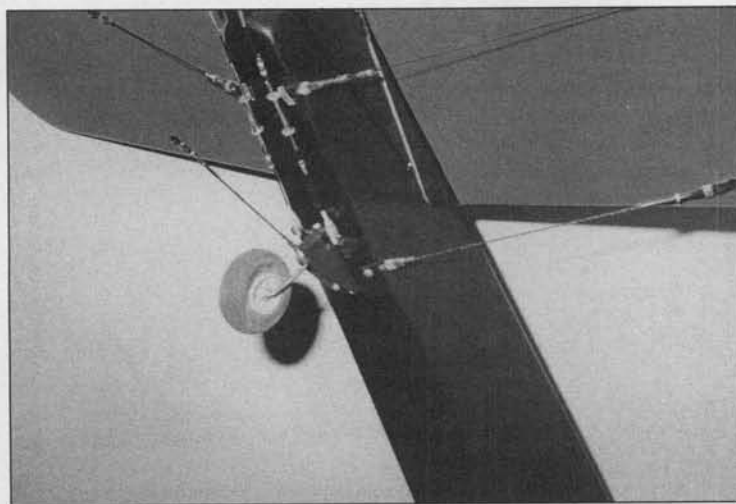
The glass composite gears are probably easiest to alter. You may simply file down the axle mount area for two or three degrees of toe-in, then insert the axle and tighten down the nut. This method worked well on the Klett composite gear used on my Big Bee.

The Klett gear was designed for about a fifteen-pound plane, but my Big Bee finished up at twenty-one pounds, so it was necessary to add music wire braces with bungee inter-connect. This gives the gear the desired strength and a very nice flex action on touch-down, with no bounce.

The next step in smoothing out that take-off roll is to check out the tail wheel setup. The tail wheel movement should be about



This is an example of landing gear toe-in on a Cessna 180 that has a two-piece gear.

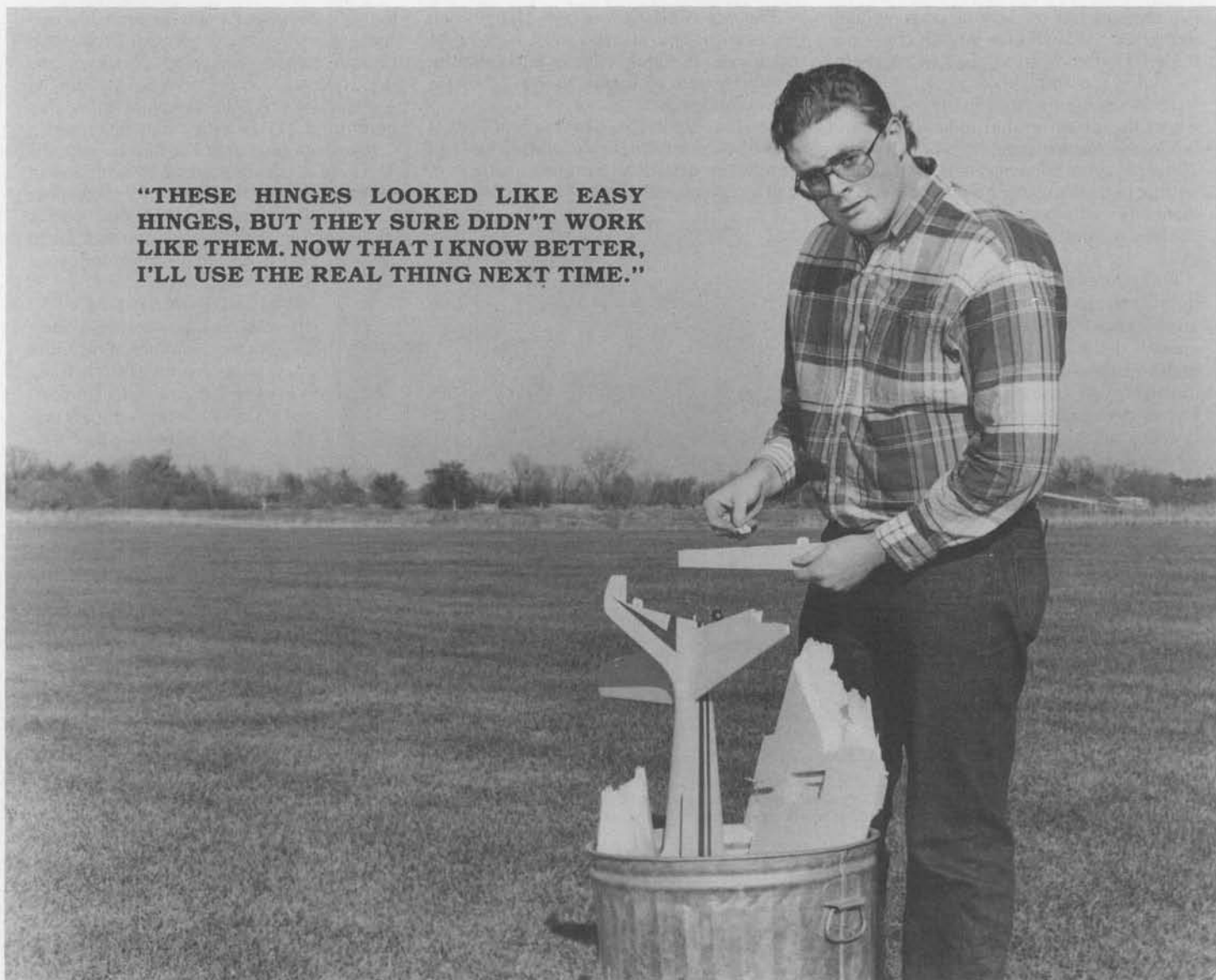


Du-Bro makes several sizes of this solid steerable tail wheel bracket.



Walt Wyrick's Travelaire biplane is one-fifth scale and it weighs 15 pounds, the engine is an O.S. 160, with a twin C.H. ignition. The R.C.D. receiver is also performing flawlessly.

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- 1.) Put a drop of thin CA on a hinge and watch what happens. Does the CA begin to flow out to the edges of the hinge immediately, or does it just puddle up and look at you? If the adhesive doesn't flow out to the edges of the hinge like it should, you won't get a strong bond when installed on a model. What you will get is a bond that will most likely fail in flight.
- 2.) After a minute or two, touch the hinge (if there is still a puddle, don't bother). Is the glue still tacky? It will be if it's an **EASY HINGE**! **ONLY** Sig **EASY HINGES** are chemically treated to retard the curing time of thin CAs. This allows the adhesive time to penetrate to the full depth of the hinge before it sets up for maximum bonding strength. No pins are ever necessary!
- 3.) Do the hinges you are looking at have slots, holes, or other "nifty" gimmicks, supposedly for better glue penetration? Sig **EASY HINGES** do not need these gimmicks to work. They have been engineered to work perfectly every time!
- 4.) Finally, does the package say "**EASY HINGES**"? If it does, relax, you have the good stuff. If it doesn't - well, you better go back to the hobby shop and get the real thing.

Save yourself the heartbreak of losing a model like our friend did here due to using cheap, look-alike hinges. Don't compromise on strength and reliability. Insist on the original and the best - genuine Sig **EASY HINGES**.

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five degrees left or right of center. Much more than that will give you an over-controlled condition that will be less than helpful during taxi and takeoff.

To decrease the movement of the tail wheel, the cable from the rudder horn should be close in on the rudder horn or bell crank. The cable to the tail wheel bell crank should be attached to the outer holes. Some experimentation will be necessary to achieve the desired turn sensitivity.

Rudder deflection will also require some experimentation to give an easy takeoff. You will also want enough deflection for aerobatics and directional control while landing; that's where dual rates on the transmitter come in real handy.

There are many types of tail wheels available for our use. Abell Hobby and Manufacturing and C.B. both manufacture leaf spring-type tail wheel assemblies, Du-Bro has solid-type tail wheel brackets in addition to the leaf spring-type. Klett manufactures a very scale-looking tail wheel assembly that has a double-sided yoke, which should help give a straight run out on takeoff. Scale Aviation Pty. Ltd., an Australian firm, makes scale-looking units they say are designed from full-size tail wheels.

Leaf spring tail wheel assemblies look scale, but are not always necessary. The solid mount brackets also work well. The tail wheel on my Jungmeister was a solid mount and had a very small wheel, but no damage ever occurred to the air frame. My quarter-scale 'Stampe' biplane will use a solid mount, and my Big Bee uses a Du-Bro solid bracket tailwheel assembly.

BATTERY CHARGER

Walt Hale, owner of Hale's R/C Supply, was showing several of us the new Ace A/T 2000 Battery charger. I was immediately taken with the unit's versatility, because I had been looking for a charger that would charge various size radio and receiver packs and then automatically trickle charge them.

The Ace A/T 2000 not only charges two packs at once but also has a very wide range of charge rates and cells per pack! It automatically goes to trickle after a C-10, 16-hour charge rate.

The left output is fixed to charge at 50 m.a. for 16 hours, then to trickle. The left side can handle one cell starter batteries, four or five-cell receiver packs, or eight or ten-cell trans-

the A/T 2000 that I should probably buy some Ace R/C stock, because I have two Charge Masters, three Add-a-Trickles, one A/T 2000, a servo cycler, a B.S.V., and the Ace tachometer, all excellent units that perform as well or better than advertised.

If you are on a tight Big Bird budget, the Ace Add-a-Trickle works well with any of the radio systems that have 9.6V transmitter

packs and 4.8 volt receiver packs. The Add-a-Trickle wires right to the charger that comes with your radio system.

NEW IGNITION SYSTEM

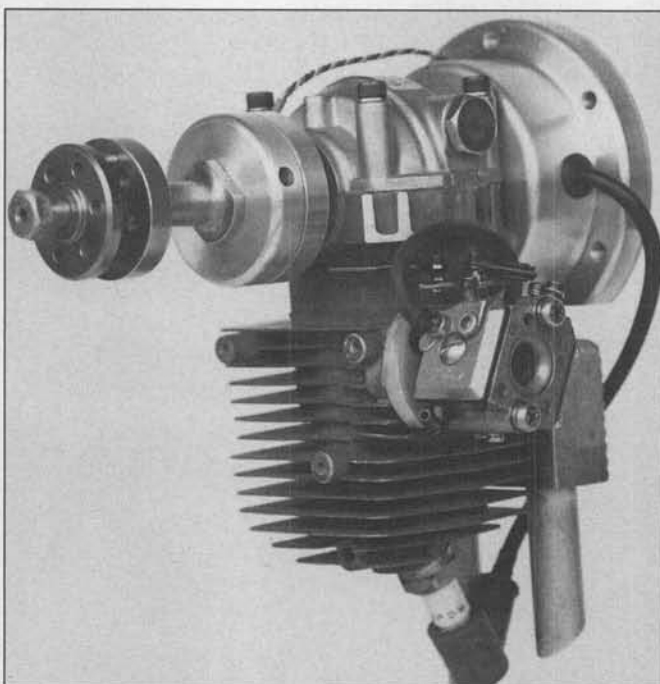
Fred Morgan, owner of R/C Service, sent me the information about a new ignition system he is helping to market. It is call "R.C. Ignition" and is a throttle-coupled spark system. The machined barstock motor mount houses the ignition and the machined spark advance mounts on the outer rail of the front ball bearing housing. The carb is repositioned with an adaptor to ease the linkage hookup.

Fred is so confident of the reliability of the electronics that repair is free should a failure occur. The picture shows that the unit is very clean. R/C Ignition is providing conversions for the Zenoah G-23, G-38, G62, Sachs 3.2, 4.2 and 5.2 engines. It is difficult not to improve the performance of any single-cylinder magneto ignition engine with an electronic ignition that has throttle-coupled spark

advance.

My good buddy Chuck Willcox and I reworked our Mag-Aero and Zenoah G-38 engines some time ago to use CH ignitions with throttle-coupled spark advance. We have been very pleased with the results even though our conversions are not as good looking as the R/C Ignition unit.

It is gratifying to see Big Birds used at the Tournament of Champions, because it was not long ago that Big Bird advocates were unduly chastised. Now I.M.A.A. is reluctant to allow jets to fly at their events. It seems to me that a twenty-pound FA-18 with two



R.C. ignition now has its new electronic ignition system with throttle-coupled spark advance ready for your favorite Zenoah or Sachs engine.

mitter packs in the 350 to 850 mAH capacity.

The right side of the A/T 2000 has a three-position switch that will allow you to select 25 mAH that charges one to ten cells in 100 mAH to 350 mAH capacity. You may select the 50 mAH range that will charge and trickle one to ten-cell packs in the 350 mAH to 850 mAH range. Position three selects the 120 mAH range that charges and trickles one to ten cells in the 850 mAH to 1500 mAH range. This seems to be an excellent unit that has a great deal of versatility.

It occurred to me shortly after purchasing

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smoking 91s qualifies as a Big Bird.

I do not own a jet nor do I intend too, but restriction of research and development, competition, new ideas and new types of planes is a detriment to the whole hobby. It seems only yesterday I.M.A.A. was fighting reactionary thinking. How soon we forget. Why should Jets be excluded because they require a different yardstick with which to be measured?

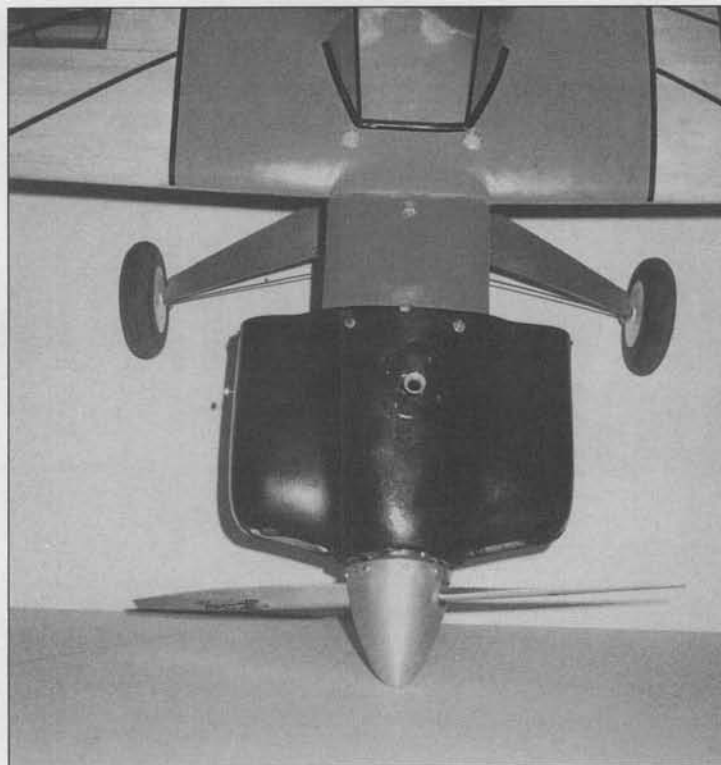
I.M.A.A.'s no-competition format is a very welcome thing for most of us, because we are satisfied to show off our latest Big Birds and enjoy the company of our peers. There is still plenty of competition available for Big Birds. Seldom does a weekend go by without a Giant Scale Contest or an Aerobatic Contest. The new Aresti aerobatics seldom have a restriction on aircraft size other than the fifty-five pound rule.

Please communicate, we all need for you to share your ideas on Big Bird care and flying. Good pictures of your latest project are always welcome.

It is off to the building board for me. That big Cessna '180' is not going to be finished for summer flying without a lot of elbow grease and midnight oil. Good building and flying 'til next month.

Abell Hobby and Manufacturing Co., P.O. Box 22573, Billings, MT 59101, telephone (406) 259-4882.

Ace R/C, 116 W. 19th St., P.O. Box 511 Dept. #160, Higginsville, MO 64037, tele-



This example of toe-in is on a one-piece Klett glass composite landing gear.

phone (816) 584-7121.

Du-Bro Products, Inc., 480 Bonner Rd., Wauconda, IL 60084.

R.C. Ignition, c/o Ralph Cunningham,

16845 North 29th Ave. #1434, Phoenix, AZ 85023, telephone (602) 582-1053.

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IS THE WING STRONG ENOUGH?

Full scale airplane designers design the wing structure by stress formulas which take into account the strength of the materials to be used, the weight of the airplane to be lifted, centrifugal force in turns, gust loads, aerobatic loads if any, and landing loads. Then they provide a factor of safety (sometimes called a "factor of ignorance").

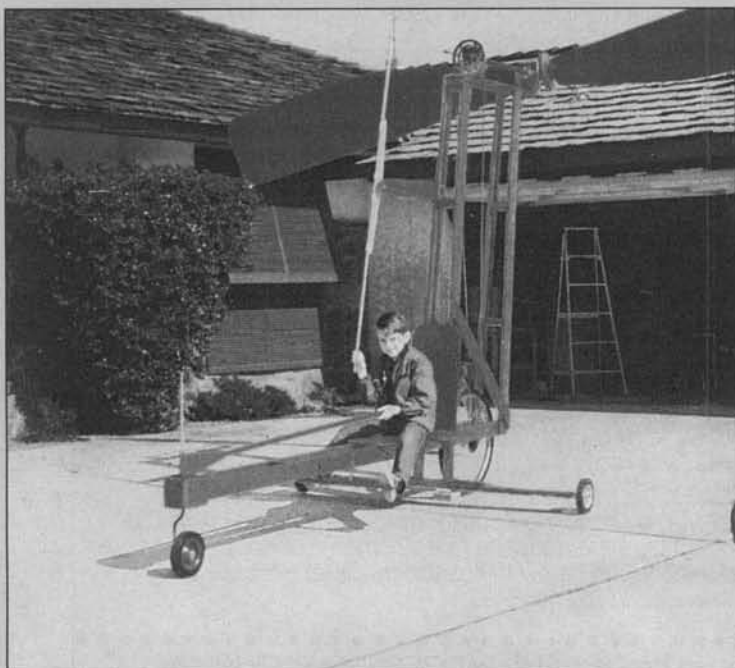
Model designers seldom get that sophisticated, even the professional designers of commercial models. One exception is my

guesstimation based on experience. The experienced model designer almost never produces a model where the wing will buckle in flight, yet the weight is usually reasonable. It is the modeler who hasn't yet gotten an adequate feel for aerodynamic loads, structures, and materials whose wing may fold.

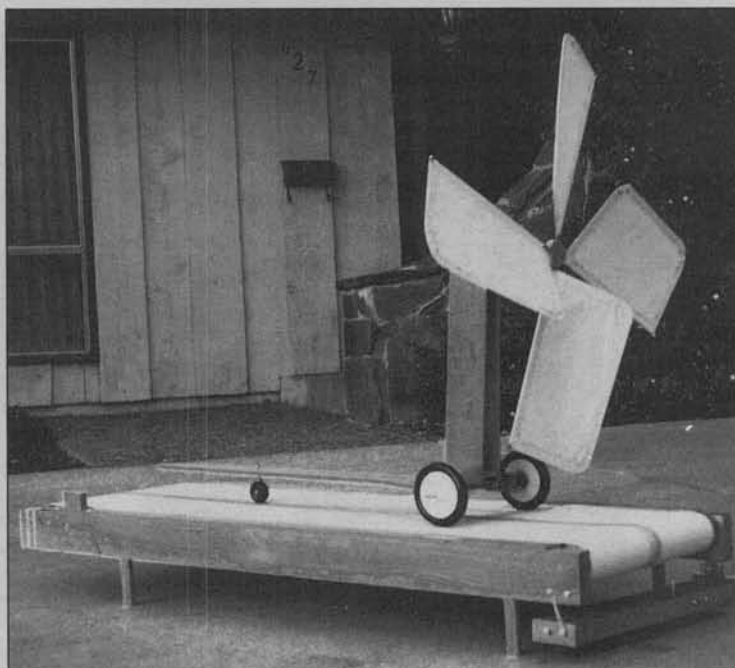
Once a wing failure happens to him, however, it isn't apt to happen to him again (Next time it will be too heavy). Painful mistakes are the best teachers.

structure. If the wing stays in one piece in level flight, loop the plane. If the wing then breaks, you have proven that it wasn't strong enough for loops. But obviously there is a better way. Public failures are embarrassing. Tests in your own workshop are private, and so can be the results, if you choose.

The big airplane companies often statically test a prototype of a new wing design to destruction; load it until it breaks. Such destructive testing is valuable as a check on the theoretical design and on the materials



The windmill sailing car revisited. This full-size working vehicle was built back in 1969 by Dr. Andy Bauer (his son Ken is in the pilot's seat) to prove the idea of being able to sail downwind faster than the wind, as well as directly upwind.



Andy Bauer used a powered treadmill to test a model of the windmill sailing car.

modeling friend Ed Westwood, who is the technical editor of the newsletter *Northwest Float Flyer*, 909 South 173rd, Spanaway, WA 98387. Ed has been running an excellent series of articles on the more formal design of model wing structures in that nice little bi-monthly. I'm sure he could fix you up with reprints if you are interested.

Model wings are usually "designed" by

This column will talk about wing design, and particularly spar design, someday, but in the meantime, is your wing strong enough? The answer can be found by a simple test much easier and more accurately than it can be found by calculation.

Flight testing is one way. Some modelers inadvertently test their wings to destruction in flight. You could also plan to flight test the

and processes. The average modeler, however, isn't inclined to build two wings for every new model, so that he can test one to failure, to find out whether the other one is strong enough.

NON-DESTRUCTIVE TESTING

On the other hand, non-destructive testing of wings can be very useful to us. If we load the wing only to the maximum flight

and landing loads it will experience, and it survives, we build only one wing. Of course, if the wing breaks in the test, we must build a second wing (after redesigning it for more strength); but would you rather have it fail in a test or in flight? You would have to build a second wing in either case; and probably also have to repair the rest of the airplane, in the flight-failure case.

Those who have never done any testing of this type may feel it is time consuming and difficult. Not so. It is much faster and easier to conduct a simple test on the wing in the shop than it is to fly the model.

The airplane companies usually suspend the wing upside down by the center section and then distribute sand bags, or more sophisticated forms of load, along the span, hopefully in the same manner as the aerodynamic forces of flight would load it.

For a simple proof test of a model airplane wing, we don't need to get that complex. Most model wings that break in flight fail at or near the center, therefore let's simplify things by considering that the lift load is applied at one point (or small area) on each wing panel, instead of being distributed. Figure 1 will make my point.

For small models, use a spring baby scale. If you don't have one, get one; not just for testing but for weighing models and materials and parts. Mine hasn't been used for weighing babies for a great many years (the babies of those babies are half-grown) but it gets more use in my shop than it ever did for its original purpose. My baby scale goes to thirty pounds. That is a good range for weighing most models and for testing wings on small models. For testing Big Birds you

will need to use your bathroom scale.

O.K., you are going to test a wing. First decide how many g's the wing may be subjected to in the way you intend to fly the

holds-barred hot-dog pilot who likes to try to rip the wings off, but also, I very much like to have them stay on, so I try to build wings which are good for eight or ten g's.

Actually, a little calculation tells me that I don't really try to rip the wings off or I would have succeeded. In the very-slightly-restrained way I fly, however, I have never destroyed a ten-g wing, so that is what I "design" for.

An eight to ten-g wing on most of our models will stand a full-throttle power dive followed by a pullout of reasonable radius. What is a reasonable radius? One that doesn't fold the wing, naturally.

But back to the static wing test. Put some kind of a pad, such as a piece of sponge rubber or a folded towel, between the scale and the center section of the wing top, to distribute the load a bit and to avoid damaging the finish.

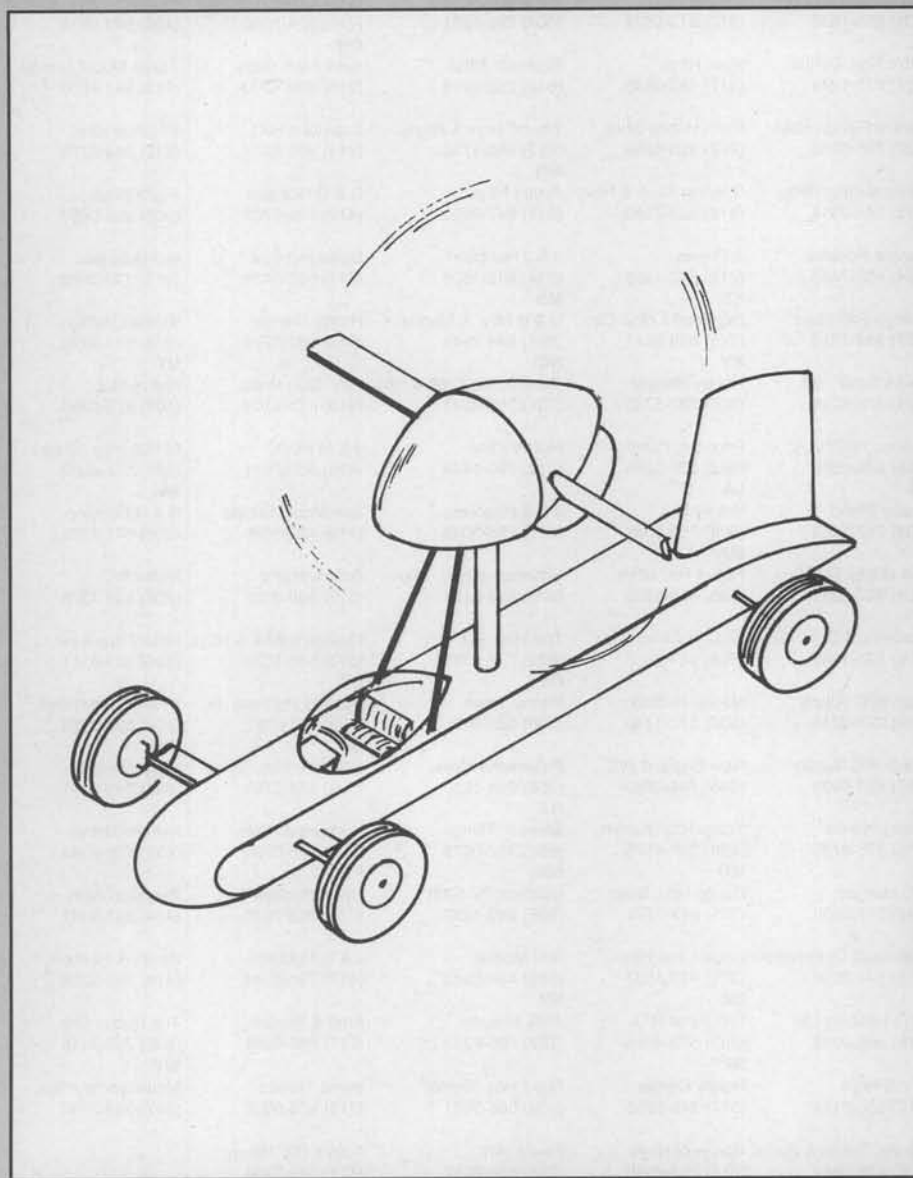
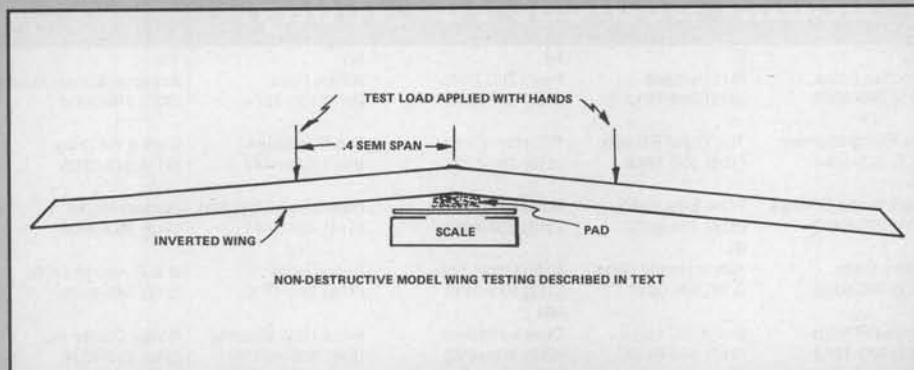
Now put your hands flat on the bottoms of the wing panels and push down, letting the scale tell you how hard you are pushing. Your flat naturally-padded palms placed over the wing spar will distribute the load well, half of it on each side of the wing.

But before we push we must decide how far out along the spar on each side we should place our hands. If the wing is rectangular and if there were no tip losses, the center of the aerodynamic load on each panel would be halfway between the wing center and the tip, but we do have tip losses. Part of the higher-pressure air below the wing flows around the tips to neu-

tralize some of the lift-producing lower pressure above the wing, causing loss of lift, induced drag, and wingtip vortices.

Therefore the center of lift on a wing panel, spanwise, is somewhat inboard of the center of the panel. For a rectangular wing I

continued on page 86



model. If it is a scale model that you will restrict to very gentle turns and never loop or otherwise intentionally stress, you may get by with a wing that will take only three or four times the weight of the airplane (three or four g's). For gentle aerobatics, a five or six-g wing is strong enough. I tend to be a no-

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NEW PRODUCTS FOR '91

The 23rd annual WRAM Show was held on February 23-24, 1991, in White Plains, N.Y., hosted by the Westchester Radio Aero Modelers. It is the major show of the year here in the northeast, and after a long winter slump in flying, modelers are anxious to get out and see what's new . . . plus show off their latest

winter projects. Many manufacturers use this show to debut new products, and approximately 150 booths were featured, along with a swap shop set up in the conference rooms just off the main floor.

This year we had a special treat; a group of Russian modelers was invited to attend and display their models. They featured a

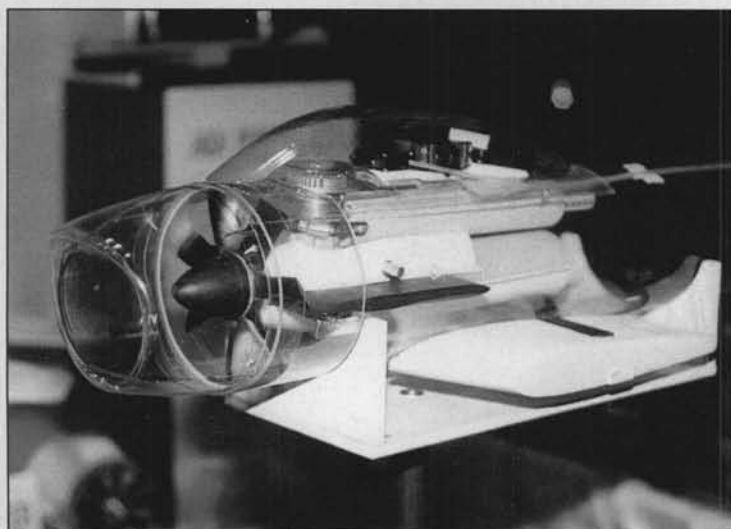
Russian ducted fan unit, which really caught my eye, and not just because of its blue anodized head and pipe. Working through an interpreter, I spoke to the designer and builder, Vladimir Boulatnikov, of Moscow. He told me that the shroud was a mix of machined aluminum with a liner of Derilium, sort of a mix between fiberglass and



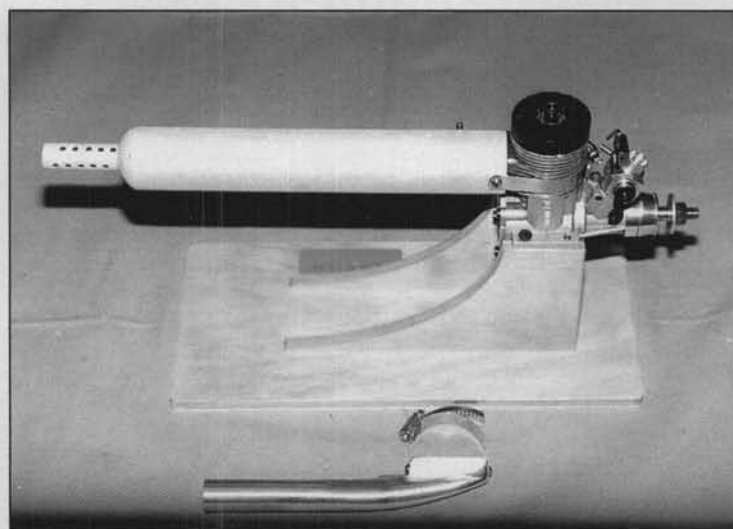
Russian fan unit has five-inch diameter, OPS 40 engine, 7-1/2 lbs. thrust. Aluminum and Derilium construction. Five-blade carbon fiber impeller. Rated at 26,000 rpm. Designed and built by Vladimir Boulatnikov of Moscow.



Bob Parkinson's new ARF R-4 Skyhawk. Uses Vector fan and .61 rear exhaust engine. Weighs six pounds.



To help answer questions about his new Saber kit, Bob built this see-through model. It was very popular.



After two years of testing, Bob Parkinson has come out with this 1/2-wave pre-tuned pipe, to be used with most popular .61 rear exhaust engines. Also pictured is Bob's new header to allow side exhaust engines to be used in his planes.

carbon fiber, as near as I can tell. It's approximately five inches in diameter and used an OPS 40 engine.

I was told that a Russian engine was also available. The impeller was carbon fiber and had five blades. It has two rows of carbon fiber stators. One set directly behind the impeller and another at the back to support the engine. Turning 26,000 rpm, it produces 7-1/2 lbs. of thrust, and weighs 750 grams. There was a small sign taped to it that read, "You can order." Asking price? \$1,200.00. Just slightly out of my range! Next to the fan were pictures of Vladimir holding a model of an F-16 Thunderbird in which the fan unit was flown. An American airframe with a Russian fan and Italian engine. How's that for Glasnost?

• • •

Rich Uravitch and Nick Ziroli Jr. have combined their talents to form "Leading Edge Models." They have re-engineered the old Sterner Engineering kits, to accept the more popular five-inch fan units on the

market. They added internal ducting to increase efficiency and eliminated the cheater hole on the bottom. The kits will be offered as "Builder's packages" or semi-kits for \$189.95 each, plus S&H. Available are the A-7 Corsair II, the T-33 T-Bird and the F-80 Shooting Star. For details, contact Rich at 170 Oval Drive, Central Islip, N.Y. 11722; telephone (516) 234-7264.

Another new arrival is Thorpe Engineering Corp. While not new to the model industry (producing the fine line of Starhawk RTF's), they are now offering an RTF ducted fan plane called the "Jethawk." Designed by Bob Ruff, it comes built, painted, with fuel tank, wheels and Turbax 1 already installed. Just add your radio and 7.5cc DF engine and go flying. It has a 54-inch wing span, 45-inch length, and weighs 8-1/2 lbs. Grass field takeoff is less than 100 feet. No price was available at the time. Thorpe will also be producing a scale T-37 Eleete, designed by Fred Henkin and Bob Ruff. With a span of 80 inches and a length of 65 inches, it's no

small plane. The plane comes completely built, painted and even test-flown. It's constructed of graphite/epoxy composite materials, with twin 90 ducted fans and retracts. It arrives in a lavish wooden shipping crate with your name and aircraft's hull number engraved on a mounted brass plate. Inside the crate is a video tape of its maiden flight. Your name is also printed on the aircraft's canopy sill. All this luxury has a price though . . . \$6,000 . . . made to order.

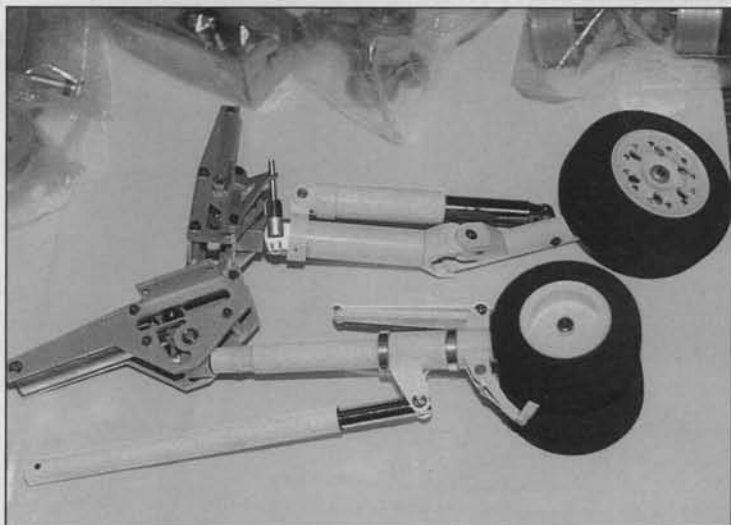
Century Jet Models is also jumping on the big bird band wagon this year with the new 1/9th scale B-57 Canberra. It uses twin 91 Dynamax's, spans 95.5 inches, with a length of 89 inches. Projected weight is 25 lbs. It's available as a semi-kit for \$469 or a deluxe kit for \$589, plus S&H. CJM is also expanding its accessory line with the addition of retract air line and a product called Ultra Lite. It was described to me as Lumed Silica filler, similar to microballoons but much finer. Sells for \$3.49 a pint. I purchased some and tried it. It's much smoother than



Bob Kress holds his new F-16 Falcon for his RK-709 fan unit and Cox TD engine.



Alec Cornish-Trestrial of England, with his scratch built Mig 29 A and B with Kress fan units.



Yellow Aircraft's scale retracts for the F-18 Hornet. Awesome looking little critters.



Leading Edge Models A-7 Corsair II. Built from a semi-kit. Features six under-wing pylons. Has 50-inch wing span and 55-inch length.

microballoons, with a less sandy texture that doesn't clump up. The cure time remains the same and it doesn't change the final strength either. I like it. All the above mentioned CJM products are available direct by calling (803) 775-6491.

Also at the show was Aerospace Composite Products. This is the company that makes those fabulous fiberglass wing skins I talked about a few months ago. I stopped by the booth to say hello to George Sparr, owner of ACP, and show him the plane on which I used his skins. While at the booth, I picked

up some more .10 skins and a sheet of .06 skins to use as thrust tubes and inlets, etc.

George showed me his new epoxy resin, called EZ-LAM. A two-part laminating epoxy mixed 2:1, it's especially formulated for use with his new .56 glass cloth. It can be used straight or thinned with isopropyl alcohol. Comes in two formulas, 30- and 60-minute. I got the 30-minute and some .56 cloth to try. I've previously used another brand .56 cloth and K&B clear with satin catalyst as my base. But on my next project, I'm going to give EZ-LAM a try. I'll let you

know how it works. Want to know more? Give George a call at (714) 250-1107. Tell him I sent you.

Yellow Aircraft arrived with a truck load of their usual neat stuff... some really nice scale retracts and wheels. Plus a batch of jet kits. I had the honor

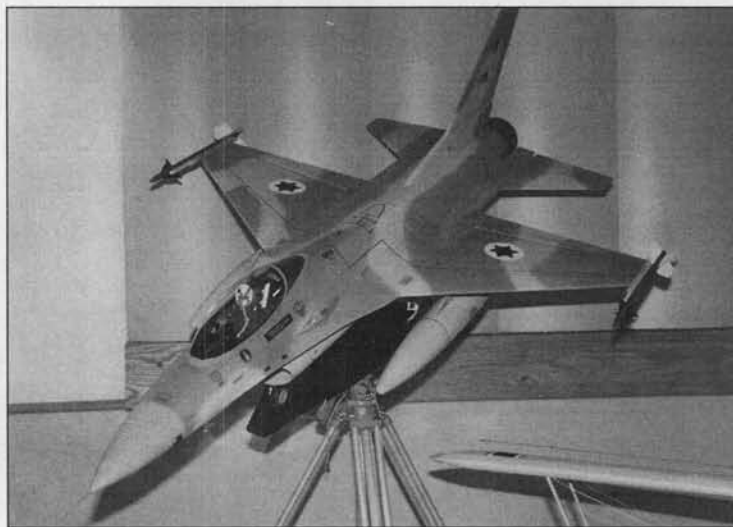
of meeting Dr. Charles Tse, vice-president of the company. You can contact Dr. Tse, his address and phone are 203 Massachusetts Ave., Lexington, MA 02173; (617) 674-2222.

My next stop was at Bob Parkinson's booth, where Bob showed me his newest creation, an A-4 Skyhawk. It's the next plane in the ARF line following the Saber. Surprisingly, it's quite scale-looking for a tube with wings. Bob's genius is his simplicity of design; molded vinyl parts around an internal wooden frame for strength. It weighs six pounds and uses his vector fan with a .61 ABC rear exhaust engine. Bob likes the Rossi 61, but you can use other short-stroke .61's. The kit sells for \$189 and \$69 for the fan.

To complete his .61 fan package, Bob has developed his own pre-tuned 1/2-wave muffled tuned pipe. This one-piece pipe just bolts onto most .61 rear exhaust engines with no tuning required. Bob has been working on this project for about two years. It also can be modified to work on the .80 and .90 DF engines as well. Sells for \$59 plus S&H. For those of you with side exhaust



Believe it or not this is a ducted fan powered aircraft. A scratch-built Space Shuttle! Built by Louis Maida, it placed second in Stand-Off Scale.



One of the nicest Byron F-16's you will ever see was built by Vic Macaluso. It came in third in Stand-Off Scale.



Don Kanak's Blue Angel Viper. Finished second in Sport class. Finish was Ditzler and graphics by Aeroloft Designs. Viojet KBV82 fan and Futaba PCM radio.



Bob Boswell's awesome 1/6th scale Lear 35A came in first in Giant Scale. Hard to see, but Barbi and Ken dolls are in the cockpit.

61 ABC engines, Bob has come up with a special header to allow their use in his aircraft also. It sells for \$25 plus S&H. For more info, call Bob at (705) 436-7041, or give me a call at (717) 259-7193.

I then spoke with Bob Kress of Kress Jets, and we discussed his new little F-16 Falcon, designed to use the RK-709 or RK-720 fan units. For those of you who are into very small jets, it has a wing span of 34 inches and a length of 34.5 inches, but weighs only 33 oz. with a cox TD 09 engine. Built of balsa and foam, with some vacu-formed plastic pieces. A quite clever little plane... just start and hand launch. While at the Kress booth, I met Alec Cornish-Trestrail of England. They use a lot of Kress jets in England. Because of the high cost over there, most modelers fly 20 and 40 class jets. Alec showed me pictures of some of his scratch built jets, like a Mig 29 A and B, A-10 Warthog, and Learjet 35. All use Kress jet units. He's a very adept scratch builder.

Another adept builder is Bob Violett. I had an opportunity to talk with Bob about his new fuel. Bob has applied his knowledge of DF engines to produce his own fuel, specially blended for use in DF engines. He combines just the right combination of castor and synthetic oils with 10% nitro, to form the maximum power and lubrication needed in today's high revving DF engines. It also possesses excellent transition from idle to full power. Bob calls his new fuel JP-4 and

it's available directly from Bob.

