

**RADIO
CONTROL
AIRCRAFT**

REVIEW: ACE RC DIGIPACE II BATTERY TESTER

DECEMBER 1991

MODEL BUILDER

WORLD'S MOST COMPLETE MODEL AIRCRAFT PUBLICATION



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Soaring
An F-4
Phantom

Build A Heath Midwing

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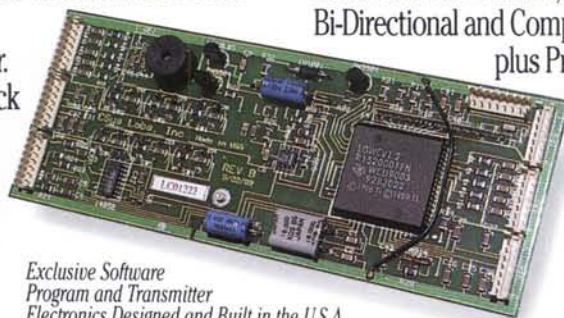
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NORTHROP P-61 BLACK WIDOW, Gary Pape with John and Donna Campbell. Chronicles the Black Widow through its development and career as a nightfighter. It was the first plane built specially for nightfighting. Included are cutaways and color plates of P-38s, P-70s, Mosquitos, and Bearfighters. Sfbd., 9" x 10 1/2", 144 pgs., 60 B&W, 60 color ill.4662B **\$24.95**

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LOCKHEED F-117 STEALTH FIGHTER, Miller. A compendium of information on the heretofore super secret aircraft just recently revealed to the public. Here is closeup detail and narrative that has been unpublished for at least five years. History, radar, weapon options, and the unique design are revealed. If you haven't seen it before closeup, you are in for a real Star-Wars experience. 103 photos, 48 pgs., Sfbd., 8 1/2" x 11"1650B **\$9.95**

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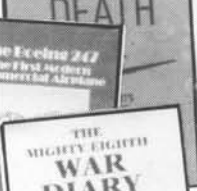
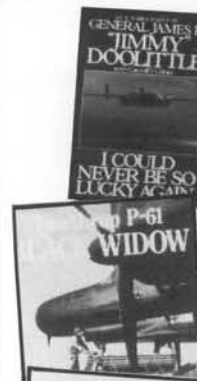
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WORLD'S MOST COMPLETE MODEL AIRCRAFT PUBLICATION

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ON THE COVER

This Playboy was one of the many colorful models at the 17th Annual Astro Electric Championships at Costa Mesa CA. Photo: Mike Ogle. Inset top: Mark Frankel's F-4D1 Skyray, see page 56. Inset bottom: Author James Wang's X-Cell 30 Helicopter, see page 71.

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PUBLISHER
Mark Thiffault

EDITOR
Wm C. Northrop

MANAGING EDITOR
Bill Rice

ASSISTANT EDITOR
Richard Dowdy

ART DIRECTOR
Scott A. McPherson

WORD PROCESSING
Edna Clark

DRAWINGS BY
Al Novotnik

ACCOUNTING MANAGER
Robert Ruiz

OFFICE STAFF
Luis Garcia
Heidi Johnston
Betty Simpson

ADVERTISING
Don Kremers
(714) 645-8830

CONTRIBUTING EDITORS
Rick Allison **John Pond**
Jake Doe **Francis Reynolds**
Bruce Edwards **Bob Stalick**
Bill Forrey **Scott Stauffer**
Bill Hannan **Art Steinberg**
Eloy Marez **John Thompson**
Walt Mooney **Al Tuttle**
Mitch Poling **James Wang**

Gallant Models, Inc. • 898 West 16th Street • Newport Beach, CA 92663 • 714/ 645-8830

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THE EXTRA 300

WINGSPAN: 68"
WING AREA: 850 SQ."
FLYING WEIGHT: 7.5-8.5 LBS.
LENGTH OVERALL: 61"
POWER: .60 2-CYCLE
.90-1.20 4-CYCLE

Kit includes formed cowling, canopy and wheel fairings plus glass-filled nylon engine mounts.

Plans include optional aileron servo arrangements.

How can you top the Ultimate? Try something Extra.

If there's a scale aerobatic subject that can challenge the popularity of the Ultimate biplane, we've got to believe it's Walter Extra's 300hp mid-wing masterpiece.

And that's why we've got a feeling lots of you will be delighted that there's a big, beautiful CGM version of the Extra that's affordable to own, a joy to build and a blast to fly.

EXTRA-THRILLING PERFORMANCE.

Among sport-scale aerobatic models, nothing can top the CGM Extra for silky-smooth tracking and control-response. And slowed to a walk, the Extra's superb glide and easy-as-you-please landings will almost make you feel like you're flying a trainer.

But turn it loose, and this lightweight beauty is capable of maneuvers they haven't even named yet. With your CGM Extra 300,

you'll be the star of your own airshow and you'll perform with the kind of confidence that only a truly great-flying model can inspire.



Designer Dave Patrick with airshow star Tim Nealey's Extra 300.

EXTRA-EASY TO BUILD.

Like all CGM kits, the 300's engineered to go together straight and true—even if you aren't an experienced builder.

Its precisely-cut balsa and interlocking ply components fit with perfection. Plus its clearly-illustrated, step-by-step instruction booklet and superb plans leave nothing to the

imagination.

You'll be absolutely amazed at how quickly your CGM Extra will be ready to cover and trim.

AN EXTRA-GREAT VALUE, TOO.

First off, consider the CGM Extra 300's impressive size, remarkable performance and ease of construction.

Then factor in its complete, top-quality hardware package, formed cowling, wheel fairings and deck-canopy unit and you'll agree—nothing else even comes close in value.

See the CGM Extra at your local dealer's now and *you'll* be flying something Extra in no time at all.

**CARL GOLDBERG
MODELS INC.**

The Extra 300. From Carl Goldberg Models.

BILL NORTHROP'S WORKBENCH

The following letter was issued on September 3, 1991, by Bob Underwood, Technical Director of the AMA, and directed to the Frequency Committee, the Frequency Advisory Council, Frequency Coordinators, Executive Council, Radio Manufacturers, and the Model Press. It's entitled, "Frequency Alert!"