STATIC DISPLAYS

There were ten jets entered in the static display competition; two in sport, seven in Stand-Off Scale and one in Giant Scale. There was one scratch-built jet that was quite impressive, and unusual. Louis Maida, of Hawthorne, N.Y., built a 4-foot, 10-inch Space Shuttle, powered by a Byron O.S. 77 fan unit. It features Spring Air retracts, Futaba radio and weighs 9-1/2 lbs. Construction is balsa and plywood, with K&B paint. It actually flies! The display was dedicated to the Challenger crew. It came in second in Stand-Off scale. Also in Stand-Off was a very nice Byron F-16 by Vic Macaluso with military specs Israeli desert camouflage paint scheme, using HobbyPoxy paint. It weighed 12-3/4 lbs., with Byrojet Rossi 81 fan, and flies with ordnance. It came in third. Bob Boswell, of Hamburg, N.J., got first place in Giant Scale for his outstanding 1/6th scale Lear 35A. Built from a Mark Frankel design, it featured twin O.S. 65 Dynamax's, MK 20 retracts, navlights and Dupont paint. Weight is 24-1/2 lbs. and it flies about 125 mph. Construction time was around 500 hours.

Bob also had a Yellow A4 Skyhawk entered in Stand-Off. Although it didn't win, I thought it deserved a mention, because he did such a great job on it. This 9-pound plane used RS Perfect paint and was very scale with rivets, panel lines and scale wing turbulators, plus 20mm cannon and carrier

landing lights. Power was an O.S. 77 Dynamax. If it flies as good as the one he built last year, it should be a great performer.

In Sport Class, there were two jets entered. The second place plane was a Viper by Don Kanak. Aeroloft Designs provided the graphics for the Blue Angel paint scheme, which was achieved using Ditzler automotive paint. This novel paint scheme was nicely accented with thin white panel lines. I've noticed that a lot of the winning planes were painted with some form of automotive paint. Power for the plane was a Viojet KBV 82 with Futaba PCM guidance.

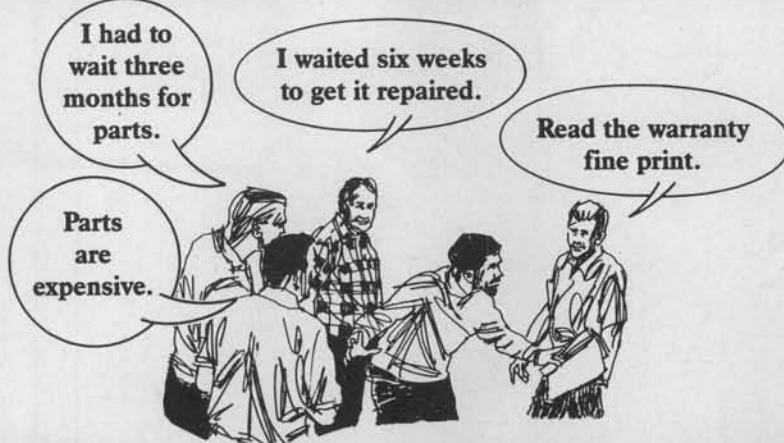
I managed to take home third place with my Parkinson Baracuda. This is the same plane I featured last month in my column about painting. Not a bad finish for the first time out. The finish is a mix of K&B and Ditzler Deltron paint. It weighs in at 10-1/2 lbs., ready to fly. Power is an O.S. 91 DF and Vector fan. Also featured were Aerospace Composite wing skins, B&D retracts and Irwine Muffled tuned pipe. JR provided the guidance.

PAINTING TECH TIP

Here is a painting tip to help cut down on the amount of dust getting into your paint: Ground your gun. Attach a small wire to your gun and run it down your hose to a ground. This eliminates the static charge built up by the air passing through the gun. This tip was given to me by Bob Violett. It makes good sense.

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CHARGE 'EM!

I got the January 1991 catalog from CS Flight Systems recently, and I am impressed! The catalog has 84 pages of electric flight goodies and information. I can't find a price on the catalog; I think it is \$5 or less. The address is 31 Perry Street, Middleboro, MA 02346, phone (508) 947-2805 between 6 and 9 p.m. EST.

I like the way the catalog is made up. The prices are listed in two ways: either manufacturer's list and then the discount (usually 5 to 20%), or the CS sale price. The prices look very good to me. You can save quite a bit on many items. Best of all are the many informative articles in the catalog, and the manufacturer's information and pictorial sheets. These are great!

I found detailed reports on the performance and care of SCR cells by Doug Forrester; how to size an electric scale airplane by Ben Almojuela; the performance of the Astro DC/DC charger by Bernard Cawley; optimizing nickel cadmium performance by C.L. Schofield; how to select an Astro motor by Bob Boucher; and building the Jodel 9-D for electric power (author unknown).

Manufacturer's information includes Astro's charts for model/motor sizes for Astro direct and gear drive motors; Astro cobalt system specifications; performance curves for the Sanyo 225 mAh to 2000 mAh cells; a complete chart of the Robbe/Keller cobalt and neodymium motors, including dimensions, voltage ranges, rpm and recommended aircraft sizes;

Sonic-Tronics propeller chart; and a complete listing of the specifications for the Cannon micro radio systems.

Another great feature is that many of the hard-to-find manufacturers are listed. The photos of planes and kits include Robbe (Pitts, Do228, Kormoran, Acrobat, Speeder

E); Davey Systems (Heron, Eindecker, Fly Baby, Curtiss Robin-Caliph), Easy Built Models (Mikulasko Easy E, Beaver, Taylorcraft, Spitfire, Hurricane); Today's Hobbies (Kopski Skybolt), Aerodrome Models (Curtiss Jenny, Flybaby, Cirrus Moth, Jodel) and JM Glascraft (Hummin' Bird). Hard-to-

find equipment listed includes the Robart ultralight retracts, High Point balancer, Sonic-Tronics folding propellers, Master Airscrew adjustable pitch props, APC quiet props, TRC Impulse IV charger, Jomar throttles and wires and the Cannon 1991 super micro radios.

Couldn't be more, could there? Well, there is also a contest date feature, if you want your contest date in the catalog, send it in by June. The three listed were the Keith Shaw Electric Fly, July 1991, Ann Arbor, MI; Charlie Spear Electric Fly, August 1991, Winston Salem, NC; and the Bob Kopski Electric Fly, September 1991, Allen Towne, PA. The days and addresses were not given, however.

• • •

I ordered the new Sanyo 1500 SCR cells from CS and they got here in just a little less than four weeks from the time I sent the letter, which is good time for overseas APO mail (to Germany). The 1500 SCR cells come in the traditional red jacket, and are stamped on the bottom with JAPAN and R. The straps are the traditional four-point weld design. The diameter of these cells is 21.5mm (the same as the sub-C 1200 SCR cells), and the length is 48mm.

Indoor demo of Kyosho's Hughes 300. Flies very well in very small areas.



The regular sub-C 1200 SCR cells are 41mm long. A six-cell 1500 SCR pack weighs 372 grams with connectors and wiring, compared to 327 grams for a 1200 SCR six-cell pack. This is 1.6 ounces more, which is quite acceptable. These packs fit all my planes that use the ordinary sub-C cells.

The welded straps on the cells have the usual four spot welds. I did not use the welded straps supplied with the cells; I stripped them off, and used Stage III (1189 Chicago Rd., Troy, MI 48083) Ultrabraid for the cell connections. This is a flat braid rated at #12 gauge. I have found it to be very good for making very low resistance battery packs. I measured the internal resistance of the pack with a momentary discharge of 16.0 amperes through six 12-volt headlight bulbs connected in parallel. (These bulbs, by the way, are small, not the sealed beam headlights. I think they are used in the



The Kyosho Hughes 300. About a 90-watt size or Astro 035.

newer cars. They are standard equipment in Germany, and only cost about \$2.50 each here.) I measured the voltage with a DVM, both in the discharge and immediately after. The discharge voltage was 7.20; the no-load voltage immediately after the discharge was

7.97. Note: the voltage will climb after the discharge, so do record the immediate (lower) voltage. This gives a pack resistance of 0.048 ohms, or 8 milliohms per cell as wired with Ultrabraid in a six-cell pack. A six-cell 1200 SCR pack that I used as a test standard wired with Ultrabraid was 9 milliohms per cell. Most SC or other packs come out to 12 milliohms per cell, so it is clear that these SCR packs are very good indeed. This shows up when these packs are discharged at a high rate (over 10 amperes). They do not get nearly as hot as packs with the higher internal resistance.

I do not have any automatic cycling equipment. I use a Navcom high rate peak charger (no longer marketed) for charging. Tekin and Novak make similar chargers, which are quite popular in off-road racing. They can charge six-cell packs at up to ten amperes. I usually charge SC and SCR packs at 8 amperes; they



Kurt Meier's 05 size flying wing; can be built either as a pusher or tractor. Kits are available.

The STW computer charger. Note bank of three 12-volt headlight bulbs to right for battery discharging as described in text.



The Robbe computer charger, keyboard entry. More info in text.

The Robbe Do 228 twin 05 looks handsome.



handle this well, and it cuts the charge time to less than ten minutes. I use the 12-volt headlight bulbs for discharging, with a DVM attached to the battery terminals for voltage, and another DVM in the wiring harness to monitor current.

The 1500 pack and the 1200 comparison pack were charged at 8 amperes. The first two cycles were run at an average of 16 amperes, through the six 12-volt headlight bulbs. The packs got very hot! In fact, the 1200 SCR pack got hot enough to loosen a solder joint on the wire braid connector! I used hot melt glue to assemble the pack, and it was flowing as though it was coming out of the glue gun! This was a surprise, as I have discharged packs at 16 amperes before, using a motor and prop as a load. The packs did not get hot then—perhaps the prop blast kept the pack cool. This has been the first time I have used a pure DC load to cycle packs at high current levels. Is it possible that a motor load, since it is not pure DC, heats a pack less? The off-road battery manufacturers discharge their packs at a standard 10 amperes. Now that I know about the heating, I can see why. I changed the discharge setup to four 12-volt headlight bulbs in parallel, which gave an average discharge current of about 11 amperes. This solved the heating problem.

This experience brings up a couple of questions. One is: will soldered connections tend to pop loose at very high current draw? If so, it could act as protection for the pack, like a fuse. The other thought is that perhaps the welded connectors should be left in place, and the wire or braid connectors soldered alongside them to reduce the pack resistance. That way, there will always be a connection, even if the pack gets very hot. I don't know, as I have never gotten a

battery pack hot enough in flight to make a solder connection come loose.

Anyhow, after eight cycles using the above methods, the 1500 SCR pack and the 1200 SCR comparison pack looked like this:

Sanyo 1500 SCR six-cell				Sanyo 1200 SCR six-cell		
Min.	Volts	Amps	Amp-min.	Volts	Amps	Amp-min.
0	7.70	11.9		7.83	12.1	
1	7.20	11.4	11.6	7.01	11.3	11.7
2	7.15	11.4	23.0	6.90	11.2	22.9
3	7.14	11.4	34.4	6.87	11.2	34.1
4	7.08	11.4	45.8	6.81	11.2	45.3
5	7.01	11.3	57.1	6.74	11.1	56.4
6	6.90	11.3	68.4	6.59	11.0	67.4
7	6.72	11.1	79.5	6.08	10.5	78.1
8	6.00	10.5	90.3			

As you can see, the 1500 pack lives up to its rating (1.5 Ahx60 minutes = 90 Am, and I recommend it as a good value for performance. It sells for \$5 per cell at CS. The performance of the 1200 SCR pack is also quite good, 78 Am is 1.3 AH, or 1300 mAH. I had heard that Sanyo underrates the capacity of its 1200 SCR packs, and this bears that out. This pack, by the way, is three years old, and has had many off road races on it. It has been charged for most of its life at 8 amperes on the Navcom peak charger. I just rebuilt the pack, as the original heat-shrink jackets were dirty and torn. With new heat-shrinks and #12 gauge flat braid soldered connections, it is as good as or better than new. The longevity and performance of the SCR cells amaze me. The cells of this pack remain matched, and I have never had to replace one. I feel that the SCR cells are the best bargain in cells, as they will last and their performance does not deteriorate.

I went to the Bad Nauheim meet in February. This is an exercise in "polar bear flying," especially this year. There was snow and ice everywhere, and on Saturday an overcast made it look pretty grim. Despite that, Charlie Binder, the man who makes it all go, an-

nounced that Sunday would have beautiful weather. He was right, Sunday was sunny and lovely! I am told this is one of the largest meets in Germany, and it certainly looked like it to me. There were 131 pilots signed up on Sunday for the F3E and Jedermann (05 glider) events. Saturday was pylon racing. The racers are fast, almost all are like the Race Cat, and sure enough, Werner Dettweiler was in the lead when I left. Kurt Meier had a couple of flying wings that were particularly attractive. They can be flown as either pylon racers or sport pattern. The photo shows the two versions—one a tractor, the other a pusher. I particularly liked the looks of the tractor, however, Kurt says the pusher is easier to balance. Kurt sells these as almost-ready-to-fly kits, consisting of an immaculate fiberglass fuselage and balsa sheeted foam wing. His workmanship is flawless. These go for DM 185, or about \$130 at today's exchange rate. Kurt is at 7436 Romerstein-Bohringen, Friedenstrasse 5, Germany.

There were some impressive chargers at the Bad Nauheim meet. The photos show the STW Computer Charger and the Robbe Multifunction Charger, also computer controlled. I do not know what all the features of these are. I think both of them can charge up to 30 cells at a constant three amperes, with peak detection shutoff. The Robbe MFC 535 charger has a keyboard that will let you select between peak charging, timer charging, and temperature cutoff charging. The STW 512 Computer Charger is DM 348 at Modelbaubedarf G. Oechsner, Aubinger Strasse 4, 8032 Lochham, Germany. I cannot find the Robbe charger in my Robbe catalogs, so I can't say what its price is.

Earlier in February I went to the Nuremberg Toy Fair. Kyosho did indoor demonstrations of their Hughes 300 electric helicopter and their Concept EP helicopter. The Hughes 300 is tiny, only a 23-inch rotor, and is powered by a LeMans AP29 motor on a six-cell pack. The battery pack in the photo lies on the floor; the helicopter flies on a cord. It looks like it can carry its own battery pack also. The tether flying was impressive; the Hughes hovered and maneuvered very nicely, for about a four minute flight. The phrase "practice in your living room" pops into mind, but I wouldn't try it! It would be quite practical to practice in a garage, however. The demo room was a tiny glass booth no more than seven feet on a side. The pilot looked quite comfortable flying in that small an area.

The Concept EP is quite a bit larger, and the pilot stuck to hovering only, and even so he looked tense. The Concept EP is obviously for flying at regular fields and it flies on a self-carried battery pack quite nicely. I did not get prices on these. Another photo shows Robbe's new Do228 twin 05 powered plane. It is very handsome, flying weight is about 5-1/2 lbs. Again, no price available.

Well, that's it for now, folks! Do it all, do it electric! My address is: Mitch Poling, 7100 CSW/MC, Box 734 PSC 2, APO NY 09220-5300.

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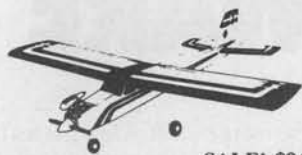
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R/C SOARING

BY BILL FORREY

OF SLOPER AND SOFTWARE

Last month's coverage of the L.A. Model and Hobby Show included a small segment on RC Products' "MC3" slope glider. Having had our curiosity aroused by this radical departure from the "hobby norm," we invited RC Products' Mike Davis down to *Model Builder's* local slope site for a "test drive."

the site, Mike parked his Jeep, got out, looked around, then walked over to the rear passenger door of the Cherokee. He opened the door and reached inside. He grabbed his jacket and dark glasses and put them on. A second time he reached in, this time pulling out a sinister looking gray rifle case. Quietly he shut the door and slowly turned around.

cliff into the marginal lift. A few passes later, the MC3 had its trim tabs properly adjusted. Then, Mike started to really work the weak lift. A couple more passes had the MC3 above eye-level and cooking.

If one wishes to use his imagination a little, the MC3 looks a bit like the all-white NASA chase planes you see so often in press



(Left) Mike Davis of R.C. Products is out to make a hit... at the slopes... with his MC3 slope glider! Glider neatly packs away in its carrying case for easy transporting. (Right) Oh... so its not a Browning deer rifle, but a glider in there! Pretty cool! Everything inside is packed tightly in protective foam, too!

When we arrived at Costa Mesa's Fairview Regional Park, alas, the wind wasn't cooperating. It was gently blowing parallel to the face of the Santa Ana River cliff, definitely not a workable situation for a slope glider! However, the south wind did present an alternative. There is a site within the general area which is a lot of fun under these conditions. That's where we headed next... the Back Bay area of Newport Harbor.

The ten-minute drive over to the Back Bay seemed to take twice that long. The anticipation of a fun afternoon of slope aerobatics was building, and the stop lights were becoming a real nuisance.

What happened next was like something out of a Hollywood movie. We pulled up to

Looking to all the world like he was on his way to a contract hit, he walked over to the cliff. His stride said, "Make my day."

After a careful surveillance of the area, the gun case was lowered to the edge of the cliff overlooking the harbor. He unlocked the case. The lid was carefully raised... Expecting to see a Browning .30-'06 deer rifle with a long range scope inside the case, I was delighted to see a slick white slope racer with a Futaba radio... end of scene one.

It only took Mike a minute to assemble the MC3. When he was finished, the brand-new-out-of-the-box model sailplane was ready for its maiden flight. Balanced properly, but as yet untrimmed, Mike showed his confidence in the MC3 by tossing it over the

releases from Edwards AFB in California. I think that would make it a Northrop T-38 Talon. In one of its other available colors, it would look more like an F-5 Aggressor (in black with red stars), or an F-20 Tigershark (in desert camo). In any case, the MC3 is definitely one of the new generation power scale slopers (PSS) that are appearing quite frequently over the California slopes.

To say that the MC3 is just another PSS model would be like saying a Rolls Royce is just another car. The MC3 is different from its fellow PS slopers in many ways. Most obviously, the MC3 is a 100% ready-to-fly (RTF) model with a factory-installed radio system and a carrying case! And if that isn't enough, it also features pitcheron control



Sharp, agile turns are possible with the MC3's pitcheron wing control.



It only takes about a minute to field strip this Top Gun . . . or assemble it for that matter. The MC3 is a simple sailplane to prepare for flight.

Head-on view graphically shows the pitcheron wing control in action. Right wing is at a higher angle of attack than the left, the plane is rolling to the left.



Launch! Mike Davis tosses the MC3 up and out for a second flight. Fashion Island business district of Newport Beach in background, Back Bay area of Newport Harbor below. Absolutely a beautiful site to fly!

Is that a T-38 Talon flying below that Boeing 737?



and rugged, molded plastic construction.

All this user-friendliness is not without its price, however. Cost-wise, the MC3 is ranked up there with some pretty fancy European imports. I'll let you find out for yourself what the cost is, because that will depend on whether you want to go whole-hog, or want a custom color, or want some things eliminated... like the carrying case or the radio. Mike is pretty flexible, so its worth giving him a call at (714) 351-9715, or dropping him a line at R.C. Products, 7044 Arlington Ave., Riverside, CA 92503.

So... how did it fly? Remarkably well! Flying the MC3 was my first direct experience with a pitcheron controlled model. Pitcherons, for those who don't know, are wings that pivot for both pitch (elevator function) and roll (aileron function). The

stabs do not move at all.

The MC3 handled just like any other aerobatic sloper. The roll rate is as you would expect, crisp. The pitch axis, likewise, was sensitive, but under control. Loops, rolls and inverted flight were no-sweat easy. Had the lift been better, we could have gone crazy with the MC3, but that wasn't in the cards. What we witnessed was the light air performance of this clean ship, and that was impressive. The Eppler 205 section provided plenty of usable lift and forward speed.

For those with a feel for performance based on specifications, the MC3 looks like this: 55-inch wingspan; 318 square inch wing area; 37-inch overall length; Eppler 205 airfoil; 24-ounce flying weight; rubber nose cone for safety; two-channel radio required (four-channel RC included); on-

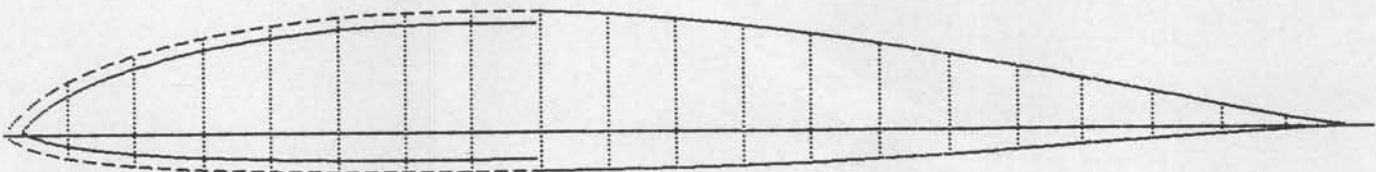
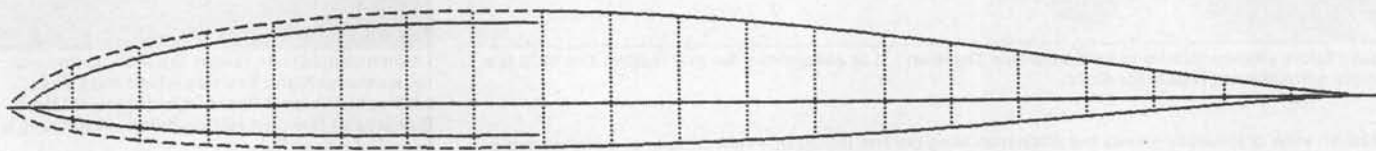
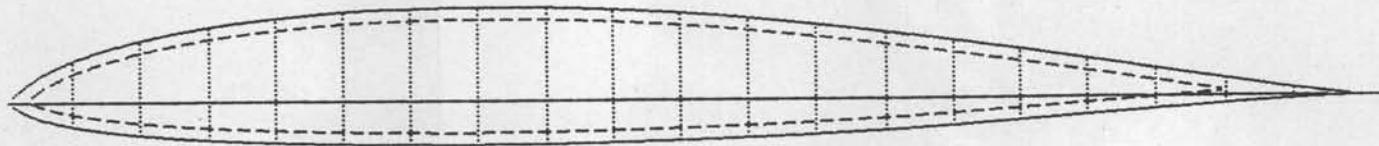
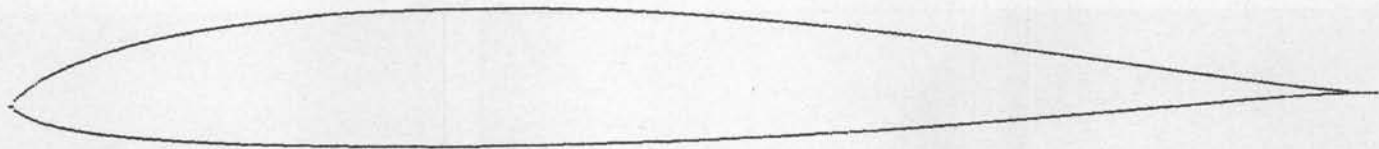
board electronic pitcheron mixing (included); and carrying case (included).

Just charge your batteries and fly. It's that easy with the MC3. Give 'em a call, and tell 'em you saw it in *Model Builder*.

CYGNET SOFTWARE'S "FOILED AGAIN" AIRFOIL PLOTTING PROGRAM IN REVIEW

Switching from one extreme (100% RTF) to another, namely, scratch-building... we come to an indispensable, time-saving tool that any scratch building modeler should have. Foiled Again (FA).

Foiled Again is the brain-child of Bernie Crowe, of Dana Point, California, who as a free flight modeler back in 1982, wanted an airfoil plotting program for his own personal use. Educated at London University with a Bachelor of Science degree in Aeronautics,



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Line	Stn.	Upper coord	Stn.	Lower coord
1	000.03	0.159	000.03	-0.159
2	000.79	1.132	000.50	-0.647
3	001.88	1.913	001.52	-1.148
4	003.40	2.710	003.07	-1.612
5	005.34	3.486	005.11	-2.025
6	007.70	4.218	007.65	-2.381
7	010.46	4.887	010.65	-2.678
8	013.59	5.480	014.08	-2.919
9	017.08	5.988	017.91	-3.105
10	020.88	6.402	022.10	-3.238
11	024.32	6.715	026.59	-3.321
12	029.32	6.922	031.35	-3.354
13	033.86	7.020	036.31	-3.338
14	043.39	6.866	041.41	-3.273
15	048.28	6.606	046.61	-3.159
16	053.22	6.225	051.85	-2.995
17	058.17	5.738	057.07	-2.784
18	063.09	5.177	062.22	-2.527
19	067.92	4.563	067.25	-2.231
20	072.60	3.912	072.12	-1.906
21	077.10	3.248	076.76	-1.568
22	081.35	2.595	081.13	-1.236
23	085.30	1.977	085.18	-0.922
24	088.90	1.419	088.84	-0.638
25	092.10	0.941	092.07	-0.399
26	094.83	0.559	094.82	-0.214
27	097.03	0.283	097.03	-0.090
28	100.00	0.002	100.00	-0.001

Max. Thickness....10.36% at 33.9% chord
Maximum Camber.... 1.84% at 33.9% chord

Bernie has in his career been a manager of the Computer Simulation Group of Tracor Flight Systems, a defense department contractor that specializes in combat training. He knows his way around computers like most know their way around their house.

After showing a model building friend the code in 1983, he was asked if it was available for sale. Bernie was asked to rewrite the code for an Apple II computer which at the time was an often requested format. This was the first time the code had been offered to any other modeler.

By word of mouth it became known that this airfoil plotting program was available. Within six months, requests were running six to one in favor of the IBM or IBM compatible computers. By 1984 the user interface for IBM computers was fully worked out and "bulletproof." Apple version sales began a steady decline, and with each Apple request came different interface problems and various other problems that made this application of FA not worth the trouble. The Apple format was eventually discontinued by 1988.

The first commercially available Foiled Again program was offered for sale in 1985 in the NFFS Digest. Calls came flooding in, and Cygnet Software was born! (Our recent survey shows that 42-1/2 percent of our readers own a home computer.-wcn) Since that time, not a year has gone by that improvements and additions haven't been made to FA. The continuous development of FA has made it a very valuable tool that thousands of modelers have used and enjoyed.

The current FA code must be used with color or monochrome IBM PC, PC/XT, PC/AT, or PS/2 computers (or their clones) with at least 256k of memory and MS-DOS 2.0 or later versions of the disk operating system. It also requires a dot matrix (sometimes called "graphics capable") printer to plot the airfoils. The majority of dot matrix printers work with FA. Developments are underway to allow FA to be used with HP LaserJet II and other laser printers.

Whether or not you have the required computer hardware (you probably know someone who does), the Foiled Again software can be extremely handy to own. This program can speed you on your way to researching and developing YOUR next model airplane. That could be a new wing for an old glider, or a whole new model. Yes, maybe even a power plane (boo-hiss).

Now, I don't make any claim to be a computer expert. If the truth were known, I'm really more of a computer user, and one of those who can hardly get around the DOS commands. For this reason I'm not going to be able to give you the whys and hows of Foiled Again, but what I will do is tell you WHAT Foiled Again can do, then let you take it from there!

Suffice it to say the owner's manual will explain everything you need to know about installing and running your FA program. Whether you have a hard drive and a floppy, or two floppy drives (like I have), you can get it running!

The most obvious and primary use of FA is to print out airfoils. Airfoils are really cross sections of wings. Cross sections of wings

continued on page 103

WORKBENCH TALK

This is going to be Mulligan stew/Pot-pourri month, with a bunch of mostly unrelated topics connected only by the wispiest of transitions and segues. Grab your favorite beverage and a few chips, and buckle up. As the lady said, this might be a bumpy night.

The first order of business is a little bit of a correction regarding something I wrote last month about JR's new X-347 radio system. I said that both the X-347 and Futaba's 7UAP Super Seven system came with standard servos. This was incorrect. The servo provided with the X-347 is the NES-517, which is a high-speed ball bearing servo roughly equivalent to the Futaba 5101s provided with Futaba's top line 9VAP system. As JR is my personal choice in radio equipment and I'm pretty familiar with the line, I should have picked up on this, but it managed to get by me and I'm sorry. If you think this gives the JR set a bit of an advantage in the 7-channel pattern radio sweepstakes, I'd have to say that I do believe you're right.

Let us now consider tails. As far as tails are concerned, not all that wiggles is good, especially when it comes to aerobatic airplanes. You may or may not be aware that fuselage torsional stiffness (or lack of same) affects the flight characteristics of a pattern plane to a fairly large extent, especially in certain maneuvers such as snap and spin recovery and, most prominently, in hard cornering maneuvers.

With prop driven aircraft, pulling a lot of angle of attack under power in a sudden

fashion can (and does) torsionally load the tail. For anyone who may not yet be fully conversant with airplane-type terminology, "pulling angle of attack" is the same thing as yanking on the elevator control. I believe the

cleanly through it.

Our control line stunt brothers have known about this since the Eastern hills were the Western mountains, and stunt plans abound with ideas for keeping the back end of the airplane torsionally rigid. However, fiberglass fuselages on Stunt ships are rarer than sharp corners on a ball bearing, so not much that our wire wrapped brethren do in this area is of any great help to us.

Pattern pilots have also long realized that a stiffer airframe is a more accurate aerobatic airframe. Unfortunately, "stiffer" usually means "heavier", and the tail of a pattern plane is the very last place you want to put extra weight. Alas, the current trend toward longer tail moments and larger tail surfaces places an even greater torsional load on the tail, simply because we are working with more mass on the end of a longer lever arm. Obviously, we need to do something, but we don't need even more mass back there, so whatever we do to increase stiffness had better be very light and very effective.

I have seen and tried a great many solutions to this problem. Among them are "bridges"

ahead of the stab (ala the Tipo and Eclipse, among others), balsa "crutches" glued into the back of the fuse (Avanti), and filling the back end of the fuse with spray expanding instant foam. None of these solutions worked well enough to satisfy me. The crutch method was more weight than I was willing to accept, and the bridge method, while light enough, didn't seem to be extremely effective. The spray foam method is effective and



Gus Ozols, of Salient Designs, shows a "Boxer" prototype.

reason for this is a combination of torque, inertia, spiral slipstream from the prop, and gyroscopic precession, but the exact technical explanation eludes me. Whatever the reason, the phenomenon exists. A common result of this tail "twistoflex" action on a torsionally weak airframe is a "bobbled" corner, dropped wing, etc. Sometimes the airplane will just seem to sort of "push" or "mush" through the corner instead of flying

light, but unbelievably messy . . . not to mention hard on control linkages!

A featured diagram shows a little modification of the bridge method that I have been using to stiffen up the rear end of my Cursor fuselages. Testing seemed to indicate that the bridge method was ineffective because the longitudinal axis of the bridge was in line with the stab chord line and the longitudinal axis of the fuselage. As the load is applied rotationally around the fuse axis, a stiffener in line with the axis makes little sense. The fuse sides deform under the load, and the bridge just twists along with the tail.

However, moving the bridge stiffener to a 45-degree or greater angle to the applied load and tying it to the stab effectively creates a shear web between the fuse sides that resists the twisting load to a remarkable degree. The tails of my current airplanes are as stiff as surfboards, and the total added weight is less than seven grams. The method should work with most glass ships. Give it a try and see what you think.

Speaking of tales of airplanes (I told you some of these transitions would be minimalist...), I have one to relate. Salient Designs of Kirkland, WA, is a new start-up firm specializing in model aircraft plans. These plans are not just any old model plans, but state of the art Computer Aided Design offerings that include full templates for all parts (done on separate sheets), and complete building instructions. Each plan shipped is printed out by plotter for total dimensional accuracy . . . no "bluelines." All orders come rolled in a tube. These are the very best, clearest, most accurate, and most detailed model plans I have ever seen, period.

So why am I telling you this in a pattern column? Because among the very first offerings from Salient is a project that has been near and dear to me for a long time, and one that I had a hand in designing.

The "Boxer" (check out the photos) is a simple foam and balsa design, engineered to be light and extremely easy to build. It is designed to be covered with plastic film, and may be built with either retracts or fixed gear. The Boxer is designed for a rear exhaust engine with a pipe and conventional gear, but it wouldn't take a great deal of modifying to fit a side exhaust engine with a

muffler and tricycle gear. The six examples now flying all weigh between 7-1/4 and 7-3/4 lbs.

The design is basically a variant of my Cursor fiberglass and foam F3A airplane. In response to local requests from Northwest area flyers, Salient Designs' founder Gus

flies a lot like a Cursor. I have flown the prototype through the F3A pattern, and it does very well, even with fixed gear. Local Novice flyers have flown the same plane through the Novice pattern, universally commenting in surprise that it was far easier to fly than their current "sport" mounts.

Well, of course. That's what I've been telling people for a long time . . . nothing flies like a pattern plane, especially a light pattern plane. Actually, the Boxer has increased knife edge capabilities over the Cursor, as it will perform knife edge loops, and my Cursors won't. Luckily, the knife edge loop has yet to be added to the F3A pattern.

Boxer plan and template sets are available for \$30.00 plus \$5.00 S&H from Salient Designs, 10326 113th CT. N.E., Kirkland, WA 98033, or call (206) 827-8348. Wing and stab cores can be ordered from Jim Graham at RC City, or you can cut your own from the templates provided. Jim should have an ad around the magazine somewhere; look him up in the Ad Index.

Incidentally (Ha!), one of the things that makes a pattern plane fly like a pattern plane is all the straightness that gets put in during the building process, and adding straightness means getting the wing and stab incidence set properly, among other things. For many, many moons I have wished for an accurate, repeatable, easy-to-read from three feet away incidence meter. I finally have my wish, even

if I did have to build half of it.

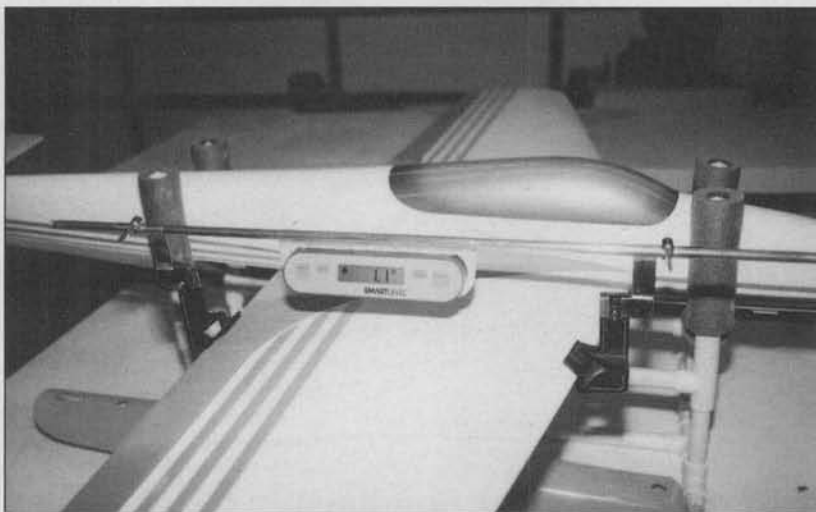
The heart (see photo) of my new meter is an electronic digital inclinometer. Digital inclinometers have been around for awhile, of course, but this little jewel is the first one that I've seen that is small and light enough (7 oz.), accurate enough (to 1/10 of a degree), and cheap enough (about \$100) to be used in a self-contained, surface-mounted incidence meter.

The name to remember is the Smart Level Digital Inclinometer, and the company is Wedge Innovations, 532 Mercury Drive, Sunnyvale, CA 94086, telephone (408) 739 3343.

As for the rest of the device, it's built mostly of brass tubing and the remains of a defunct commercial model incidence meter. What we really need is for somebody to produce something like this commercially,



The "Boxer" is a simple foam and balsa design, and easy to build. See text.



The author used an electronic digital inclinometer to build himself an incidence meter. See text for details.

Ozols set out to create a "box fuselage" Cursor (hence the "Boxer" name!), using the Cursor airfoils, areas, planform, and force arrangement, but with a quick-and-easy wooden fuselage that required no carving, hollowing or painting, and very little sanding. The only real aerodynamic change from the Cursor design is a little added side area.

The idea behind the project was to create a simple but very capable machine that would put modern F3A type performance within the reach of nearly everyone competing in pattern, and do it for very little more than the cost of a .60 sized sport aircraft. As a matter of fact, the airplane can be built as a .60 sized sport aircraft, or use a .60, .80, or .90 four-stroke engine for power. Why shouldn't sport flyers enjoy real (as opposed to "sport") pattern performance?

The resulting airplane, naturally enough,

only smaller, lighter, and designed from the ground up for model aircraft. Wouldn't that be nice, swell, rad, neat, keen, gonzo, and awesome? Are any manufacturers listening?

Now that we've covered tails and wings, we proceed forthwith to the nose of the beast, where the horsepower lives. Friend Dean Pappas, of *Flying Models* fame, has often said that insofar as horsepower goes, way too much is just right. Righto, Dean. Having too much power in a pattern ship is like having too much money in the bank, it just ain't possible.

I have recently found a low hassle, commercially available spot to purchase additional power. The company is Pacific Model Engine Works, and the guy behind it is Kip Jackson, who is a silver and goldsmith by trade, and an RC pattern and helicopter pilot by avocation.

Kip's standard motor massage consists of mirror polishing the crankshaft, crankpin and wrist pin, and fairing and polishing the cylinder liner intake ports to improve fuel flow through the engine. Engine timing is unchanged. On the engines of mine that Kip has done, these mods were worth about 3-400 extra rpm, static, on my standard setup, with all variables (fuel, plug, pipe length, prop, temp, and humidity) being equal. In the air, the difference is very noticeable. I would assume that most of the boost is coming from freeing up the bottom end of the mill by polishing the rotating components.

Pacific Model Engine Works does business from 14635 S.E. 16th, #24, Bellevue, WA 98007, telephone (206) 643 2980. The charge for all this is 50 bucks. Repair and bearing services are also available.

Of course, it takes more than just engine power to get one of these babies up and flying. Our radios require a steady diet of electrons to function at all, let alone function properly. I have had more than a few recent questions about the practice of using five-cell, six-volt battery packs rather than the manufacturer's industry standard four-

cell, 4.8-volt packs that come with the radio. Because we spare no expense to bring you the facts here at *Model Builder*, I moved a couple of stacks of assorted junk around until I found the telephone. Most of the following information comes to you courtesy of Larry Sribnick of SR Batteries.

Five-cell packs do offer some definite advantages, and one of the most important for pattern flyers is that the servos become

this is old wide band type stuff that you shouldn't be using anyway. However, some newer four and five-channel sets don't tolerate the practice well, either. When in doubt, check with the manufacturer.

One of the most major advantages to the five-cell pack is redundancy. If a cell shorts out in a 4.8-volt, four-cell pack, you instantly have a 3.6-volt battery pack and, most likely, a serious and immediate need

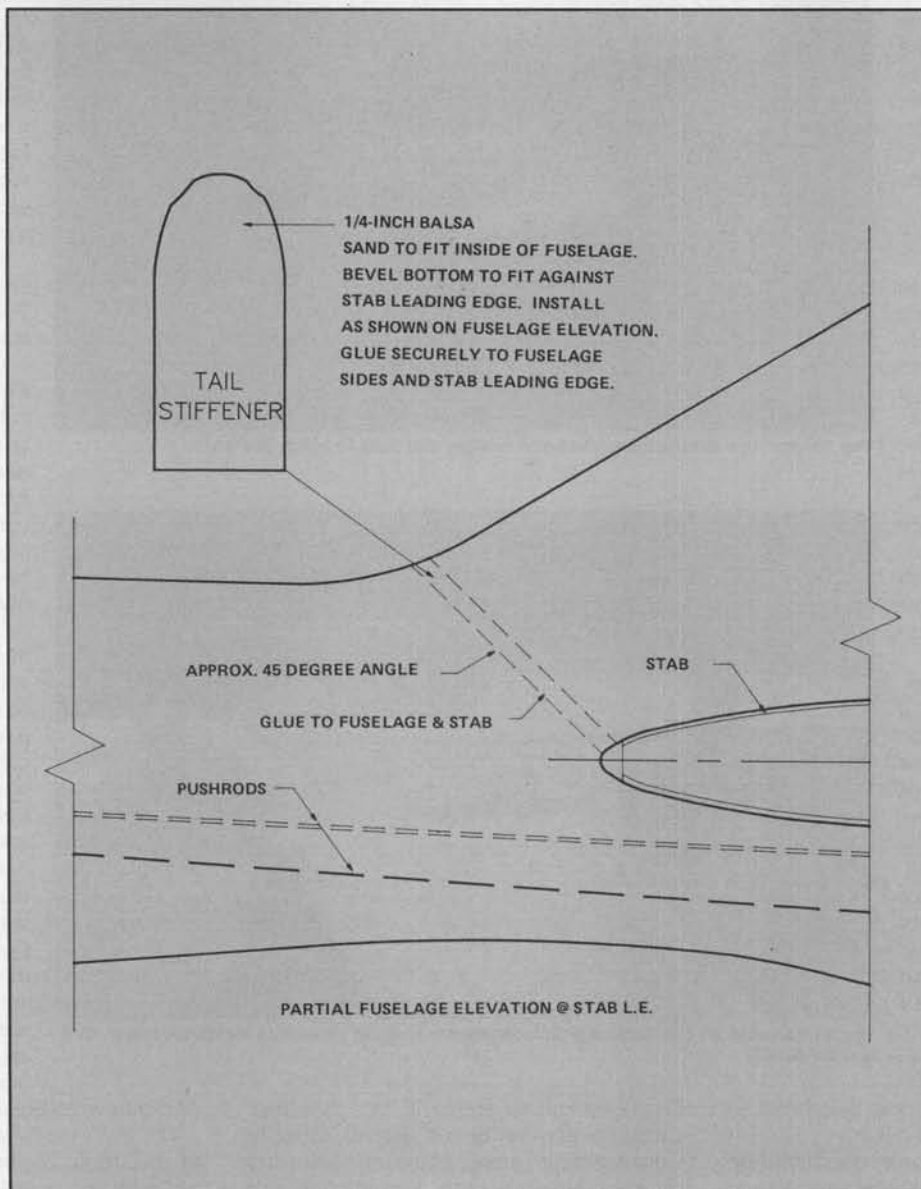
for a new airplane. If one cell of a five-cell pack shorts out, you are down to 4.8 volts, and both the radio and airplane live to fly again.

The most obvious disadvantage to going the five-cell route is that the charger supplied with your radio will no longer be adequate. You will need an aftermarket charger with an output level you can set, such as the Ace Metered Vari-Charger. Most expanded scale voltmeters (with the exception of the Ace Voltmaster) will no longer work, and most battery cyclers likewise were not designed with five-cell packs in mind (again, with the exception of the new Ace Digipace).

Another thing to keep in mind is that as the number of cells goes up, current draw through the system is increased, as Ohm's Law has not been repealed. How much the current draw is increased depends basically on the type and number of the servo motors in use, but the rule of thumb is about 15-20%.

Given that, it probably is a good idea to step up to a cell with a little higher mAH rating if you are contemplating a five-cell pack. If you are using 500 mAH cells, go to a 700 mAH cell, and so on. The alternative is to keep the same size cell and settle for a little less operating time on each charge.