"Several years ago Robinson Engineering, a supplier of movable cranes, filed a petition with the FCC requesting the sharing of the 75 MHz surface model

Robinson was already operating on model frequencies. As a result, Robinson then requested a waiver for a specific time period in order to convert that equipment. The period requested by them ran until 1993. The Academy again filed with the FCC indicating that the period of time was excessively long. Nevertheless, the FCC granted Robinson the time they had requested.

"In order to develop some means of determining the interference potential, the Academy

the problems inherent in our obtaining information. In addition, we found that the equipment was operating not only on the 75 MHz frequencies, but 72 MHz in some cases!

"Most of the companies responding appear not to have known that the equipment they were using operated on RC modeling frequencies. Others appeared to be very reluctant to provide any information at all. In some cases, it is very likely the Academy's request was never forwarded to the individual responsible for such operation within the company.

"The Academy next appealed to Robinson for help in this matter. We requested that they provide information concerning the equipment they had sold. Their response was that they were unable to do so since much of the equipment was sold through distributors and its location was unknown to them. Currently, the Academy is seeking guidance concerning additional steps to be taken in this matter.

"Included as part of this communication is a listing of the company names and addresses that appear to be using Robinson



Jim "Doc" Edwards, dentist from New Albany, Mississippi, Chief Judge for the well-known Tournament of Champions in Las Vegas, sponsored by Bill Bennett, Chairman of the Board of Circus Circus Enterprises, Inc., succumbed to the challenge of building and flying this twin-rotor RC autogyro from *Model Builder* plans (No. 4751, \$9.50). This semi-scale model was designed by Skip "RC Martian Spaceship" Ruff, and published way back in April of 1975. It continues to be one of the most popular construction projects from *MB's* extensive list of over 700 plans.

"It is important that you remember the Academy has some 20 scanners... which can be borrowed by chartered clubs..."

frequencies for crane operation. The Academy opposed this petition, pointing out that potential interference could produce safety

problems. Robinson's request was subsequently denied.

"However, it became known that equipment produced by

obtained the list of the names and addresses of companies currently possessing the equipment that desired to continue to operate the equipment under the temporary waiver. Following the acquisition of this information, each of the 130 companies was contacted, by letter, requesting the exact location, power output and frequency of the transmitters. The return of information has been very poor. Those companies that did respond helped us to appreciate

NOTICE

As of Thursday, September 26, 1991, management of RCMB, Inc., publishers of *Model Builder*, *RC Model Cars* and *U.S. Boat & Ship Modeler* magazines, was turned over to Gallant Models, Inc., Capistrano Beach, California. All office staff, editorial staff, contributing editors and other personnel involved in production are unaffected. Bill Northrop, co-founder of the company, will remain with the magazines. He will continue to assist Anita Northrop with her full-time management of the IMS Radio Control Model Sport and Hobby Shows in Pasadena, Milwaukee and Orlando/Daytona Beach. IMS address and phone number will remain unchanged (see page 107).

The bottom line is that the three magazines will continue without a glitch in service to their readers. Stay tuned!

DEAR JAKE

Advice for the Propworn

BY JAKE

Many of my faithful readers (now up to eight, thanks to a recent Parole Board ruling) have written, wondering whatever happened to "Jake's Glossary of Misunderstood Modeling Terms." Many more have written expressing their sincere appreciation for the Glossary feature's failure to appear in over a year. Such heartfelt interest cannot be ignored, and consequently, the Glossary returns with this month's column.

Most of you have no appreciation of just how much effort goes into preparing the Glossary. Many a tax-deductible beer was consumed in researching this material. Consider the task . . . selecting a term, recalling its definition, thinking up a better one. This is not easy stuff. More than once, I had to lower the volume on the TV to improve my concentration. But I'm a professional, and backbreaking work like this is why they pay me the big bucks (*Jake wanted bigger bucks, so we printed up special ones for him . . . three to a sheet on nice quality 8-1/2 x 11 paper. wcn*)

So, no more complaints. Without further ado, here then, is another chapter of "Jake's Glossary of Misunderstood Modeling Terms," keeping in mind that the term "Modeling" is used rather loosely, as the Glossary includes definitions from not only modeling, but from aviation in general, and from nowhere in particular.

JAKE'S GLOSSARY OF MISUNDERSTOOD MODELING TERMS

- *P-51 Mustang*—Horse with a bladder problem.
- *Injection Molding*—New

automotive system that squirts penicillin into the fuel/air mixture.

- *First Class Cabin*—Part of an airliner built by Abe Lincoln.
- *High Lift Devices*—A ladder and a truss.
- *Mold Parting Line*—"See you later, fungus."
- *Shrink Wrap*—Rhythmic music popular with psychoanalysts.
- *Wafer Board*—Corporate group at Nabisco.
- *Five-Ply Sandwich*—Radial BLT.
- *Pitch Rate Gyro*—What you do when it doesn't work.
- *Fault Tolerance*—Ability to forgive earthquakes.
- *Blast Pattern*—Zone of window breakage and dead animals around Bob's Diner when the daily special is beans and franks.
- *50 Grit*—Dan Quayle's IQ and one of John Wayne's movies.
- *Spread Sheet*—Circulate a rumor that's nothing but bull.
- *Helical Thread*—What a doctor uses if you cut the back of your foot.
- *Model Railroad*—Running Christie Brinkley out of town.
- *A-26, B-24*—Select the correct answer: $(9 \times 2) + 8$
- *White Noise*—Barry Manilow.
- *Fiber Optics*—New carrot cereal that improves your eyesight.
- *Fuel Filter*—Gauzy paper basket used in your Mr. Methanol.
- *Anti-Foaming Agent*—Rabies shot.
- *Fuel Additives*—One gallon plus one gallon equals thirty bucks.
- *Fuel Pick-Up Line*—"Say baby, what's your percent nitro?"
- *Spray Bar*—What they do when roaches are found in the beer nuts.
- *Damping Ratio*—Moisture level where mold versus mildew fraction equals one.
- *Fiberglass Part*—One feature of a very cheap toupee.
- *Advanced Composite Design*—Using a graphite pencil to draw your plans.
- *Load Limit*—Diaper capacity.
- *Carbon Fiber*—New breakfast cereal shaped like briquettes.
- *Carbon Copy*—General Mills'

continued on page 6

Engineering equipment. In those cases where information has been returned to us, you will find frequencies and locations listed. The power levels are low, generally in the 250 milliwatt range or below (roughly 1/3 to 1/2 the output of an RC transmitter).