So ends our journey for this month. Cut to a shot of me stuffing this column in a mailbox and fade to black as the camera pans up to roll the credits. Speaking of rolling, remember to keep those cards and letters and photos rolling in. Somebody must be building something somewhere, but I'm not seeing it. See ya at the field!-Rick. **MB**



faster and more powerful. Additionally, most modern receivers are very happy munching on six volts instead of four-and-a-half or so, as most were initially designed to use dry cell instead of NiCd power. Dry cells produce 1.5 volts to a NiCd's nominal 1.2 volts, so the output of a four-cell alkaline pack is six volts. The increased voltage often actually cleans up a "glitchy" receiver and makes for a more solid RF link.

There are exceptions to the above rule. Some earlier radios, most notably Kraft sets built in the 70's, didn't contain voltage regulators, and consequently aren't very happy with the increased voltage. Of course,

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Helicopter WORLD

KALT WHISPER ELECTRIC HELICOPTER PART I

BY JAMES WANG

The Kalt Whisper has been introduced for about half a year now, and sales have been quite good. It is relatively inexpensive; the best price that I have seen is just over \$200. However, besides the kit you must purchase four micro servos and an electronic speed controller. A micro gyro is also recommended. The micro servos are about \$30 apiece. The special 9.6-volt speed controller will be close to \$100. The mini Kalt gyro is around \$80. Hobby Dynamics, the importer of Kalt Whisper and JR

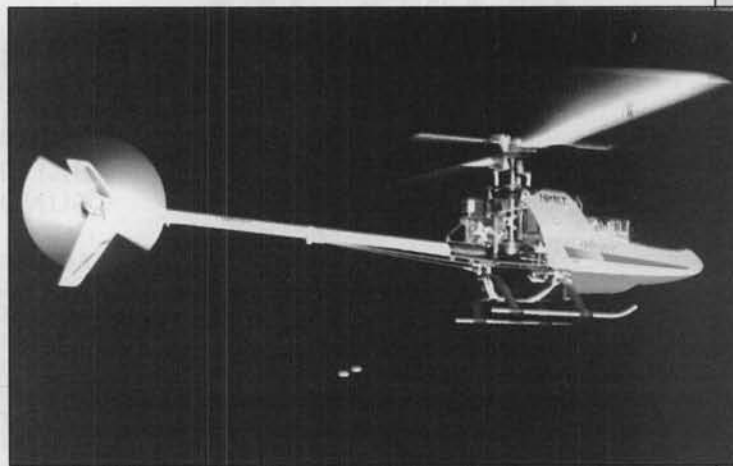
the author has built. Back in 1982, I built two Ishimasa EH-1 helicopter kits. The EH-1 was the first commercially available electric RC helicopter. It also cost around \$200, but it never flew as well as the modern Whisper. The EH-1 had aluminum frame construction, and used two inexpensive Mabuchi 540 motors running on a 9.6-volt battery. I saw Larry Jolly fly his EH-1 at the 1982 IMS Show in Pasadena for about 30 seconds and then land quickly. Well, I couldn't even get 30 seconds of air time on my EH-1.



James flying his Whisper at the local full-size heli pad. It is amazingly stable on calm days. Unfortunately, with an 1100 mAH battery, it only gets two and a half minutes of flight time. It is so light it feels like a flying a butterfly.

radios, also sells a special airborne package that includes three micro JR 305 servos, one micro JR 3035 servo, one Kalt 9.6-volt speed controller, and one Kalt mini gyro. This is the package that we are using along with our old trustworthy JR Unlimited 8 radio system.

Now let's start the review. This is the third electric helicopter that



Flying the Whisper at night. It is so quiet that it really whispers! Great relaxation to take in some flights after dinner without disturbing the neighbors. Ideal for the cool, calm summer evenings.

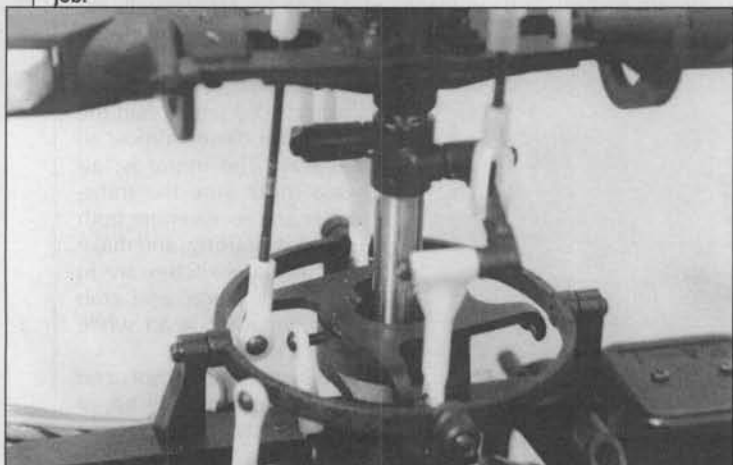
However, instead of using a 9.6-volt battery, I tethered the EH-1 and ran it off an electric cable to an automobile-size 55 amp car battery and it flew great. It could be flown for almost ten minutes. The only reason I had to land after ten minutes was to cool the electric motors. But it flew great on a 25-foot cable, and it was very stable, even without any gyro.

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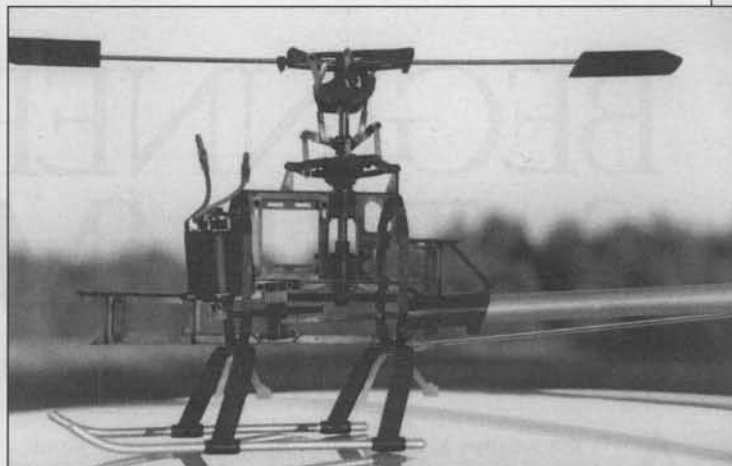


MB flight team members Mike Donnell and James got the Whisper together in four evenings; two for building and two for installing radio, set up and check out. Here Mike holds the digital fishing scale that shows the Whisper weighs two pounds, 14 ounces ready to fly. Mike did the fluorescent paint job.

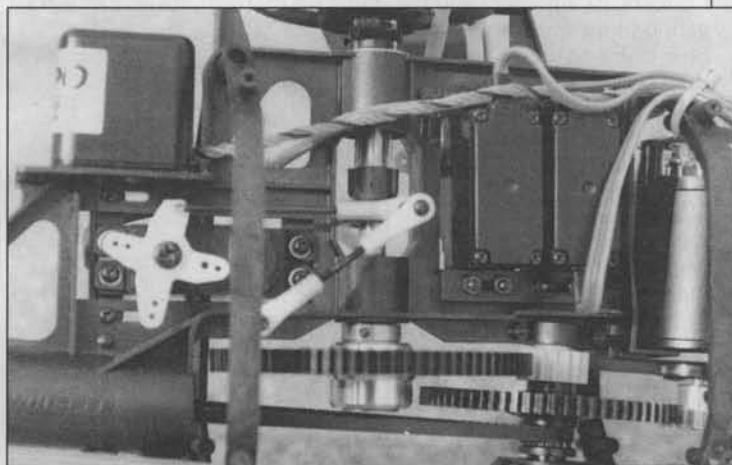


The swashplate and hingeless rotor head on the Whisper. The swashplate is very unconventional. It uses thin rings instead of solid plates. This reduces weight, but also makes it somewhat fragile. Collective pitch control accomplished is by sliding the washout unit up and down. The main shaft is hollow to reduce weight.

Well, the Whisper is definitely a vast improvement over the EH-1. The Whisper flew fine straight out of the box without any modification. With the 1100 mAH, eight-cell 9.6-volt battery pack, my Whisper can get two-and-a-half minutes of steady hover. In slow forward flight, due to translational lift phenomenon which improves the rotor efficiency of any helicopter, the Whisper can loiter for three minutes maximum in the air. When the battery gets weak (those NiCds really die fast), the helicopter will sink immediately. The NiCds have this interesting characteristic that they maintain almost a constant voltage while being discharged, but when the juice is nearly finished, the voltage will take a sudden plunge. Alkaline batteries are different, their voltage drops steadily during use. Therefore, make a habit of flying for not over two minutes and come back for hover. Because if you keep on doing forward flight, there might not be enough juice to bring the model back into a hover



The light weight frame assembly with the electric motor and rotor head installed. Installing the super small nuts and bolts requires good eyesight!



The right side of the Whisper. The servo on the left is for collective control. It slides a collar up and down on the main shaft to move two wires along the side of the main shaft; similar to the Concept 30. The electric motor is seen on the right. The gears are not supposed to be parallel to each other, they are beveled. The picture shows the pulley and the belt drive for the tail rotor. Before installing the motor make sure the gear mesh is smooth, because electric helicopters need every bit of power saving they can get.

for landing.

The reason that in slow forward flight any helicopter requires less power is because in forward flight, the incoming air stream improves the efficiency of the blade airfoil by reducing the induced drag on the blade. By reducing the induced drag, it means that at the same blade pitch angle, a blade can produce more lift and less drag, which means better lift-to-drag ratio. Thus, in slow forward flight, a helicopter can require up to 20% less power to sustain flight than in hover. For model helicopters, this speed is around 20 to 30 mph. For full-size helicopters, this optimal translational lift speed is around 60 mph.

With a rate gyro, the Whisper is extremely stable in flight. It is very easy to hover on calm days or indoor. However, due to its light weight, and we have flown it in 10 to 15 mph winds, and it really

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BEGINNERS HINTS & TRIMMING TIPS

BY JAMES WANG

As the weather is getting fabulous here in the Maryland/Virginia area, I have been doing a lot of flying and spending some time teaching many beginners how to fly and set up. Here are some of the big mistakes that I have observed. One of the beginners needed to borrow some gas for his Concept 30. Another beginner said, "No problem, there is an extra gallon in the car trunk. It's a blue color Mach-7." So the first beginner grabbed the gallon and fueled up the tank. We tried to start the engine and it just wouldn't start! Finally we discovered that he had picked the wrong container and fueled the Concept with windshield washer fluid, which also happened to be the same color as the Mach-7 fuel. No wonder that O.S. 32 wouldn't start! At least now the inside of the engine is clean.

Yours truly also made some dumb mistakes. After I helped a beginner trim out his new helicopter, I landed it and shut the engine off. After the engine had died and the main rotor was slowing down, I switched the transmitter off to save batteries. However, as with some older radios, such as the Airtronics Module 7H, when the transmitter is turned off, the receiver may cause the servos to go wild. So, even though the engine had stopped, and the rotor had slowed down, when I switched the transmitter off, all the servos went to one side and caused the helicopter to roll over! The moral is; do not turn the transmitter off until the engine and the main rotor have both stopped.

The next advice is to make a habit of checking all of the transmitter switches before starting the engine. I noticed that a beginner had accidentally bumped the idle-up switch before starting. Hence, when the engine started, the motor immediately revved up to full power. Luckily, the beginner was holding onto the main rotor head

while starting the engine. Otherwise, it would have started spinning and caused serious injury. But still, the brute power of the little motor stripped three teeth on the plastic main gear.

One fellow tried starting the engine without turning on the transmitter. That was dangerous, too, because that did not give him any throttle control. Still another tried starting his engine with the throttle hold switch accidentally turned on. The engine never got started because the throttle hold setting had the carburetor closed almost all the way. The moral is; always make sure the transmitter and receiver are both on before starting, and make sure all the switches are in the proper place, and grab the main rotor head while starting the engine.

As beginners will not need the throttle hold, idle-up, or invert switches during the first few months, it is better to inhibit them in the transmitter. Most helicopter radios allow the user to inhibit these switch functions. When you are ready to learn autorotation, then activate the throttle hold switch. When you are ready to do loops and rolls, then activate the idle-up switch. As for the invert switch, it is almost useless nowadays because everyone

is learning how to fly inverted without using the invert switch.

I notice that most beginners who came to our club field to seek help have a helicopter radio, but they do not know how to set them up at all! Most of the time they come out and ask an experienced pilot to help them fly, but they run into a big problem. That is, the beginner does not understand the radio manual completely so he programs the radio all wrong! But the experienced pilot may not be familiar with the particular model of radio that the beginner has, so he can't help him either. Therefore, if you are a beginner, read the radio manual as thoroughly as possible and try to understand it. This



Reza Fatami and his Peka MD-500 model. It incorporates Vario mechanics and Webra Speed 61 engine. Reza just took the five-bladed rotor head off (on the ground) and installed the less expensive, and easier to fly, two bladed rotor head with flybar. The flybar is what makes RC helicopters easier to fly. It provides a mechanical feedback like a semi-autopilot system.

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way, at least when the experienced pilot asks you to increase the pitch at the top, you will know where the pitch curve is stored in your particular radio. Bring the radio manual with you to the field.

Again, I highly recommend that all beginners seek the help of experienced fliers. They will save you time, frustration, and money. Like Ray Hostetler says in his RC helicopter Manual, even if you have to drive five hours, it's worth it. I see a lot of my fellow members spend more time each weekend helping beginners than flying their own machines. Well, if you are lucky enough to find someone willing to help you, at least bring an extra soda or a sandwich for him!

The other switches that should be checked before takeoff are the dual-rate switches. Make sure they give the rate that you want. Make a habit of moving the cyclic and tail rotor sticks to assure they move the controls in the proper direction. I usually check them right before takeoff. I look at the rotor disk to make sure the rotor disk tilts in the direction that I move my cyclic stick. I also look at the tail to make sure it swings in the proper direction.

Another problem that beginners have is knowing how to determine what is the best gyro setting. For an inexpensive, single-gain setting gyro (JR-130, Futaba 154, Airtronics SG-X, GMP), the best gain setting is the one that will solidly lock the model's nose onto a heading, but without causing any tail oscillation. This is also the maximum gain that can be used for your particular helicopter without letting the gyro over-correct the heading. Here is how to set it up. First, make sure that the gyro is working and it is moving the tail rotor servo in the proper direction (the procedure was explained last month). Then turn the gain setting to about 80 or 90 percent of maximum. Hover the model. Most likely the model's tail will be zigging back and forth rapidly. This means the gyro is over-correcting and causing over-shooting. This is also called "hunting." The gyro is over-correcting and trying to hunt for a heading to stop, but never finds it. Now, reduce the gyro gain setting slowly until the tail no longer wiggles. This means the gyro is set at the maximum possible gain without hunting.

If you have one of the more expensive gyros which has dual-gain settings (JR-120, Futaba 153, Airtronics SG-1, JMW), then set the high rate setting with the above mentioned procedure. Then set the low rate setting at about 70 percent gain of the high rate gain. At the high gain setting, when you give a sudden tail rotor command, the model should yaw the nose immediately, but the moment that the tail command is released, the tail swing stops. Try giving a blip of tail rotor command to the left, and then also test it to the right. The



The colorful tail rotor system on the MD-500. Very similar in design to the X-Cell, but the tail rotor hub does not teeter here.



Vario mechanics in Alan Helper's Vario Star Ranger helicopter. Notice this rotor head is of earlier generation than on Reza's MD-500. Webra 61 engine. Collective and roll control system is identical to X-Cell. JR-347's two servo CCPM mixing function may be implemented on this model.

model's nose should almost swing and "zing" to a stop instantly. The JR-120 and 130 are excellent at locking on target. They are so sensitive that you can almost always see the nose and tail zing slightly. The only difference between the 130 and the 120 is that the 120 has dual-gain setting and costs more than the 130, which only has one gain setting. The mechanics of the 120 and 130 gyros are identical. We showed a picture of the inside of the JR-120 gyro in the October 1989 *Model Builder*.

The Airtronics SG-1 gyro behaves similarly to the JR and has two gain settings. The Futaba 153 is a two-gain setting gyro, but it seems smoother in response than the JR gyros. The corrections from the Futaba 153 to the helicopter are usually smoother and do not cause the tail to zing. However, this also means the nose and tail do not zing and lock onto a new heading as quickly as the JR. The JMW gyro behaves similarly to Futaba's. For smooth and scale-like flying, the smoother response type like the Futaba and JMW might be better. But some may prefer the digital-like, high-gain response type such as the JR. Personally, I like the JR-120 for all my hot dog flying because of its fast response. I use the high gain for relaxed hovering, while most of the time I hover and do forward flight on low gain setting. For the Collective Shuffle maneuver that we discussed in the February 1991 issue, I use high gain to keep the tail pointing solidly to the ground. However, recently I have had two motors on the JR gyros fail. Make a habit of listening to your gyro before you start the engine. Memorize the gyro's electric motor sound. This can help you determine if the gyro is working properly and can also indicate the condition of the receiver battery.

For people who have been flying the Excalibur, you have probably wished that you could have more collective range for hot dogging. In the stock form, I could only get +10 to -6 degrees of collective travel. In the Excalibur review (August and September 1989 *Model Builder*), we said that we had tried using the other hole locations on the Bell-Hiller mixing arm on the wash-out unit and on the rotor head seesaw, but that increased the slop in the control system. When I said the slop increased, I meant that if you grab the Hiller paddle in your hand, it will wiggle more. Therefore, it is not a good idea to change the ball location on the mixing arms away from the stock position. A better solu-

tion is to use a Dremel tool and elongate the rectangular hole on the side frame where the collective control collar slides up and down. This allows the collar to travel farther up and farther down. Elongate the hole until the top and bottom edges of the hole are flush with the

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main rotor bearing blocks. With this modification, my Excalibur has +12 to -9 degrees of collective. For normal flying and idle-up, the top end is at +10 degrees and the bottom end is at -6 degrees. Plus 12 degrees is used for the top end during throttle hold autorotation. Minus 9 degrees is used in the bottom stick position during idle-up-two for switchless inverted flight.



Royce Brademan flies this beautiful X-Cell 60 with Quicksilver fiberglass fuselage. Due to the angular backdrop, this model requires a careful paint scheme to look great. The stock horizontal tail is quite small. The model was tracking nicely in the air.



On the display case are three unique scale fuselage kits manufactured by Century Import and sold by Helicopter World Inc. From left to right, they are: Bell Huey UH-1 that was widely used in Vietnam, the Bell Huey Tow Cobra which was a gunship used in Vietnam and the Middle East, and the modern Apache AH-64. The Cobra and Apache fuselages are not made by any other manufacturer. By the way, The Tow Cobra is the author's favorite scale model.

the main rotor blades are not balanced. This means the rotor's center-of-mass is not located directly on the main shaft. Instead, the center-of-mass is whirling at the rotor rpm and causing a one-per-rev vibration to shake the entire helicopter. The solution is to add a one-inch square piece of sticky blade covering material arbitrarily to one of the two blades. Stick it on the bottom side of the blade at about four inches away from the blade tip. Hover the model again. If the vibration gets worse, then peel off the tape and put it on the other side. Normally, you may have to add one or two strips to get rid of

Another thing to watch out for on the Excalibur is the super-thin and flexible fuel line that comes with the stock fuel tank. It is too soft and can tangle and stop the fuel from flowing inside the fuel tank. Instead, replace it with some regular silicone fuel line. Also, periodically check the two black plastic pieces that are clamping the tail rotor gear box. These two pieces can crack with age. This will allow the tail rotor gear box to rotate.

Now let's look at some of the common causes of model helicopter vibration and how to cure them. First, if the whole helicopter shakes, then it's an indication that

the vibration. Add one strip at a time. The best sticky blade covering materials are the ones sold by Robbe/Schluter or Miniature Aircraft because they are sticky and heavy.

Add the sticky patch to the bottom of the blade because we want the air to flow smoothly over the airfoil's upper surface. It is worse to have the upper surface get nicked or disrupted than the bottom surface, because disruptions on the upper surface cause flow separation and reduce the lift. The top side of the airfoil is at a low pressure and is responsible for forcing the blade upward. The bottom side of a lifting airfoil is always at a high pressure and the air flow will not separate away from that surface. We will have detailed discussion next time. The reason for adding the tape three or four inches away from the blade tip is that this is near the 3/4-blade radius location: that is, it is close to a point called "the radius of gyration." That is a point where if all the mass of one blade is concentrated, it will produce the same amount of centrifugal force as the whole blade.

The bottom line is that you should always statically balance the main rotor blades before you fly them, then add the one square inch tape during flight tests to fine-tune the balance. The easiest way of static balancing is to put a long bolt through the pivoting hole on the two blades and tighten it with a nut. Support the bolt and nut on your fingers, and see if the two blades teeter into a level position. If not, add some trim tape to the lighter blade. Instead of using your fingers, Kyosho sells a simple type of teetering balancer for about \$35 (see photo in June 1989 *Model Builder*). Robbe/Schluter sells an even higher quality metal construction balancer for about \$60. These two balancers are about the easiest ways of balancing main rotor blades. Of course, there is the High Point balancing system which also allows you to balance the entire main rotor head assembly with the main rotor blades attached. This is the technique that the most discriminating competition fliers use. But for beginners and sport flying, the teetering method will be sufficient.

If the main rotor blades are out of track, which means one blade tip is flying higher than the other, you will also note one-per-rev vibration. Adjust the blade pitch links to bring the blades to the same plane. Vibration at the rotor one-per-rev frequency is called low frequency vibration.

Next, look at your fuel tank during hovering. If the fuel is foaming inside the tank, it usually means the engine/starting shaft is not dial indicated accurately, or the side frames are bent. Hence, the flywheel and clutch bell are wobbling to cause high frequency vibration at the engine rpm, which means around 14,000 times per minute. This is called high frequency vibration because this oscillation rate is almost ten times faster than the rotor's one-per-rev vibration rate (which would be around 1500 times per minute). This high frequency clutch misalignment problem occurs predominantly on X-Cell, Legend, and Schluter models because they have a starting shaft bolted onto the clutch. You need to purchase or borrow a machinist's dial indicator (about \$40 to \$60) and true the starting shaft to within .002 inch from true center. If you don't have a dial indicator, you may give Royce Brademan a call at (703) 799-9643. He specializes in engine blueprinting to increase power, or he can dial in your engine/clutch assembly for a small charge.

Another possibility when the entire helicopter shakes is that the engine is running too rich . . . it is four-cycling. Indications of an engine running too rich include; too much blue smoke coming out of the exhaust, the engine cylinder and crankcase are relatively cool, and the model seems sluggish and lack power. Simply lean out the engine by closing the main needle valve three or four clicks at a time.

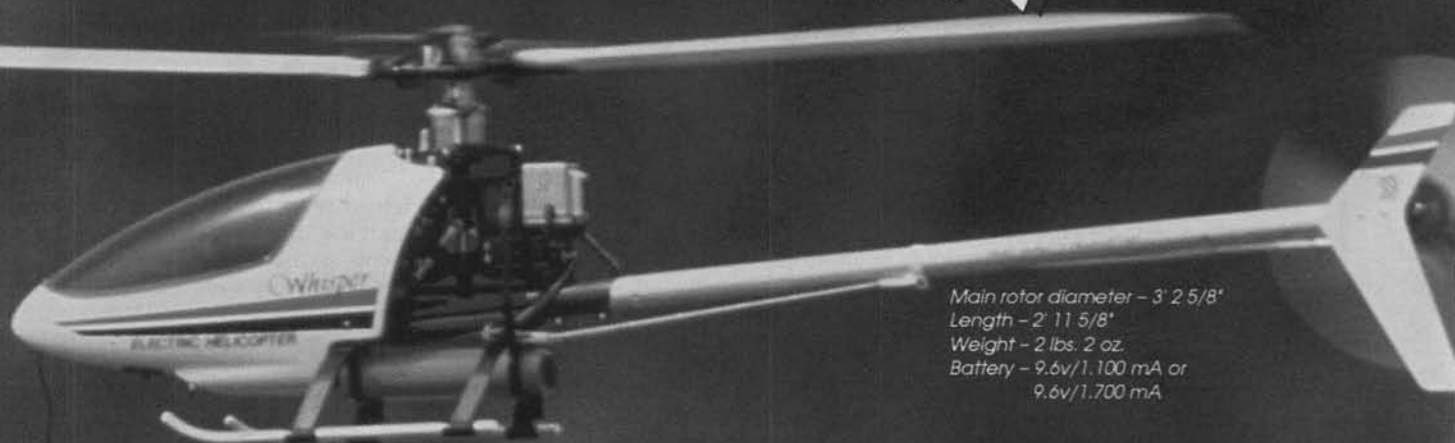
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Whisper

ELECTRIC HELICOPTER



NEW!



Main rotor diameter - 3' 2 5/8"
Length - 2' 11 5/8"
Weight - 2 lbs. 2 oz.
Battery - 9.6v/1,100 mA or
9.6v/1,700 mA

ELECTRIC AEROBATIC HELICOPTER FROM KALT

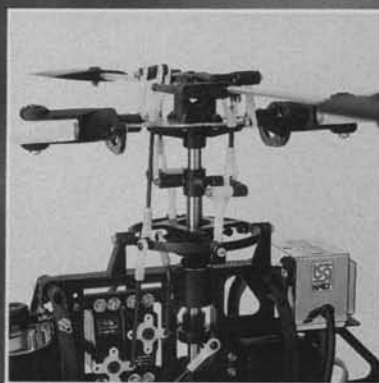
... for Beginners, for Experts, for Competition, or just for Fun

We'd like to introduce you to the Whisper ... the first electric helicopter worthy of the Kalt name. This breakthrough in technology incorporates exceptional performance and reliability in a helicopter less than 3 feet long and weighing in at just over 2 pounds!

Kalt achieved this through the painstaking development of new component designs and features:

- Strong yet light modern materials allow the longest flight time of any electric heli
- Powerful Mabuchi RX540VS motor included
- Collective pitch provides excellent hovering stability and flight control
- Direct servo to swashplate control reduces power loss and improves control (photo at right)
- Optional autorotation feature
- Fully aerobatic - a first for electric helis!
- Available as a kit or ARF

Combine all this with Bell/Hiller mixing and a state-of-the-art toothed drive belt, and you've got a truly revolutionary electric helicopter! In fact, the Whisper is excellent both as a trainer for the first time pilot, and also for experts who are searching for the best possible combination of fun and performance flying.



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BUILD THE RYAN STA

BY AL WHEELER

To many of our present-day RC fliers, their ARF, is nothing more than a means to an end, something that will get them into the air with a minimum of effort, the fact that it isn't a model of any particular real world airplane is unimportant, in most cases it isn't even considered.

This concept of RC flying is fine and it introduces many newcomers to our sport, who, were it not made easy, would quickly lose interest. They are not modelers, in the

true sense of the word, but are participants in a sport that often, through association with other fliers, leads the fledgling to develop an interest in and appreciation of "real airplanes." Once interested, the many variations of RC modeling become apparent; actual building, sport scale, scale, scratch building, etc. Possibly, some day, an antique or classic will captivate his or her imagination. Now, at last, you have the makings of a real MODELER!

Many of us, from the world of real aircraft: retired pilots and flight service operators from the '30s and '40s, developed attachments to certain of the aircraft we flew day after day. Some were work horses carrying cargo and passengers, and others were sport aircraft, fun machines that were a pure joy to fly; aircraft that blended with your personality and became an extension of your own thoughts, happy to roll about a point until sky and clouds and earth were but a blur.



These were happy airplanes, and such a friend was Ryan STA NC18902, an old companion whose memory is steeped in nostalgia and who, with some patient effort can still be with us today, small, but as beautiful and lively as ever!

BUILDING THE RYAN STA

The plans-built STA is a sizable project, however, not a difficult one. The plans are well-detailed and the building instructions cover individual steps of the program in sufficient detail to make them easily understood. The STA is not recommended for the first-time builder, but is not difficult for those of you who have a fair amount of balsa dust under the work bench. The finished aircraft, for builders affected by a nostalgic time warp, is truly representative of Sport Aviation during the Golden Era. As it flies by, it is easy, with a little imagination, to see Clark Gable in the pilot's seat with Myrna Loy as his pretty passenger.

GENERAL COMMENTS

The prototype has been flying for several years and has been a most satisfying project. Appearance of the model is outstanding and the flight performance on an OS .25FP with a 9X6 Master Airscrew is quite scale. Ground handling, despite the somewhat narrow landing gear, is good. The aircraft tracks well and directional control with the rudder is positive. Aerobatic flight is pleasing, particularly in rolls, which are absolutely axial. You will find the STA a pleasing effort and one that will give something to take to the flying field that is a real attention getter.

Familiarize yourself with the plans and the building instructions and cut out all parts so that once you start construction you can keep going . . . just like a kit, except you won't have the box in which to put the pieces.

FUSELAGE

Mark both FS1 structural side pieces with bulkhead locations. Attach doublers FD1 3/16-inch back from the forward edge of FS1. Install FD2 1/4-inch behind FD1 and FD3 1/8-inch behind FD2. Use scrap pieces to establish the required spacings. When you have completed the two sides (ONE LEFT AND ONE RIGHT, please!), lay one side flat on the work area with the doublers up. Cement B1 and B1A together. Starting with B1/B1A, cement it into the slot between FD1 and FD2, follow with B3 in the slot between FD2 and FD3.

Bulkhead B4 is installed against the rear



face of FD3 and B5 on your mark on FS1. The opposite side may now be installed. Place it flat on the work surface and insert the bulkheads from the first side in the appropriate slots. Use a square to assure a straight assembly. The firewall may now be installed in the slot provided forward of the FD1 doublers. Use epoxy and install the triangular vertical braces behind the firewall.

Bulkhead B2 may now be installed and the flat sheet between it and the back side of B1. Use epoxy on this installation as it supports the wing locating pin. Install W1 and W2 on the forward face of B4 and against the inside of FS1. Locate the position for B6 and B7, carefully pull the aft end of the fuselage together and install them. The FS1 sides may be scored behind B5 to accomplish the bend. On the actual STA, the fuselage skin angles at B5 and the sides are straight to the tail cone, no compound curves. Join the fuselage at the rear, being careful to keep it straight. The side pieces of all bulkheads may now be attached. Install the servo support rail on the forward face of B4 and the forward servo support at the correct distance to accommodate the servos to be used.

Using a straight edge, check the fuselage sides from the B1 bulkhead back to B5, sand as required to be sure the 1/16-inch skin will lay flat against all frames. Accomplish the same from B5 back to the tail. Study the skin application sketch and cut 1/16-inch medium balsa to fit from B1 back to B5. Edge join the top and side sections, wet on the outside and wrap around the fuselage. Use

tape or rubber bands to hold in place, rewet if required and let dry, the skin should retain its curve. Trim the bottom sides of skins 2 and 4 even with the bottom of the FS1 sides. Accomplish the same skin application (fitting) from B5 aft to the tail. A little more care is required in this section due to the taper. Paper templates are a good way to obtain an initial fit prior to cutting the balsa. Following fitting of these sections, install them using a good amount of cement on all frames and along the bottom edge of FS1. A six-minute epoxy works well, as it gives you a bit of "fitting" time. After drying, cut, fit and bend the sections (No. 1 on the sketch) that fit on the bottom. Again, wet, form, allow to dry and trim for a good final fit and epoxy into place.

Up to this point we have not been concerned with cut-outs for the cockpits. This may now be accomplished, use a pattern and start with a small hole to locate the bulkheads, once you know where you are, cut away. Leave the wing cut out for the present time, as that will be accomplished after half the wing is built. Cut the openings for the elevator and rudder pushrods and the slots for the stabilizer and vertical fin. Put the fuselage flat on the work surface resting on the bottom from B1 to B5. Assure the tail is perpendicular to the work surface and measure up the sides and mark the stabilizer. Cut out area. Be sure to keep it level fore and aft as the stabilizer should be at 0 degrees. The vertical positioning may also be checked using the sides of the firewall. The fin slot should be straight fore and aft and in the center of the fuselage top. Later on at assembly, the vertical fin is attached to the stabilizer, and the assembly is slid into the back of the fuselage like an inverted T. The

fuselage may now be sanded and filled as required. Sure looks good in its oval form with the cockpits cut out, doesn't it? You might even form the headrest from soft balsa at this time, but do not attach it yet. Round off the forward section of B1A and radius the corners of the fuselage from the firewall to the face of B1A, this makes it easier for the cowl to slide on. Put the fuselage aside for the present and we'll go on to the engine cowl.

COWLING

The cowl is not as difficult as it may seem when you first look at it. Study the drawings and follow the instructions and you won't have any trouble. Laminate the nose sections C1 through C5. Install C6, 7 and 8 into C1. This is best done by laying C1 flat on the work area and installing C6, 7 and 8 in a vertical position. Make sure they are straight in relation to C1. Now fit the nose section over the top of the four verticals into the slots cut in C2. Align and cement. The nose section may now be carved and sanded to shape and the three holes cut as indicated in the front view. The rear section of the nose may be routed out for a rough fit over your engine. Provide adequate clearance in the area of the carburetor throat to assure good air flow and to permit priming if required. Trial fit the cowl over the front of the fuselage; it will fit up against the front of B1A. The cowl may be skinned with 1/16-inch balsa in the same manner as the fuselage, wet and form prior to attaching. The exhaust pipe opening may be cut if desired, see fuselage side view. Sand the entire cowl, fill as needed and put aside for final fitting with the engine installed.

TAIL SURFACES

All surfaces are made from 3/16-inch medium light balsa. The elevator halves are joined with a 3/16-inch dowel. Join them on a flat surface making sure the trailing edges are even and the leading edge is straight. Install hinges in the stabilizer and slot the elevators, but do not assemble. The rudder has a fairing on the bottom that should be built up to the width of the fuselage at the rear edge. Round the fairing into the rudder at top and bottom. Install hinges in the fin and the back of the fuselage, slot the rudder but do not install. Sand surfaces for covering and put aside.

WING

Working on the drawing, cut and edge-join the bottom 1/16-inch sheeting. With the sheeting on the drawing, mark spar, rib and rear spar locations with a ball point pen. Cut and install the spar, assuring that the faces are vertical to the bottom sheeting. Cut and install the rear spar. Install the four R2 ribs, angle the inboard rib to accommodate the dihedral angle, and slot the aft edge of the two inboard ribs to fit over the plywood wing attachment block. Install the block before the ribs. Assure the R2 ribs are flush with the top of the spar and 1/16-inch below the front top of the rear spar. Assure that the round cut-out on the front of all R1 ribs allows the leading edge dowel to seat on the bottom skin, even with the skin front edge.

Notch the four inboard R1 ribs to accept the 1/8-inch ply landing support. Install the support and all R1 ribs. Cut and sand the leading edge dowel at the tip and with the wing on a flat surface, fit the dowel into the R1 rib cutouts and assure a good fit to the bottom skin and all ribs. Cement in place. T1 and T2 may be installed and the scrap reinforcement between the leading edge and the outboard rib.

Shape and install the leading edge wing dowel support guide into the cutout in the inboard R2 rib. The dowel support will extend out from the end rib and will be inserted into the opposite wing as they are joined. Do not insert the dowel until after the wings are joined. Install the skin support strips between the aft end of the R2 ribs, flush with the top of the ribs and 1/16-inch below the top of the rear spar. These support the rear edge of the center section skin. Between the two inboard ribs install the one-inch square "J" bolt support pads, these are of 1/8-inch ply.

Cut the ailerons to length. The inboard end of the aileron material, from the aileron to the center of the wing, will be grooved out for a section of Nyrod to house the aileron actuating rod and then cemented to the rear spar. Cut the slots for the hinges into the spar only. Fabricate the aileron actuator rod from 3/32-inch rod, bend the end that goes into the aileron, slide the rod through the Nyrod and bend up the control (servo) end. Cement the section to the rear spar, leaving clearance at the aileron end. Assure that it is level with the bottom surface of the wing. Mark and drill aileron for the actuator rod, insert the rod and feed the aileron onto its hinges until seated. Provide clearance wherever it is needed until the aileron operates freely, and the actuator arm has adequate clearance.

The center section between the outboard R2 ribs may now be sheeted with 1/16-inch balsa. Sheet from the front of the rear spar to the center of the front spar. Cut a piece of 1/16-inch balsa to fit the leading edge from the rear face of the spar to midway of the leading edge dowel, notch to clear the center section sheeting at the top of the spar. Moisten the top, use ample cement on the spar top, the top of all ribs and the top of the leading edge dowel. Tape in place to assure a good fit as the adhesive sets. When both wing halves are completed, sand the inboard ribs square and angle to obtain a good fit with **one** tip elevated 1-1/2 inches (In my shop, that is a 2x4 block turned on its side, accuracy counts you know!). Sand until a good butt-to-butt fit is obtained (another new dance step, sanding butt-to-butt).

Check to make sure the leading edge is straight. When satisfied with the fit, puncture a series of holes in each butt rib for better epoxy penetration. Double check the fit of the leading edge dowel support in the wing to be joined. When satisfied, join the two panels with epoxy, assuring there is enough epoxy on the leading edge dowel support. Be sure the butt ribs are both flat on the work surface and the 1-1/2 inch block is

square under one tip. Allow to dry. Carefully cut the leading edge sheeting to allow installation of the dowel, trim the top of the center ribs back to the dowel support, staying level with the bottom of the wing, drill a 1/4-inch hole in the support. Cut the dowel to length and trial fit, do not epoxy in place at this time.

Now comes the task of fitting the wing to the fuselage. Using a test pin, locate and mark the rear face of B2 on the bottom of the fuselage, also the forward face of B4. Mark a center line between the two bulkheads and cut out a piece of sheeting one-inch wide centered on the line. Measure the distance between the two bulkheads and, on the wing, measure that distance back from the leading edge. Trim the trailing edge 1-1/2 inch wide forward to the line. This allows the wing to fit in between the two bulkheads. Place the wing on the building surface and block up each tip 3/4-inch so the wing is level.

Place the fuselage over the wing and carefully trim the side skins a little at a time, until the bottom of the fuselage rests flat on the work surface with the sides of the forward fuselage vertical. Use a triangle to check this at the firewall. When you are satisfied with the fit, measure the position of the wing attach dowel above the bottom of the wing (the work surface) transfer this dimension to the rear face of B2 measuring from the bottom of the fuselage and, on a center line, drill the 1/4-inch hole for the dowel. The dowel may now be epoxied into the wing, assuring an ample amount of adhesive on the cross support, the top of the ribs and the leading edge dowel, as well as the edges of the leading edge skin.

Install sufficient wedge material between the rear wing attachment points and the top of the wing to place the bottom of the wing even with the bottom of the fuselage. These attachment holes may now be drilled, assuring the wing is straight across by measuring from a point on each tip to a point on the rear end of the fuselage. Drill 1/4-inch holes in the wing and 3/8-inch holes in the fuselage supports to be tapped out to 1/4X20. Start with the 3/8-inch holes in both the wing and the fuselage to assure alignment, opening the wing holes to 1/4-inch later. The glass tape may now be applied to the center wing joint, top and bottom. Do not interfere with the aileron controls at the center section. The wing may now be finish sanded for covering. Remember, if the structure has bumps, the covering has lumps!

LANDING GEAR

Again, it isn't as bad as it looks and the looks are really important on the STA. A popular ARF on the market left the struts and pants off and that plus the BT-13 shaped tail surfaces make it pretty devoid of any resemblance to an STA Ryan, and of course there is the John Gosney paint job.

The first step is to bend the landing gear wire, 5/32-inch was used on the prototype. The drawings are adequate for patterns. Shape the struts out of two pieces of 3/16-

continued on page 90

NiCd MEMORY? NO WAY!

THANKS FOR THE MEMORY... with apologies to Mr. Bob Hope for borrowing his line! I have a number of critics around the country who seem to delight in letting me know every time a mistake, even as minor as a misplaced comma, appears in the column. Having learned some time back that I am not exactly perfect, I don't really mind, and simply make another request to the word processor gods that they don't let me make the same mistake again. The latest one to come down on me was over a recent column in which I stated that NiCd battery memory isn't and in my opinion never was, the widespread or serious problem it is purported to be.

The basis sent in by many of these friends was a ridiculous article which appeared in an electronics industry magazine, which summarized the results of a survey of NiCd battery users. The idea itself is not bad, except that none of those involved were technically experienced, at least not in this particular subject. They were all users of NiCd powered transceivers which they did not own, but which they used on the job. One report even claimed that the NiCds used in his particular group of transceivers had even learned the shift schedule and quit at the end of each shift. No matter how expert a person may be at whatever his primary job is, simply speaking "10-4s" into a microphone all day long is not going to also make him a NiCd expert. The only things missing from this particular survey were a few housewives evaluating the performance of the NiCds in their Dust-busters.

Unfortunately, the fallacy will probably live on and on until the day when NiCds are replaced by one of those new power sources we hear about from time to time. In the meantime, I have in my files articles to the contrary from knowledgeable people in-

involved in the battery industry. One is from a Mr. Bob Williams, a battery specialist at Alexander Manufacturing, a major supplier of NiCds to other than RC users. Mr. Williams categorically states, "What some call memory effect really is the result of improper charging. Proper charging avoids undercharging and overcharging; both reduce battery capacity. Voltage measurement offers the best charging control."

the misnomer Memory!" Notice again that the blame is placed on overcharging, and not discharging down to any given level.

I repeat, NiCds are better than ever, and I really don't believe that this mythical memory is a problem to us. I do preach the periodic discharging of NiCds with an Ace Digipace or similar device that accurately measures their capacity, but that is more of an assurance that they are still up to par than to erase

something that does not actually exist. Still, memories are not all bad... why, I remember that time on Copacabana Beach...

NORCAL AVIONICS O.M.T.

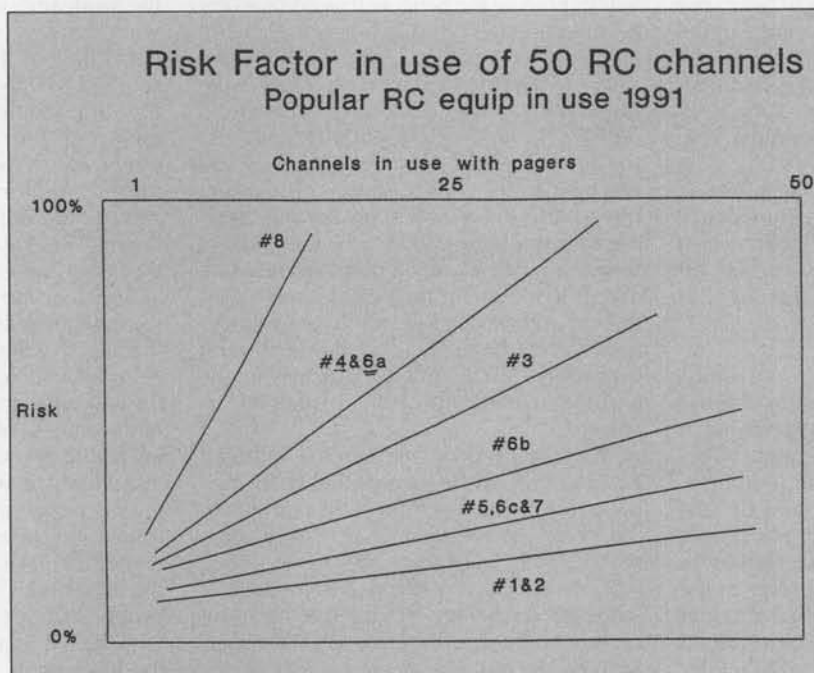
One error of mine that my critics did not catch, proving once again that nobody is perfect, was my listing in the March column of the new address for the current makers of the Accu-Tach tachometer/ammeter. Unbeknown to me, and I guess to everyone else, as apparently there have been few or no ads or notices to the effect, the current company A.B. Tech Inc., has once again changed location. Thanks to all of you who wrote to tell me that the Post Office had returned your mail with the notice that the company had moved and that the forwarding period had expired. I

was able to chase them down once again, and the current address, at least as of the middle of March, is:

Norcal Avionics/A. B. Tech, Inc., 329 Park St., Troy, MI 48063; telephone (313) 569-3320.