"Your help is requested in

Most overhead cranes operate in areas completely surrounded by steel structures that will prevent stray signals...

order to build a file of information. If, as a club or individual, you are flying in or near an industrial complex please document any suspected incidences of interference. Note the frequency, time, date, type and age of equipment (transmitter and receiver). Additionally, include the name and AMA number of the individual owning the equipment and the distance of the field from the probable source. A 'probable source' includes manufacturing plants utilizing overhead cranes such as those found in moving steel products, car assembly facilities, etc.

"It is important that you remember the Academy has some 20 scanners in the field, which can be borrowed by chartered clubs to monitor for suspect interference. Contact your district Frequency Coordinator. Their names and addresses are listed in *Model Aviation* directly beneath your district Vice President's picture. Any data gathered should be forwarded to the Academy in care of the Technical Director, Bob Underwood."

How about them apples!? The FCC's behavior in this situation reminds me of the old joke about the young couple parked in "Lovers' Lane." The pretty young thing (the FCC in this case) says to her escort, "Don't be so fresh. I'll give you just ten minutes to

get your hand off my knee!"

The FCC is as much as saying that anyone can produce and market a radio controlled device on our 72 and 75 MHz frequencies, and once the device is out there being used (and interfering with our surface and air frequencies), they can then file a petition for permission to use those frequencies, be denied, and then obtain a waiver allowing use of the frequencies for as much as three years before having to convert the equipment. Like the guy in the parked car, someone can accomplish quite a lot if given enough time!

In truth, aside from the principle of the matter, it's probably not all that serious. Most overhead cranes operate in areas completely surrounded by steel structures that will prevent stray signals from their RC operation to escape and create a problem for model operation some distance away, and as Bob states, the transmitter output is considerably weaker than our model transmitters. Fact is, considering that if the crane operation has to resort to RC instead of the more direct method of cables leading to a pushbutton operator's box, it must be because the crane is operating under extremely hazardous conditions. As one responsible for safe operation of that crane, the first thing I would do is try to locate the nearest track, pond, or flying field where RC model systems, using stronger transmitter output signals, could foul up the crane operation . . . and legally at that! It would seem to us that it behooves Robinson Engineering to cover their butts by making this known to their customers instead of trying to hide behind, " . . . much of their equipment was sold through distributors and its location was unknown to them." You mean they're selling that stuff without a guarantee, which would certainly contain information on the name of the owner and the

continued on page 6

operating radio frequencies? Come on!

In any event, Bob Underwood's "Frequency Alert" letter concluded with a list of the names and addresses of the seven companies that were concerned enough to respond and list the frequencies they are using. Our count showed a total of 12 frequencies in the 75 MHz band, and 11 frequencies in the 72 MHz . . . yes, 72MHz band . . . in operation! In addition, the names and addresses, and the contact person of over a hundred other companies, were listed that, for one reason or another, did not supply information about the frequencies on the equipment they have available to them. Because the list was so long, we could not print them here, but I'm sure that club secretaries can write to AMA for a copy. We did sum up the distribution as follows: radio control crane units on 72 and 75 MHz are in the possession of companies located in 32 of our United States and Puerto Rico. The largest numbers are in Texas (20), Pennsylvania (18), Ohio (12), and Michigan (9), the others ranging from one to six units each.

BRING A MODEL, WIN A RADIO

Just a reminder that once again, radio control systems will be awarded along with First Prize in all categories of the Static Model Display competition at the 1992, Fifteenth Annual IMS Pasadena Radio Control Model Sport and Hobby Show on the weekend of January 10, 11, and 12, 1992, in Pasadena, California. In addition to Best of Show and People's Choice, the categories include; RC Race Boat, RC Scale Boat/Ship-Military, RC Scale Boat/Ship-Pleasure, RC Scale Boat/Ship-Work, RC Car/Truck-Electric, RC Car/Truck-Gas, RC Glider, RC Old Timer, RC Pylon, RC Scale/Sport-Military, RC Scale/Sport-Non-Military, RC Scale-Precision, RC Helicopter, RC Precision Aerobatics, RC Sport, RC Sport Biplane, Control Line, FF Endurance, and FF Scale. Radio systems will include Ace R/C, Airtronics, Cox, Futaba, and Hitec/RCD.

Incidentally, we're glad to see that the

Eleventh Annual Northwest Model Expo in Puyallup, Washington, February 1 and 2, 1992, will also be awarding prizes for models in four non-RC categories.

ALUMINUM CANS CAN FLY!

We casually looked at an ad that was to start in this issue for a bunch of small hand launch gliders, put it down, and then did a double take. Wait a minute . . . one of these is called a "Beer Can Bomber!" Then we picked up the ad again for a better look . . . Well, whadya know . . . these are little hand launch gliders made out of aluminum can material! The thing that fools your first glance is that they really look like very flyable balsa gliders. Instead of that, they're very flyable aluminum gliders!

Finally, we decided to read the ad, which isn't easy 'cause the type's very small. They're called Alcan Flyers (that figures), and what you get for \$5.00 including postage, is full-size patterns for one of the gliders, along with illustrated fabrication and flying instructions, plus all accessories required to produce a flying unit from an aluminum can of your choice. There are 26 patterns available (note the variety in the ad), and all are photo illustrated in a catalog you can order for a buck. In case you don't have a magnifying glass handy, the address is Box 97A, Southeastern, PA 19399. My first choice is the "Short Stopper," but I also want to try the "Spike" and "Alkie." Hmmm . . . wonder if I should use Pepsi, or Coca-Cola cans? Maybe I can fly higher on Budweiser!

THE AMERICAN DREAM

Dear Editor,

Thanks to the "American Worker," I have learned to fly R.C.

My Sig Sportita (made in U.S.A.), and my K&B .28 Sportster engine (made in U.S.A.) flies and runs so gentle, it's magic in the wind.

If you want slow flybys, then relax the throttle, and if you're after gusto and loops, then push forward on the stick.

The American dream is flying, and I am too . . .

Sincerely (Name withheld)

I hate to wake you up from your American dream, but you didn't mention what kind of radio you are using? Unless it's an Ace R/C system, you could be having a pleasant nightmare! And by the way, don't feel bad if you drive to your flying field in a Honda, Toyota, or Nissan . . . they're being made by Americans in Ohio and Kentucky, U.S.A.! **MB**

DEAR JAKE *cont. from page 5*

answer to Kellogg's Carbon Fiber.


- *Fulminate of Mercury*—Buzz Fulmin got hungry at the drive-in.
- *Cargo Hatch*—What happens when the egg delivery truck breaks down.
- *Battery Pack*—Knapsack for the Energizer rabbit.
- *Spot Weld*—Catch a glimpse of Tuesday.
- *Azimuth and Elevation*—Height and a science fiction author.
- *Green House Effect*—What happens about two weeks after you paint your house with yellow paint you bought on sale for \$2.99 a gallon.
- *Novice Pilot*—Pontius Pilate's apprentice.
- *Bombadier*—Poaching method popular in Georgia.
- *Belly Turret*—Navel artillery.
- *Navigation Lights*—Turn signals on a Buick.
- *De-Ice*—What de bartender should leave out when you order your drink "neat."
- *Oscillating Sander*—Auto body man who can't make up his mind what to charge you.
- *Rotor Disk*—Back problem common in helicopter pilots.
- *Carpenter Ant*—Karen's mother's sister.
- *Radio Crystal*—Cheap glassware you can win from WHIC if you know Slim Whitman's real first name.
- *Green House Effect*—Superstition that a house painted green can never win the Indianapolis 500.
- *Center of Gravity*—Mass centroid point within the Earth's core that moves as a function of Roseanne Barr's location on the Earth's surface.
- *Spade Lug*—What Agnes did after her big dumb boyfriend got ideas. **MB**

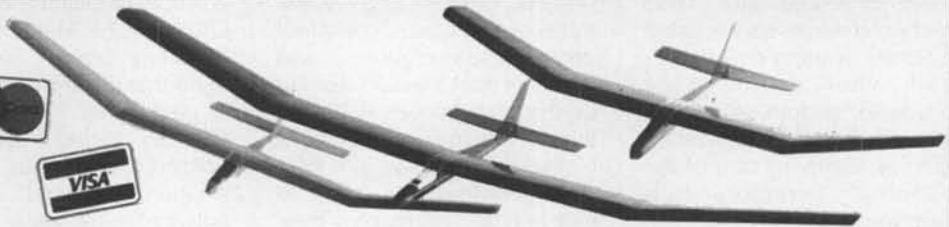
MINIMAX

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All Minimax kits guaranteed or return within 10 days for refund @ Rolled Plans @ All parts machined to exact size; no sanding required; just drop in and glue @ Hidden antenna Complete hardware package @ Factory Direct

Information: 1-509-683-1288
Orders only: 1-800-328-1288

<p>MINIMAX 700X</p> <p>2 Meter Sailplane For the Expert Master of lightest thermals</p> <p>Wing Span: 78 in. Length: 43 in. Weight Complete: 19 oz. Wing Load: 3.8 oz./sq.ft. Airfoil: ME1033 Wing Area: 719.250 Price: \$51.00</p>	<p>MINIMAX 1000X</p> <p>3 Meter 2 pc., D Capped, Webbed Wing</p> <p>Wing Span: 118 in. Length: 44 in. Weight Complete: 29 oz. Wing Load: 3.8 oz./sq.ft. Airfoil: ME1033 Wing Area: 1095.187 sq.in. Price: \$68.00</p>	<p>MINIMAX 700</p> <p>For the Novice Builder 32 pg. inst. manual 174 pictures Tech. Support Dial 509-683-1288</p> <p>Wing Span: 78 in. Length: 43 in. Weight Complete: 19 oz. Wing Load: 3.8 oz./sq.ft. Price: \$46.00</p>
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**A distinguished past.
An ambitious future.
It's time to join AMA.**

Since 1936, AMA has worked fulltime, year-round for you and the sport of model aviation. It's our job, and we take it as seriously as you take the fun of aeromodeling. As a non-profit organization, we must rely on member

support to fund our many efforts on your behalf. More than 200,000 members have pledged their support to us, but thousands more enjoy the rewards of our work. Isn't it time you joined AMA?



Here are just some of the programs AMA offers its members, fulltime:

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- A solid relationship with the Federal Communication Commission (FCC) that keeps radio channels open and available.
- Comprehensive insurance package for all members and clubs to cover liability, accident/medical, fire, theft and vandalism, PLUS our new vision/eyecare benefit that offers significant savings on eyewear.
- **MODEL AVIATION** magazine subscription to give you all the news you need, plus building and flying stories, month after month.
- Over 2,500 event sanctions per year issued nationwide.
- The National Safety Code, developed and monitored by AMA.
- Youth Scholarship Program awards of up to \$25,000 annually, plus free support materials to schools.
- Close working relationship with Federal Aviation Administration (FAA) for safe sharing of airspace and joint formulation of rules.
- AMA-sponsored National Championships, the world's largest aeromodeling event.
- World Championships teams, selected and supported by AMA.
- Newcomer support and instructor programs to promote safe flying through more than 2,000 U.S. clubs.



ACADEMY OF MODEL AERONAUTICS

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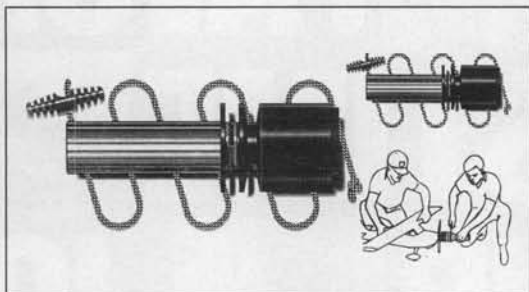
MB

over the counter

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

THE POWER HANDLE

First there were rubber finger guards, then John Tatone came up with the "Chicken Stick" for starting glow engines, to replace the pieces of rubber hose that the more injury-



conscious used to crank an engine into life. We brought the first commercial electric starter to our flying field way back in about the early 1960's, marketed by Herb Abram's Rand Corp. Everyone there

sorta pooh-poohed it at first, but before the day was over, it was, "Hey, let me try that thing," as some flier became impatient with his balky engine that refused to fire up. Since then, electric starters have become standard equipment in every modeler's field box, and about the only new developments have been attached battery packs and/or bigger starters for the prop-turning nose ballast on the overweight giants.