FUTABA PCM RECEIVER INADEQUACIES

As discussed in the April column, this also brought a flock of mail, mostly from those who have experienced problems with them and were thankful for the half solution presented. Half only, as because of another error, this one by the production staff, the proper diagram did not appear with the rest of the article (*Whoops!-wcn*). Those of you who wrote will already have received the correct information, and for the more pa-



Comparative results of George Steiner's tests of various popular RC receivers operating in present pager environment; see text for explanation.

The article is quite an eye opener, and discusses various charging methods and their effects on the performance and life of NiCd cells. For those of you who have more than a passing interest in such things, a copy awaits only your SASE to be on the way.

Another battery expert source to be heard from on the subject is the NiCd battery handbook published by General Electric. It discusses what it refers to as the depressed voltage phenomena in a NiCd cell, stating that it is definitely caused by overcharging. This depressed voltage has the same effect on the equipment under power as a charged cell, and as it can in fact be reversed by a discharge/charge cycle, "this effect is probably the very characteristic that gives rise to

tient out there in readerland, it is presented here. Hopefully correct and complete this time . . .

While on that subject, which dealt primarily with the low amplitude of the control signal available from the Futaba R-129DP receiver, I've since had the opportunity to check yet another PCM receiver for proper operation. This one, the Airtronics Model No. 92985, as furnished with the Airtronics Spectra and Vision systems, with a measured 5.0-volt supply voltage, furnished servo control pulses at 4.3 volts. This is over one volt, actually 1.3 volts higher than the I29DP under the same test conditions, and proved more than adequate for any servo combination and/or auxiliary devices that I have on hand. It sure is a drastic step to change a radio to clear up a problem, but then again, how much is that Violet ducted fan of yours worth? Anyway, keep the 92985 and Spectra or Vision in mind for that future project.

TALKING ABOUT RECEIVERS

Some quite interesting data compiled by receiver guru George Steiner has come my way, and is presented here for you to study and digest. It is indeed an eye opener. Not content to accept the claims made by manufacturers and so-called independent labs, George has developed his own procedures for testing RC systems and specifically receivers, with the results appearing regularly in some of the other publications. George is doing what I wish I had the time and equipment to do. Anyway, the enclosed chart entitled, "Risk Factor in Use of 50 RC Channels," is a guide to what can be expected, in risk percentage, when flying with various receivers. This data is based on individual receiver tests for adjacent channel rejection, capture ratio, image rejection, 3IM and 2IM, as applicable to the receiver design under test. The receivers tested, with the number corresponding to those on the chart, are:

1. Airtronics 4-Channel FM DC Vanguard No. 92765/72.
2. Airtronics 6-Channel FM DC Vanguard No. 92965/72.
3. Aristocraft (Hitec) Challenger 7-Channel FM SC No. HP-7RM72F.
4. Futaba 4-Channel AM SC Attack RX FP-114H.
5. Futaba 4-Channel Conquest FM DC Rx FP-127DF.
6. Futaba 7FGK-AM Transmitter, w/receivers:
 - a. Futaba Rx FP-R117H AM SC.
 - b. Ace Rx 1991 AM DC.
 - c. RCD Rx PGP-21 AM DC.
7. Cirrus 7-Channel AM, Rx RCD PGP-21 DC AM.
8. Kraft 5C. Rx KPR-5C SC AM.

The "SC" and "DC," obviously meaning Single and Double Conversion, were my addition for those of you who may not be familiar with all of the receivers mentioned. It's a confusing world out there, isn't it? Thanks to George Steiner for helping to remove at least a little of it!

GYROS IN SCALE AIRPLANES!

Though all of the rate gyros available on the model market are designed primarily for use in RC helicopters, their use in fixed wing airplanes is not new or without some merit. Within the past year, a number of serious scale flyers have installed them on the rudder of their machines, as an aid to maintaining directional stability during the takeoff roll. As with most everything that one does, there are those who did not agree with gyro controlled rudders, and there is a move on to ban them completely. Possibly it has already happened by the time you read this. I cannot speak as a Scale Masters class scale builder, but there are points to consider from a purely technical viewpoint, which I can't help but wonder if those who have or want to rule against the gyro understand.

First of all, the gyro on the rudder is not an autopilot! It will not add stability to the model, or hold it on a given heading perfectly. What it will do is react to any abrupt movement with control input in the opposite direction; if adjusted properly, it will turn the model back to the originally intended heading. The reason some of the

ply focusing on the gyro for some reason, and not seeing the total picture! In that respect, there are many equipment features now in common use that offer greater in-flight piloting advantages, and none have been banned that I know of. No one objects to the use of the programmable maneuver switches on the transmitter, or any of the coupling now in use, and let's face it, on certain aircraft designs, tying the rudder to the ailerons is a lot more help in flying than tying it to a gyro.

Maybe it is just the fact that it is an add-on, and someone dared to use it without first asking, "Teacher, may I?" Okay, we'll build a rudder servo with a built-in gyro, call it an "automatic unwanted input detector/compensator surface deflector," forget the fuss over something relatively inconsequential and put the fun back in!

MY BUDDY, MY BUDDY . . . dum di dum dum . . .

One hundred percent new products don't come along now as often as they did in the earlier days of RC. But there are innovators and innovations still amongst us, and one such item, clever as well as useful, has just been introduced by Custom Electronics, of Alta Loma, California. As you will have guessed, it is a kind of "Buddy," a "Throttle Buddy," in this case.

The Throttle Buddy is one step ahead of the DSC (Direct Servo Control) with which some RC systems are equipped, which allows you to operate the engine throttle without turning on the transmitter and putting a signal on the air. The fallacy with that thinking is that at any serious contest, no matter how much you promise or plead, you aren't going to be able to get your transmitter out of impound. Nor should you be able to! The Throttle Buddy brings you the normal DSC functions . . . plus!

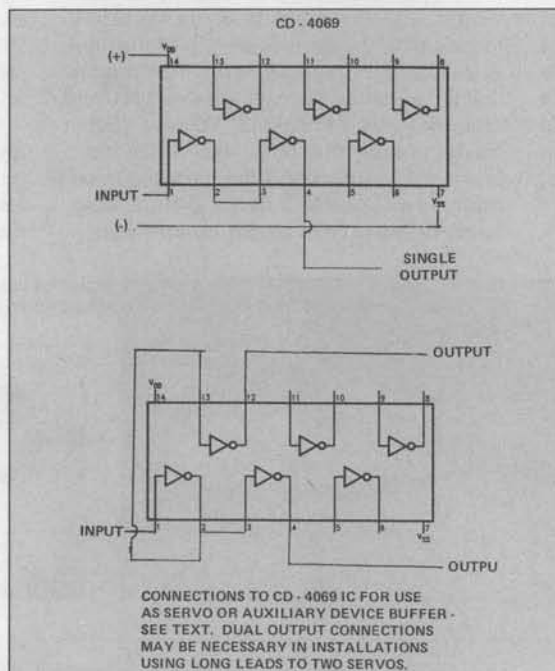
Before you get the idea that something the size and weight of your transmitter is required to provide "DSC" operation, allow me to inform you otherwise. The Buddy becomes a permanent part of your model . . . no dangling wires, weighs only .75 ounce, and measures .80 x 2.4 x .50 inches. Current draw, always a consideration for add-on equipment, is reported at 10 milliamps, just slightly more than the average non-PCM receiver or servo.

I can hear you all the way here in California: "All right, already, what does it do?" Well, it connects to your receiver and airborne battery, and provides you with all throttle functions via one of two switches. The main switch is a three-position toggle switch, which also serves as a mount for the Buddy. The three positions operate the Buddy as follows:

Back Position - Off/Normal. Off when everything else is Off, or normal operation when the RC system is On.

Mid Position - Low Throttle. Engine is at idle, and a remote switch function, to be described, is actuated.

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Connections to CD-4069 IC for use as servo or auxiliary device buffer; see text. Dual output connections may be necessary in installations using long leads to two servos.

flyers installed it was to correct some undesirable takeoff characteristics inherent with highly loaded warbirds with less than desirable gear positioning and spread. Many such airplanes are difficult to get airborne, with a definite tendency to pull left, and have more than once gone into the pits with the expected results. The gyro, again if properly adjusted, and not otherwise over-ridden by the pilot, will command the airplane back to its intended heading, but not necessarily back to its original path. As it won't gain you anything in the air, and can save yours and other airplanes while trying to fly, why the "Ban the Gyro" movement?

Lack of understanding? Or possibly sim-

THE COVETED SPARK PLUG AWARD

During the display of the SAM O.T. Beauty models at the SAM Champs in Lawrenceville, Illinois, this writer was struck by the amount of work that had gone into models that had to fly under the "Concourse D'Elegance" rules.

The most outstanding gas model (to this writer's viewpoint) was the Super Viking as designed and built by Don Wensel, one of the nicest free flight designs at that time. The fuselage is completely painted white with white silk and red trim wing and tail. What else for power in a classic like this but an Ohlsson .60 Custom! Very nice combo, won first place.

Also very attractive was Buck Zehr's

scaled-up Goldberg Sailplane. A magnificent job in itself. The model had to be displayed in a corner; when assembled it did take up room!

If there had been a separate Beauty award for rubber power (should have been one in any case), then Frank Mock would have won it with the prettiest Korda Wakefield these old tired eyes have seen in a long time. A look at the photo will convince anyone that the all-white Korda model with red and blue trim was a knockout! When a rubber model is built this nice, this writer has a hesitance to fully wind the motor to maximum turns. A broken motor skein is absolutely destructive in a built-up fuselage!

COLE PALEN'S RHINEBECK AERODOME

Guess who showed up at the Westover SAM Champs? None other than Cole Palen. Most modelers will readily recall Cole's famous Rhinebeck Aerodrome, located near Poughkeepsie, New York. This is a fabulous flying field (dead ringer for WW I Aerodromes) with an amazing collection of World War I airplanes, either original, rebuilt, or replica. Doesn't make any difference; they all look great!

At this writer's last visit, Cole professed a great interest in encouraging one-inch scale flying scale models in the hopes of arousing interest among the Junior members. Evidently, Cole couldn't get much help as he is



This month the coveted Spark Plug Award goes to the infamous Karl Spielmaker, aka "Krazy Karl," aka "Bearing von Spielmaker," seen here with a Zipper A while in the army at Fort Knox in 1945.



Beautiful tissue trimmed Korda is the work of Frank Mock, flown at Lawrenceville SAM Champs last year.



Lew Mahieu demonstrates a perfect ROW launch with his famous Kiwi design back in the 1950s. Photo by Dick Everett.



Don Wensel's Beauty Award winner at the 1990 SAM Champs, a Super Viking with Ohlsson 60 Custom.

Cole Palen, of Rhinebeck Aerodrome Fame, is a proficient modeler, pictured here winding a Caudron rubber job with help from his grandson at Westover AFB.



Stephen Kowalik's last design, the Miss Delaware II, as built for RC by Charles Stager. Clark photo.



seen in the photo personally attending to a Caudron type model in the company of his grandson. This is proof that Cole is not fooling! Anyone interested should contact Cole Palen, Rhinebeck Aerodrome, Poughkeepsie, NY. He'll love ya for it!

SPARK PLUG AWARD

Every so often, the constraints imposed by publication deadlines have forced this writer to abbreviate or eliminate the proposed article. Such is the case regarding Karl Spielmaker, whom we are honoring this month as a "Spark Plug Award" recipient. By the time the bulk of the material had arrived, this columnist had gone to press with what background information he had at that time.

One of the photos he sent depicts Karl in the Army at Fort Knox in 1945. Of course, with only a footlocker in which to store things, it was a natural that he build a 32-inch wingspan Zipper A. The Atom engine made a perfect fit.

We didn't hear how it flew, but if it was like most Zippers, without a dethermalizer setup, he probably lost it. Just goes to show you, even the Army couldn't dampen the modeler's spirits!

MORE EASTERN ECHOES

Reports have been a bit sparse from the Atlantic Seaboard states, but thanks to Dorothy Granieri this information.

Two annual meets are held by the J.A.M. and SPOT clubs at the North Branch Park in Bridgewater, New Jersey in July and September, respectively. Both contests were almost carbon copies for weather which

resulted in 23 and 29 contestants in each meet. Weather was just great which did help eliminate "casualties," lost models, and in general, produced great flying conditions. Talking about that, Steve Boucher flies what he likes, namely the Granieri "MG." He had no less than three various sized MG models!

Getting on with Dorothy's report, we note that the SPOTS have the right idea. When the meet is over, all fliers, workers, etc. go out to dinner! What a great way to celebrate a successful meet! Wrapping up this report, a photo shows Charles Stager with a four cycle O.S. powered Miss Delaware II. Thanks to Charlie Thuet, this model is enjoying a modicum of success on the eastern seaboard.

ENGINE OF THE MONTH— FOX IGNITION CONVERSION

This month, we are indebted to Bill Schmidt, former SAM Rocky Mountain vice-president and one of the wham-bam SAM 56 sparkplugs. If the following article interests you, Bill can be reached at 4647 Kreuger St., Wichita, Kansas 67220.

Our Engine of the Month drawing originally appeared in the SAM 56 newsletter, dated February 1, 1991 (Vol. No. K-1). We quote Bill directly:

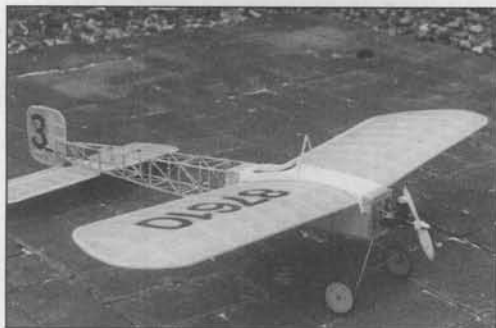
"There are only approximately four cross-scavenged engines still in production today. Realistically in today's marketplace there shouldn't be any. It does seem strange that in the Schnuerle world these anachronisms are still produced. Fox still makes the standard Fox .35 and .19-.25 and .15. K&B still makes

the .61 although I wonder for how long. This about constitutes the list of commonly available cross-scavenged engines currently still in production.

"SAM rules state that only C/S glow engines can be converted to spark ignition. For a long period of time O.S. engines were the popular choice for conversion to spark because of their physical configuration and quality construction. O.S. no longer produces these C/S style engines and we are forced to look elsewhere for suitable subjects for conversion to spark ignition.

"I have never converted a Fox engine to ignition before because they are way too close between the prop drive washer and venturi. This dimension is only about 1/8-inch and is tough to deal with when installing a timer assembly. The way to do it is to build an extension drive spool/cam unit that provides necessary clearance for the point assembly. The resulting short crankshaft uses a sleeve nut and knurled washer made up from one of Fox's after market assemblies.

"The result of all of this is an easy-to-find new or used engine that is easy to start and pulls with the best of them. You can expect 11,000+ on a 10-4 Rev-Up prop with unleaded gasoline and castor oil. Yeah, you better do as Duke says and use at least 12% castor in your fuel or you will go through a Fox engine pretty fast. Free flight types will probably use a bigger prop for a little less power depending on what they are flying. The timer is best left in place at its optimum spark setting and the engine started with a



Great looking Bleriot built by Joe Elgin for the increasingly popular RC 1/2A Texaco Scale event.

From the 1990 Swedish Nats comes this shot of Sten Kristiansson with his beautifully constructed 1938 Cahill "Clodhopper." Photo by Sven-Olov Linden.



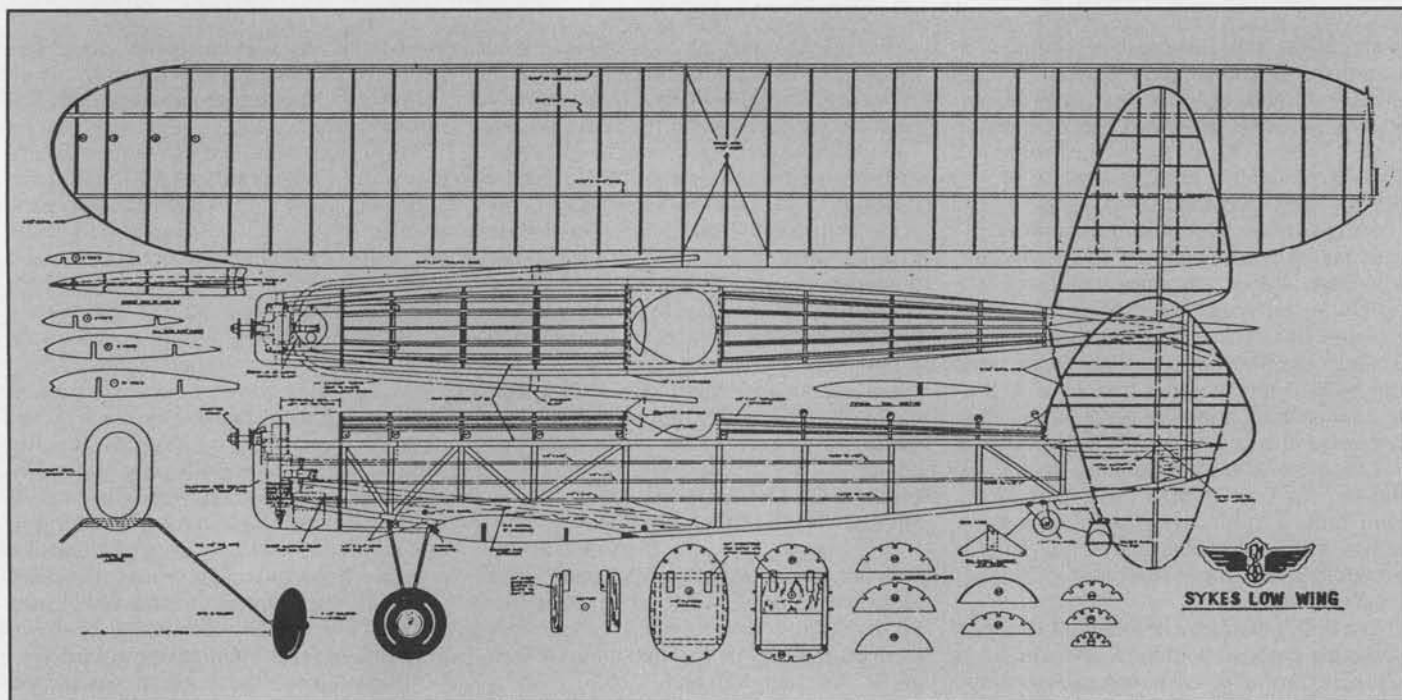
Seen at the Australian SAM Champs, Trevor Boundy and son with a George Reich "Albatross," a real floater and a fast climber with a Saito 65 four-stroke.



Iris Chatsworth poses with a pretty orange Solarfilm covered electric Playboy. Alas, it is no more; story in text.



The classic Comet Curtiss Robin did an incredible 26 minutes to take first in O.T. FF Scale at the SCAMPS Annual at Taft last year. Mik Mikkelsen photo.



starter. Machine your drive spool to limit the fore-and-aft movement of the crank and to handle the thrust loads accordingly. The Fox engine really needs a means to prevent the fore-and-aft slap of the conrod when running. I made up a new backplate from turned aluminum and riveted on a steel washer that sits very close to the crankpin,

and it works very well. This backplate also packed the crankcase very tightly with its close side clearances. The drawing has most of the information required to fabricate the conversion. Scale the drawing when necessary to fabricate the insulator spool, timer frame, etc. If you do not have a spare McCoy .29 moving point assembly, neither does

Dick McCoy, so you might make up a facsimile from brass shim stock. The O&R fixed point is very commonly available from friends or at swap meets.

"I realize this is not for everyone out there, but there are quite a few who will really enjoy making up this conversion and run-

continued on page 96

TIMER FRAME
 .157 ALUM. SHEET
 - SCALE DWG. FOR DIMS. -

NOTES

- 1) DISASSEMBLE ENGINE AND TURN FRONT OF CRANKCASE .637 DIA. X .157 AFT. FOR SLIP FIT OF TIMER FRAME.
- 2) FABRICATE TIMER FRAME. TURN .637 HOLE FIRST IN SHT. AND THEN DRAW & SAW TO OUTLINE. DRILL, RAZOR SAW & TAP AS SHOWN.
- 3) TURN DRIVE SPOOL & CUT CAM BY PUTTING .030 SHIM UNDER ONE JAW OF 3-JAW CHUCK AND CUTTING .016 DEEP. 110° TO 120° POINT DWELL IS DESIRABLE. SWISS FILE WITH KEROSENE THE 4 FLUTE RELIEFS TO MATCH CRANKSHAFT. INDEX CAM TO CLOSE POINTS JUST AS PISTON CLOSES EXH. PORT & OPEN JUST SLIGHTLY BEFORE TDC. GAP NOT CRITICAL BUT SHOULD BE APPROX. .008 NOMINAL.
- 4) OHLSSON FIXED POINT (4-90) IS INSTL'D. LAST SO AS TO GET IT PERFECTLY CENTERED & RELATIVE TO THE MOVING POINT.

DRIVE SPOOL - CAM
 MAKE FROM 12L14 OR MILD STEEL

SPARK IGNITION FOX.35
 SIDE VIEW
 TIMER ASSY. INSTALLED

FOX .35-.29 SPARK IGNITION CONVERSION

SCALE: FULL	APPROVED BY: WELL--DUKE	DRAWN BY WLSCHMIDT
DATE: 1-25-91	SAID IT WAS "CUTE"	REVISED N/A
A SIMPLE WAY TO CONVERT THE WORLD'S MOST COMMON C/S PRODUCTION ENGINE TO IGN.		
INTENDED FOR SAM EVENTS		DRAWING NUMBER F-35-1

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A REAL "ERF" IS HERE!

As an introduction to our first topic this month, let's go over what we mean when we use the term "ARF." Virtually every Almost Ready-to-Fly RC airplane on the market today is exactly what its name implies, Almost Ready to Fly. That means the buyer has to spend at least some time putting his bird together, and this effort can result in anywhere from a couple of hours work to two weeks of intensive assembly effort. As our ARF manufacturers become more and more sophisticated, their models undergo a great degree of prefabrication at the factory, and the buyer/builder/flyer has less and less to do.

Recently at the Los Angeles Model Hobby Show in Pomona, California, I was very pleased to encounter a new entry into the ARF field, called the "R.C. Products MC3 Series Slope Soaring Plane." The remarkable thing about this model is that the purchaser receives a "turnkey" product, as the MC3 comes completely built with radio installed, ready to be charged up and taken out to the slopes. MB Editor Bill Northrop, who is generally credited with having coined the term "ARF," calls this new model an "ERF," meaning "Entirely Ready to Fly." Out of deference to my boss, I may have to go along with that, but my personal choice for a name for this class of model would be "CRF," or "Completely Ready to Fly." But anyway, you get the picture, this model requires no work at all. (Actually, the idea for "ARF" was given to me by Orphan Annie's dog, Sandy, who also agrees that "ERF" is more in keeping with the tonal quality associated with the concept. I passed the ARF and ERF terms on to the modeling public in an article published circa 1965-66. wcn)



Kimberly Davis shows the MC3 series slope soaring plane. It comes completely ready to fly in its own protective carrying case.

The Classic 40 from U.S. AirCore is not only handsome, but almost indestructible.



The MC3 is made of all plastic molded components, and is available in basic white, black or camouflage color scheme. The specifications of the MC3 include a wingspan of 55 inches, 318 square inches of wing area, and a fuselage length of 37 inches. To tame those hard landings, the fuselage is fitted with a protective rubber nose cone, and replacement parts are available if necessary. The radio and all control rods are truly factory installed, and the entire airplane knocks down or assembles in about sixty seconds. The various parts come nestled in a fitted, foam-padded carrying case which has a special compartment for every component of the airplane, plus a place for the transmitter and charger. When the case is closed and latched, there is practically no possibility of damaging the model. Actually, the case appears strong enough to walk on, or even to be stowed in the baggage compartment of an airplane.

If you'd like to see the MC3 in action, the manufacturer is offering a demonstration video for \$15. For more information, phone or write R. C. Products, 7044 Arlington Ave., Riverside, CA 92503, telephone (714) 351-9715.

THE CLASSIC 40

Last year this column reviewed a revolutionary new ARF from U. S. Air Core, called the CoroStar 40. This is a combat-type sport plane, simply constructed of folded AirCore material. I found it to fly quite well, but its main claim to fame was its Power Cartridge feature. The Power Cartridge is a sliding tray which bears the engine, fuel tank, receiver, and flight battery, (somewhat reminiscent of the famed Goldberg "Zipper." wcn) the purpose of which is to allow quick interchangeability of engine and flight pack from one

airplane to another.

The second important feature of the AirCore construction is its great resistance to damage, because the model can survive crash after crash and still come up ticking. That probably had a great deal to do with the favorable reception of this model by that segment of the RC fraternity which tends to be a bit rough on its airplanes.

Following the introduction of the CoroStar 40, the next model offered by U. S. AirCore was a high wing trainer airplane, which was a natural, as it was made of the same almost indestructible material as its predecessor. A really important improvement was incorporated into the new trainer, a pre-applied color scheme. Whereas the CoroStar 40 comes completely fuel-proof, it does require painting to finish it properly.

Now on a streak of real success, a new product was rapidly brought to market, a set of sturdy floats, made up, of course, of the tough CoroStar material. And now, the most recent introduction from this innovative company, and probably its most beautiful airplane yet, is the exciting new "Classic 40," a take-off on the beloved Piper Cub, dear to the heart of every true modeler. Yes, once again the U.S. AirCore people have adhered to their winning formula, the use of CoroStar construction. This model sports a brilliant Cub yellow finish, and needs only the application of a bit of trim tape and some decals to give it an uncanny resemblance to a classic little taildragger.

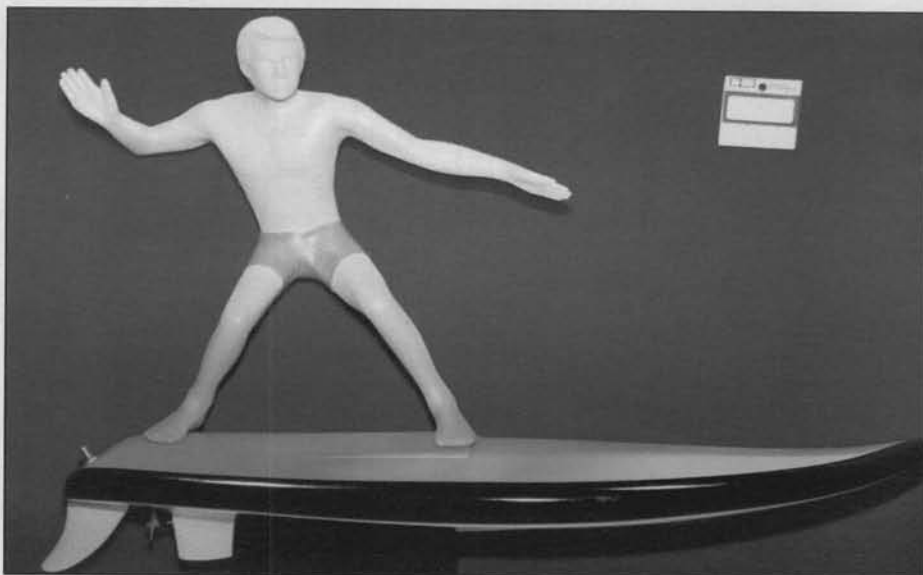
The wingspan is a generous 64 inches, with a high-lift semi-symmetrical airfoil. Wing area is 704 square inches, and with a projected ready-to-fly weight of 5.75 lbs., the wing loading computes out at about 21 oz./sq. ft., just about right for a sport plane. Recommended power is a .40 to .46 two-stroke, or a .50 four-stroke engine. Judging from their previous models, the Classic 40 should be a true fun/sport airplane, and I am eagerly anticipating an opportunity to personally get my hands on the controls of one of these little cuties. U.S. AirCore offers all kinds of goodies such as folders, pamphlets, and videos on their products. To find out more, write them at 4576 Claire Chennault, Hangar 7, Dallas, TX 75248; or telephone (800) 336-0602.

ARFING IN THE SURF

As we seem to be on an innovative ARF kick this month, another new product which certainly qualifies as different from anything I've ever seen also made its debut at the Los Angeles Model Hobby Show. Imagine a surfboard, complete with rider hanging ten as it makes its way through the ocean waves. The idea is to use power to get out where waves begin to break, and surf your way in! Called the "Surfmaster" this radio-controlled ARS (Almost Ready to Surf) electric-powered surfer is actually designed to negotiate one- to three-foot ocean waves.

It features a 540 electric motor and all hardware is included. The buyer supplies a 2-channel radio and a 7.2 volt battery pack. Also planned for production is a smaller 380-powered model, which is intended for operation limited to lakes, ponds and swimming pool's. For further information, contact the manufac-

continued on page 83



For those who like surfing (or should we say sARFing?), check out this electric-powered RC surfer. Called the "Surfmaster," it's new from MTE Industries.



The revolutionary new Jet Hawk from Thorpe Engineering Corp., a sport/trainer ducted fan ARF which comes complete except for engine.



Can you find the ARF in this photo? It's little 4-year-old Travis Holchak, who loves planes and is truly "Almost Ready to Fly." With Mr. Mulligan is builder Gerald Brown of the Hou-Texins RC Club.

BY GUY REVEL

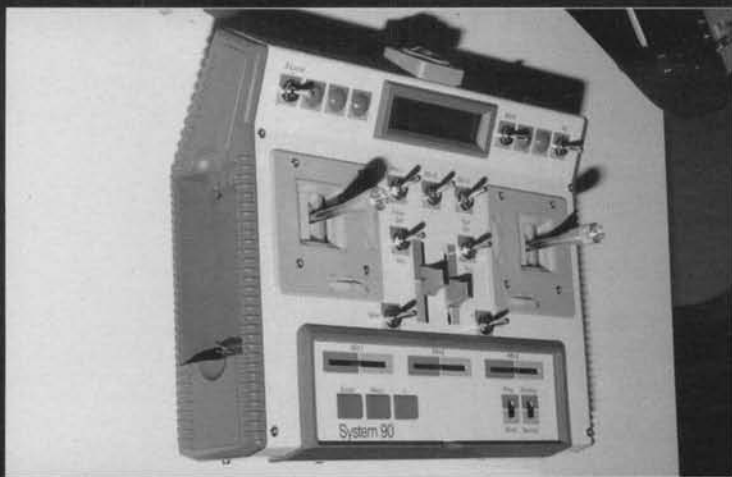
NUREMBERG FAIR 1991: TREND CONFIRMED

Less visitors this year, as can be easily understood, but a modeling industry in perfect shape and a possible mutation just ahead; such is the impression I got from my visit to the world's largest toy and model fair where, even without any world-breaking new product, the preceding year's tendencies are quite confirmed, but where politics will soon bring some changes in the established power equilibrium.

No doubt about it, modeling is expanding worldwide. This could be easily seen at Nuremberg where, despite the marked decrease in the foreign visitors' number (by 7%) for fear of long-distance air travel, the trade volume was definitely on the increase. One just had to look at the satisfied smiles of most exhibitors/manufacturers to understand that model trade was definitely not slowing down, at least in most countries. *continued*

The 43th International Toy, Hobby and Model Fair is the largest of its kind in the world. It is only open to manufacturers, distributors and importers.





The new Simprop "System 90" computer radio includes a lot of new features and is primarily aimed at the sports modeler.



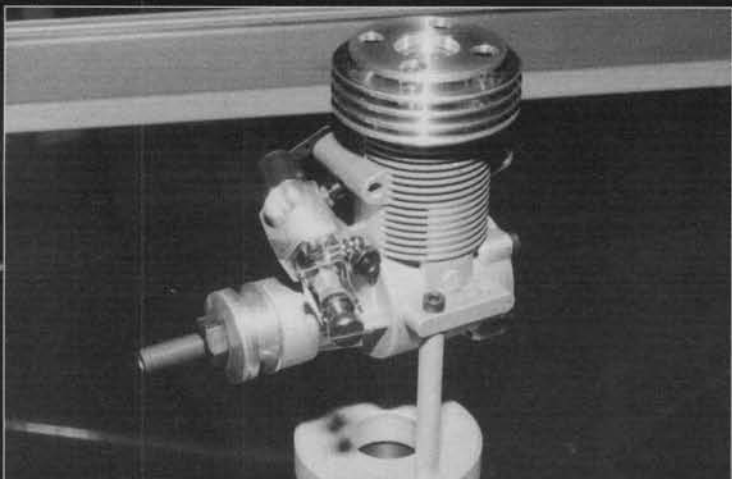
New European-styled computer radio manufactured in Korea to Prafa's (a Swiss distributor) specifications with graphic display and on-screen programming. Not PCM, the microprocessor is used for the mixing programs.



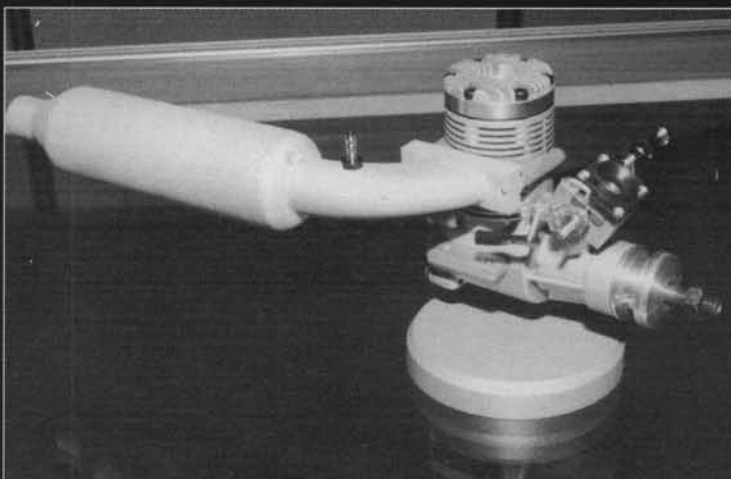
The RCD Micro 535 narrow-band dual-conversion receiver manufactured by Hitec is very small and a true quality product.



One of the highlights of the Fair was this PLL frequency synthesis set soon to be available in the U.S. through RCD. Narrow-band, dual-conversion receiver and two versions of the Tx HF module designed as a direct replacement for Futaba, JR, or Airtronics modules.



New Webra 32 specially designed for small helicopters.



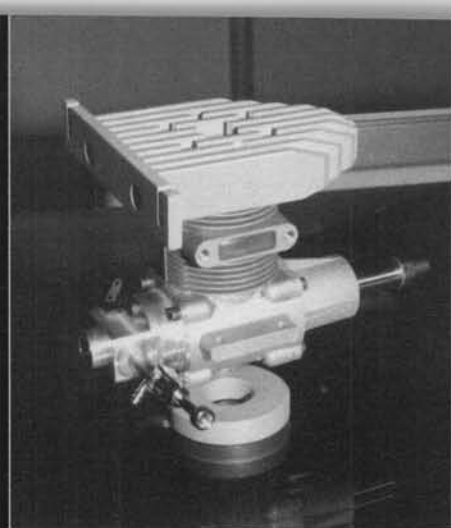
The Webra 40 Quickie has been specially developed for the US Quickie 500 pylon racing class.



Hitec's latest radio is the recently advertised Focus FM series. New servo is now competitive with equivalent Japanese products.



The new Webra "61 Racing" is an improved version of the previous 60 Long Stroke for turnaround F3A competition.



Impressive new Webra 60 heli in its Heim version. Lots of power.

DO NOT TRUST ONE'S FIRST IMPRESSION

This report deals only with model aircraft products, as in the five days I spent there I had no possibility to get a close look at all the boat, car and train products. For this reason I may have overlooked some manufacturers and the products cited are to be considered only as examples.

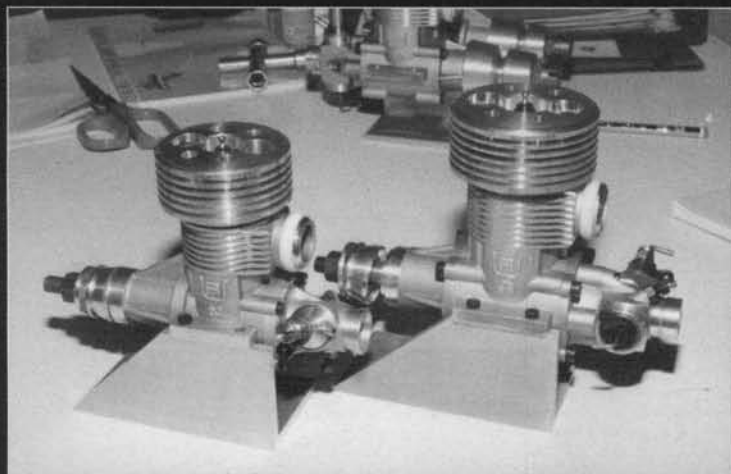
It is usually extremely difficult to move through the more than 1,000,000 square feet of the Nuremberg Fair, but not so this

Great Planes, Midwest, Top Flite, Carl Goldberg and others. Lewis Polk, of Aristo Craft, had a big change this year as his booth was filled to the rim with an assortment of his magnificent scale trains, but he showed me his new line of PCM/PLL radios. Coming from their own factory in the Far-East, these radios should be extremely competitive on the American market and provide a few interesting novel features.

Chun Sue Park, director of Hitec, the largest Korean manufacturer, and now firmly

well indeed. This hobby and model fair, the largest of its kind in the world and getting bigger every year, attracted this year a record number of 2,077 exhibitors and almost 500 other companies are still on a waiting list, on average for 5 years, before being allotted the eventual available exhibition space within the present over one million square feet of exhibition halls. A 14th hall is being built, but will most probably prove insufficient when it opens next year.

LAST YEAR'S TREND GETTING STRONGER



Ugo Rossi (Rossi engines) is widening his range of ducted fan engines with these 53 and 65 sizes that have enormous power.



Ron Irvine is constantly expanding and updating his range of engines; this 1.20 is meant for large sports models.

year. A number of executives from leading modelling companies did not come this year: OS, JR, Sanwa, Hirobo, among others, were only represented by their agents. I noticed, however, that Joel Davis and Scott Christensen (International Hobbycraft), Yoshio Kondo (KO radios), Hisashi Suzuki (Kyosho), Mamoru Takamatsu (OK Model), were there as usual, and a few others I did not meet. Hiroyuki Oki (Kalt helicopters) arrived later than expected, but then was seen everywhere. The same American manufacturers were present as every year: Cox, Pactra, Sullivan, X-Acto, as well as the group of companies represented under the International Hobbycraft banner: Du-Bro,

established in the US, was busy explaining his new offerings which will undoubtedly stir somewhat the present US market and also mark their imprint on the European market. Jim and David Martin (Hobby Lobby) were doing their business as usual with the many European manufacturers offering new products for electric flight. Jim told me that these products were increasingly well accepted on the US market, although there is nothing to compare with their widespread acceptance in Europe.

Actually, although less visitors could be seen in the vast exhibition halls, business was steady and even better (by 13%) than last year. In fact, business was going pretty

Curiously enough, discerning this year's trend did not come immediately, but came stronger every day until it became absolutely obvious. Let's go through the details. For the last ten years or so, the larger manufacturer's catalogues have been filled with every conceivable type of model. Discovering a true innovation or a marking novelty is only a remote possibility. So, with already a full range of popular model types behind them, the big names content themselves replacing aging models, filling in the gaps, and anticipating the future. This is the reason for the various twin-engine airplanes, flying wings, sailplanes and the like we have seen these last years. They just show that the



Even the Russians are coming into the international market, with this TK-10 pattern engine having an almost exact copy of the Webra "Dynamix" carburetor.



Webra has now become known for its high-quality samarium-cobalt electric motors. Here is the new "30" size motor available in two versions with different winds. Excellent workmanship.

big manufacturers do not want to let the smaller industry alone in a market gap, limited as it may be. This is, among others, the very reason for the first-ever solar-powered RC sailplane kit: even if the financial return of such a large investment seems remote, a manufacturer having sufficient financial backing (Graupner in this instance) will not take a chance and will claim his presence in this field, just in case.

This has nothing to do with the present modeling trend, you may think. And you

would be wrong. It means in effect that the era of garage industry and smaller semi-professional manufacturers is quietly but firmly being knocked out of the game. This has been quite evident in the US recently, and the same is happening in Europe. When exporting is an absolute necessity to reduce costs and fight against larger companies, small manufacturers tend to be taken over by others or to join forces, at least for sale and export. It is nowadays of the utmost necessity to grow over a critical size in our

competitive world, and to sell beyond national boundaries so as to increase production volume. Model goods production is more and more an industrial game and, as long as this means an increased exposition of our activities to the general public, it is a welcome move. It follows, however, that small volume production would be increasingly restricted to high-quality, high-cost, small-quantity competition and specialist products.

Another factor in the change which is

MODEL OF THE YEAR

Like every year since 1980, the Nuremberg Fair was for me the occasion of remitting the "Model of the Year" awards to the winning manufacturers. These prizes are awarded to the best sailplane and the best power airplane kits put out on the market during the preceding year. The models are submitted by manufacturers to a jury of specialized journalist contributors to a dozen of the world's most significant model magazines representing a total circulation of well over 700,000 copies and more than 2.5 million readers (*Model Builder is the US magazine in this select group. wcn*). The models are judged according to four criteria: One is the basic design itself, a field that best shows the expertise of the manufacturer's design staff. Next is the quality of the kit, considered as a complete package. This is where the manufacturing process is judged; from the selection of all the components, their processing into quality parts or assemblies and up to the instruction booklet, sometimes basic and simple when it comes with a model intended only for experts, but often quite elaborate and even one of the main judging criteria when it is the only link for a newcomer between a strange-looking package of parts and a successfully-flying model aircraft. Next comes the suitability of the product to its intended

purpose. This is what enables placing under the same scrutiny models which cannot be compared as such; the judges are looking for quality and this is not dependent upon whether it is a basic trainer or a full-blown competition aerobatic aircraft. Last of the judging criteria is innovation, so as to favor manufactures who, far from following traditional practice in design and production, make efforts to improve quality and reduce the final price, whenever the innovation results in a better final product for the modeler.