Now, Ace Radio Control, P.O. Box 511, Higginsville, MO 64037, phone (816) 584-7121, offers the "Power Handle," a device that requires no electric power, designed by John Gotzicki. It's the model airplane version of the good old pull cord starter used for many years (before electric starters) on gas powered lawn mowers and outboard motors. In addition to NOT requiring electric power that may die out at the most inappropriate moment, the Power Handle DOES require the safety element of someone else to hold your model while you apply the starting torque.

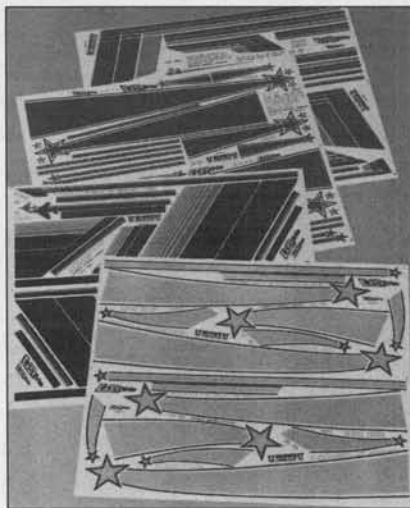
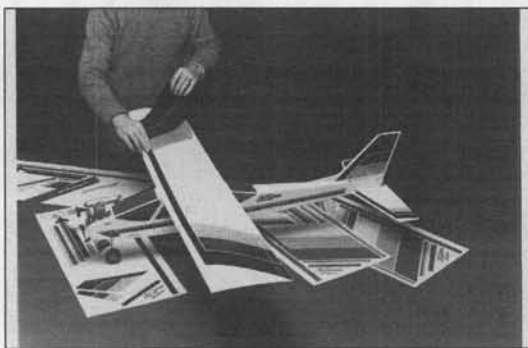
If nothing else, this backs up the most important safety precaution of all . . . never go flying alone!

The Power Handle is priced at \$24.95, with replacement rubber inserts going for \$5.50, and can be used on engines ranging from .09 cu.

in. up to the gasoline powered biggies. Like Ace says, even if you have an electric starter, keep a Power Handle in your field box just in case...

MIDWEST EASY TRIM

You finally finish the framing and covering of your next pride and joy, and you're getting hot-to-trot to head



for the flying field to try it out. But wait . . . not this weekend; you still have another six to eight hours of putting some fancy trim on your "Plane Jane" so your peers from the club will say "Wow!" instead of "Ho-Hum."

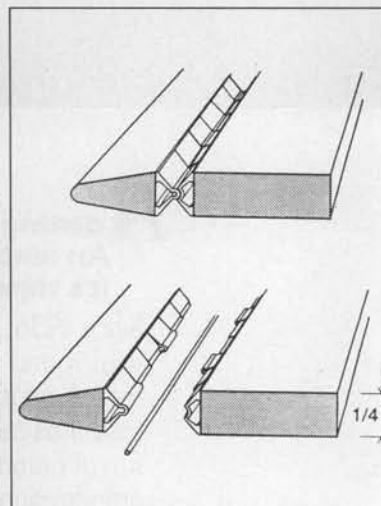
Ta Dah! Midwest to the rescue! Buzz down to your local hobby shop and pick up a set of pressure-

sensitive vinyl Midwest Easy Trim sheets, available in four different basic styles (Thunderbird, Starburst, Shooting Star, and Hot Stripes) and ten different color combinations, including Neon Pink, Green, and Yellow. Put one of these sets on your plane in a matter of less than an hour or two, and they'll see you coming to the field from three blocks away! The trim sets list for \$18.95 and \$19.95 (for the neons).

Call Denise Taylor at Midwest Products Co., 400 S. Indiana St., Hobart, IN 46342, phone (219) 942-1134, and she'll help you locate the nearest supplier, particularly if you say you read about it in *Model Builder!*

DEMOUNTABLE HINGE

When to hinge your control surfaces, before or after you apply



the covering and finish? And if you are the least bit serious about flight performance, add to that question the matter of obtaining gapless hinging and still being able to attach or detach the surfaces after covering and finishing. Fourmost Products, 4040 24th Ave., Forest Grove, OR 97116, phone (503) 357-2732, has an answer to all of the above. It's, logically enough called Demountable Hinge, and comes in a package of 12 six-inch segments, for a total of 36 inches of hinge line. Hinges are coupled with 1/32-inch piano wire. Although it is manufactured in white nylon, the hinge may be dyed or painted to match any finish. Deflection is a full 45 degrees in either direction, which is a whole lot more than you'll normally need, so you can afford to mount it on

surfaces thicker than the 1/4 inch shown and still have plenty of hinge action.

OK, John, let us ask the question interested modelers are going to put to you. Will you be making it in a top surface hinge point style, as often applied to aileron mounting? Looks like it should be no problem.

FIVE STAR 30V

Many world-class RC helicopter fliers choose TSK mechanics for



their competition machines. Up to now, this has been a relatively unknown company to the average chopper pilot, other than seeing reference to it in James Wang's "Helicopter World" articles in *Model Builder*. Now, Vortex R/C Helicopters, 1374 Logan Ave., Unit "A", Costa Mesa, CA 92626, phone (714) 751-6212 (Fax -6209), has set up a US distributorship and retail source for easy access to this company's products.

A new TSK Five Star 30V helicopter kit is now being offered for the discerning model enthusiast, both for the advanced and the intermediate weekend flier. Typifying the TSK approach to quality, all parts, including the drive unit and linkage systems, are manufactured from metals, to the exact standards associated with the TSK name. In addition, a fully machined rotorhead offers response from full aerobatic to precision FAI-type hovering maneuvers.

Standard Five Star 30V features include: all metal rotorhead, all metal box-type main frame and servo tray set, new in-line top hex

- starter system, precision D-85 tail
- drive transmission, new tail rotor
- grips and blades, 300cc (10 oz.) fuel
- tank, fiberglass 30V "Super Body",
- and decal set. Optional parts include
- an S-30T silencer, fiberglass main
- rotor blades, JRC Multi-Laminated
- weighted blades, reflex tail rotor
- blades, rotorhead top stop button,
- and lightweight stunt flybar paddles.
- Specs on the Five Star 30V are:
- length 42-3/4 inches, height 15-3/4
- inches, main rotor diameter 47-49

- inches, tail rotor diameter 8-1/4
- inches, dry weight 5.9-6.4 pounds,
- and list price \$749.95.

Give Nick a call for more information on available TSK and other name products, and tell him we sent ya!

21ST CENTURY PAINT



- Computer problems be darned
- (see October '91 "Workbench"),
- Coverite is ready for the 21st century
- with its line of covering and painting
- materials. The photo shows the

- dealer counter displays that will
- present Coverite's materials for your
- selection. The 21st Century covering
- film is 100-percent polyester like
- most popular brands, but also has
- "Shrink Control" that allows you to
- control shrinkage as you apply it.
- The 21st Century Paint dries dust-
- free in 15 minutes, coats can be
- applied in 30 seconds, and it
- becomes fuelproof to as much as
- 15% nitro fuel overnight. And 21st
- Century Fabric has a fuel-proof
- finish, and is typically tough for a
- fabric covering.

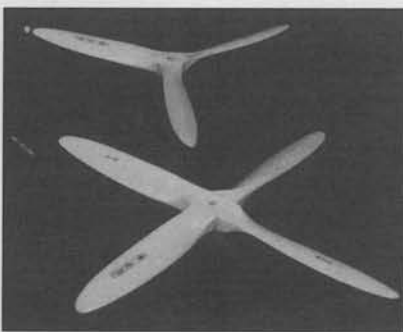
Check at your local dealer, and if he's asleep at the switch, contact Coverite at 420 Babylon Road, Horsham, PA 19044, phone (215) 672-6720 (Fax -9801). Art will wake him up, or help you find a reliable source.

FROM HOBBY LOBBY

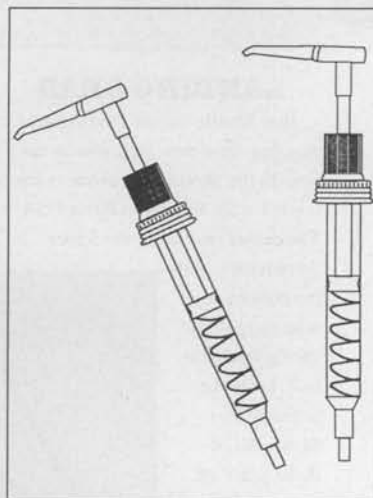
Two more items are shown that are displayed in Catalog No. 18, which is available free in the USA from Hobby Lobby International, 5614 Franklin Pike Circle, Brentwood, TN 37027, phone (615) 373-1444.

Giant two, three, and four-bladed wood props ranging from 16-inch diameter up to 24 inches, and in a variety of pitches, are listed in the catalog. These are big hunks of lumber that should be able to take all the torsional loads that any gasoline engine can offer.

If you decide to use Hobby



- Lobby's new magnetic hatch latches,
- you better build a strong hatch!
- These neodym magnet lock sets, that
- sell for \$7.60, exert over six pounds
- of magnetic attraction. You can't use
- your fingernails to separate a hatch
- that's held in place by these things!
- They're the same magnets used in
- neodym magnet motors. Better build
- in a screwdriver slot, or you may
- have to find another way to get
- inside the fuselage!



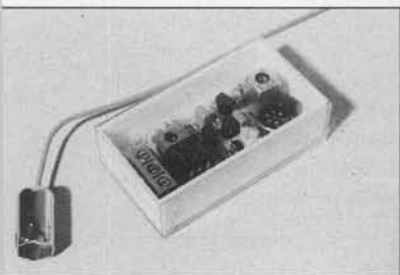
DISPENSER PUMPS

Aerospace Composite Products, P.O. Box 16621, Irvine, CA 92714, phone (714) 250-1107 (Fax -0307), now offers convenient pre-set calibrated dispenser pumps for its pint, quart, and gallon cans of EZ-Lam Epoxy resin and hardner; one ounce per stroke of resin, one-half ounce per stroke of hardner... the exact mixing ratio. The pumps are \$6.00 a pair, available at your hobby shop, or direct from ACP. Dealer inquiries invited.

LISTEN TO YOUR ENGINE

An AGIM is what it's called, and it stands for Acoustic Glow Plug Idle Module. We knew that, didn't we? It's available from High Sky, 3929 Kansas St. No. 19, San Diego, CA 92104, phone (619) 297-5792. What it does is listen to your engine through the built-in microphone, and then switches on glowplug power whenever the engine runs critically slow, preventing unwanted stalling. The AGIM does not interface with the radio control system,

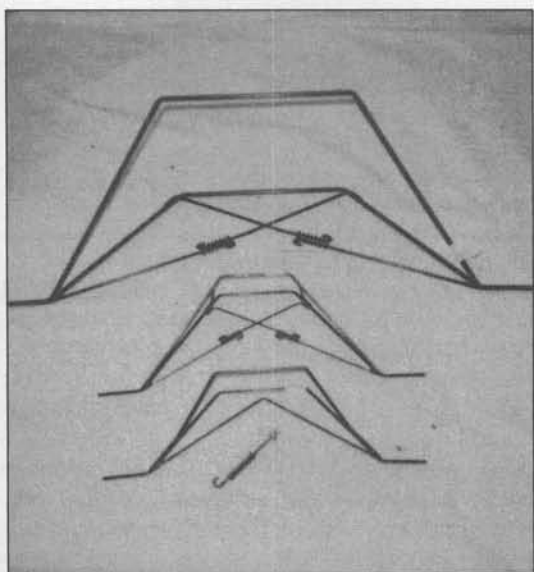
therefore no microswitch or servo linkage. Only a 1.2-volt cell is required for the simple installation. List price is \$34.95.