The models having received the Awards in the past years have proved their quality and have been unanimously recognized as superior products. I am confident that the two 1991 Awards winners will share the same privilege.

The 1991 RC Model Sailplane of the Year is both traditional and highly modern. Traditional, because it uses the age-old modeling material par excellence: balsa wood. Modern, because only modern production methods could produce the level of constant quality which has been acclaimed by all jury members. With well thought-out production methods, this makes for a model which actually needs less time before airworthiness than most of the so-called "Ready-to-Fly" products. This winning kit is the

"Spirit" by Great Planes Model Manufacturing of Urbana, Illinois. It is worth remembering that Great Planes had already won last year's Model Airplane Award for their "PT-40" and that the "Spirit" has received many points from the European judges against other European models.

After having been won by an American model in 1990, the 1991 RC Model Airplane of the Year Award has been won by a model truly representative of European modeling as it is designed as a sailplane tow-plane and aerobatic trainer: the "Schleppi" produced by Simprop Electronic of Harzewinkel, Germany. Simprop is one of the oldest established European manufacturers, producing digital proportional radios since 1966. They later entered the model kit production business with considerable success. The "Schleppi" is a large shoulder wing model for .60 to 1.20 power. Very easy to build, the kit is unusual in that the wing, supplied almost finished in obechi-covered foam, is one-piece including dihedral, thus suppressing any tedious or delicate work. The kit is a perfect balance of quality, simplicity, appearance and performance. By pure coincidence, the "Schleppi" is distributed in the US by Great Planes Model Distributors; this just shows how successful companies have mutual affinities. **MB**

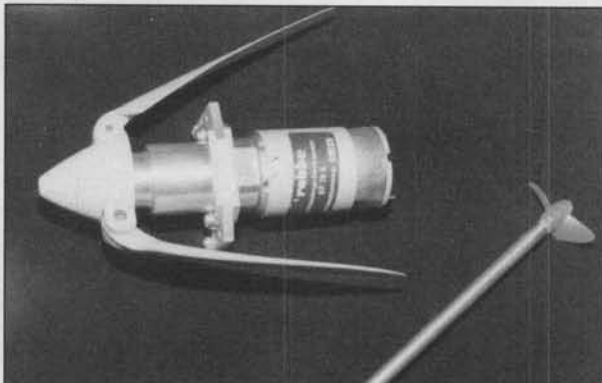
taking place is of political nature. We are now accustomed to labor-intensive ARF products, the low-cost products coming from manufacturers established in Taiwan, Korea, Thailand, Hongkong, sometimes Brazil or Rhodesia, and recently, Italy and Spain. We must now add to this list the Philippines and the Soviet Union, but primarily, the newly-freed ex-eastern-block countries of Hungary and Czechoslovakia. This is a big change as, contrary to most of the Far East countries, we find there both low labor costs and really qualified workers, so much so that if a few related problems (like production quantities) can be quickly solved, these countries could well become a real concern to the present established manufacturers. Czech ARF models should already be available this year on the US market.

I mention here ARF models, but other products are coming from these countries; the Czech MVVS (and Modela, a larger concern of which MVVS is now a part) engines are already well-known since the Malina brothers pylon race wins at the US Nats and World championships in 1987; new high-quality Hungarian engines are now being manufactured and, far from the small-production specialist engines which have occasionally found their way to the US, even the Russians are producing pattern-type engines with the international market in mind.

Apart from this new situation the general trend, which was clearly highlighted by Robbe (one of the two largest German manufacturers) a few years ago when they took over the Schluter company (and Keller shortly afterwards) is still valid, and more than ever. More helicopters (Schluter), more electrics (Keller). This results from the recognition of a simple fact: available space for model flying is more limited every year and noise pollution restrictions, specifi-



Wide distribution of high-quality electric motors by Robbe/Keller, Graupner, and Webra have restricted the sales volume of independent manufacturers who are now searching for distributors. Shown here is the Hecktoplett HP 320 K, now distributed in Germany through Bauer.



A fantastic new product was this unique inline gear-free reduction device made by a Dutch manufacturer. Should get a prize for the best new device of the year.



Other new Rossi engines are these 40-size in sports and pylon versions.

cally in Europe, are stronger than ever.

More helicopters, this is already a fact in Japan where all sizes enjoy an ever-growing popularity; the European market follows the same trend with a few differences; standard-size electric helis competing with the new Japanese mini-electric machines. More electrics (and sailplanes), one only has to browse through new products catalogues to realize how this is important in Europe; of the 29 new kits offered by the "Big Four" German manufacturers (Graupner, Robbe, Multiplex, and Simprop), one finds only four new power airplanes, compared with eight new sailplanes, three new electric-powered airplanes and fourteen new electric-powered sailplanes. Need I say more? In fact, not only are there more electric models, but they are also becoming larger. Last year we could already see indications of this trend, now all manufacturers have models for bigger (rare-earth magnets) motors and batteries of more than seven cells. This practical seven-cell limit on the less expensive models is imposed by the fact that a normal 12-volt car battery cannot charge fully more than seven Ni-Cd cells in series. It follows that many new automatic chargers in the middle-price range, able to charge up to 24 cells, could be seen on all manufacturers' booths to take care of the bigger motors.

Another result of the "anti-noise war" is that new and more efficient mufflers (and even more "after-silencers," as the British put it) are to be seen in every booth, and that big and/or noisy powered models are "out."

ENGINES

Not only are new engines very scarce, most of them are definitely intended for the US market with almost specific products; ducted fan engines (Rossi, Webra), pattern engines (OPS, Picco), and big strokers (Super Tigre). Most other new engines are merely Asian clones of existing .25 or

NEW PRODUCT UPDATE

- **Uni-Lock Universal Joint Starting System** -- positive starter engagement at up to 15° angle without downforce or possibility of body damage. Adaptable to all popular models.
- **Magna Fuel** -- special heli blends with 12.5% or 30% nitro.
- **Webra .50 Heli with X-Cell or Schluter Fan** -- ABC - \$98.00; Ring - \$95.00.
- **X-Cell .30-.60 Plastic Servo Tray with Push/Pull Collective** -- *Coming in Spring*

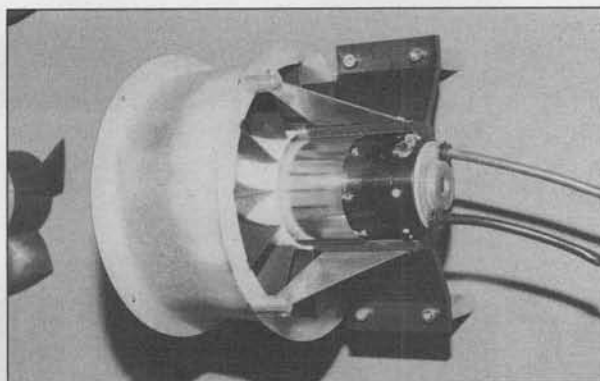


miniature aircraft USA

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.40 OS classics. Irvine and Webra are alone with 1.20 engines mostly intended for big models, scale airplanes, or big models for glider aerotow use. Much lighter than the usual industrial-type engines, they put out more useful power than most of them in the 2.0 to 2.5 cu.in. range.

Actually, and curiously enough, most new engines come from Europe but very few are likely to see widespread use there. For years now, Italian aircraft engines retain from their racing ancestry a definite reluctance to low revs and have a noisier exhaust than most. This is certainly the reason why one finds among the new products so many Italian engines for ducted fans and pylon racing. An exception is the new OPS 60 Super with reed rear intake and a new design exhaust port giving improved low rpm torque for turn-around pattern use. A heli version will also be available. OPS, one of the leading Italian manufacturers and equally well-known for its RC car racing engines, also showed a pylon racing .40 with strengthened steel front case, which should prove very popular, and will certainly be used at this year world championship in Australia. Rossi showed several new engines, including a D/F rear-ex-



The Bauer electric-powered ducted fan unit is now in production, as well as many suitable models. Whether or not this is a new trend remains to be seen, but it is extremely interesting.



The new MMI 3.5cc Hungarian engine, from a new range of fine Hungarian-made engines of .09 to .21 cu.in. capacity for airplanes, boats, and cars. Well up to modern standards.

haust rear-intake racing 65 and Picco had a new .60 on show.

On a different path, most interesting are the Webra .32 and .70 for heli use (the larger one being specifically designed for scale models), as well as an improved .60 for turnaround pattern said to be on a par with a certain redhead 60 and adorned with a similar anodizing. A new Speed 40 Quickee, with power-increasing special muffler, is intended for Quickie 500 use.

We can expect to soon see more engines from the East European countries. An Austrian distributor has been instrumental in getting a full range of engines of Hungarian origin. These engines, of very high quality, are not produced by the well-known Moki company but by an optical mechanics manufacturer. Most of these fine mechanical pieces show a strong influence from traditional European diesel engines of the sixties as well as from the Cox Medallion series, but the larger .21 in aircraft, boat and car versions is much more modern in design with a marked Italian style. All of these engines share high-precision mechanical parts as well as a very nice and attractive finish.

The Czech MVVS engines are also
continued on page 104

Compromise No More

MAXIMUM DYNAMIC RANGE

Astro's New Model 205 Hi-Rate Electronic Speed Control has the largest dynamic range available anywhere. It works with 6 cells to 32 cells...efficiently. It works with 50 Watt Ferrite 05 motors and 2000 Watt Cobalt 60 FAI motors.

100 AMPS PULLING POWER

Five IRF-Z40 MOSFETS, a special gate drive circuit, and a Built in Aluminum heat sink give the 205 a peak (1ms) rating of 700 Amps and a 30 second rating of 100 Amps. Power enough to handle twin 40 motors sucking 100 amps during monster truck pulls.

100 AMPS BRAKING POWER

Four IRF-Z30 MOSFETS in the brake circuit have a peak rating of 500 Amps and a 5 second rating of 100 Amps. Powerful enough to stop an 80 mph dragster or a 400 lb sled. And the regenerative braking circuit pumps amps back into your nicads during braking.

OPTO-COUPLING

Opto-coupling eliminates any the radio circuit and the motor

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Motor noise can't get into your radio receiver and cause glitching.

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Hi-Frequency switching is much more efficient than frame rate switching,

especially at lower throttle settings. Motor heating is greatly reduced, motor runs noticeably longer, and throttle response is extremely linear.

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A special triple pole low pass filter in the decoder circuit produces a SOFT START and a very smooth and precise speed command. Try it once and you will never want to return to the spastic control you live with now.

16 AMP SHOTKY DIODE

This massive flyback diode greatly reduces switching losses during partial throttle operation. The control runs much cooler and more efficiently and your nicads run longer.

NO MORE COMPROMISES

I designed the Astro Model 205 Hi-Rate Speed Control with No Compromises. I gave it all the features that serious electric competitors have been asking for. I hope you like it.

Bob Boucher
Bob Boucher

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LOOK BACK, AND ENJOY

Welcome to another free flight month at the *Model Builder* workbench. In fact, as you read this, you might think that you have taken a step into the past; a nostalgia design for the mystery model, another nostalgia ship for the three-view, and a great story from the early days of twin pushers for your enjoyment. In fact, one of the enjoyable activities that free flighters share whenever they meet to talk about the old days is that our old days go back many, many years. So, we share not only the designs and materials of the past, we use them today, perhaps as an attempt to trace our modeling lineage to simpler and happier times. Maybe it's the notion of tradition and custom that has kept us at this hobby for so long. It may be the reason that many of us disdain plastic film covering materials, carbon fiber parts, CA adhesives, and electronic devices. It may be that our kinship with the past is kept alive by using nitrate dope, silk and tissue coverings, Ambroid cement, and the like. Of course, it could be that we are just stuck in the mud, and resistant to any change. It must be time to start.

JULY MYSTERY MODEL

Recently, I received a nice packet of free flight materials from Howard Robinson, of Ohio. Howard is a long-time free flighter and designer of this month's mystery model. According to Howard, "I am still flying the original that I placed with at Los Alamitos in 1952...wing and stab recovered several times with Japanese tissue... but with the same Wasp .049 that Bob Holland gave me while in California. It is a 'hot' Wasp.

According to the article accompanying the plan, as published in a popular national model magazine of the time, Howard was a member of the Shelby Balsa Butchers and a

flying partner with Dick Korda. At any rate, this ship is typical of the designs of the day, but was equally at home as an ROW or ROG free flight. It apparently was quite competitive in both events.

All you, dear reader, have to do is to identify the model and send your best hunch to Bill Northrop at *Model Builder*. Maybe your correct answer will be drawn to win a free subscription to *Model Builder* magazine. Is that a good deal or what?

MYSTERY MODEL WINNERS

Like the old saying, "Time passes quickly when you're having... fun(?). We have a lot of catching up to do on Mystery Model winners, as the last one acknowledged goes all the way back to February of 1990!

The March '90 MM was Frank Ehling's "Sweet Fifteen," and the winner was Newt Stansfield, of Milwaukee, Wisconsin.

Next, in April of 1990, it was Ron St. Jean's "Tenderfoot," and the Mystery Model winner was Bob Beecroft, Carlsbad, California.

Dick Hawes, Omaha, Nebraska, whose picture appeared as an "unknown" modeler with a Peanut Scale "Isreal Red Head," some years ago in *MB*, finally gets some respect, but mostly for naming the "Californian" as the MM for May 1990.

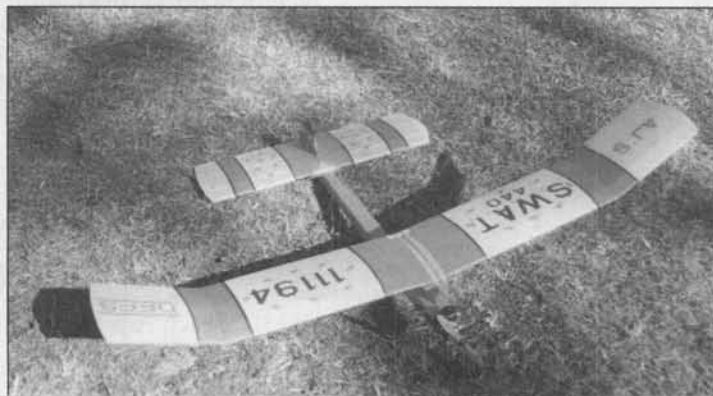
Chet Bukowski, a high ranking officer in the Flying Aces air group, from Wilmington, Massachusetts, identified Dick Warner's "Bean Bogan 865" as June's Mystery Model.

The combined July/August issue represented the last Mystery Model competition for which the winner was selected by postmark date with a postal zone handicap, and by the same token, the last time we would have a tie! Try as we might, there was just no way to defeat the unpredictable delivery of magazines to subscribers, hobby shops, and newsstands so that everyone would have a fair chance at getting the earliest postmark on their answers (It would have been even worse if we simply chose the first correct answer that arrived, instead of going by the postmark). Starting



Clarence Bull at the Sierra Cup, 1990, with mouth in standard configuration. "Pilfered Pearl," TD .049. Bruce Augustus photo.

The SWAT, a nostalgia model, is now available in kit form. See text.



with September, 1990, and from now on, everyone who responds within about six weeks of the publishing date, has a chance to win. Most answers are in within four weeks, so we allow two more for the stragglers. At that point, we count the number of answers received, shuffle them into a stack, and then ask someone in the office to pick a number between one and the total number received... say 25. If the number selected is 17, we count down through the stack to the 17th (correct) answer and pull out the winner! As six weeks give Canadian and Mexican readers plenty of time, their answers go in the US pile. Overseas answers go into separate piles for each country (we get a lot from England), and are selected about ten weeks after publication.

So... Danny Lutz, Fallbrook, California, and Carl Stokes, Seattle, Washington, share the dubious honor of being the last tied winners of the Mystery Model, by naming Frank Ehling's "Timer's Nightmare" as the MM for the July/August 1990 issue. That model, by the way, elicited a huge number of answers.

Just because Kermit Walker, Lodi, California, sent the correct answer that was selected for September, don't go out and chop down a tree! His answer was written on a postcard, which was actually a piece of 3-3/4 by 5-3/4 by 1/8-inch thick California redwood! The mystery model was the "Space Tiger," by Richard Oscar.

For October, 1990, the Mystery Model was Paul Gilliam's "Civvy Hearse." The winning answer selected was that of Bruce Augustus, Sun Valley, Idaho. Also had a couple of overseas winners on this one; John Birnie, from Coopers Hill, Gloucester, England, and Bob Lowe, Krugersdorp, South Africa.

October's MM also elicited a lot of correct answers, including one from the designer of the model! It was Vic Cunnyngnam's "Space

Rod." The winner's name should be familiar to free fliers, whether it's Junior or Senior, and that's C.O. Wright... Junior in this case, as C.O. Senior has gone to the place of infinite thermals. And again, we have an overseas winner. This time it is Roland Wong, of Hastings, New Zealand!

One of our perennial winners under the old system, was Ed Turner, of Ft. Worth,

lands, pointed out that there was a bit of a pun in the name, as the "Weepy" was powered by a Pee Wee 0.020. Did he call it, Dave?

Bob Stalick figured that he'd get by everyone with the February '91 MM, as it was published in a non-modeling magazine. However, he should know that you can't fool a free flight modeler any better than you can fool Mother Nature! A whole bunch of people knew it was Frank Zaic's "Utility Special," out of the May 1937 issue of *Popular Science*. Several answerers even named Roger Hammer as the probable builder of the model in the article. We have no way to verify that, as Frank was not at home when we called to check. The winner of this one sets an example of the effect of the new selection system.

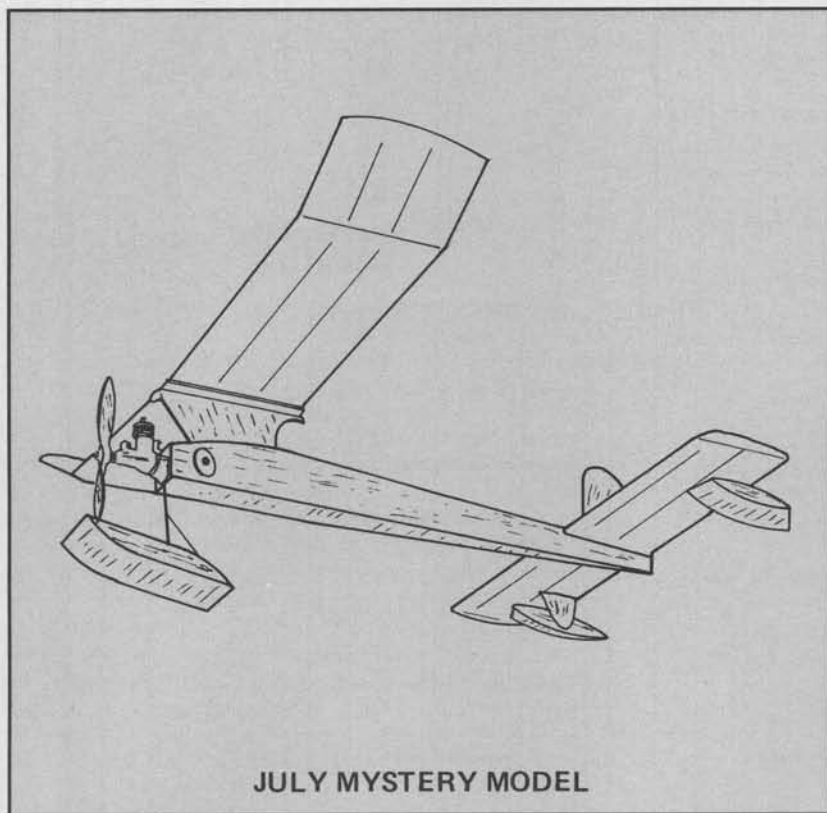
... it is Peter Mann, of Guelph, Ontario, Canada, who stated in his letter that he didn't have a chance, but wanted to send in the answer anyway. Glad you did, Peter, although you named the May 1937 magazine as *Popular Aviation*. However, this was not part of the question, so you still win!

Well, that completes a year of Mystery Model winners brought up to date, and now we forge on to March and April (already have some correct answers for May, too).

For March, we have a model that sounds like it was named after a popular item of lady's make-up, the "Hi-Liner," by Keith Hoover, and published in the July 1961 issue of *Aeromodeller*. A postcard from Jerry Barnette, Fredericksburg, Virginia, was selected as the winner.

Several months ago, Jerry Zierdt, from Colbert, Washington, sent us a folded 12 by 18-inch card with a correct MM answer! That didn't do him any good, other than to get this mention, but the answer he sent in for the April Mystery Model, Maurice Schoenbrun's "Planeteer" (on a 4 x 6-inch card), hit the mark.

continued

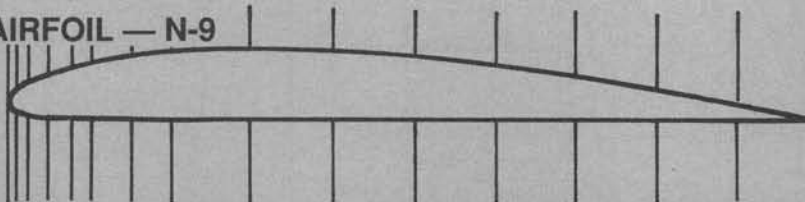


JULY MYSTERY MODEL

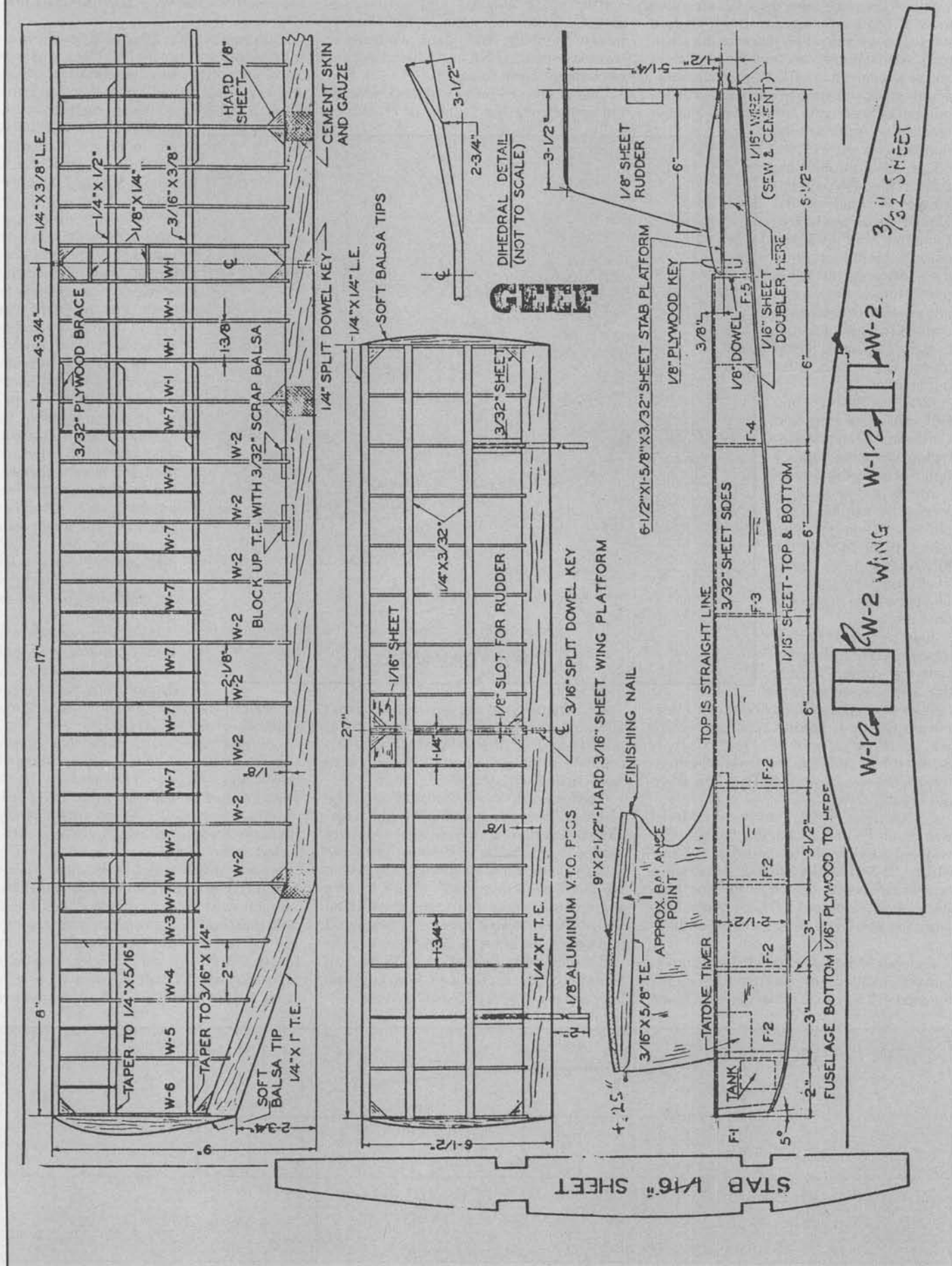
Texas. Changing to the new system didn't allow us to escape his grasp, as his name was pulled from the correct answer stack for December, 1990, Joe Bilgri's "Gusty," from April 1959 *Flying Models*.

Gordon Roberts, of Parma, Ohio, says he had to go through a bunch of his old magazines before finding January 1991's Mystery Model in the January 1959 issue of the English publication, *Model Aircraft*. What he found was Dave Platt's "Weepy." We also received a note from Dave, in which he said, "It seems like a hundred years ago. I don't need the subscription, I just wanted you to know I'm awake!" We also had an overseas winner on this one, from England, logically enough. A.J. Taylor, of West Mid-

DARNED GOOD AIRFOIL — N-9



STA	0.00	1.25	2.50	5.00	7.50	10.0	15.0	20.0	30.0	40.0	50.0	60.0	70.0	80.0	90.0	95.0	100.0	
UPR	2.25	3.98	4.78	5.80	6.44	6.92	7.76	8.26	8.46	8.22	7.60	6.52	5.24	3.86	2.12	1.35	0.28	
LWR	2.25	1.24	0.88	0.48	0.30	0.22	0.00	0.00	0.00	0.02	0.08	0.12	0.12	0.08	0.02	0.01	0.00	



STAB 1/16" SHEET

GERT

DIHEDRAL DETAIL
(NOT TO SCALE)

3/32" SHEET

W-12

W-12

W-2

W-2

W-2

W-2

W-2

W-2

W-2

W-2



(Left) Bruce Augustus with his "Northern Light" F1J with CS .061 engine, now powered by BV Shuriken. At Lost Hills, April '90. Wes Funk photo. (Middle) This month's Mystery Model. This is the original ship . . . still flying after nearly 40 years. Photo by designer Howard Robinson. (Right) A picture from the 40s. This picture was taken at an old golf course in Portsmouth, VA. The modeler is Raymond Anderson, posing with his "Ensign" powered by a Forster .29. Raymond was a submarine commander in WW II and is now retired and living in Norfolk, VA. Photo by Bill Alexander.



DARNED GOOD AIRFOIL - THE N-9

This is an example of an airfoil that would serve free flighters well as a stabilizer section. It has a definite upsweep on the leading edge lower camber and the sweep continues past the 10% station and then picks up again at the 40% mark. Because of this feature, the section provides less lift and would be less critical to stabilizer adjustments.

Many FAI (F1C) power fliers have found

that semi-symmetrical airfoils allow for easier control of their fast climbing models. When equipped by VIT, stabilizers on such models are not intended to provide very much lifting surface for the glide. As a consequence, such stabilizers can use airfoils that have relatively low lift characteristics. This month's section is a modest step in the direction of a semi-symmetrical section. Although it is too thick to use on today's F1C, it could be thinned down to around 6%

for such use. It could also be used pretty much as is on AMA power models with fixed surfaces and the typical 9 to 10%-thick wing sections.

THREE-VIEW - DAN SOBALA'S GEEF A-B NOSTALGIA MODEL

Several years ago, I featured Dan Sobala's 1/2A Geef in this column. I thought it was time to feature the big Geef. This ship is a bonafide nostalgia model and was designed for engines in the .19 to .29 range. With



Christen A-1 Husky

1/4 Scale



SPECIFICATIONS

Wing Span: 105" Channels: 5
Length: 67 1/2" Weight: 19-20 lbs.
Power: Super Tigre 2500 & 3000, O.S. 240,
Quadra 35/40 or Equivalent
Engines.

The A-1 Husky by Christen Industries represents a rebirth of the classic Super Cub. Byron Originals brings you the Husky complete with scale components and features totally unlike anything currently available in Cub kits--features like detailed hand-layed fiberglass fuselage and cowl, conventional wire cut wings, operational cabin door, scale single slot flap hinges and scale strut anchors. Easy,

gentle, Cub-style flying is a natural with the Byron Husky . . . full-flap take offs in 15 to 20 feet plus all the aerobatic prowess expected from a Byron kit.

If you're looking for traditional Cub flying, with the flair and excitement that only Byron Originals can bring, end your search with the Byron A-1 Husky. For a detailed Info-Pack, send \$2.00. Catalogs, just \$3.00.

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FLYING... JUST FOR FUN

The thrill of competition flying enjoyed by many control line fliers has its dark side . . . many hours in the workshop and on the flying circle, building, testing, refining, repairing, preparing. Sometimes we get so caught up in the competitive cycle that we find ourselves ready for a day at the club field just "boring holes in the sky" for no particular purpose, but without anything to fly that isn't designed for some kind of competition.

When that happens, it's time to look around for a "just for fun" project that can help us remember how we got into this hobby in the first place, the delight of mere flying.

That was just the situation for me when Sig announced its intention a couple of years ago to manufacture a new kit for sport and stunt flying, the first profile from Sig in several years. It was the Skyray 35, a scaled-up version of the successful 1/2A trainer called the Skyray. It seemed the perfect solution to my desire for a sport plane.

Regular readers may recall a description of the kit in this column just after it was released . . . and the promise of more detailed information when it was constructed. Well, those competition pressures remained and it took a while to get the Skyray built, but it's now flying and has definitely lived up to its initial mission. It's the perfect Sunday flier, sport trainer and just plain relaxing airplane.

Construction of the Skyray confirmed my long impression of Sig kits: These are kits built for modelers by people who know about model airplanes from the building end. Parts fit perfectly and the plane goes together swiftly and easily enough that even a novice would find the plane an easy project. I didn't keep track of the hours spent building the plane but, in spite of the fact that I spread the building out over about five months and two moves of my workshop, the actual construction was nearly the quickest of any profile I have encountered. I believe it could be built in a day by an experienced modeler in a hurry.

One of the first questions that immediately comes up with any kit is: "Can I follow the instructions or should I modify the plane in some way?" With older kits and even some in production, some methods described on the plans are outdated and there are numerous things that need to be mod-



Our columnist's Skyray 35 is just the ticket for a non-competition sport CL model, one built "just for fun," as the headline indicates. Text contains a mini-review of this popular Sig kit.

ernized on the plane itself. With the Skyray, the answer to the question comes in two parts: You can build the plane exactly as the plans and instructions say and you will come out with an excellent airplane. Nevertheless, there are a few things you may want to consider that could improve your satisfaction with the final product.

The full-size plans include crystal-clear instructions and illustrations, building tips and even a rundown on the different types of modern adhesives and their proper applications. A far cry from the old "Buy a tube of model airplane cement" approach to instructions.

The kit provides all sorts of helpful little touches, such as triangles for alignment of the parts, as well as a complete hardware package. Even the balsa sheeting for the center section of the wing is pre-cut to size.

A piece-by-piece look at the construction of the kit starts with the wing, which can be built very quickly and quite straight and true, provided you are working on a perfectly flat board. The kit ribs include alignment guides which are removed after the wing is framed up. As is typical with full-size plans, the wing is built directly over the plans, so it's pretty hard to do anything wrong.

The kit uses Sig Lite-Ply ribs, for reasons that are not particularly clear. It's doubtful that the plywood adds much strength, aside perhaps from reducing the likelihood that heat-shrink covering will pull warps into it. A flier concerned about weight might save a little by substituting balsa ribs. However, my plane was built with the plywood ribs and did not seem to suffer much of a penalty from the extra weight. The plane came out at about 30 ounces (including engine and all hardware), a bit heavy for a sport profile, but a standard Fox .35 stunt pulls it through the entire stunt pattern effortlessly.

Elsewhere in the wing, a builder can save the step of soldering a keeper onto the bellcrank end of the pushrod by simply enlarging the bellcrank mount a little bit and using the mount itself to keep the L-bend of the pushrod in the bellcrank hole (the hardware package, by the way, includes a pre-bent pushrod, a boon for those of us who hate bending metal!).

The wingtips need some care to prevent them from warping, so a couple of triangular braces on each tip might be helpful. Without them, you may be able to correct minor twists by pulling them out with the covering, as I did.

The only modification I made to the fuselage was to add a balsa cheek doubler to the inboard side, roughly the same size as the inboard plywood doubler. It serves to close the gap between the motor mounts, providing a cleaner and marginally stronger front end. If you're concerned about vibration, you might want to consider closing the gap by cutting a new ply doubler, or by going with a 1/4-inch cheek cowl. Mine was an 1/8-inch cowl, and a little vibration still shows when the engine is running rich.

The Sig Easy Hinges provided with the kit



"Otto the Giro" is a guaranteed show-stopper at any CL site. Dick Mathis designed it, *M.A.N.* published it back in 1974.



Otto flies! Seen here coming in for a power-on landing. Throttle control, especially for landing, is essential on a model like this because it doesn't glide for beans!



Dick Peterson (left) and Dick Salter work with Otto. Peterson is the owner/pilot; ship was built by the late Jim Parsons.

are an excellent hinging material that seem to work very well and are much easier to install than the pin hinges that are in common use. As with any 1/8-inch material, cutting of the hinge slots without punching through in undesirable places is a real challenge. If I were going to build another Skyray, I would substitute 3/16-inch wood to make the slot cutting easier. It could be sanded back down to 1/8 after hinging.

Following a practice I have adopted almost universally for profiles, which grows out of an obsession with strength that comes from construction of multitudes of racing planes, I covered the entire fuselage, elevator-stabilizer assembly and rudder with light fiberglass cloth, applied with clear epoxy paint. This was done before assembly. I put

two coats of the clear epoxy on to seal the cloth, and sanded it off smooth. The glass cloth covers seams and flaws, smooths everything out and adds strength over the entire structure without adding much weight.

After assembly, the wood parts of the plane were covered with Sig Sanding Sealer and sanded smooth twice. Then chrome MonoKote was applied to the wings and two coats of black K&B Super Pox paint were sprayed on the fuselage and tail assembly. I used the decals provided by Sig for decoration. It should be noted that the construction time would be significantly reduced by using a plastic covering over the entire airframe, as suggested in the plans.

The result was a plane with a pleasing appearance that did the entire stunt pattern



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on its second flight. It allowed a feeling of confidence the instant it was in the air. There was never a doubt on line tension (the leadout position shown on the plans turned out to be just right. I used very slight tail offset). The balance point was just right and the plane turned precisely the same upright and inverted. I used the recommended Sig clunk tank, which has marginal fuel for the stunt pattern. I also used an SST muffler and muffler pressure to the tank.

The kit provides wire for a single-wheel landing gear, but a flier interested in using the plane on asphalt or who is simply interested in a more conventional stunt layout may consider a two-wheel arrangement (bearing in mind the additional weight and drag this would involve). If you decide to use the single wheel, consider placing skids on the wingtips at least on the outboard side . . . unless you plan to always fly over grass. Otherwise, you'll scrape the covering off the outboard tip. A large elevator horn on the tip's trailing edge makes an excellent tip skid. By the way, I used a metal tailskid instead of the plywood one shown on the plans.

I've heard the suggestion that the plane would be improved by a larger elevator, but I didn't feel any need for more elevator authority in flying mine with the stock setup.

In summary, the Skyray is an excellent way for either a beginner or an expert to get out to the flying field on a Sunday and have some fun just plain flying. And it would make an excellent stunt trainer that should carry a flier through the intermediate class.

It's available at all good hobby shops or by mail from Sig Manufacturing Co., Montezuma, Iowa.

• • •

Mention of stunt flying allows us to move smoothly into a question raised by reader Paul Forrette:

"Think about 'flying style.' Do stunt fliers use only the exact amount of control input? Or do they bang-bang, full control to execute loops, etc.? Or is that 'bad form'? For good or bad, I find myself flying that way at times. I sorta expected that combat fliers would do it constantly, not having time to go for finesse!"

All of us at times find ourselves "one-lining it" for one reason or another, but in general that should not be occurring except in emergency situations. Virtually any kind of airplane that is properly set up will have some reserve of control that isn't used except in emergencies.

Before going any farther into the issue of flying style, let's digress into the issue of control movement itself.

Generally, anything more than about 45 degrees of elevator or elevator/flap travel is excessive. When deflected more than that, the elevator or flap becomes more of a brake than a control device, and the result is more likely to be a stall and a very inefficient turn. This helps explain why combat planes often have only a few degrees of elevator travel. The plane's moments and balance are designed to allow high maneuverability with

little elevator movement, to avoid stalling and slowing in turns. Similarly, a stunt plane with too much elevator input will lose headway in those critical corners and become a lumbering, sluggish monster.

Stunt fliers—and combat fliers, too, believe it or not—will use only enough movement to make the desired turn. This is often much less than is available. The stunt flier's goal is to make the turn graceful and keep the plane moving forward with enough speed to make the difficult climbs. Smooth turns also avoid the jerkiness that causes judges to reduce scores. Combat fliers will sometimes use full control for an instant to provide quick, unpredictable movements, but they will just as quickly neutralize it and avoid long periods of full control or multiple consecutive maneuvers with full control in order to keep their speed at maximum. Contrary to occasional appearances, most combat fliers are clearly aiming at something most of the time and are not likely to want to be in a constant turn for very long.

Beginners learning their first maneuvers find it difficult to avoid full control. It's hard to believe at first that the plane will ever pull out of a loop. Thus you get the one-line panic maneuver and a slow, stalling plane that is in fact hard to pull out! As fliers gain experience and learn that they can nurse the plane into the maneuver, and increase the size of the loop, the plane and the pilot both begin to perform better.

Without even seeing them fly, my advice to every beginning stunt flier is: "Make it bigger!" The most common stunt flying beginner problem is to reduce the size of the sky and try to fly all the maneuvers too small. This overworks the plane and makes easy maneuvers difficult. If you exaggerate the size of the maneuvers tremendously, they will be easier for you to do and the plane will have no problem making the climbs and turns. Make the maneuvers twice as big as you think they should be . . . huge loops and vertical eights that make you bend over backwards.

Judges won't mark you down for this as much as you might expect . . . they're more likely to downgrade pinched, stalling maneuvers. As you gain proficiency, you can begin to close the maneuvers down to their proper size. It's much better to start big and bring them down than it is to start small and try to open up.

• • •

Every now and then something shows up at a contest or on the club field that brings everything else to a halt. That's what happened at last fall's Raider Roundup in Kent, Washington, when Dick Peterson (known as the proprietor of Motors and Memories and a proficient Northwest racer) appeared with a remarkable aircraft called "Otto the Giro."

Autogyros are a subject of considerable interest, if mail to this column is an indication, but they are seldom seen actually in the air.

But Dick's Otto was an excellent flier, and during a lull in the contest (caused mainly by

Otto's appearance) Dick had experienced fliers (including this columnist) waiting in line for a turn at the handle.

Since it was throttled, the pilot could land and hand the controls over, allowing several fliers to participate on one tankful.

The gyro taxied and took off and flew level like a normal CL airplane. It's glide rate, however, was nearly vertical when the engine was off, and it wanted to land pretty quickly when throttled down. Thus, powered landings were required, and it took some getting used to handling the throttle. But it's definitely a conversation piece that would make the builder a celebrity at any field.

Dick's plane actually was built by the late Jim Parsons. It's a Dick Mathis design that was published in the January 1974 edition of *Model Airplane News*.

Our continuing "Newsletter of the Month" series now turns to the northeast, whence emanates *New England Combat News*, the control line combat newsletter of New England.

Neil Simpson has taken the diverse interests of combat fliers and melded them into an excellent publication that covers a wide range of combat competition activities and issues. The latest issue at this writing is Vol. 2 No. 9, February 1991. That edition features a report on a January contest that was Round 1 of the 1990-91 Winter Championships, featuring New England's Formula GX Combat, and listing Gerry Pompeii as the winner.

There's also some general area combat news, advertisements for numerous hard-to-find combat products, an article on how to make fuel tanks, classified ads, a report on the Southern California 80-mph combat season, the beginning of a three-part series on the Fox .35 stunt engine, an article about combat engines by Doc Passen, and news of New England's first Combat Raffle.

NECN is mailed free to readers who support control line combat either through participation in New England combat contests or by donations to the New England contest fund. Others can subscribe by sending \$6 to: Neil Simpson, 129 Podunk Road, East Brookfield, MA 01515.

The latest catalog from Tom Dixon is, as have been all previous editions, a must for stunt fliers and of interest to all CL enthusiasts. Tom deals in items not usually found in hobby shops and he has a wide range of kits and accessories.

At the top of the list of new items is his "Right Stuff" package for stunt. This is a rework service that tunes Schnuerle-ported engines for precision aerobatics applications.

Another new item is a hinge tape imported from Germany and designed specifically for sealing hinge lines for maximum efficiency. Graupner "Super Nylon" props also make their first appearance in the Dixon catalog.

New on the plans list are the Curtiss Swift

and the Galloping Comedian, both suitable for Old-Time Stunt.

For a catalog, write Tom Dixon at P.O. Box 671166, Marietta, GA 30066. His order telephone number is (404) 973-0004.

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IN THE LAND OF THE GIANTS

As I write this, during the first part of March, the contest and flying season here in Florida is in full swing. Every weekend there is a gathering of some sort with quite a few choice scale models present. Unfortunately, to date, I

have only been able to attend the IMAA rallies. Consequently, the majority of the photos shown are of the large scale variety. In mid-February, there was a scale meet in Sarasota, Florida, that I would have liked to have attended, as it featured RC Sportsman

Sport Scale, ARC Expert Sport Scale, RC Giant and RC Fun Scale. I couldn't make it as my club, the Deland Golden Hawks, was hosting the Annual Winter Festival of Giants that weekend. If any of you readers have any info and/or photos of scale meets in your

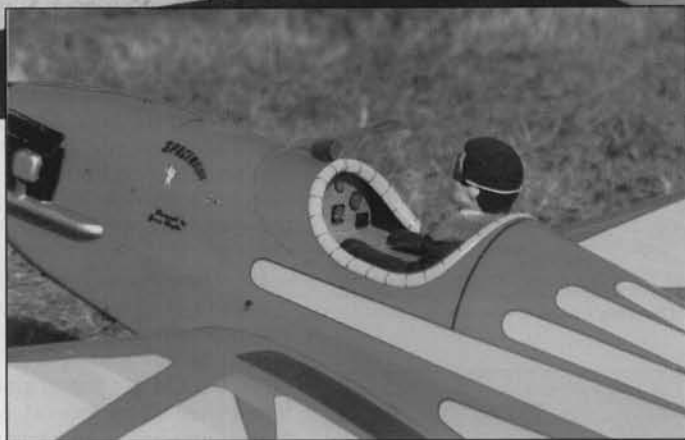


(Left) Bob Henderson of De Land, Florida, with his Super Decathlon. (Right) Super Decathlon on climb out. Pretty! (Bottom) Bob Henderson's Super Decathlon taking off an official flight at the 1990-91 Tangerine in Apopka, Florida.