LANDING GEAR

Bob Shattleroe, the landing gear guy, has three new additions to his line. In the photo, the top one is for the 1/3-scale Cub from Balsa USA. The center gear is for the Super Aeromaster, and the bottom one, with suggested spring-loaded J-bolt, is for the Smith Mini Plane. All of these gears are wire welded, reheated 1/4-inch piano wire, and spring loaded for those less-than-perfect landings.

Coming soon are Bungee Covers, for even more scale appearance. Watch for them!



Send a buck to Bob Shattleroe Custom Gear, Dept. #8, 31985 John Hawk, Garden City, MI 48135. If you have any questions, or want to talk about some custom work, call Bob at (313) 261-9064, and tell him you read about him in *Model Builder*.

TRICKLE CHARGER

Tejera Microsystems Engineering, Inc., P.O. Box 340608, Tampa, FL 33694, phone (813) 968-9510, or (800) 729-9210, is offering the Auto-Trickle Adapter. This device is said to convert all standard overnight chargers into fully automatic trickle chargers. It is simply plugged into a wall outlet, and then all of your existing overnight chargers are plugged into it. Push a button to start it off, and the 100% solid state timer circuitry will, after 14 to 16 hours,

- turn your
- chargers into
- safe pulse trickle
- chargers. The
- unit is said to be
- able to handle
- up to 120 watts,
- and can take on
- up to 30 Tx and
- Rx chargers,
- NiCd starters,
- etc. Not only can
- it be used with
- R/C overnight
- chargers, it can
- also be used
- with cordless
- drills, screwdrivers, saws, sanders,
- vacuums, and shavers, to increase
- their life and readiness. There are
- three AC receptacles available for

- direct plugging in of chargers. The
- unit retails for \$39.95.
- The ATA-CX1 will be available
- at hobby dealers nationwide, or may
- be purchased directly. Contact
- Albert Tejera for more information
- or to place an order.

DRILL KIT

- Minicraft, of Berkshire, England,
- which markets its complete line of
- precision-engineered power tools
- and accessories in 23 countries, is
- introducing its High-Precision Drill
- Kit to the American hobby and crafts
- market. Designed for professional
- craftsmen and serious hobbyists, this
- drill kit can be used for a variety of
- model building and repair tasks,
- limited only by the inventiveness of
- the user.

- The MB8571 kit includes the
- 100-watt High-Precision Drill, a



- variable-speed transformer, chuck
- key, and 15 accessory items for
- drilling, cutting, grinding, routing,
- shaping, sanding, and polishing. The
- kit's high-impact, clear plastic box
- serves as a convenient storage and
- carrying case for the drill, trans-
- former, and accessories.

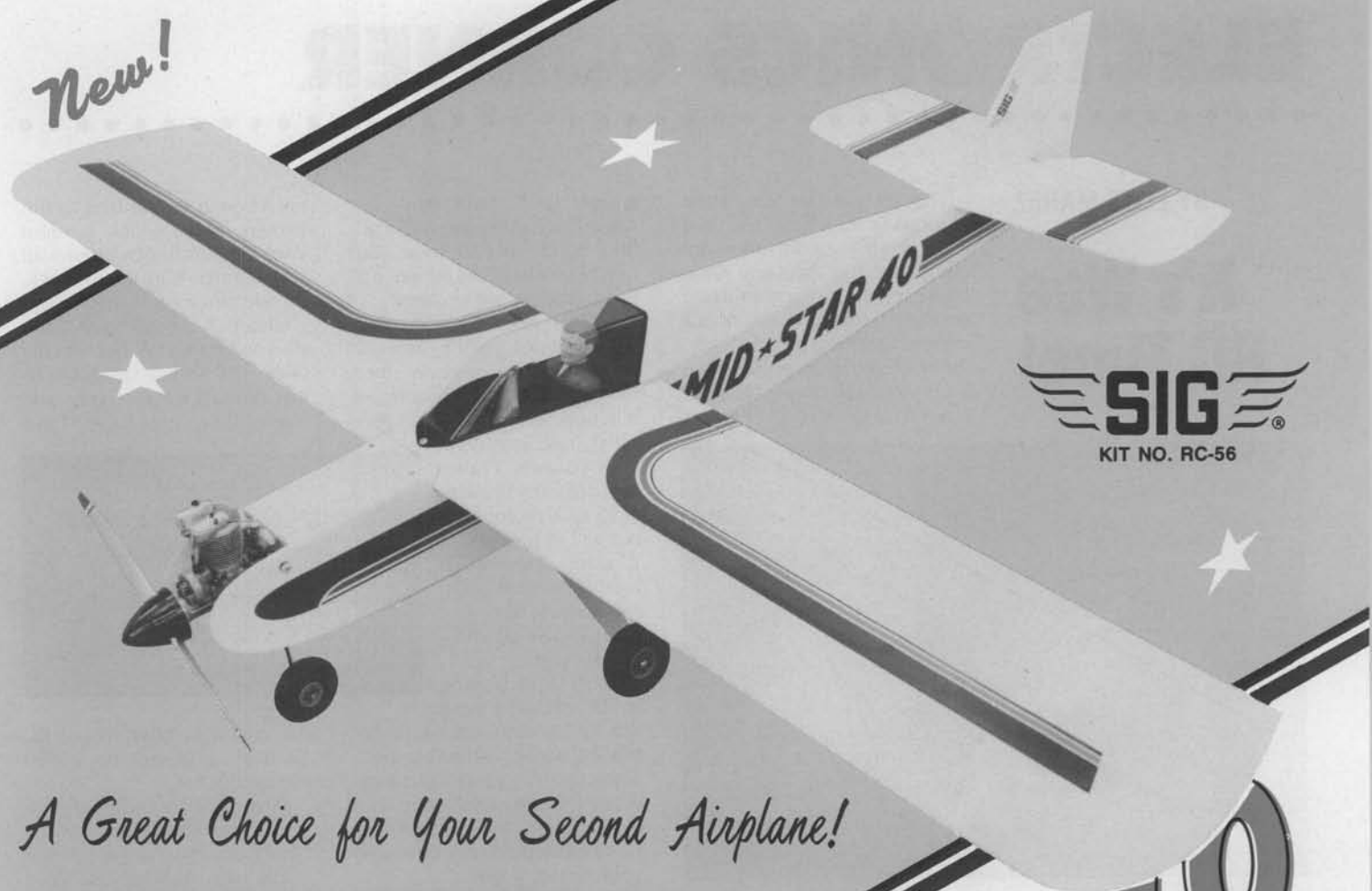
- The drill has a 9 to 18-volt D.C.
- motor which develops a maximum
- output of 100 watts and is fan-cooled
- for a longer life span. The no-load
- speed of 12,500 rpm at 12 volts can
- be increased or decreased with the
- MB730 variable-speed transformer
- to suit each application. The 15-
- ounce drill's housing is ergonomi-
- cally designed to give users a