(Above) Pat Rogers, Apopka, Florida, with his Sig Spacewalker. (Left) Note cockpit detail of the Sig Spacewalker.



area please send them in so that they can be mentioned in the column.

The yellow-and-white Super Decathlon seen in the photos belongs to Bob Henderson of Deland, Florida. Bob has been campaigning this plane for a few seasons now and has done very well with it. His latest win was a first place in Giant Scale at this year's Tangerine' at Apopka, Florida. Bob placed eighth at the '88 AMA Nats, qualified it at the Odessa Scale Masters in Texas, and placed well at the 1990 Scale Masters Championships in Irvine, Texas. The model is a Hobby Shack Pilot kit, covered with Silkspun Cover-ite, painted with acrylic enamel, and is not clear coated. The plane weighs nineteen pounds and is powered with a Zenoah G-38 engine. Radio is Futaba. The model is complete down to the rib stitching. Bob says one of the reasons he has not placed higher is the lack of an adequate three-view. It seems that he has tried many sources to obtain a three-view of this plane, including the manufacturer, and there doesn't seem to be one available. If you know of the availability of an accurate three-view of a Super Decathlon, let me know and I will tell Bob.

Another pretty airplane is the Spacewalker belonging to Pat Rogers of Apopka, Florida. Pat placed second at the recent Tangerine contest, Bob Henderson's Super Decathlon beating him out by only one point! This is the third year Pat has campaigned this plane and has won many awards here in central Florida. The model is from a Sig kit. Pat says the kit is excellent, goes together easily and is a real joy to fly. It is covered with Sig Koverall and is finished with K&B epoxy over nitrate dope. It weighs 19-1/2 pounds and is powered with an S.T. 3000 engine. Prop is an 18x8. Construction time was eight months from taking the parts out of the box to its first flight. The radio is an eleven-year-old Kraft, which has been upgraded to '91 specs, and according to Pat, it hasn't missed a beat. For those of you who are contemplating a large scale model, I highly recommend this kit. Not only is it a relatively easy kit to build, but the superb flying characteristics do not require a hotshot pilot to fly it. You won't have any three-view problems with this kit, as it is modeled from Sig's own full-size Spacewalkers. I believe Hazel and Maxey have a couple of single seaters and at

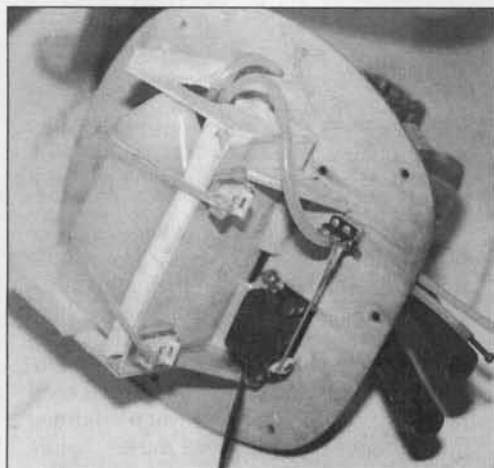
least one two-holer. Knowing the Sig gang, they probably have an update to convert the single-seat Spacewalker kit to the two-seat version.

Tired of having your engine go rich or lean during a flight? There is a clever little unit on the market that eliminates this problem. Big deal, you say. Yes, I know there have been adjustable in-flight needle valves available for years and I have used them. The problem with these units is that their range is very limited, and when adjusting the high speed needle valve, the low or idle end is affected also. Not with this baby! You can go from a full rich to a full lean setting and not affect the idle. The unit is called a "Carburetor Injector" and is manufactured and marketed by Don Pinckert, who is the inventor and patent holder. It has been available for several years and is well-known throughout the RC power boat racing fraternity.

Don is a world class, record-holding boat racer, and invented this device to obtain steadier, controlled engine runs while racing. Fortunately, it is a natural for use with airplanes and helicopters as well. I first



Bruce Schamber, Naples, Florida, with his 12-1/4 pound Byron "Christen Eagle."



Author's Pinckert carburetor injector mounted on rear of Staggerwing firewall.

heard about it several years ago while discussing an upcoming IMS show with Bill Northrop. During the course of the conversation, Bill mentioned a new exhibitor who claimed to have a gadget that would revolutionize the operation of venturi type carburetors; he called it the Carburetor Injector.

Sure enough, at the show, Don was showing a device that was no larger than a postage stamp, was approximately 3/8-inch



Preval spray gun . . . see text for details.

thick, and had two fuel nipples protruding from the top and a control arm attached to one end. According to Don, you remove the high speed needle valve, cut the entire tapered tip off the needle and replace it in the spray bar to create a plug effect. The Carburetor Injector unit is placed between the high speed needle valve fuel nipple and the fuel tank. The unit is controlled with a servo.

Several of us skeptics thought it was a nice

idea, but would it work, and what about its effect on idle? Undaunted, Don pulled a table out from behind his booth which had a .40 size engine, injector unit and servo attached. The fuel tank had an approximately five-foot length of fuel line running from the tank to the injector unit. The tank was not secured to the table. Not being able to run the engine in the exhibit hall, we all repaired to the underground parking lot and proceeded to fire up the engine. After filling the tank, Don set the tank on the garage floor. Height of the test setup table was approximately thirty inches.

Using his transmitter, Don adjusted the injector unit, pulled the engine through a couple of times in the accepted manner for priming, attached the glow driver and started the engine. Via the transmitter, Don adjusted the unit to a smoking lean run, brought the throttle back to idle for a short while, then back to high throttle. He then adjusted the unit to a sloppy four-cycle rich position, brought back the throttle to idle for a short while, then back to high throttle. He then had one of us hold the tank in a position high above the test stand and repeated the preceding runs. At no time did the engine quit. Impressive! We all took turns playing with the unit and we were all convinced that Don really had something going here. Of course, by the time we finished running the tests, etc., the garage was full of smoke and our ears were ringing from the resounding echoes produced in the garage by the engine. In those days we weren't too interested in 90 db at 9!

I purchased one of these little rascals, took it back to Maui with me, put it in a drawer and promptly forgot about it . . . until one day while trying to fly a canard I had just built. I could get the engine running and tuned okay on the ground, but after takeoff and during climbout the engine, being at the rear in a pusher configuration would go rich and quit. If I took off with a lean needle it would be okay on climbout but would lean out to the point where I could cook the engine during level flight. What to do? Suddenly I remembered the Carburetor Injector.

I took the plane home, installed the injector and Voila! It worked! I could take off with the engine adjusted lean, level off, richen the mixture and fly the entire tank with no problems. I still have the plane and the unit still works. At the time, it was available only for engines up to .60. About three or four years ago, Don came out with several sizes for engines up to and including the fuel-guzzling ducted fans and the 1.8 and larger alky burning mills.

Don has them available in three sizes: Small, medium and large. These sizes denote the diameter of the fuel line. If your engine takes a medium size fuel line, you order a medium size injector. There is a brass barrel with two slots cut in it. The width of these slots determines the size engine it is to be used on. The control arm is attached to the end of the barrel. Rotating the barrel via the control arm and servo

adjusts the fuel flow to the carburetor. Engine response to the control arm adjustment is instantaneous. I am currently using one on my S.T. 3000 powered Byron Staggerwing and an S.T. 3000 powered Ace Seamaster 120, and have yet to have a flameout! The carburetors on both engines are stock; the engines have not been reworked, and yet they idle perfectly with positive high speed recovery from extended full idle. On-board glow ignitors for low idle are unnecessary.

About three years ago, while at the Toledo show, I told Greg Namey about this unit and he tried one. He likes them so much that he uses them on his planes and also stocks them. If your dealer doesn't handle them, contact Greg at Innovative Model Products, in Margate, Florida. To order a unit, which retails at \$26.95, call (800) 780-3190. If you are after information only, call (305) 978-9033. You can also order direct from Don Pinckert at Pinckert Custom Boats, 433 Grand Avenue, Masaryktown, FL 34609; telephone (904) 799-0595. The photo shows the installation of the unit installed on the rear of my Staggerwing firewall. The servo is a standard size Airtronics. However, a miniature servo can be used, as the injector arm only has a small amount of drag.

Last month, I mentioned a professional paint sprayer that costs \$4.69. Shown is a photo of the unit. It is manufactured in the U.S. by Precision Valve Corporation, in Yonkers, N.Y. It is a completely portable

sprayer that gives professional results with almost any liquid. This unit is used by auto paint shops for touch-up work. The sprayer is powered by a pressurized power unit that mounts on top of the glass container, weighs 2.1 oz., and is pressurized with an ozone-friendly chemical called Difluoroethane. The power unit will spray up to 16 oz. of liquid. Replacement power units are available for \$3.69.

There are comprehensive instructions on the back of the card that the spray unit comes mounted on. The thinning instructions tell you to follow the paint manufacturer's directions for thinning. Where instructions are not designated, there are general thinning instructions: For auto lacquers and acrylic lacquers, use approximately two ounces of paint with three ounces of the appropriate thinner; for auto enamels and acrylic enamels use approximately four ounces of paint with one ounce of the appropriate thinner; for auto primers and auto vinyls use thinner as recommended by the manufacturer.

When we used the sprayer, we used a paint that had been thinned for use in a tank-type air compressor spray gun, and found that we had to use a bit more thinner to get a smooth flowing spray. The spray nozzle looks exactly like the ones used on spray paint cans, but that is where the difference ends, because the paint comes out in a nice even flow and in a perfectly circular pattern.

Directions say to hold the sprayer six to ten inches from the surface (five inches for lacquers and other quick drying finishes).

I suggest that you practice a bit first on a scrap piece of cardboard. Start out by thinning your finish as per directions. Try spraying the cardboard at the distance recommended. If the finish goes on lumpy or doesn't spray evenly, add thinner, a little at a time, until a satisfactory spray is obtained. The unit shown in the photo is the one we used for painting. As you can see, it can be cleaned. When through painting, empty out the paint, clean the jar with the appropriate thinner, place more thinner in the jar and spray it through the nozzle until it comes clean. For those of you who haven't tried spraying or can't afford the high cost of a compressor and spray gun, give this unit a try. You can't go wrong for five bucks!

Last, but not least, is a photo of smiling Bruce Schamber from Naples, Florida. This photo was taken at the Sun Dancers Aero Squadron IMAA Big Plane Fly-In, held March 23 near Fort Pierce, Florida. Bruce's plane is a Byron Christen Eagle, covered with EconoKote, powered with an S.T. 3000 and weighing 12-1/4 pounds. You have to see this puppy perform to believe it. Although the wind was atrocious the day I was there, Bruce and his airplane put on dazzling performances several times during the day. Remember: The secret is keep 'em light! Nuff said.

MB

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Photo shows components for RB-1 King Condor.



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BY BILL HANNAN

"THE CURSE OF THE PERFECTIONIST: IF SOMETHING MORE CAN BE DONE TO A MODEL, YOU DO IT."

So says Tom Hallman, builder of that fine MIG-3 shown in one of our photos. Obviously he is true to his own words.

All of the aeroplanes in our photos this month have one thing in common, in addition to being rubber-powered: The property they share is the ability to conduct light in a manner closely akin to stained-glass windows. There is an almost magical luminosity in these models that evokes emotional re-

"Show me a man who likes to cover and I'll show you a masochist!" True, the application of tissue in a successful manner requires plenty of practice, and even experts admit to occasional frustration with worrisome wrinkles, pesky puckers, and woeful warps. This may not be so surprising, considering the wide variations in tissue characteristics, multiplicity of adhesives employed, and the many techniques used.

Tissue can be imported or domestic,



Mike Midkiff seems pleased with his Jumbo rubber-powered DH-9! Photo by Dick Johnson.

Naomi Sturman, of Japan, proudly displays her father's 18-inch span Waco from a Canadian Easy Built kit.



sponses entirely different from opaque aircraft. Bill Brown, of Brown Junior fame, considers them a true art form, and we agree.

THE STICK AND TISSUE MYSTIQUE

There is a certain charm about see-through covering which places it in a separate category from opaque covering or paint. Perhaps one attraction is that delicate "work intensive" structure is so well revealed, allowing proper appreciation of the time, skill and dedication invested? Whatever the philosophical reasons may be, translucent coverings have remained popular throughout the history of model aeroplaning. From simple ROG types through complex Old-Timers, the stick-and-tissue approach seems destined to survive as long as the hobby itself.

In spite of the advantages, applying tissue remains a daunting proposition to many modelers. As Bill Pardoe once remarked:

grained or ungrained, stiff or limp, shiny or dull. It can vary in porosity, wet-strength, thickness and weight. George Benson recently compared three different types of Japanese tissue and found that the quantity required to cover a Peanut could range in weight from 0.77 grams to 1.3 grams. Prices were similarly varied, giving new meaning to the old "less is more" dictum.

As for adhesives, one may choose clear dope, shellac, white glue, alaphatic resin, glue sticks, glue rollers, glue sponges, and heat-activated proprietary products. In the final analysis, trial-and-error testing is required to determine what works best for each individual. (Like any other form of art!)

FINISHING

The selection and application of tissue is only part of the process. To really bring a model to life, markings should be added. This may include insignia, registration numerals, control surface outlines, etc.

Options include use of decals, paint or colored tissue, perhaps the most appropriate.

Dark tissue over light tissue is easy, however placing white tissue over, say red, may yield an unsatisfactory pink. Ordinary typewriter paper can be employed in such situations, however it may be too contrasty and excessively opaque to be in keeping with the desired translucence.

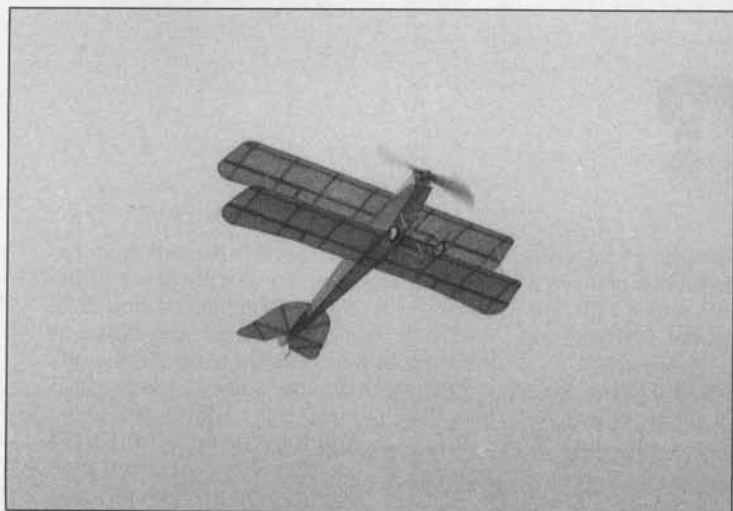
Dr. Plenny Bates suggests a novel solution, in employing Coverite Pearly White Micafilm for markings, with the rough side out. The Micafilm resembles tissue in texture, and lets a limited amount of the underlying color show through. As a roll of Micafilm, at about \$9.50, would yield more than a lifetime supply of markings material for the average builder of stick-and-tissue models, Plenny offers 7x14-inch sheets of Micafilm, including application suggestions, for \$2, plus a pre-addressed business size,

stamped (52 cents) return envelope. This is obviously a non-profit venture, however, any accumulated funds will be applied toward a backyard picnic for model builders! Plenny Bates, 2805 White Eagle Trail, S.E., Cedar Rapids, IA 52403.

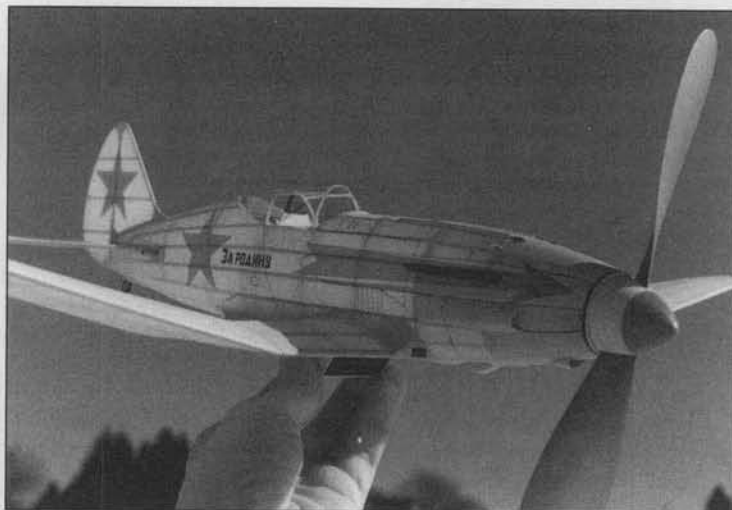
water-resistant after drying for about 30 minutes.

Glenna Tarango, writing in the Arizona Cactus Squadron newsletter, described her experiences with J.W.'s Right Step brand clear acrylic applied to a stick-and-tissue

Peanuts, larger rubber-powered designs, plus CO₂ and gas-engined models. Featured are obscure types such as the Fokker Spinn III, Bleriot Nyrop, Zankonig, Schlepp and the aforementioned Curtiss Tanager. If you prefer more familiar aircraft, how about a Spirit of



A 36-inch span Curtiss Military Tractor constructed by Vern McIntosh from a vintage 1920s Ideal plan.



Tom Hallman's impressive Mig-3 has a sprayed acrylic finish sealed with matte varnish.

GILDING THE LILY

Regardless of how the tissue and markings are applied, many (but not all!) builders add some sort of sealant such as clear dope or ScotchGuard to increase tissue strength, seal the pores and render the covering moisture resistant. As usual, individual preferences also enter in. The late Walt Mooney, for example, preferred shiny finishes, and frequently applied a spray coat of clear lacquer to achieve it. Others prefer a matte or satin finish, preferring low luster sheen rather than a highly reflective shine.

One product that may deserve examination is water-base clear acrylic varnish, available from many craft and art supply stores. Ordinarily used as a protective sealant for paintings or decoupage projects, the varnish is available in gloss, satin or matte form. Although initially water soluble, it is

model with a wide, soft brush. Although the tissue initially sagged, it soon returned to taut condition without causing excessive shrinking. After several months, the tissue has held up well, even though subjected to some rather damp flying situations. The product's major advantage though, is that it is odor-free and nonallergenic. As Glenna put it, it is great for "people who get tired of having to do everything in the famous well-ventilated area." Amen to that!

NEW PLANS SERVICE

A series of model construction plans are being marketed by Dave Haught, who specializes in researching older aircraft, and says: "Then comes the fun of discovering something like the Curtiss Tanager and bringing the extinct bird to life in tissue and balsa; then setting it to flight."

Among Dave's offerings are plans for

St. Louis, Demoiselle, Cessna Cardinal or Lockheed Vega? A stamped, pre-addressed return envelope will bring you the complete list from: Haught Graphics, Route 1, Box 978, Munising, MI 49862.

LOW-COST ELECTRICS

Paul and Paula Clark, of WATTS-UP, have a limited number of small electric motors suitable for free flight models, complete with instruction sheets that discuss batteries, charging and operation. These units are only \$5 each, or three for \$10, postpaid from P&P Clark, 120 Laura Road, Hamden, CT 06514. Please tell 'em *Model Builder* sent you!

BOB HALL

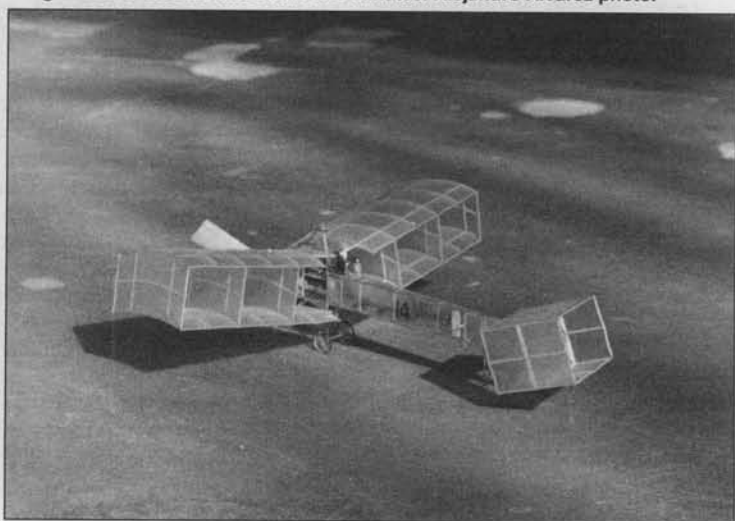
Well-known designer Bob Hall passed away at age 85, according to newspaper reports sent in by S.B. Pell and Ed Whitten.

continued on page 108

Charming Pistachio Scale 1911 Caudron Type N, by Wijnand de Jooe, of Holland. Photo via Albert Jansen.



Santos-Dumont 14-bis canard by Marcos Molo, of Argentina, weighs only 2.5 grams and flies for more than two minutes. Alejandro Alvarez photo.



INDOOR

BY KEN JOHNSON

IS EASY B EASY?

I suppose most of us indoor builders have built at least one Easy B model before. Remember when they had to be covered with condenser paper? How successful was your first one? Mine was less than a first place winner, to say the least. Many first Easy Bs are somewhat heavy and so don't fly for more than three or four minutes. If the local competition is pretty good you may be spurred on to build a better, lighter B to prove that you can hang in there with the best of them.

Eventually other priorities take you on to other types of indoor models, be it Peanut, hand launch glider, Bostonian, or whatever. This is how it was with your indoor editor. Eventually, I tried another Easy B. This time it was built much lighter (too light in fact) so the stick bowed badly. Then off in a different direction I went again. To Peanut, then ornithopters and various other projects.

Recently, I met Wally Miller of Woodland Hills, California, and renewed my interest in Easy B. Wally, as it turns out, was the modeler who conceived this event, many years ago, when with the Wilmington Club in Los Angeles. He, Bob DeShields and Mike Thompson are flying Bs every session at our Burbank, California site. It became apparent that their models were far superior in craftsmanship and flight times to anything I had seen recently. The more I checked out their models, the more impressed I was.

These planes are now covered with Micro-Lite type plastic film. The wood is very carefully selected and even the propellers are super light and well thought-out. The .007 indoor balsa is angle grained and baked to the correct high pitch. Props of different shapes, diameters and weights are tried and the rubber turns counted after each flight as well as the flight times. A written log is kept on each flight with each prop and rubber motor change noted.

These pros usually fly nothing but Easy B during each session. Wally even uses a

temperature/humidity meter to check conditions. He relates that to be competitive, a good Easy B should weigh under .030. His models are coming in at about .023 (without the rubber motor).

Well, I again tried Easy B and this time paid closer attention to what the other guys

Closer examination revealed that the model plan was somewhat out of scale. The stabilizer was the wrong shape and size. Before building the Peanut, the stab was redrawn to more closely resemble the one on the real machine. Some of the wood in the kit was used, but I substituted sliced wing ribs for the kit ribs. The wheels were made from blue foam and the covering used was condenser paper. My model weighs about 4 grams, without motor. The kit is a starting point to modify and refine for a good indoor Peanut. My Farman flies for about one minute.

CYLINDERS

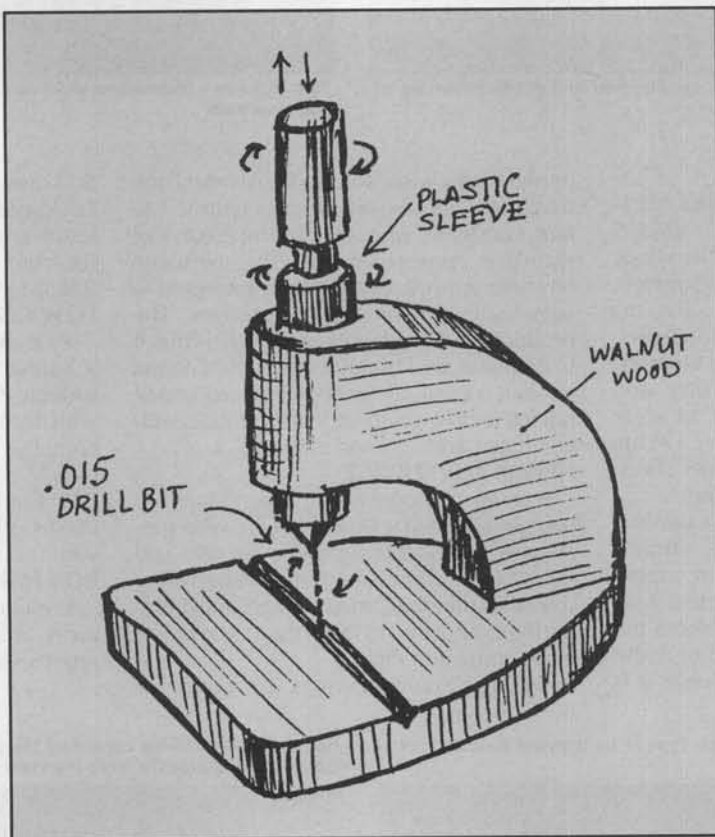
During construction of the abovementioned model, I found myself needing three engine cylinders. Usually, Peanuts require a little weight in the nose, so I decided to turn the cylinders from solid balsa. This was accomplished by chucking a two-inch long piece of rather hard 1/4 sq. balsa in my Dremel tool. The balsa was spun to a round shape by holding medium sandpaper against it. Then a thin Zona saw was used to cut in the fins. The saw blade was held (teeth up) in one hand, while the spinning round balsa was lightly pressed against the blade. The fins were cut in one at a time, until the balsa resembled an engine cylinder.

The three cylinder heads were then mounted in position on the engine block. Looking back, basswood would have worked better. The fins would look cleaner in shape and the extra weight would have been a benefit.

SHEET WING ANTIQUES

How about an all-sheet Old Timer scale profile gas and rubber event? Bob DeShields of Thousand Oaks, California, came up with this event for pre-1950 designs. More than a few modelers on the West Coast are building these cuties. So far I've seen sheet profile replicas of the Zipper, the 1940 Arrow, etc. Here are the rules:

- 1) Wing span thirteen inches maximum projected.
- 2) Fuselage within one inch of scale size.



are flying. At the last session Wally gave me several motor stick blanks (from Indoor Model Supply) to try on my next attempt. Maybe eventually my times will come up closer to his. One thought came to me recently. What's so "easy" about Easy B? (Expert class, that is).

MICRO-X FARMAN PEANUT

Gerry at Micro-X sent me a kit for his new Farman Peanut. Just happened to have one of Bill Hannan's scale booklets around which featured this Farman. As it turns out, the plane it most resembles is the 1924 Avionette Farman. The reference book is *Scrapbook of Scale, 3-Views, Volume 1*, by Hannan.

One inch can either be added to nose or length of fuselage.

3) Commercial plastic props only. Can be sanded.

4) All surfaces have to be solid sheet with solid motor stick and profile sheet fuselage.

Many Old Timer plans can be found in previous issues of *Model Builder* magazine. Just Xerox the plans to 13-inch span and build with sheet wood. Four grams is a good weight to shoot for. Build these Peanut antiques with 1/64-inch sheet balsa if you can find it. Shops stocking indoor wood should have this size. If unsuccessful, write to Micro-X, P.O. Box 1063, Lorain, OH 44055, or Indoor Model Supply, Box 5311, Salem, OR 97304.

RUBBER STRIPPER

Have you seen the neat rubber stripper being built and sold by Robert Oppegard of 140 E. Golden Lake Lane, Circle Pines, Minnesota 55014? It sells for \$80, and appears to be well built. All the parts are on the outside. Plenty of room to handle it without getting your hands near the shearing wheels. If you have tried to cut rubber down to the desired size without a wheel stripper, then you have a treat coming when you try this one.

MODEL BALANCER

At the I.M.S. hobby show in Pasadena, California, your editor came across a gizmo for balancing your plane. It's called the "Balance Bug." It's constructed of plastic pipe and will tilt to any axis for dihedral angle. The uprights will also tilt to any configuration needed, with Allen set screws on both left and right rails to secure the position chosen. Assembles in minutes. Write to Model Aviation Products, P.O. Box 26017, San Bernardino, CA 92406; telephone (714) 883-3586.

PROP SHAFT HOLE DRILLER

The abovementioned Wally Miller made me one of the handiest tools ever. It's a (hand twist) drill press for drilling holes in prop spars. It has a horizontal surface with a "V" notch cut into it. The prop spar is placed in the slot at the proper position. Then the vertical twist handle is rotated above the spar. A .015 drill bit is locked into the twist shaft. By twisting and pushing down gently with the drill bit, a correctly aligned hole will be drilled into the prop spar. After this operation, simply run the prop shaft wire through the hole, make a right angle bend in the wire and cement it to the prop spar. I have used it half a dozen times, with great success.

In signing off, I would like to mention that I just got off ten days of jury duty. If you've done this chore, you know how boring it can be. Each day I took my copy of *Winning Indoor Designs of 1987 to 1989* with me and read it cover to cover. Just studying these great designs each day made my task of jury duty a lot easier to bear. Have you gotten your copy yet? If not, write to: Fred Terzian, 4858 Moorpark Avenue, San Jose, CA 95129.

Send photos and questions to Ken Johnson, 16728 Bermuda Street, Granada Hills, CA 91344.

MB



The "Father of Easy B," Wally Miller, with one of his Super light "B's" in Los Angeles.



Bob DeShields arches to launch his hand-launch glider at the Navy/Marine Corps Armory in Los Angeles. Warren Williams photo.



Airline pilot Paul Avery with his Huntington H-12 built from Mooney Plans.



Earl Hoffman with his F1D Micro Film model. It was your "Indoor" columnist's pleasure to spend some time with Earl at Taft indoor meets. This gentle gentleman is indeed a credit to indoor modeling.



Illustrator Otto Kuhni, of Los Angeles, California, launches his Thomas Morse MB-7. This 13-inch beauty flies in large circles and is a real joy to observe in the air. His museum quality models would be very hard to beat in competition. Warren Williams photo.

'MEDUSA'

BY JOE BESHAR

Fly on Compressed Air Power!

When I learned there was a compressed air engine for models manufactured in Italy, and available in England, I wrote Ken Hinton, my good friend from across the pond in Bury St. Edmonds, England, and asked if he knew of it, as I was interested in obtaining one. Lo and behold, Ken came to the USA to attend the SAM Champs at Westover Field, Massachusetts, in July ('90) and, with him, he brought me one of the engines. It's the MM3, manufactured by Z Model, Via Solferino, 31020 Frescada, Treviso, Italy.

When Ken handed it to me, I was very impressed from the start, as it comes packaged in a clear enclosure, complete with hand pump (bicycle type), tank, connecting lines, and engine... all in plastic construction. The plastic tank is smaller than a liter-sized container, the type used for packaging soda products. The label read "Maximum Pressure 7 Bars (99.6 psi)"... hard to believe, but true. Supplied is a molded, red plastic prop with spinner, resembling a P-30 rubber-powered prop.

The engine cylinder is clear plastic and thus transparent. You can see the connecting rod, which is not connected to the piston, but free floating with a ball joint at the end of the rod, which rides freely in the piston cavity without a rod. I couldn't wait to run it

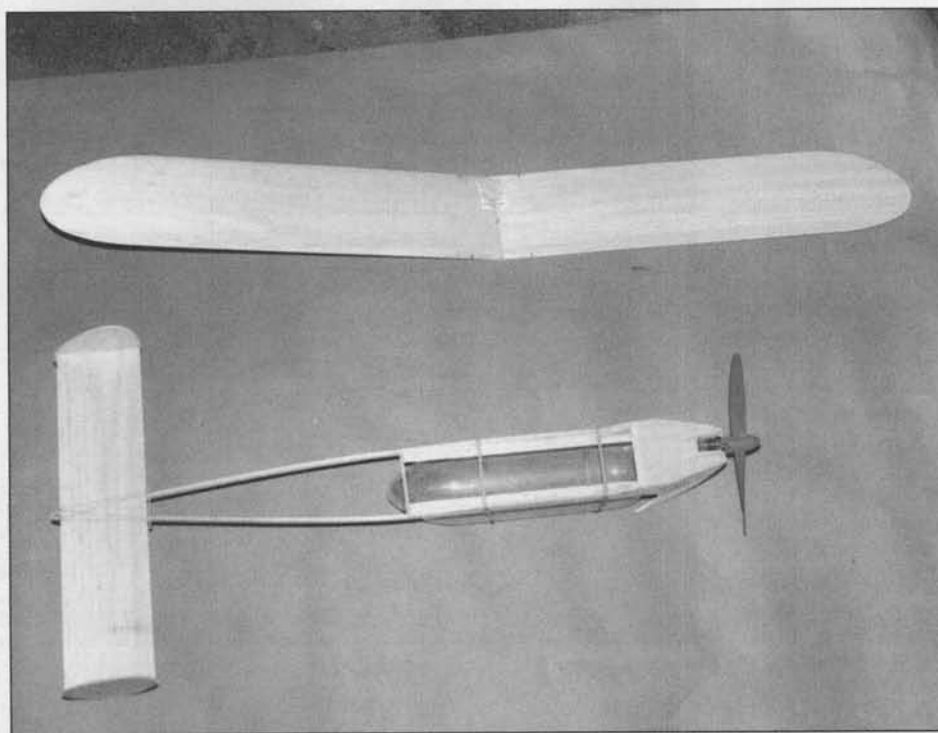
Using the hand pump in accordance with the instructions, I stroked the pump handle 50 times. It was great; one flip and it ran about 2 to 2-1/2 minutes. At this point, I decided that the hand pump was not for me, as I wanted to know just what pressure there

would be in the tank for purposes of control and safety. The tank does have a safety pressure relief valve, which is designed to limit the maximum pressure of the tank. I felt that a pressure gauge should be employed, rather than depending on the relieving pressure of the valve; besides, as lazy as I am, my arm got tired with the hand pump.

I went to the local outlet store and purchased a 12-volt auto-type air compressor; this comes complete with a wire extension and plug for insertion into a car cigarette lighter receptacle. The pump comes with a pressure gauge and can generate up to 220 psi of pressure; this

was ideal for my purpose. The cost was a mere \$20. Being a senior citizen (not retired), I got 10% discount, with a final cost of \$18.

As the pump air supply outlet is designed



The Medusa wing, fuselage and tail, with the compressed air motor installed... held in by rubber bands.

when I found that the entire flight gear, plastic, tank, engine, connecting fittings and propeller weighed a mere 49 grams (1.72 oz.).

I immediately put it through a trial test run.

for insertion and clamping on an automobile tire tube valve, I picked up a scrap tire valve from a local gas station, cut off the rubber portion and adapted it to the plastic tube extension which came with the hand pump. This made it compatible for charging by insertion into the charging plug supplied with the tank. It worked great, as I was able to pump the MM3 tank to any pressure I wanted, up to its maximum of 99.6 psi, simply by depressing a button and reading the pressure reading on the gauge.

At this point, I was so encouraged I went ahead to design and build the "Medusa," a very simple and basic model constructed entirely of balsa wood. Initially, I left the fuselage crutch open. For the first flight, I pumped the tank up to 40 psi. I launched it, and it just about stayed airborne and found its way to the ground, with a gentle soaring attitude, to a fine landing.

For the second flight, I proceeded to pump up the tank pressure to 70 psi. I launched it, and it flew beautifully in a left hand circle, about 100 feet in diameter, ascending up to 250 feet, docile and in perfect stability. It was a beautiful sight. While in flight, it suddenly occurred to me that I didn't have a de-thermalizer. Hysterically, I screamed at it to come down... it must be disciplined, as it acknowledged in a continued gentle soar to ascend and land right in the middle of the football field from which I had flown it. I

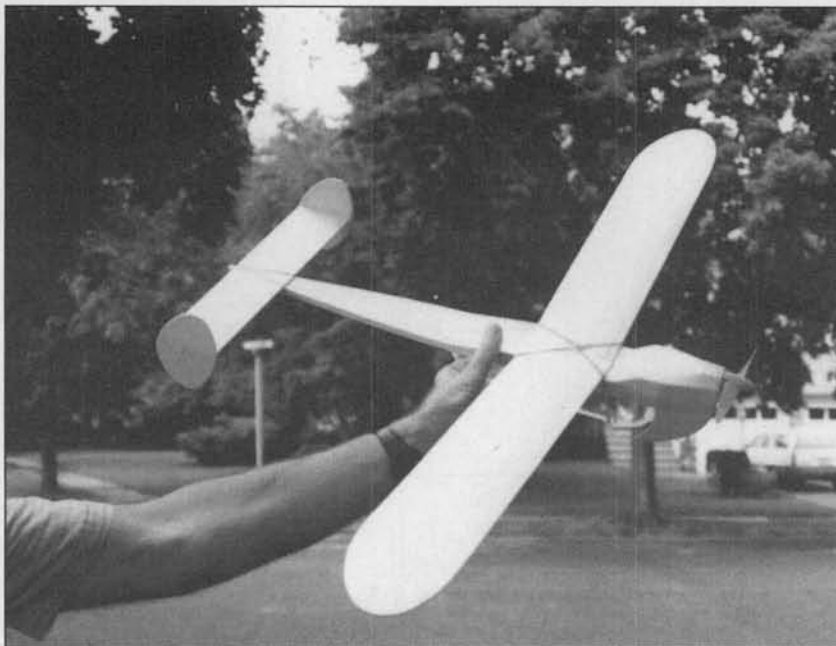
think the people in the area must have thought (?) I was crazy when I was talking to the plane to have it come down!

The compressed air approach is great, it is clean, without temperature concern or liquid state to worry about as with CO₂, and

a simple crutch design using 1/8 x 3/8-inch strip stock and planked at the front section with 1/16-inch balsa sheet contoured as shown on the plans. The motor is simply mounted by gluing the mounting members as shown on the plans with CA to the flat of the fuselage front top section.

The wing with three ribs is contoured as shown from 3/32-inch sheet stock with a dihedral of 2-1/2 inches at each tip. The tail and wing are held on with elastic bands over the pegs as shown. You will note, in the wing there is a peg at the center; this peg serves not only to hold the wing in position with #32 rubber bands, but also the tank nested in the crutch construction of the fuselage. Rudders at the rear provide stability when "Medusa" is landing and serves to keep it level when setting it on the ground.

Some of the vital statistics of the engine are as follows:



As an option, the Medusa fuselage can be covered, as here, with Litespan covering.

Constructed entirely of plastic.

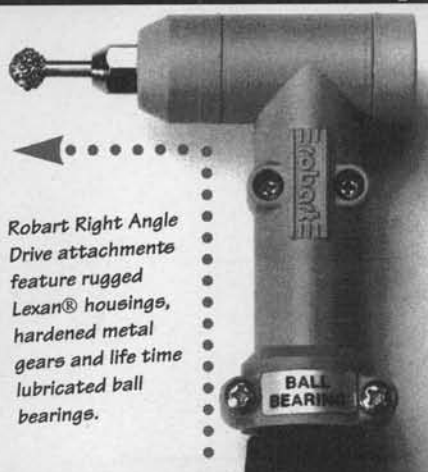
Displacement	.04 cu. in.
Bore	.39"
Stroke	.31"
Maximum RPM	15,000
Tank Capacity	46.5 cu.in.
Length	11"
Diameter	2.68"
Max. Pressure	99.6 psi

I trust you will find "Medusa" interesting enough to build it, and enjoy flying it like I did, with compressed air power. **MB**

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turer, MTE Industries, P.O. Box 1396, Goleta, CA 93116, or give them a call at (805) 650-0396.

A NEW DIMENSION IN ARFS

One company which can always be counted on to come up with the most unprecedented advances in the field of radio controlled aircraft is Thorpe Engineering Corporation, headed up by my old friend, Doug Thorpe. Doug is an engineer by profession, but these days devotes all of his time to running his company, which offers a line of ARFs second to none in quality. These vary from .40 size monoplanes and biplanes to a state-of-the-art fun fly airplane, to a monster sized RPV complete with ground to air control via a sophisticated television system.

Doug's most recent offering is something brand new in the field of ARFs, the very first Almost Ready to Fly ducted fan combination trainer and sport plane. Dubbed the "Jet Hawk," the model has a low wing with a conventional horizontal stabilizer and twin rudders. For easy ground handling it is fitted with a tricycle gear, and the ducted fan unit, less engine, comes with the kit. The intended powerplant is the K&B 7.5cc rear exhaust engine, and anyone with any sport flying experience should find the Jet Hawk easy to assemble and fly. It would seem logical that anyone planning to build a conventional scale ducted fan model would greatly benefit from getting some initial experience on a Jet Hawk. If your dealer doesn't have them in stock yet, write to Thorpe Engineering Corp. and they'll tell you how to get one. Their address is: 1715 E. Fairfield, Mesa, AZ 85203, or if you're in a hurry, phone them at (602) 969-6168.

READERS WRITE

Received a letter and some interesting photos from good old Ron Parker of Houston, Texas. Ron is my official RC reporter for the Houston area, and I just love his letters, as he usually agrees with my views. He writes:

"It was nice to talk with you yesterday on the phone. In all my ramblings I forgot to comment on a couple of items that you mentioned in the March '91 MB.

"Your talks with AMA about ARF reporting is a good idea. I know several folks who have never built or plan to build a kit plane, yet these same people are excellent fliers and an asset to the flying community. AMA needs to address all aspects of the hobby and I hope they listen to you!

"An incentive award/gift system for AMA sign-ups would be nice. I'm like you, I can't count how many people we have signed up because of talking to them about getting started in the hobby. Folks will show up at the field because they are interested in getting into the sport and eventually the conversation will turn to AMA membership. We explain to them that membership in AMA is mandatory at our field and at about any other field where they choose to fly. I keep copies of the AMA applications with me.

Wouldn't it be nice to have a box on the form that reads: 'Signed up by AMA member _____.' AMA could feed that into their computers and have a record of who got their new members for them. I think I signed up (or told the people they had to sign up) more than 20 new AMA members last year! We'll see what happens. Regards, Ron Parker."

Ron was referring to the idea I put forth to the AMA that they consider adopting the policy of the National Rifle Association. The NRA awards small prizes to members for recruiting new members, in the form of hats, tee shirts, belt buckles, etc. I keep getting all kinds of promises that the matter will be considered for possible implementation by the AMA, but no concrete action has yet been taken.

A CLOSE CALL

A few weeks ago, I was putting a new ARF through its paces, and just happened to have it about a hundred feet up, performing a shallow dive. With absolutely no warning, there was a loud humming sound, followed by a thunderous "CRACK!" and to my dismay, I saw that both sides of the horizontal stabilizer had broken and were flapping in the wind. Being no stranger to such catastrophes, I knew exactly what to do. I did the only thing possible; throttled back, and hoped that the crash damage wouldn't be too severe.

Imagine my surprise when the airplane leveled out and assumed a normal glide. I moved the elevator stick a bit, and found out that the plane was responding, albeit ever so slowly. I fed in a little throttle, circled into a stable approach, and made a gentle and uneventful landing.

My analysis of the mishap indicated that the broken stab was due to flutter. The flutter was the result of an extra long fiberglass pushrod which had a little slop built into the system. I wasn't prepared for flutter, as this was a slow moving sport plane, so I wasn't overly concerned about the slop in the system. I am now a believer in absolutely no slop, and after repairing the stab, I installed a cable control system. This is a very tight control system with no play or slop whatsoever. Besides, with a little practice, you can install a complete cable control system to your vertical and horizontal stabs in only a half hour or so. Therefore, I have made it my business to thoroughly research cable control installations, and in a future column I will outline in detail the best ways to equip your models with such systems, be they ARFs or hand-built airplanes.

Meanwhile, I'm completing the evaluation of a number of exciting new ARFs, and can promise that our faithful readers have a great deal of interesting reading coming up in future issues of MB. Meanwhile, keep sending your questions and comments to me at 2267 Alta Vista Drive, Vista, CA 92084, and don't forget an SASE if you want a reply. I answer all letters as promptly as possible. You can phone me anytime at (619) 726-6636, or send me a FAX at (619) 726-6907.

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PYLON

BY WAYNE YEAGER

LET'S RACE WARBIRDS!

There's a bunch in St Louis, Missouri, who call themselves, "The Spirits of St. Louis," and they have a different racing concept worth talking about. They have an organization called SWRA, "Scale Warbird Racing Association," and they scale judge per AMA rules earning points, and then they race for additional points, ala Reno full-size.

The Warbirds' description of the event is: "The mini-Reno event is a race of sport scale models of piston engined military and unlimited racing aircraft. It is intended to capture the excitement and character of the unlimited racers held in locations like Reno, Nevada. An event such as this is enjoyable to both spectators and contestants."

I like the idea and have been involved in conversation with some people in the past who have talked about starting this type of racing, and it turns out there's a bunch of guys already into it with established rules.

To give you a better idea of what is involved, here are the official rules for a race scheduled for September 14-15, of this year.

General:

The intent of Warbirds Unlimited is to have a contest featuring military aircraft either in Military Colors or Reno Racers with airframe and power plant modifications.

The model must be any WW II military propeller-driven aircraft that was flown between the years 1939-1946, either in military or postwar configurations.

The contest will be divided into two phases: Static Scale Judging and Racing Competition. Each phase will be awarded points separately with the overall results determined by the total points received from both events.

All competing aircraft must complete one racing heat to be eligible for any points.

Entry fees will be refunded only in case of contest cancellation.

Engine requirements:

Minimum engine displacement (cumulative if multi-engine air-

craft) is .25 cubic inches. Maximum engine displacement (cumulative if multi-engine aircraft) is 1.26 cubic inches for two-stroke and 2.51 cubic inches for four-stroke engines. No superchargers allowed (not to be confused with tuned pipes).

A standard kit that was produced in a quantity of at least 500 and made available through normal retail sources, is allowed. The maximum engine displacement printed on the kit literature may be used. No modifications to the kit planform, as shown on the kit drawings, is allowed, except to enhance

scale presentation; for example, moving a tail wheel from the rudder to the scale position.

Proof of engine displacement and construction is the responsibility of the contestant.

A 10% minimum wing thickness will be measured at the center of the wing or at the first station adjacent to the center section which is clear of all bumps, bulges and fillets. The wing thickness can be no thinner at any cross section than that produced by a uniform taper from the measured 10% point to the tip. (NO UNDERCUTS).

Wing area measurement will be on a projected line basis. Span will be measured from the aircraft center line to the wing tip and multiplied by two.

Rules:

1. Static judging will be in accordance with the AMA Sport Scale rules except where modified to meet the requirements of this contest.

2. Racing procedures will be as outlined in the Formula I section of the AMA rule book except where modified for this contest.

3. Ten laps are required to complete heat. Failure to complete ten laps will result in a zero for that heat.

4. If a pylon is cut, fly an extra lap. Two pylon cuts will result in disqualification for that heat. Flying over pit or spectator areas will automatically disqualify the contestant for that heat. This and other safety rules will be strictly enforced.

5. No idle check will be made for a specific rpm, however, aircraft must not roll on grass at idle for a ten second period. This check may be made before any heat, immediately following the engine start. Brakes are not allowed for this event.

6. A maximum of one and one-half minutes will be allowed for starting and adjusting engine(s). Any contestant not ready to release the aircraft at the end of one and one-half minutes will be eliminated from that heat.

Wing Area/Displacement Requirement: The following wing area to displacement standards must be met for scratch-built aircraft.

Max Eng. Displace. (Two-stroke)	Min. wing Area (sq. inches)	Max Eng. Displace. (Four-stroke)
1.26	950	2.51
1.13	880	2.31
.91	775	1.81
.82	725	1.63
.76	680	1.51
.66	620	1.31
.62	595	1.22
.57	550	1.12
.51	505	1.01
.46	465	.91
.41	430	.81
.39	420	.77
.36	400	.71
.26	350	.51

7. A racehorse start will be used. Restarts are not allowed after the drop of the starting flag.

8. Contestants will supply their own fuel. There are no restrictions other than those covered by AMA rules.

9. The builder of the model rule will not apply, however, a signed declaration by the contestant will be provided as described in AMA event #511, Paragraph 4.6. Team efforts are encouraged, however, a team must be identified with only one aircraft at the time of registration. All team members must have current AMA licenses. Pilots may not fly more than one aircraft.

10. No back-up aircraft will be allowed.

11. All tuned pipes are allowed, however, none of the tuned pipe or exhaust header system including the exhaust gas outlet, may be exposed beyond the outer mold line of the aircraft. No 1/4-wave stacks are allowed. Failure to comply with this rule will result in loss of all Accuracy-Of-Outline static scale points.

12. Mufflers and/or tuned pipes are required on all two-cycle engines. "Magic Mufflers" and "Irvine Silencers" are considered mufflers. Exposed mufflers will not result in scale downgrading.

13. The Contest Director or designate may prevent any aircraft from participating in the racing event because of poor workmanship that may compromise safety. If rework or repair is performed on any aircraft during the contest, the model must be reinspected by the technical committee prior to flying the next heat.

14. The following alterations to the model are allowed after scale judging. Replacement of the propeller with one of any size. Replacement of the spinner with one of equal diameter (if no spinner was present during static judging, an AMA safety nut must be used for the racing event). All external ordinance such as bombs, rockets, drop tanks, and other attachments may be removed for racing. Sharp projection from the wing or fuselage, such as pitot tubes, guns, and antennas, will be removed before flight as a safety consideration.

15. If there are frequency conflicts in the racing events, aircraft will fly against the clock.

16. AMA numbers are required on the inside of the aircraft.

17. The aircraft must complete all laps with the components it took off with.

18. Any aircraft that makes contact after the start of the race must land immediately for inspection. Aircraft deemed airworthy may be allowed to re-fly that heat for the reaining positions.

"19. Only wooden fixed pitch propellers shall be permitted."

These, other than the scoring format, are the rules for the aforementioned race and if interested, contact Tom Karez at 14327 Whitebirch Valley Lane, Chesterfield, MO 63017.

Next month, race planes at the Weak Signals Toledo R/C Exposition. **MB**

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MODEL DESIGN *Cont. from page 17*

estimate it is at about 40% of the way out on each side. For a wing of moderate taper, there is less area toward the tips and less lift out there, so let's say the center of lift spanwise on each panel for a tapered wing is at 30 to 35% of the semispan, depending upon the amount of taper. These numbers need not be precise, because the whole effort is an approximation. We don't know exactly how strong a wing we need, so we don't need an exact test answer either.

Assume you want a six-g test of the rectangular wing for your eight-pound model. With your hands on the spar about four-tenths of the way out on each side, gently push down harder and harder on the bottom of the inverted wing until the scale under its center reads 48 pounds.

If it doesn't break, you have at least a six-g wing. With a little experience and confidence you can apply some judgment here. If you get to four gs and the wing hasn't broken but is bending badly or is beginning to make disturbing snapping sounds, you may decide to stop the test and fly your 4g wing with restrictions on sharp turns and aerobatics.

On the other hand, if the wing acts very solid during the test, and hasn't complained a bit at a 6g load, you may decide to push it on up to a 7 or 8g load. Knowing you have a stronger wing will give you more confidence to fly it hard. If your test has shown that the wing is much stronger than you really need, you have the knowledge that you can build lighter on your next model.

ANDY BAUER'S WINDMILL SAILING CAR

The photograph shows son Ken sitting in Dr. Andy Bauer's experimental test car in which he sailed faster than the wind downwind and also sailed dead into the wind. The second photo is Andy's model windmill sailing cart, with a 30-inch diameter prop, which has also accomplished these miracles. It is sitting on a powered treadmill for test purposes. The sketch is an attempt of mine at configuring a racing windmill sailing cart for moderate winds. It would make a fun RC model.

If you are a very recent *Model Builder* reader, you can read up on the controversial windmill sailing car concept in this column in the following issues: July/August and December 1990, and February and May 1991.

I now have copies of four technical papers that Dr. Bauer presented to the American Institute of Aeronautics and Astronautics on windmill sailing cars and windmill sailboats. I also have Will Kuhnle's and Leonard Duke's analyses of the machine, and one by Dr. Paul MacCready of human-powered flight fame. I will send to those interested in these technical to highly-technical vector analyses and mathematical derivations, copies of everything, about fifty pages total, for \$10 to cover copying, postage, and handling.

If you have a technical background and an open mind, these papers will help you

see that it is not only theoretically possible but practical to sail faster than the wind dead downwind. If you are absolutely convinced that it is impossible to be driven downwind by the wind faster than that driving wind, nothing may change your mind (except possibly watching a machine do it). "Don't bother me with facts, my mind is made up." Yes, I, and these other gentlemen, believe in the conservation of energy and do not believe in perpetual motion. Surprisingly, sailing downwind faster than the wind with a windmill sailing cart does not violate any laws of physics.

TECHNICAL STUFF BY OTHERS

Largely as a result of exploring the subject of Reynolds Number, first in the May 1990 issue, a number of readers have been sending me some very good technical articles on modeling, written both by themselves and others. Because I thought some of these would be of interest, I have offered to mail you copies, in recent months, for the cost of copying, handling, and postage. The response has been surprisingly heavy, so much so that it is taking too much of my time and I'm going to back out of the "business." Exception: I just offered to mail you copies of theoretical analyses of windmill sailing. That still goes. I will continue to comment on other good technical material in this column, and I will try to tell you where you can get copies from the original sources. You don't need me as a middleman.

As the first item under this new policy, I call to your attention a thirteen-page technical paper, "Performance Analysis of Hand-launched Gliders," by Lou Young. This was published by the National Free Flight Symposium in 1974. Ted Off, of Oxnard California, sent me a copy of this one recently, and a number of other good modeltech articles earlier, most of which I previously offered.

Lou Young's article is quite technical, combining theoretical equations with empirical data on the optimum design of gliders and optimum throwing techniques for maximum duration. Most impressive and enlightening.

You should be able to get a copy of it from the NFFS. Jim Boccinfuso and Ed Lamb advise me that the National Free Flight Symposium publication is an excellent and highly technical series of papers each year. For these, write to Fred Terzian, NFFS Publications, 4858 Moorpark Ave., San Jose, CA 95129.

Membership in the National Free Flight Society (\$15 per year) includes a subscription to the *NFFS Digest*, which includes more good technical stuff and designs. Write to NFFS Membership, 12324 Percival Street, Chester VA 23831.

PARTING WORDS

I celebrated the 32nd anniversary of my 39th birthday recently. My wife was going to include chicken noodle soup in my birthday dinner, but our darn chickens wouldn't lay any noodles.

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

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Review:

A Close Look at RCD's Apollo 20 Servo

BY STU RICHMOND



PHOTO # 1.



PHOTO # 2.

As the Central Florida RC Think Tank has studied new-on-the-market RC equipment, we've found lots of great, good, fair, and poor RC equipment. Our basis of measurement is what we call "uplink performance." We measure uplink performance as that which begins with a human movement on the transmitter's control stick and ends with the rotation of a servo wheel while your model is in flight.

If a servo output wheel follows your control stick movement, within arbitrary limits, it is possible to have numerically what we measure to be 100% uplink performance. As we measure the uplink performance of all popular brands many interesting things come to light. If our article does not quote specific figures you can bet that particular manufacturer/importer is actively working to improve uplink performance.

Model builders have much interest in small/tiny/minature servos. We've studied lots of them. Some have quit in flight. We've had two different brands fail during our hundred cycle bench testing! Some small servos have such poor uplink performance they're simply not suitable for flying in a model airplane. Virtually all variation in uplink performance has been directly traceable to servo performance alone. We've

written about two outstanding smaller servos, and this column covers the new small Apollo 20 servos sold by RCD in their Electro-Glide Pack.

A further explanation of uplink performance is in order. We fasten a three-foot long pointer to each servo being tested. The mass of the pointer simulates moderate inflight servo load. We put a ruler at the tip of the pointer. Then we cycle each servo from the transmitter and record how the tip of the pointer returns to center for each of one hundred cycles. It's a long, tedious procedure. We convert the data to fractions of a degree of rotation of each servo's output wheel. This reporting then presents factual numeric data to help guide you in spending your hobby dollars. We refuse to come up with comments like, "We like this one a lot," or "It isn't the best, but the price is sure right!" We simply omit the human judgement as non-factual.

Current RC uplink data indicates:

Less than 50% of the returns within 1/2

degree and less than 75% within 1/2 degree of servo wheel rotation is **poor**.

- 50% within 1/4 degree and 75% within 1/2 degree is **good**.

- 75% within 1/4 degree and 90% within 1/2 degree is **very good**.

- 90% within 1/4 degree and 100% within 1/2 degree is **excellent**.

We're finding very little correlation between uplink performance and hobby dollars spent. This is darned disturbing! It's possible to spend hobby dollars on servos with coreless motors and single or dual ball bearings and find **less reliability and poorer servo performance!**

Due to ganging of tolerances, it's real tough for the RC manufacturers to manufacture small/tiny/micro servos that have good performance. It's easier to make "standard" size servos. As an example, the best performing Futaba servo we've yet found is the standard FPS-148 (commonly costs under \$20 each). More money doesn't seem to buy anything better in performance at this time.

We ordered an RCD Servo Pack that comes with three Apollo 20 servos (RCD's Electro-Glide Pack) in our continuing search for small/tiny/micro sized servos, and *what a surprise we got!*

If you mount three Apollo 20s side-by-side, they occupy 1-5/8 inches of width, weigh under three ounces total, and the measured uplink performance (listed below) exceeded that of the larger Futaba FPS-148s by about 5%! This is totally terrific performance for small size servos.

1st col: % Return Within 1/4 Degree

2nd col: % Return Within 1/2 Degree

• Apollo 20 on throttle	54%	87%
• Apollo 20 on rudder	52%	79%
• Apollo 20 on elevator	63%	96%
• Apollo 20 on ailerons	50%	84%

These columns normally avoid direct comparisons, but the above figures far outdo our testing on the Futaba S9601 (\$135) mini servo that is slightly bigger/heavier and retails for \$79.95, and usually sells for at least \$50 each!

continued

PHOTO #3.

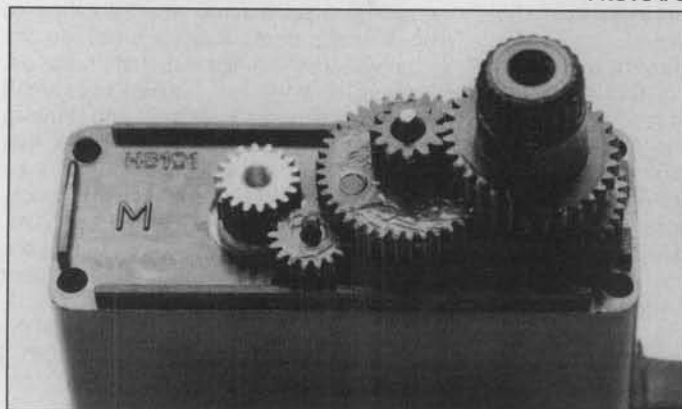


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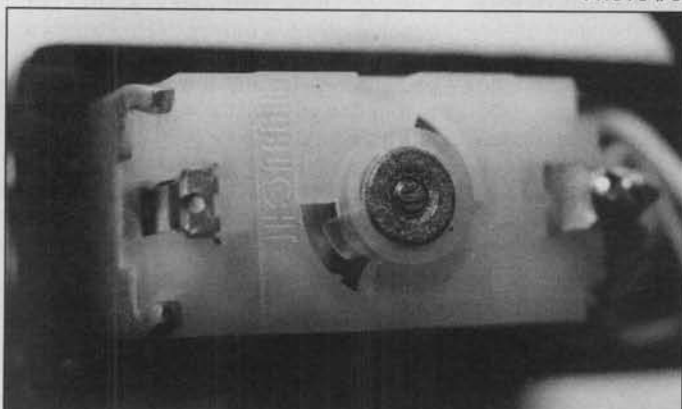


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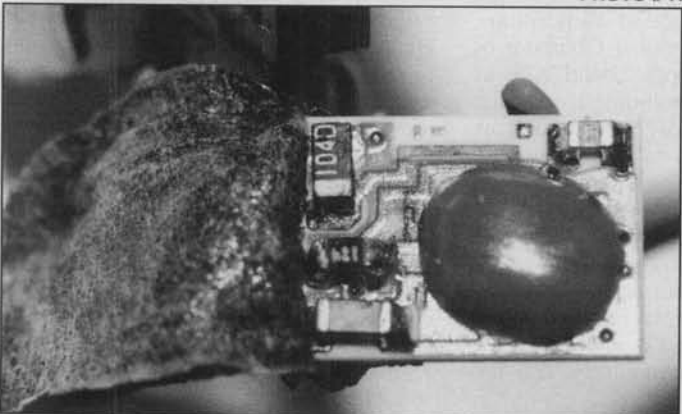


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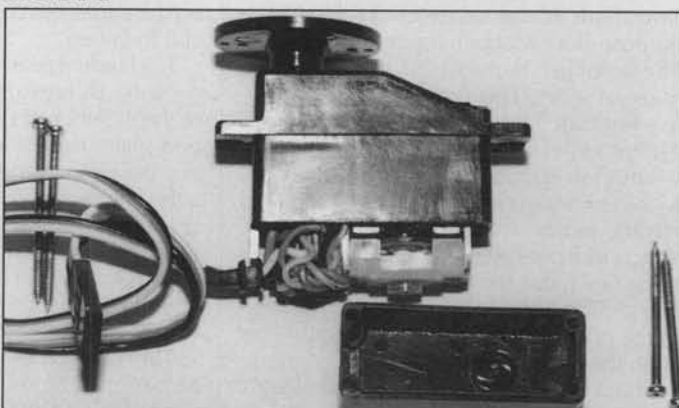


PHOTO #6.

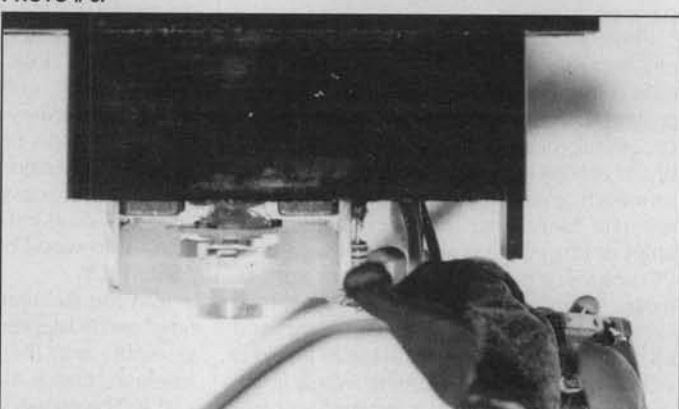


PHOTO #8.



The Apollo 20s are 1.20 inches high, .54 inch wide, 1.20 inches long and weigh .95 ounce each. They have about 3/4 the torque of most standard size servos and should be suitable for all but the biggest of RC gliders, most electric model use, and powered RC sport models using engines smaller than a .40.

Let's look inside an Apollo 20:

Photo #1: Each Apollo 20 comes with three outputs (one is an adjustable length rack) and mounting hardware.

Photo #2: Weight is under 28 grams (28 grams = 1 ounce).

Photo #3: Removing the case top shows a brass pinion gear pressed onto the motor's output shaft, plus five separately molded rotating parts, with a total of eight more sets of gear teeth. The first driven gear's shaft is offset (space-saving) and each set of teeth gets progressively thicker as the final output drive is reached.

Photo #4: The Apollo 20 is closed with two screws going down from the topside, and two screws going up from the bottom. Two-thirds of the cavity is occupied by a purpose-built Mabuchi open-frame motor. The amplifier is packaged just above the maze of wires. This is no place for inquisitive fingers!

Photo #5: This is the first time we've seen a special space-saving, purpose-built Mabuchi square-framed and open-cased electric motor. It's even stamped "PAT. P" which indicates Mabuchi really has something new, and they're trying to protect its design. The bottom end of the motor shaft is in the photo's center; the brass pinion gear is on the shaft's upper end.

Photo #6: This view shows the bottom of the two motor magnets and the partially uncovered amplifier.

Photo #7: Latest miniaturization technology is to manufacture the integrated circuit right on the circuit board and cover or protect it with a round brown blob of resin or ceramic material. These boards are probably machine-made in a step-and-repeat process that makes one big board, of probably 100 amplifiers, that are machine cut apart to form each of these .400x.525-inch PC boards. You can also see four surface mount technology components on the "blob" side; other side has two tiny capacitors and all wires junction there. The entire board is vibration-protected by being wrapped in thin, sticky (one side only) soft rubber sheeting.

Photo #8: Three Apollo 20s will fit inside two inches of fuselage width. They should be installed with their mounting screws on the same axis as the direction of flight, to minimize rocking action that can come with two-screw mounting.

Apollo 20 servos are made by HITEC in Korea; a servo pack of three 20s costs under \$76.00 from RCD, 9419 Abraham Way, Santee, CA 92071. You can call them at 1-800-NOW GORC, or 1-800-669-4672. Tell 'em *Model Builder* sent you.

Oh yes, each servo pack also comes with a free switch harness! **MB**

RYAN *Continued from page 45*

inch medium balsa and provide a channel for the gear wire; do not cement together yet. Cement the center laminations of the wheel pants together with one outside panel, tack the opposite side panel in place for shaping, it will be removed later, make a left and a right. After shaping, cut out the top as shown to accommodate the bottom end of the strut. Remove the inside lamination from one pant and, inserting the gear wire through the strut hole in the top, mark and route out its passage down the inside of the pant. Be careful, it gets a bit thin in places.

Now trial fit the strut over the gear wire and into the top of the pant. Once satisfied with the fit, cement the strut halves together and into the top of the wheel pant. You leave the inner pant side off until the wheel is installed. Center the wheel with proper spacers, assure there is no rubbing and then the inner panel is installed, acting as a wheel retainer, no collar required. Several coats of clear dope, filler and paint are recommended on the pants, the contours make them difficult to cover.

The landing gear may now be trial fitted to the wing. By measurement, find the location of the 1/8-inch plywood landing gear support plate inside the wing. Center the gear over it (wing inverted) mark and drill for the attachment clips (see drawing) and for the "I" bolts at the rear supports. Visually check your alignment for tracking and twist gear wire as required. The gear may be removed and put aside for final assembly.

COVERING

The prototype was covered in Super Monokote, chrome on the fuselage and silver on the remainder, this choice because it is a model of a real life STA that had a highly polished fuselage with the balance of the aircraft silver dope. The choice of covering material and colors are obviously the builder's. The basic prerequisite to a good cover job is lots of sand paper and a good cleaning to remove all dust and hidden specks prior to covering. Cut covering away from any joints to be cemented. This allows a wood-to-wood bond.

ASSEMBLY

Join the stabilizer and vertical fin, centered and 90 degrees to each other. Slide the assembly into the slots in the back of the fuselage, check alignment and cement in place. The elevators may now be installed, followed by the rudder. Trial fit the rudder to assure elevator clearance in all positions, correct if required. Install a Goldberg or similar tail wheel support, bend wire as shown and make an aluminum clip to attach to the bottom of the rudder. Servos may now be installed, along with the pushrods to the elevator and rudder. The aileron servo is mounted directly to the top surface of the wing and Du-Bro strip aileron linkage may be used. The prototype uses Golden Rod for the throttle linkage, again, your choice. The six-ounce fuel tank may be installed, a Sullivan slant flex type works well. With the inverted engine, do not mount the tank too

high. Tank outlets should be about level with the carburetor inlet. The engine mount and engine can be installed now and the throttle linkage and fuel and vent lines attached.

Now to final fit the cowl, C7 may have to be trimmed and C1 opened up. Unless you use a Pitts type muffler, the left side C8 will require cutting. This is not a structural problem, as the skin makes the cowl quite rigid. The cowl should seat against the front of B1A and a small screw into the side supports will hold it in place. You will find that a scale spinner for the STA is not available, any commercial unit will be too long but look good. Install the wing, and with the aircraft leveled and the stabilizer at 0 degrees, check the wing incidence, using the rear shims, set it at +1-1/2 degrees. Install the ailerons and linkage and with the servo at neutral, rig the ailerons flush with the bottom surface of the wing. The elevators should be rigged level and the rudder straight fore and aft. Switch and charge plug may be mounted as desired. The side struts may be pinned to the wing with a small screw attaching them to the fuselage sides. Rigging wires on the prototype are simulated with stretchy thread, through the wing and hooked over small hooks above the fuselage struts and in the aft end of the wheel pants. Exhaust stacks, fuel filler and gage and oil filler door may be added as the builder sees fit. The front cockpit may be covered; it was on many STAs. Or, left open so Myrna Loy won't be upset. Two windshields are required. The front cockpit was always covered on NC18902, the only disadvantage being that none of the airport kids ever helped wash or polish. I wonder why?

PREFLIGHT

Range check your radio, adjust control travels as follows: rudder, 1/2-inch right and left, elevators 1/2-inch up and down, ailerons 1/4-inch up and down and throttle as required to give full throttle and the desired idle plus cut-off. Recheck all controls for the proper amount of travel IN THE RIGHT DIRECTION! Adjust the engine for proper running at full throttle, a bit rich if it is new, and a good idle.. No need for an engine failure on the first flight.

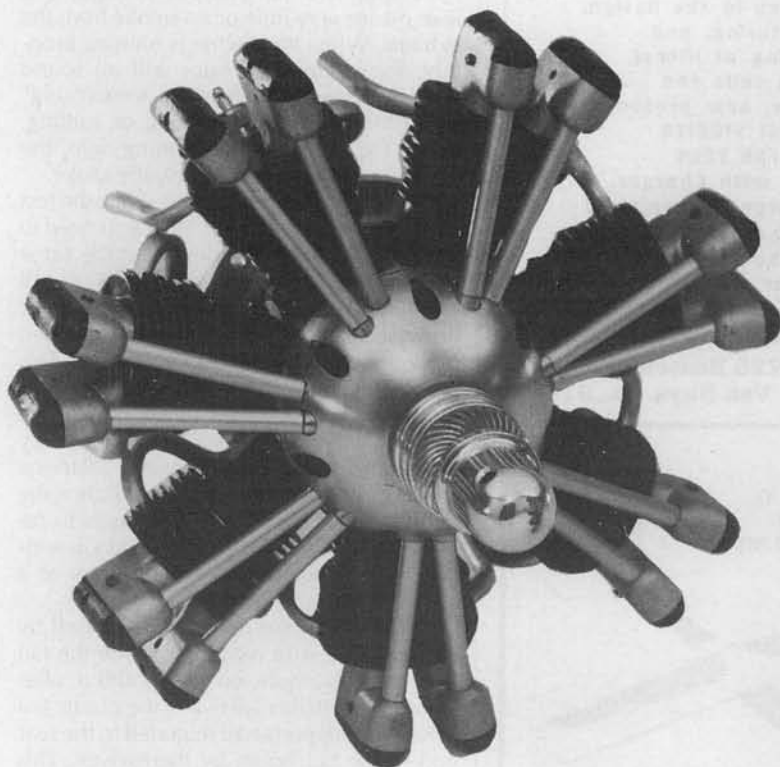
FLYING THE STA

Assure that the aircraft taxis well with no wheel bind and good directional control. On take off, add the throttle with a positive movement, the prototype tracks well, the tail comes up by itself and the lift off requires a nudge of up-elevator. Climb at a moderate angle, check aileron response and correct any trim problems. The STA is quite fast, has good response and slow flight will indicate reasonable stability. Approaches are made with reduced throttle, little trim change is required and the flare and landing are routine. The landing roll is quite docile for such a narrow landing gear. As you get used to your new aircraft you will find its aerobatic ability to be most pleasing, rolls are really on a point. Control throws may be changed to suit your taste. Have fun with your new/old Ryan! **MB**

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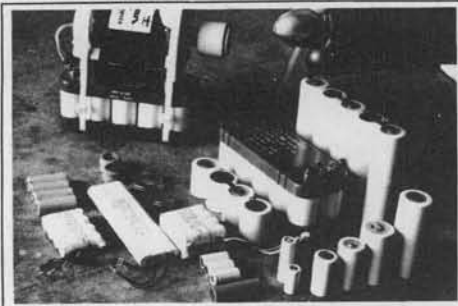
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CHATTER Continued from page 40

But never run the engine too lean as it will kill the engine (in more ways than one!) and the engine will quit abruptly in flight. Too lean means very little or no smoke from the exhaust. When the engine is running properly, the engine and rotor will all sound smooth, and you can hear the noises "sing" in harmony without burbling or rattling. When the engine is not running right, the canopy and landing skids usually shake.

If only the tail boom shakes, while the rest of the helicopter does not, then you need to check that both tail blades are at the same pitch angle. Move the tail rotor control until the blades are at zero degrees. Sometimes, because of some strange reason, the two blades might not be at the same pitch. This problem is similar to main blades being out of track. Also check to see that the tail blades are not mounted too tight or too loose. They should be snug. If you have a teetering balancer like the Kyosho, then balance the tail blades. The most precise way is to remove the entire tail rotor blade/hub assembly and balance it on the High Point as a unit.

Tail boom shake can also be caused by the tail drive wire whipping inside the tail boom. For example, on my Excalibur, after a few dozen flights, all five of the plastic tail drive wire supports had migrated to the rear end of the tail boom by themselves. This means the front of the wire became unsupported and was whipping inside the tail boom. Therefore, when putting the plastic tail drive supports inside the Excalibur, drop in some CA glue to secure the plastic disks. Also check to make sure the tail drive wire is in the center of the steel collar when tightening the set screws on most 60-size helicopters.

The main blades should not swing very freely, nor should they not be locked down. We want a snug, friction-tight fit. If the blades can swing freely they can lead to tail boom strike on hard landings, and cause the helicopter to oscillate slowly in hover. This is called air resonance, which is due to the blade lead-lag (swinging) motion causing an oscillatory shift in the rotor center-of-mass to rock the fuselage. This problem can be solved three ways: Loosen the rotor head stiffness by decompressing the rubber damper or O-ring, or increase or reduce the main rotor speed to take the lead-lag oscillatory frequency away from the fuselage natural frequencies, or slightly tighten the blades more to reduce the blades' lead-lag motion. For instance, the GMP Legend and GMP Prohead exhibit air resonance oscillation at low rotor rpm; around 1300 to 1500, the exact rpm depending on the tightness of the rubber damper. A stiff rubber damper raises the fuselage frequency and requires even higher rotor rpm to get away from the resonance phenomenon. The Legend comes with the stiffer rubber (9543), thus it runs best around 1600 to 1700 rpm. Prohead comes with the softer rubber (543), hence, 1500 to 1600 will be sufficient. Kalt Excali-

bur and Cyclone II also exhibit air resonance. The Cyclone needs about 1800 rpm to be away and above the fuselage resonance frequency. Usually after a few dozen flights, the rubber will soften and the resonance problem will diminish. Depending on the fuselage pitching and rolling natural frequencies, some models exhibit air resonance as a fore/aft nodding in flight, while some others show lateral oscillation. The Whisper shows lateral oscillation, while the Cyclone and Legend show fore/aft.

There is a reason we do not want to lock the main blades. When the blades flap up or down, due to Coriolis effect (conservation of angular momentum), the blades will want to swing forward when the blades flap up, and swing back when the blades flap down. Locking the blades down adds stress to the rotor system. That's why all the full-size helicopters allow the blades to lead-lag. Instead of depending on blade grip friction to reduce lead-lag motion, full-size helicopters use a shock absorber at the pivoting point to reduce lead-lag motion. For models, we want a snug fit, but not solidly clamped. You should be able to pivot the

blade with some force, but not lots of force.

On the Concept 30, when the plastic starting cone gets worn and becomes out of round, it can also shake the fuselage and cause the fuselage to oscillate laterally. The Kalt Whisper also exhibits lateral air resonance oscillation when the rotor speed is too low; to cure this simply raise the Whisper rotor rpm. The Whisper and Robbe Avantgarde helicopters also exhibit ground resonance phenomenon. When it happens, you notice the helicopter rocks laterally on the skids. This is because the rotor lead-lag motion is in tune with the landing strut spring frequency. The solution here is to simply increase the rotor rpm quickly so it will rapidly pass through the landing gear resonant frequency range.

Finally, check the Hiller control paddles' angle. They should be parallel to the swashplate. Swing the rotor half a turn and check to make sure that both paddles are parallel to the swashplate. The above discussions on vibrations are in response to a call from Newfoundland. I hope we have answered some of your questions.

People have also asked if they were to

replace only one of the five servos in a helicopter with a better one, which one should go first. Well, I would put the best servo, with the minimal gear slop, on the collective control. This would prevent the model from bobbing up and down in hover. The next best servo should probably go on the tail rotor control because this helps to lock on the heading. For collective control we want high torque and preferably a ball bearing servo. The Airtronics 94735 ball bearing servo is one of the best servos available for a helicopter; it has high torque, fast speed, and minimal slop at the output shaft. For tail rotor control, we want a fast response servo . . . something better than 60 degrees in .2 second. Even though the throttle servo does not need high torque and minimal slop, it should not move too much slower than the collective servo. Ideally, it should move faster than the collective servo, because when the blade pitch changes, we want the engine response to lead or stay right with it.

Well, hopefully this month's column has answered some of the readers' questions. See you next month.

MB

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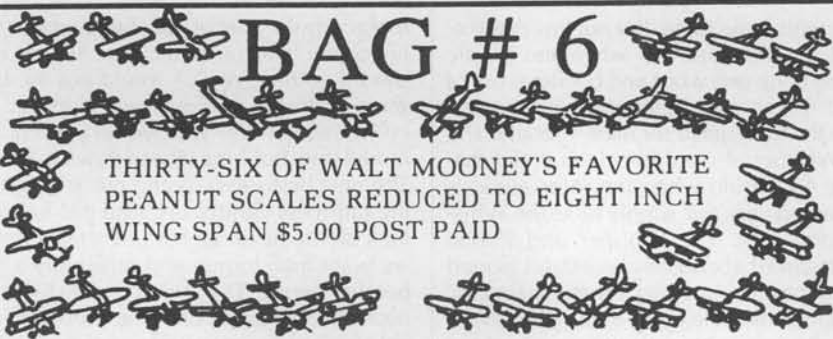
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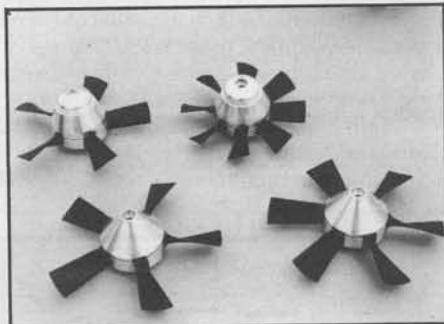
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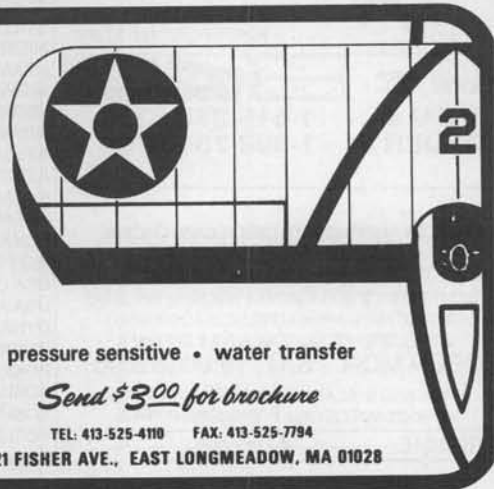
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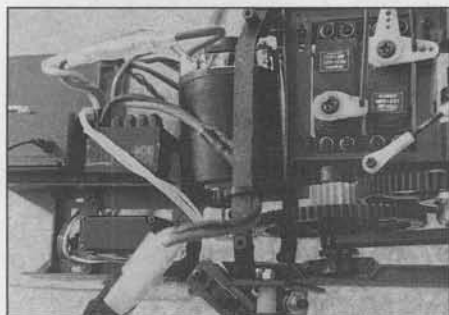
KALT ELECTRIC *Cont. from page 37*

gets blown around. Even though it has docile handling characteristics, we do not recommend it as a beginner's first helicopter because it is very fragile. The only way to make any electric helicopter flyable is to reduce structural weight. Kalt has reduced weight and strength at almost all possible places. Under normal conditions (which means extremely gentle care), the model will not break by itself. However, if you just apply too much force while installing a ball link, some little plastic piece can break. In a really bad crash, you might have to replace the whole machine! It is fragile! The main rotor shaft and flybar are both hollow tubes, and they bend easily. The tail rotor shaft will also bend easily. Just by picking up the model improperly you can bend or break parts.

The Whisper is made of a very brittle molded plastic. Maybe a few years down the line someone will make an electric helicopter out of aerospace composite material like resin imbedded Kevlar or boron which has almost the best strength-to-weight ratio that present technology allows. The landing gear struts on Whisper are made of the same brittle plastic as the frame. I tried an autorotation with the stock wood blades and there was insufficient rotating inertia, which consequently broke a strut on landing. Therefore, do not try an auto with stock blades! By the way, the kit does not come with autorotation main gear, that is an optional \$30 unit that we have to buy. Later on, I received a set of weighted blades for the Whisper from Bill Curtiss at Tech Specialties in Pennsylvania. About 10 grams of lead was added at each blade tip. This allowed the Whisper to do autorotations.

I even set up my Whisper to have minus six degrees of collective pitch for inverted flight. Well, after 40 flights, I think doing autos and flying inverted is not what the Whisper is best at. There isn't sufficient power to really get up to altitude quickly. By the time you get it up there you have drained one-quarter of the juice, and the moment after you barely flip it over to inverted you start to worry about remaining battery power. Why bother doing auto? You are only asking for trouble to possibly shatter this cute little toy. As it hovers so smoothly, our conclusion is that the Whisper is best reserved for flying in the front yard without disturbing the peace. It is very relaxing to fly it on a calm evening on the front porch or in the living room. This allows you to use the 110-volt quick chargers at home, too. It is great for demonstrating to friends when they visit your house. If you want to tear up the sky, fly the gas models. So far the best performance that I have seen from a Whisper was from the Kalt Japanese factory demo pilot at the 1990 Kyosho MB Challenge. He looped, rolled and autoed his Whisper. And, his flight time was consistently in the five-minute range. Peter Chao, of Helicopter World, told me that he sells 1700 mAh 9.6-volt packs that can get six-minute flights.

I weighed my Whisper with a digital fishing scale, and the ready-to-fly weight is two pounds, 14 ounces. This is with an 1100 mAH battery pack. With the 1400 or 1700 mAH pack it will be even heavier. The 1100 mAH battery pack alone is twelve ounces. There really isn't anything that you can remove from the Whisper to save weight. The structure is very light already. The servos are the lightest possible already. The

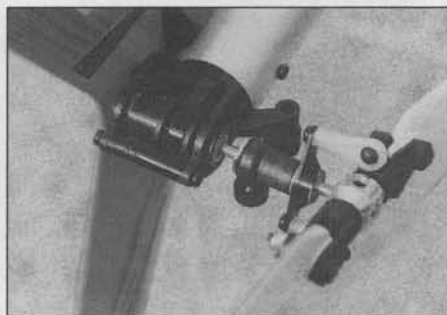


The left side of the Whisper. From left to right are: receiver, gyro amplifier on top of receiver, Kalt speed controller, tail rotor servo on the bottom, 540 electric motor, aileron servo and elevator servo. Notice the switch on the bottom for the speed controller, which also turns on the receiver. The push-button switch is for arming the electric motor. As this is a safety precaution, without pushing the button, the motor will not turn.

only thing that I could have done was to obtain a micro receiver which can save another two ounces. There is no receiver battery used. The Kalt speed controller is the BEC (battery eliminating circuitry) type, which means it has a built-in voltage regulator to bleed off a five-volt supply to drive the receiver, servos, and gyro.

In the May 1991 *Model Aviation*, George Meyer had an article on the Whisper, in which he mentioned his speed controller pumped out 10 volts and smoked one of his servos and the receiver. Well, before I even flew my Whisper, my speed controller also

blew the transistor in my JR 527X receiver and a JR 3035 servo. However, after that incident, mine worked fine and has not caused any problem. Anyway, I sent my system back to Hobby Dynamics for inspection and they replaced the parts. David Franklin, of Copter Corner store in California, complained that some Kalt gyros will suddenly cause the tail rotor servo to jerk one way. I have noticed this also, but this



The tail rotor assembly. It is toothed-belt drive and has sliding ball bearings for blade pitch control. Very nice, but fragile. The vertical fin also functions as a tail skid to prevent the tail blades striking ground. Land this machine carefully, otherwise you can knock the tail fin and rotor off, as there isn't much ground clearance.

was on the slightly burned out 3035 servo. This gyro jerking problem seems to occur when the gyro gain is set too high and causes the capacitor to charge and discharge during rapid tail movements. The suggestion is to leave the gyro at low gain setting. So far, my new Kalt gyro that I have received back from Hobby Dynamics, has worked perfectly. But still, to be safe, I leave it at low gain setting, which is plenty sensitive.

In order to save two ounces of weight and to get an extra 10 seconds of hover time by eliminating battery drain from the gyro, I have tried flying the Whisper without gyro.

It is flyable, however the tail rotor control throw must be reduced by about 30%. Without the gyro, you must also react faster to disturbances. Back in 1982 I had no problem flying the EH-1 without gyro, but now I am having more difficulties flying the Whisper without gyro. This does not mean that the Whisper is less stable in yaw, it simply means I have been spoiled in the past few years by the ease of flying with a gyro!

One of most important things to ensure success in electric flight is knowing how to take care of the NiCd battery. I am using a Protech 701 digital charger. It is not a peak detector charger, but it does allow you to plug into a 110-volt house outlet or a 12-volt car battery. The digital meter lets you monitor the charging current and voltage. According to electric RC car buffs, the battery is fully charged when the voltage reaches a maximum and then drops by .03 volt. This means you need to carefully monitor the voltage while charging. A better way is to purchase a peak detector type of charger that will automatically shut off when the battery is fully charged. However, most peak detector chargers on the market will only work on up to seven-cell battery packs because RC cars only use up to seven-cells. The Whisper uses an eight-cell pack. Astro Flight sells a peak detector charger that can automatically charge up to 12 cells. I have not tried this peak charger, but I think this is probably better than manually watching the voltage, because I am never really sure if my battery is fully charged.

I was told that the timing on these modern electric motors can be adjusted by the user to optimize the performance. As the instruction manual did not comment on it, I don't really know how to do it. Has anyone out there successfully improved the performance of their Whisper motor? Would you like to share the information with us? Okay, we will continue the Whisper review next month with a look at the engineering. **MB**



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Wing Area: 860" Engine: 1.20

ning it. I have puzzled over this thing for years and having finally accomplished it, I just wanted to share it with the membership." Thanks, Bill!

NOSTALGIA . . .

As most readers will recognize, this columnist has been pushing a new line of O/T RC; the Nostalgia types between 1944 and 1956. This month, we feature another photo taken by Dick Everett when he wrote the "Out West" column for *Air Trails*. It shows Lew Mahieu and his famous "Kiwi" on floats. Getting them off the water free flight is not as easy as it looks. Don't say we didn't tell you. Contact Vic Cunyngnam, Sr., at 314 Albert, Space 76, Exeter, CA 93221.

In a recent letter from Bucky Walters of SAM 39, he mentioned how Dick Korda won the 1939 Wakefield. Ken Sykora (who edits the SCIFS newsletter) carried a gag quotation of Fred Bowers saying to Dick Korda: "I'm not ready, you go ahead and fly."

Well, according to Joe Elgin, this is exactly what happened. Joe was "pitting" for Korda at the time Dick said he had spotted some good air but it was not his turn to fly. He was one down from flying.

Bowers was not ready (not sure if the air was right), so Dick got his chance and flew. The rest is history. Ironically, when Bowers

flew he could "only" get twelve minutes, not a bad time anywhere. One other fact unearthed by Elgin was that the timer of the historic flight was Bill Winter. That's today's trivia for you!

Incidentally, to show you that Joe Elgin is still very active, we present a photo showing Joe's latest handiwork, a Bleriot for 1/2A Texaco Scale. This latest O.T. event is starting to take off like crazy!

MODEL OF THE MONTH

Looking for a good-looking low wing design? Well, here is a dandy built and flown by Dick Sykes of the Gas Model Association of Southern California, back in 1937-39. A photo of this model appeared in the May 1939 *Model Airplane News*. There is no question about this model being an antique.

In his efforts to track this design down, this writer was fortunate in contacting Gordon Coddington, 3724 John L. Avenue, Kingman, AZ 86401. Gordon not only remembered the model well, but did have some beat-up drawings. Turns out that Sykes had taken Ohlsson Pacemaker wing and tail parts and had created a "new" model design.

Reports in *M.A.N.* by Sykes indicate the model was a good, stable flier, registering well over 100 flights before the time of photo publication.

Wing and tail construction was practically identical to the Ohlsson Pacemaker. The M-6 airfoil was shown on the plans but Sykes (and Coddington) recommended a Clark Y airfoil be used if one expects to place in the Duration event.

The reader must appreciate the style of flying so prevalent in Southern California at that time. Models were judged for performance; i.e., takeoff, climb, glide, and landing. Took several years for the duration format as used in Northern California to filter down.

Emphasis was also on appearance as can be seen by the dual exhaust pipes attached to the inverted Brown Jr. The pipes connected directly to the exhaust stack on the engine.

The fuselage was constructed of hard 1/4-inch square balsa or spruce longerons, with balsa stringers and formers. Also to be noted on the full-size plan is a copy of the insignia

used by members of the Gas Model Association of Southern California, which at one time numbered over 400 members! What great contests in those days!

This plan is available from John Pond O.T. Plan Service, #48G5 @ \$8.00 + \$1.60 P&H, and California sales tax if applicable.

SAM 21 ANTICS

Since this writer was gone for a period of six weeks and missed the SAM 21 January business meeting and the later SAM 21 awards dinner, the boys decided to cook up something for their "leader."

Anyone who has been reading this column well knows this writer's feelings about the Lanzo Bomber design, not because it is such an excellent performer, but simply because it is so overdone. Feature 28 Bombers entered out of 30 entries at the SAM Champs!

To offset the moaning and groaning by this writer, SAM 21 formed a four-man committee to build an electric-powered Lanzo Bomber based on the Leisure kit. Towards the end of the business meeting, this writer was summoned to the head of the membership and presented with a complete Lanzo Bomber with the admonition: "Don't say you can't win now!"

Jack Alten was responsible for these monkeyshines, as he enlisted the help of Dave Lewis (fuselage), Neil Kaminar (wing and tail), Howard Osegueda (covering), and the complete electrical and radio hookup by Jack Alten. In short, the model is ready to fly for the First NCCFFC meet!

It was ten minutes later that more chicanery broke loose. Stuart Bennett, one of the original Oakland Cloud Dusters, took Pond to task in the form of a "Virginia Woolf" award, for fictionalizing the start of the Oakland Cloud Dusters. True enough, the Dusters did meet in the home of the Bowen family, but the origin of the club was based on two groups organized prior to the Oakland Dusters. The first was a group of young fliers with no formal model group association. The second was based on a Junior Birdmen Squadron that drew many of the older members still active with the Dusters.

Of course, these groups merged into one club known as the Dusters with members

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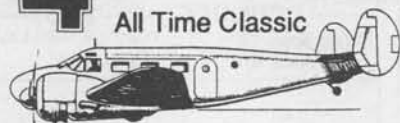
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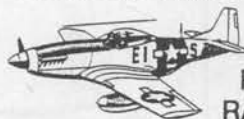
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such as Serge Milesich, Stu Bennett, the Bowen boys, Bob Meuser, et al. Hope this sets the record straight! Ya gotta be careful these days!

SAM FLYING SCALE

We have been talking about the new 1/2A Texaco Scale event and have neglected to mention some of the fine free flight flying that has been going on at the SCIF and SCAMPS Annuals. Another photo shows exactly what we mean when we say O.T. Flying Scale. Seen in the pic is Jim Robinson (a liberated Ohioan) with his Comet Curtiss Robin that registered the rather amazing time of 26 minutes at the November SCAMPS Annual. Needless to say, the model took first place.

The design of the model is dated at 1937 when Joe Konefes worked for Comet. By 1938 this was quite a popular kit, eventually being supplanted by the new Comet Clipper. Neat thing about this model is that you can fly it in the Flying Scale, Texaco, Antique, and Class C gas events. Four for the price of one!

SWEDEN

We are just about running out of pictures of the 1990 Swedish Nats taken by Sven-Olov Linden. By the time the results arrived, we actually had badly dated material, but the photos were so good, we run one every so often.

Such is the case of the photo showing Sten Kristiansson and his extremely well built Jim Cahill Clodhopper. Sten has faithfully reproduced Cahill's 1938 Wakefield Winner. Matter of fact, reports indicate the model flies every bit as good as Cahill's original.

AUSTRALIA

Although this writer attended the 1990-91 Nationals at Bendigo, he was not present for the SAM Champs at Canowindra in Easter of 1990.

Trevor Boundy and his son attended the SAM Champs and flew Trevor's Reich "Albatross" powered by a Saito .65. One may notice many Australian O.T. modelers use this particular engine. Rules call for a maximum of .65 cu. in. displacement, and the Saito barely gets under the limitation at .649 cu. in.

This Saito engine has turned out to be the mainstay of flying for the Texaco and Antique Events at the Australian SAM Champs. Trevor picked an excellent soaring model in his choice of the George Reich "Albatross."

The reader might look at the background and wonder no longer why the SAM Champs are held at Canowindra, located midstate of New South Wales. Very little wind or rain makes this an ideal flying area. The last two years have seen a reversal in weather, but the Nats go on regardless.

NEW ZEALAND

George Chatsworth sent in a photo showing an electric-powered Playboy, scratch-built by his wife, Iris. When first testing the model, Iris was admonished, "Don't lose the model in the corn field!"

Alas, and alack! This real floater died in a terminal velocity dive induced by lack of decalage. Iris is now older and wiser! **MB**

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FREE FLIGHT *Continued from page 63*

approximately 475 square inches of wing area, it is a hot performer with either engine. Dan Sobala, who now splits his time between Arizona and Oregon in his retirement, is no longer active in modeling activities, but he is an accomplished square dance caller and well known in such circles.

While Dan was actively flying here in the NW, he was a fierce competitor and spent a good share of time standing at the head of the line when trophies were handed out in the AMA gas classes during the 60's and 70's. Dan flew only Geefs and their performance was outstanding.

The full-sized plans for the Geef series is available from John Pond plans, or you can scale up the three-view for your own use. Full-sized ribs for the wing and stab are included for your use. The wing airfoil is the standard NACA 6409.

A flight tip for you: Model flies right-right, using the balance point location shown on the plans, slight right stab tilt, slight right rudder tab, five degrees downthrust as shown, slight washout on the left wing tip, and 1/4-inch wing incidence.

This model in all of its sizes is an excellent performer and would be an outstanding addition to your Nostalgia fleet. I am always amazed that I don't see more Geefs on the flying fields. Here's your chance to get your own and clean up on the competition before anyone else finds out your secret.

KSB ENGINE TIMERS RETURN

During the past couple of months, I have been bemoaning the absence of simple engine timers such as the old Tatone and KSB styles. As noted two months ago, Starline has begun to import timers from Europe, and now I just received a nice letter from Ed Dolby of FAI Model Supply with the news that he was able to get more KSB engine timers, but he had to order 4000 of them!

Here's your chance to get them while you can... who knows when they will be for sale again. According to Ed, these will be available by the time you read this article. The price for these units will be \$17.50 each plus \$2 for UPS up to six units and \$4 for seven to 12 units. Ed notes that these timers are identical to previous KSB timers.

This is good news, so get in on the act and drop your order to Ed at FAI Model Supply, P.O. Box 3957, Torrance, CA. 90510. Tell Ed that *Model Builder* sent you.

NEW KIT FROM A.J.'S HOBBIES

Received a nice flier from A.J.'s Hobbies in Fresno and a letter from Nat Comfort. Both indicate that the SWAT, a nostalgia gas model is now available in kit form. The model is 440 sq. in. in wing area and can be flown with nostalgia-eligible engines from .09 up to about .23. Kits can be obtained for \$34.95 plus \$3 S&H from A.J.'s, 4840 E. Leisure, Fresno, CA 93725 or Nat Comfort, 12324 Percival St., Chester, VA 23831. Elsewhere in this column is a picture of Nat's SWAT, powered by an O.S. 19. Soon, other sizes of the SWAT will be available, as 650 and 750 square inch wing area versions are

in the works.

NFFS CHANGES - NOSTALGIA COMMITTEE APPOINTED

Some changes are in the works for the National Free Flight Society. The organization is changing its representation schemes that feature active free fliers from four areas of the country. One of the appointments made was Terry Thorkildsen as the new NFFS Technical Director. Terry is a regular contributor to this column and a member of the San Valeers MAC.

Another appointment is a Nostalgia Committee. The original members of this committee stay in place. They are Bob Larsh, representing the Northeast region of the U.S. and Ralph Prey, representing the Southwest. Bob is the chairman of this committee. New members round out the committee, and they are Ron Sharp ton, representing the Southeast, and Bob Stalick, the Northwest.

The charge to this group is to "harness rule changes, including cleaning up current rules, deleting useless ones, introduce required rules, review suggested rules, introduce new events, etc."

So, it appears as though this new group will have some work to do with continuing proposals to modify current Nostalgia rules. Stay tuned, you may read about it here in *Model Builder* first.

Personally, I feel very honored to be asked to serve on this prestigious committee and with such good folks as well. Thanks to Tony Italiano, NFFS president, for the appointment.

HUMOR FROM THE FRESNO MODEL NEWS

"Professor Von Booth's Third Incontrovertible Law of Modeling.

There can be little question that any model aircraft engine, no matter how recalcitrant, balky, or generally stubborn will run beautifully, without any sign of missing, and at peak RPM, whenever it is mounted in a free flight model aircraft with a stock engine timer and is aimed at the ground in a death spiral. If the ground toward which it is racing happens to be covered with concrete, an additional 1000 RPM is to be expected; if the ground is paved with asphalt ... 500 RPMs."

HOW I GOT STARTED IN FREE FLIGHT BY THOMAS OGDEN

About a year ago, I asked for stories about how readers got started in this free flight hobby. And a number of you responded with your stories. As time and space permits, I will be featuring a number of these tales for your reading pleasure. This month's is from Thom Ogden, who lives in Norwich, N.Y. Thom's experience pre-dates many of us, including me, and is delightful.

"Lindy had just made his famous flight, and all the world was talking about it. I was just another one of the kids living in New York City flying hand launch gliders made of cheese or cigar box wood cut to size with my pocket knife and nailed together. Flights were all a young arm could muster and some even survived the first landing. However, it was soon discovered that longer

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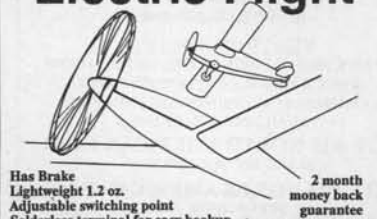
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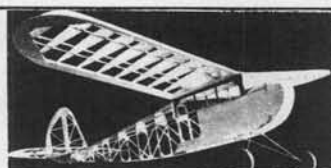
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flights could be obtained by throwing them from the roof of the apartment building. None ever survived the landings and many a horse showed a remarkable turn of speed with a wagon when one of them landed nearby or on it. In those days, NYC still had many horse-drawn vehicles. Then, one day, I found some Japanese flying models in the local candy store. These were catapult gliders and rubber powered fliers. They were made of soft wire and were covered in a beautiful doped, almost transparent, silk. They flew well enough to keep me satisfied for awhile.

"One morning, I found several copies of *Flying Aces* magazine in the trash pile. These were quickly grabbed and read from cover to cover . . . all the articles on aircraft, and

people, but best of all, the photos of models and plans. While the plans were just so much 'Greek' to me then, it wasn't until the owner of the magazines made himself known that some of the stuff made sense. It seems he was a new tenant and had served in the German Air Forces as a fighter pilot. Then as now, when modelers get together, language is no barrier. Well, we built models from wire used to wrap newspapers. We covered them with newspaper. Power was supplied by cutting up old inner tubes from trucks. They flew but not really great. One day in my wandering, I found a shop that changed my life. After all these years, I can close my eyes and still see it. The name on the grimy window said 'Ruggler's Model Shop.' He took the time to answer the thousands of

questions a brash young kid could ask. The result, I walked out of the store with one of his own designed kits, a combination plane; a hand launch glider with prop and rubber band . . . an R.O.G.

"The kit consisted of several pieces of balsa, some wire, thrust bearing, wheels and prop. The instructions were printed on the back of a large envelope and sold for five cents. With his help, it was built as a glider. It would make several loops and come in for a graceful landing. As an R.O.G., it would make long flights. This was more like it. This formed a friendship that lasted for years.

"In one issue of *Flying Models*, there appeared a set of plans for an all balsa twin pusher, a type quite popular at the time. So, in no time, the materials were acquired, and

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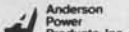
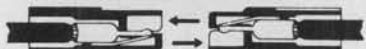
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the model built. When finished, it was given a glide test for trim. Aiming at a manhole cover about 25 feet away, the model was given a shove in that direction. Straight as an arrow it went and landed like the proverbial brick. As it was undamaged, it was pronounced trimmed and ready for flight.

"After winding the motors, it was launched at about a 45-degree angle. Off it roared, climbing like a rocket over the tops of the apartment houses. Never had I gotten a model this high. As the power fell off, the model started to descend only to rise again. Unknown to me at the time were thermals. And on hot summer days, they were always present climbing the face of the buildings. Well, there she was slowly circling and drifting east to the river, as I watched in awe.

I saw it start to shake as a train went by on the Second Avenue El. It slowly righted itself and started to climb again, all the while slowly drifting east. Suddenly, it started to descend and the angle steepened as it came down. Following as quickly as I could, I finally spotted a crowd of people where I was sure my model had landed. Drawing near, I slowly composed my model acceptance speech for the honors I expected for my epoch making flight. Arriving at the front of the crowd, I saw my model, undamaged, buried to the elevators in the canvas top of a new Buick auto. While my knowledge of Italian was limited, from the tone of his voice, I was sure that it was not to honor my flight, especially when he proceeded to reduce my model to unrecognizable pieces

of wood. So, as I slowly made my way home, I consoled myself with the fact that I, too, had joined the ranks of the unknown pioneers. But I had been airborne at least 10-15 minutes and had covered about 1000 feet. And even today, over 60 years later, I still feel as I did then when I turn one loose and hope the great God Hung takes over."

Thanks, Thom, for sharing this neat story. I wonder just what this NYC neighborhood looks like today, and if any youngsters can be found flying free flights as described.

THE END

Hope you enjoyed this little sojourn into the past for this month. I'll be back with a more up-to-date look for you next month. In the meantime, join me at the flying field, and we can catch a thermal together. MB

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CORNER *Continued from page 47*

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RC SOARING *Continued from page 31*

are really nothing more than wing ribs with (or without) wing sheeting. The FA program will print you a complete set of ribs, whether it's a constant taper panel of a wing, a constant chord panel, or even an elliptical or parabolic shaped panel! Just tell it the root chord, the tip chord, and how many ribs you want, and FA will print out a wing full of ribs, telling you the length of each rib and the correct spacing between each ribs.

If you wish, you can have FA subtract 1/16-inch (or any other reasonable thickness) from every rib for your wing sheeting requirements, from the leading edge back to any percentage of chord you like. If you were building a D-tube wing without cap strips, you could plot the skin thickness back to 30%, for example. For a D-tube wing with cap strips and T.E. stock (or a fully sheeted wing), you could plot the skins back to 90%, etc. You can even ask for optional station reference lines at 5% intervals to help you place spars, or pace yourself while cutting foam cores using hand-bow methods.

Optional rib centerlines can be drawn on every rib to help you determine proper angle of attack, proper washout, or splicing together very large airfoil plots (greater than 11 inches) printed on single sheet, 8-1/2 x 11 paper. The largest rib possible is 24 inches at a thickness ratio of 20%, the smallest a mere 0.5 inches.

If you should desire a modification of your

favorite airfoil, you may choose the options of increasing or decreasing its thickness or camber for experimentation, or trailing edge profile. The latter is very handy for certain FF and RC sections where TE's are razor thin and impossible to build.

You can enter or correct coordinates for any airfoil you choose using the editing functions of the code. It will accept the standard NACA style number system, or with a little thought, the Eppler/Selig style system. For those who would rather not think, there is even an "E2F" Eppler to Foiled Again converter utility (version 1.30 and later) for creating new airfoil files from Eppler or Selig-Donovan data.

When you are done entering the coordinates in a file, you can output the Airfoil Data File to your printer if you like, and FA will also tell you the maximum thickness and camber of the airfoil you've entered and the locations of each in percent-of-chord. This is a great way to give airfoils to friends who like what you're flying and want to build something similar.

Although the FA code is specifically designed to plot airfoils, with a bit of clever (X,Y) measuring on your part, your own coordinates can be entered for just about any shape you choose. FA's curve-fitting routine can smooth and duplicate these shapes to any size. Bulkheads, fuselage profiles, wing tips, etc., can be plotted this way.

When you purchase FA, you are supplied

with 50 different airfoils in three separate directories: soaring related airfoils ("SOARING" directory), free flight related airfoils ("FREEFLY" directory) and sport/scale/old-timer related airfoils ("OLDTYMR" directory). They range from Goettingen, Clark, and NACA, to Eppler, Quabeck, and Selig-Donovan. Almost every airfoil you could ever use is given to you!

With this report I have included some examples of Foiled Again's work. For reference sake, I own a nine-pin (i.e., cheap) Panasonic KX-P1080i printer, but just about any dot matrix printer will give you results like these.

If you wish to buy FA, contact Bernie Crowe at Cygnet Software, 24843 Del Prado, Suite 141B, Dana Point, CA 92629, (714) 496-6961. The cost is a very reasonable \$45.00 (plus California sales tax, if applicable). Overseas orders are \$55.00, international bank draft, US funds. You must state which computer type, printer type, and diskette size (5-1/4 or 3-1/2 inch disk) which you own to ensure compatibility.

TIME TO FLY . . .

That wraps it up for another month, buckaroos. Take time to soar with the eagles . . . it's good for the soul! If you have any questions regarding this column, or wish to submit anything for publication in this column, please contact me at (714) 245-1702 between 6:30 and 9:00 p.m. PDT, or write 3610 Amberwood Ct., Lake Elsinore, CA 92530.

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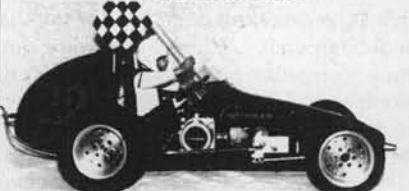
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NUREMBERG *Cont. from page 58*

ready well known, especially since the pylon racing Nats and World Championships titles of the Malina brothers in 1987 as mentioned previously. But besides top class competition racing engines, the MVVS factory produces other engines ranging from .09 to .60. In fact, MVVS is now a division of the larger Modela distribution company, manufacturing and selling a number of modeling goods like kits, accessories, RC gear etc. Engine production is shared between MVVS and another manufacturer.

There are actually two Czech distributing companies for modeling goods: Modela, as mentioned above, comes from regrouping several specialist companies and is headed by Rudi Cerny, a well-known modeler and former President of the Czech Model Federation as well as past Secretary of the CIAM, the model committee of the International Aeronautical Federation. He had to resign from his official functions after the 1968 revolution. The other company, called Igra, leans toward children's technical toys, and as such, produces quite a number of simple model kits. Igra is now headed by Jiri Kalina, world-famous free-flight modeler, President of the new Czech model association, and renowned engine collector. His two books on the subject are eagerly sought after by modelers the world over.

Well, back to our subject: MVVS engines are now available on the "normal" export market. The 60's have already found their way to Germany, where they have quickly been recognized as excellent mechanics for everyday use. The famous 6.5 GR pylon racing engines could well become more common on US racing fields. And the equally famous Modela CO₂ engine could well be more widely available to free flight modelers.

Even the Soviet Union is in search of export markets. It seems that quality engines coming from normal production units (as opposed to engines produced in small quantities by individuals or groups) could well become available. This is how I met Soviet representatives in Nuremberg, showing to potential importers the latest version of the TK-10.60 pattern engine, indicating a strong Italian influence and sporting a close copy of the Webra Dynamix carburetor, displaying a machining quality equal to that of the best occidental products. This engine, supplied with a mixture control lever, delivers the same power as is expected from a modern pattern engine and at the reduced rpm required for turnaround.

Thus Eastern Country's producers are coming back into the international model market. It is doubtful that, due to their limited volume production capacity, they will have a major impact on the model market right now. However, as they improve machinery and work more efficiently, they could well equal Far East countries for low costs and, retaining their original design capacity, they could eventually compete successfully against the so many copies of

Japanese engines we presently know. As already said above, politics could well have a major influence on the world modeling market.

ELECTRIC MOTORS

There are no more drastic changes to be expected from this field as a very wide variety of sizes and power is already available. Large companies like Robbe merely complete their assortment of the simpler ferrite magnet motors, most of them coming from the Mabuchi range. Higher quality motors with rare earth magnets, samarium-cobalt or neodymium, are gaining in importance and popularity and an increasing number of (larger) models need the kind of power they can develop. At the Robbe booth, where the widest range can be found in the Keller series (Keller is now a division of Robbe), the only new motor was a 40/8, 8-wind version of the very popular 40-size neodymium powerplant, thus better suited to 7 to 12-cell batteries. In the Keller terminology, "40" means that the design input power is 400 watts or approximately .4 HP output power. Robbe is also working on new versions of the larger 150 and 200 motors. Prototype 200-class "234" motors had already been used at the last electric flight World Championships in Austria and proved extremely powerful and reliable.

In the Graupner booth, where the "Ultra" motors are subcontracted to Gerhard Plettenberg of Hecktoplett fame, and the present range reduced to those motor sizes suited to the Graupner kit models, three new variations of existing sizes could be seen; from a faster 4-wind version of the existing "800" for pylon racing use to an 8-wind "1800" for large sailplanes and pattern aerobatics with 16 to 20 cells.

For the first time this year the original Hecktoplett motors were available to all retailers. These high-quality motors, which have competed for years against Keller for the lead (and were the most-widely used motors at the last World Championship as well as the winning powerplant), were up to now only available direct or through a handful of specialist retailers. However, the large scale distribution by Robbe and Keller has drastically reduced the appeal of these confidential motors to the general modeling public. Gerhard Plettenberg has been pushed to sell through a distributor to keep his share of the market and retain the better profit-making production of his own-name motors against his lower-benefit subcontractor production.

The American-made Astro motors are slowly finding their way on the European market and several of the new Multiplex gliders are designed for these motors. Most interesting, of course, was the new availability of the 6-wind version of the "60" FAI, as was used so successfully by the American team during the World Championship. I guess that these excellent motors would gain a greater popularity when metric-size screws and shaft would be compatible with everything used throughout the world outside of the US.

Webra, well-known for its engines, is expanding its range of high-quality samarium-cobalt motors, the first of which appeared two years ago. These motors are designed by Peter Billes, the same who designed the latest Austrian HP engines, then all the recent Webra competition engines. The Webra electric motors have been quickly recognized for their immaculate production quality, high efficiency, and low weight. They all use the "traditional" samarium-cobalt magnets, known as "cobalt" in the US. This year, their new "30" motors, available with two different winds, are of a larger size in accordance with the general trend for larger sailplanes and aerobatic airplanes. The 30-20 (300 watt nominal, 20-cell battery), a 9-wind 17 oz motor, will no doubt excel as a pattern motor in 45 to 60-size models. Its efficiency reaches 81% and it can deliver up to 750 watts (1 hp).

Not only are powerful electric motors more readily available than ever before, but the choice is such that just about any model can be designed for this kind of power. However, this purely European trend has not been followed to any appreciable extent in the other parts of the world, Japan or America, and it remains to be seen whether the specific necessities of highly populated countries with diminishing free space will be significantly followed in other parts of the world.

SOPHISTICATED RADIOS

Here again, one cannot find really new products but merely detail improvements and extension of the microprocessor encoding to the lower priced RC sets. Model European-style microprocessor radios offer the possibility of constant improvement by merely replacing the software in static memory and this is exactly what happens. Both Graupner/JR and Robbe/Futaba follow this path for their up-market sets.

Simprom now offers its own "System 90" PCM programmable set with many neat innovations. This set is not really intended for competition use (although its functions are powerful enough for any competition class), but rather for the average modeler wanting a practical, easy-to-use and complete radio set offering everything one could wish, whatever the model complexity. This radio is very easy to use, and apart from the usual mixing and trim programs, 23 model settings memories, it offers several interesting innovations, among which an interesting teacher/pupil system where the teacher, after having given over the controls to his pupil, needs only move any channel to regain control of the model. But more astonishing is the "log book" function where it is possible after a flight, by connecting the receiver to the transmitter via a special cable, to "replay" on the transmitter screen information memorized by the receiver! They even include temporary interference, battery condition, etc. When the receiver is fitted with the suitable sensors it is also possible to keep trace of altitude and speed. This information can also be fed to any PC computer. I guess that many sport modelers

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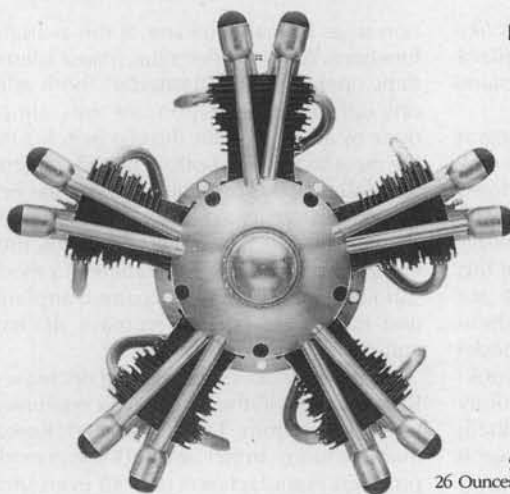
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would make full use of all this. (*Sounds like the model version of the infamous "Black Box" used in analyzing full-scale airplane crashes. wcn.*)

On the other side, the microprocessor technology is going down to most of the new middle class radios and is not restricted anymore to the PCM encoding system. The Multiplex mc 2010 and 2015, Graupner/JR mc-15 and Robbe/Futaba FC-15 are of this type. Ready-made mixing programs are included for any type of model, from helicopters to large sailplanes, as well as model setting memories. The new different-looking Sanwa (Airtronics in the US) Infinity radio was not to be seen at the Nuremberg Fair and is . . . function-wise . . . in between these radios and the European-style top-of-the-line Graupner/JR mc-20, Multiplex 3030 and Robbe-Futaba Fc-28.

As a result of the widespread use of easily-done mixing, most of the present aileron models are designed for two-servo opera-

tion so as to make full use of the available functions. Aileron differential, mixed aileron-flaps operation and "butterfly" (both ailerons up) landing position are now simply done by anybody at the flip of a switch. Only the most basic rock-bottom priced transmitters will lack this possibility within the next two or three years. A further result is that the demand for specialized aileron servos, presently almost exclusively restricted to model sailplane use, competition pattern airplanes and large models, will increase dramatically.

A consequence of the marked decrease of RC car activity is the lack of new equipment to be seen from Taiwanese and Korean manufacturers. In fact, several Korean model products manufacturers did not even show this year. On the other hand Hitec, the largest Korean RC goods manufacturers, displayed a number of very interesting new products including their RCD Platinum and Micro 535 dual conversion receivers and

their new Focus radio series. The new Hitec servos use a proprietary amplifier IC chip (Futaba is the only other manufacturer in this case) and are mechanically and electrically very tight. I have witnessed the evolution of the Hitec products over the years and I can vouch for the dramatic and steady improvements leading to the present high-quality original products. However, the highlight of what I have been shown by Hitec manager Chun Sue Park was a new PLL frequency synthesis receiver/HF module set. This is meant to be sold as a package for use with other radios, HF modules being compatible with either Futaba or Airtronics original modules. Of course, frequency synthesis is not new and Kraft had such a device already long ago, but it did not meet with success at that time. Nowadays, with the new US RC frequencies available, it is a completely different proposition. No more expensive and fragile crystals. Actually I believe that the biggest advantage lies in the planning of flight lines at club or competition level. No more pylon race finals postponed for Tx frequency incompatibility!

Prufa is the name of a Swiss distributor offering a number of various products, mostly of Far East origin. They were exhibiting new European-style microprocessor radios quite different from the usual low-cost sets we find at many distributor booths. Bearing a slight European Futaba influence, these radios could well attract a number of modelers wanting the functions, but not ready to pay the price of the big name manufacturers.

Still on the subject of radios, most manufacturers offer small-size receivers intended for the electric sailplane market. The lightest is a five-channel receiver (by the way, there are no AM radios any more) by Webra, weighing a mere .66 oz (19 g). More than four-channel is an absolute requisite on the European market, as further channels are necessary to operate the mixing functions. A "normal" European model with two wing-mounted aileron servos needs at least five channels, a competition sailplane at least six. The largest receiver available on the European market (Simprop) has 12 channels!

To be continued next month.

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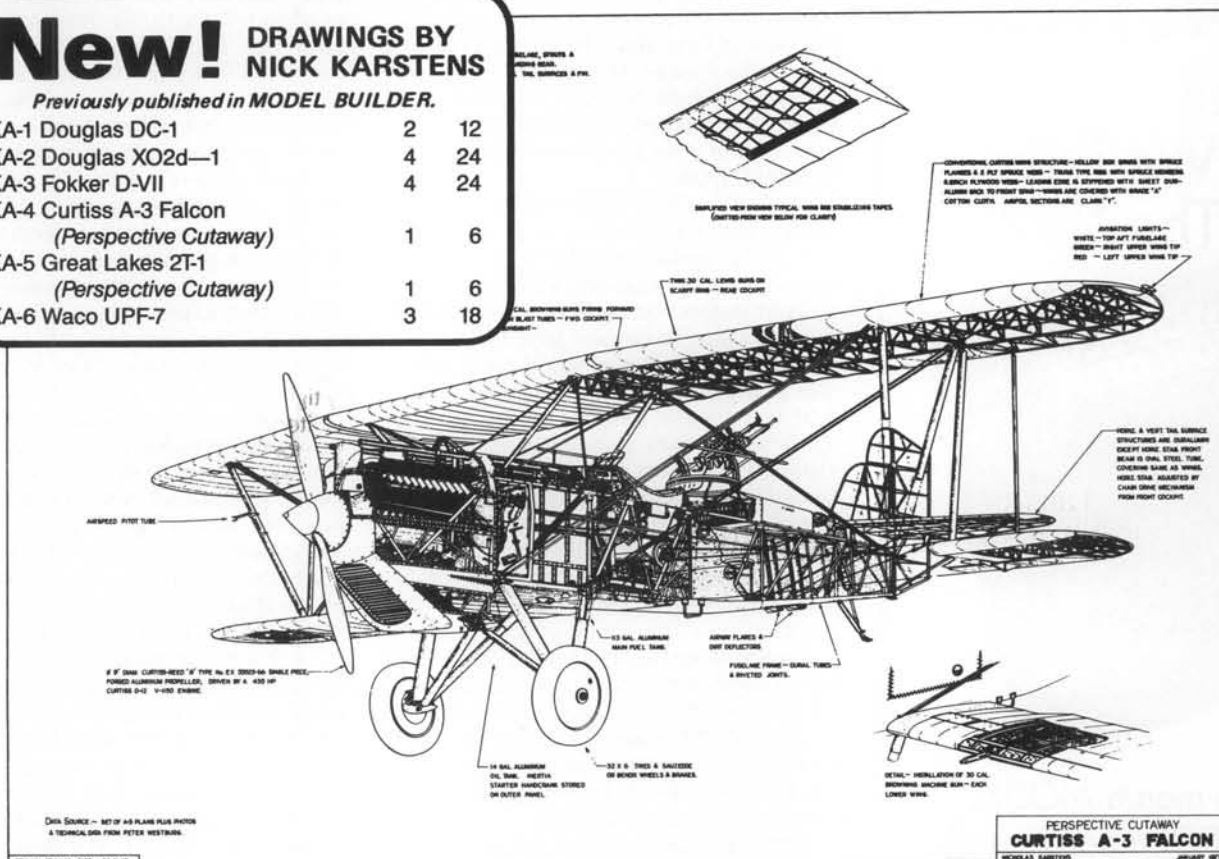
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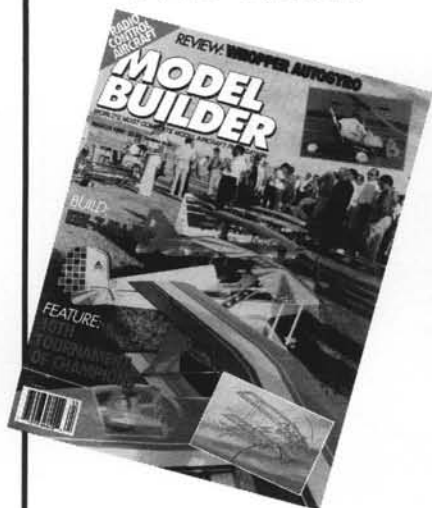
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HANNAN *Continued from page 77*

Bob gained fame as the chief designer of the Granville Brothers "Gee Bee Z" and his own esthetically-magnificent "Hall Bulldog" racer. Later, while employed by Stinson, his projects included classics such as the Stinson Reliant.

During the World War II era, Hall helped design and test-fly the Wildcat, Hellcat, and Avenger. Then, as vice-president and chief engineer of Grumman, he directed the design of the Panther and Cougar jets. Bob's survivors include his wife, four sons and seven grandchildren. Certainly he also leaves a heritage of many much-modeled designs.

COMPETITION

The National Free Flight Society, in cooperation with the Academy of Model Aeronautics, is conducting the 1991 Free Flight Nationals in two locations, according to A.J. Italiano. Indoor competition will be held at Johnson City, Tennessee, June 6-9, in the wonderful Mini-Dome world-class flying site. Events include hand-launched glider, EZB, Pennypine, Bostonian, Peanut Scale, AMA Scale, many duration events and a slate of Flying Aces competitions. In short, something for almost everyone. Low-cost dormitory accommodations are available, and for more information send a stamped pre-addressed return envelope to: A.J. Italiano, 1655 Revere Drive, Brookfield, WI 53045.

Outdoor Free Flight will take place at the Mid-American Air Center in Lawrenceville, Illinois, with the Flying Aces Club and SAM 57 assisting NFFS and AMA. We have not received event information as of this writing, however it should be available from A.J. Italiano at the above address.

Moscow, Idaho, will be the place and August 8-11 will be the time for the 2nd Annual Kibbe-Dome Scale Contest, hosted by the Boeing Hawks. "Nut categories" will include Pistachio, Peanut, Walnut and Coconut. Semi-scale classes will consist of Profile Scale, Kit Sport Scale and Bostonian, which will employ both the Ed Whitten 7-gram and the Walt Mooney 14-gram rules.

SAM 8 will sponsor Old Timer Indoor, and the pure duration classes will also be well catered for, according to Jim Woods, who describes the Kibbe-Dome flying venue as "the premier available 147-foot dome in the world."

MODELS IN THE MEDIA

Richard Sierk and Michael J. Patti sent in newspaper and magazine articles describing a remote pilotless vehicle being manufactured by AeroVironment, Inc. Called the "Pointer," the nine-pound craft spans nine feet and is electric powered. Carrying a video camera and guided by RC, the craft can stay aloft for an hour, and flies at speeds of from 22 to 45 miles per hour. Unlike many RPVs, the Pointer is relatively simple to transport and operate. It features many standard model airplane characteristics, including a pylon-mounted polyhedral wing and Carl Goldberg's pop-up-tail dethermalizer system. The model airplane simi-

larities are not coincidental, as among the model builders involved in the project are AeroVironment president Paul McCready, Peter Lissaman, Ray Morgan and Mike Reagan.

DELTA DARTS

Micheline Madison and Bob Vojislavek, of AMA headquarters, are sponsoring a special Delta Dart contest during the 1991 indoor Nationals. Their goal is to have some fun while helping to raise money for the US Junior Free Flight World Championships Team Fund. Entry will be at the flying site, with \$5 of the \$6 entry fee going into the team fund. Delta Darts furnished to the entrants must be employed (no fair bringing pre-tuned "ringers"). Rules are simple and specific, although "innovation is encouraged" and certain rearrangements and substitutions are permitted. Sounds to be fine entertainment for a worthy cause!

In an effort to provide some fun to members of the Michigan National Guard stationed in Saudi Arabia, Dan Miles of the Detroit Cloudbusters Model Airplane Club conceived the idea of sending some Delta Dart kits. Hazel Sig/Hester quickly responded with a donation of 500 specially-imprinted models. Next, Larson's Ace Hardware supplied 500 razor blades, and K-Mart came through with a whopping 20,000 straight pins! Micro-X supplied extra rubber motors and the Flint Michigan Balsa Termites provided three gallons of white glue.

Cloudbuster members Don Campbell and Dave Livesay came up with a letter and all the sponsor logos on a single sheet, and 500 of them were printed at no charge by Burtin Printing. The white glue was successfully repackaged in Ziploc bags donated by the Quality Transparent Bag Company, of Bay City, Michigan; quite a time-consuming task.

Dan Miles, Jay Williams, Dave Livesay and Curt Haskell packaged 500 extra rubber motors, and 5,000 straight pins were individually laid on masking tape strips in groups of ten each with the tape folded over the sharp points.

John Haskell joined the team and helped transfer the supplies into the individual kits. The result was two large boxes, filled with kits, totalling about 60 pounds! Postage paid by the Cloudbusters took care of overseas transportation, concluding a remarkable effort in organization and dedication.

Was it worth it? Decide for yourself, after reading this letter:

"Hi! My name is Darlinda J. Burt. I am a member of the 460th Supply and Service Company, Michigan National Guard currently stationed in Saudi Arabia.

"Today we received the model airplanes that you sent. I just wanted to thank you very much for what you did. I know I really enjoy having fun. Everyone around here was having a lot of fun putting together the airplanes and then flying them.

"I just wanted to write and let you know how much we appreciated what you sent us. Thank you for supporting us.

"We all hope to be home soon.

"Thank you, Darlinda J. Burt."

MB

"ARF PLANE OF THE YEAR"
-Model Builder Magazine, 1989



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SKYWARD	25	40	60 ¹	120 ¹
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Wing span	53"	63"	72"	108"
Length	37"	44.25"	56"	76"
R/C channels	3-4	3-4	4	4
Wing area*	449	730	909	2127

* (sq.in.)

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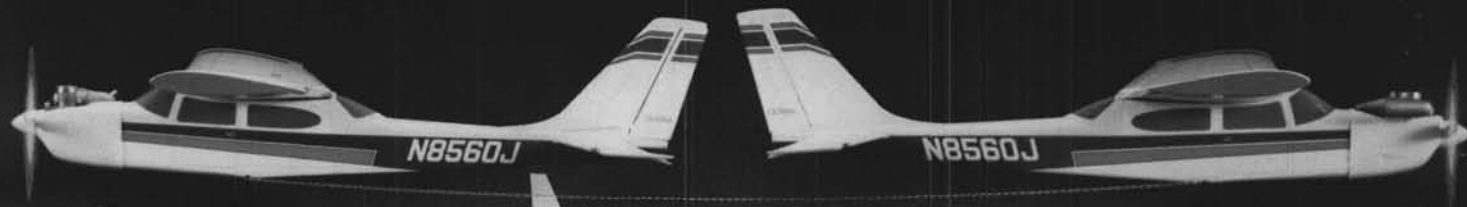
Engine Size: 40
Displacement: 6.40 cc
Net Weight: 420 gr
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ABC Construction
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Competitor's .40 Engine

Enya Super Sport .40/TV

To prove that Enya engines not only have a reputation for legendary reliability, but that they are among the most powerful you can own, we once again did some comparison testing.

This time we took an Enya Super Sport .40/TV and a leading competitor's .40 off the shelf and put them in identical ARF's in order to accurately test pulling power. There were no weather variables. No pilot competency involved. Just sheer power.

Each plane was rigged with a special harness that assured stability and equal pulling ability. Both engines were broken in with one 6 oz. tank of 5% fuel. Then they were run at near max RPM and then reset to run at max RPM.

The results? The Enya Super Sport .40/TV out-pulled its well known competitor throughout the testing. No ifs, ands or buts.



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more. The Super Sport .40 was designed with a cast iron piston running in a gas-hardened steel cylinder to produce more RPM's and longer life. In addition, we provide a high quality Enya carburetor to make it run better at both high and low speeds, plus a quiet, bolt-on muffler.

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