- comfortable three-way grip (palm,
- pen, or pistol), and the twin-bearing
- drive makes the drill run smoothly
- and efficiently. The chuck capacity
- range is from 1/64 to 1/4-inch. A
- six-foot long expandable cable
- permits greater flexibility for
- workbench applications and storage
- in confined spaces.

- The MB8571 High-Precision
- Drill Kit retails for \$119.95, and
- may be ordered, along with a free
- Minicraft catalog, by calling
- Minicraft toll-free at (800) 288-
- 5331. VISA and MasterCard are
- accepted. Oh, and be sure to tell
- them you read about the drill in
- *Model Builder*. **MB**



New!



SIG
KIT NO. RC-56

A Great Choice for Your Second Airplane!

- ★ LITE-PLY FUSELAGE/SIMPLE WING DESIGN
- ★ TRICYCLE GEAR OR TAILDRAGGER
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- ★ FAMOUS SIG EASY HINGES
- ★ BIG DECAL SHEET

Designed by
BRUCE THARPE

MID ★ STAR 40

**FOR FOUR CHANNEL
RADIO EQUIPMENT**

RECOMMENDED ENGINES:
.30-.40 2-STROKE
.40-.50 4-STROKE

SPECIFICATIONS:
WING SPAN: 64-1/2"
WING AREA: 630 sq. in.
LENGTH: 47-1/2"
WEIGHT: 5 lbs.

PH: 515-623-5154 FAX: 515-623-3922 Toll Free Orders: 1-800-247-5008

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ELECTRONICS CORNER

BY ELOY MAREZ

It's Wee RC Time!

Though I get a lot of mail and requests for information on Wee RC's, fresh material does not come along in the same ratio. However, I have accumulated enough to take up most of our allotted space this month. Sorry, those of you who prefer them king-size will have to stick around till next month. First off



The Great Georgia Gnat Guru, Fritz Mueller, launches one of his Wee RC creations, this one with a very unique and one-of-a-kind control system. See text for details.

the runway is our old pen-pal Fritz Mueller, out there in Georgia, who writes, first about big ones, then:

"I'm perfectly happy with my Wee RC stuff on a band that remains unchanged, 27 MHz. They are shaking their heads at my RC Club, 'Isn't it risky to be on a 27 MHz toy channel?' My

answer is, 'I don't think so.' After which everyone walks off; they don't want to know. But maybe you have the patience to listen (*We do, we do.-em*).

"1. A regular Albin receiver with batteries, switch, antenna and my actuator weighs less than nine grams. Hence you can put it in Bob Peck's (*Gone but definitely not forgotten.-em*) 16-inch Prairie Bird driven by Brown's A-23 CO₂ motor for a n a 11-up weight of 21 grams. A model that light is flying at walking speeds. You can run it into a wall, and it will survive.

"2. A 16-inch plane at 200 yards is a small dot. Flights observed from a distance of about 150 feet are more enjoyable. This puts your two-watt transmitter so close that not even a 50-watt transmitter within half a mile could knock through your carrier wave.

"3. A plane guided by a manual pulse system will not crash even if the RC system fails, because it is basically a free flight model. It will just continue to circle to the left if no signal is received. It will fly straight if it receives a spoken message, because the rudder then flutters at the rhythm of the speech pattern. Only a solid whistle (500 to 900 Hz tone) can make it turn to the right. There are some CB operators who can talk for 10 minutes, but the average CB message is eight seconds.

"I can go to any gathering of RC fliers and operate my plane at any time without asking anybody. I flew at three meetings

and the fabulous fly-in at Americus, Georgia. Being the only one on 27 MHz, my radio was never impounded. I gave

my 16-inch Prairie Bird to Bill Brown. My 13-inch tandem wing is controlled by a two-watt walkie-talkie from Radio Shack, on sale now for \$29. It has three channels. I can talk to my buddies on Channel A, but into the Channel B sockets I put toy control crystals for receiving and transmitting. Thus I even have

In case you're brand new here, Fritz is controlling his flea-weights with a normal walkie-talkie voice transmitter.

the option to listen to my RC channel, a feature no \$1000 transmitter has."

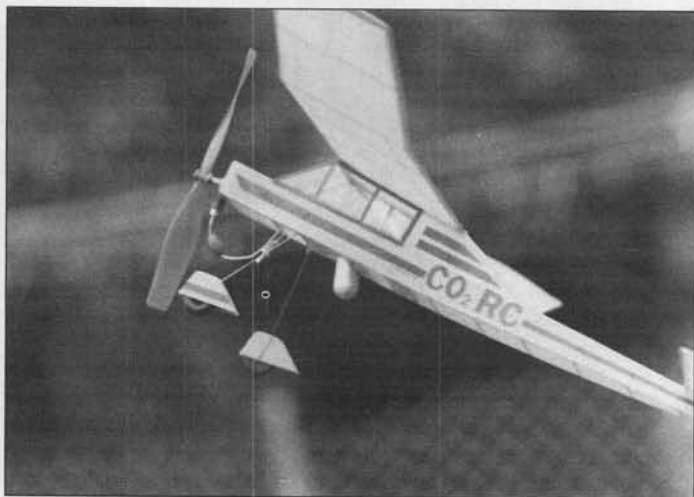
Included are a couple of photos, one of the Great Georgia Gnat Guru about to launch one of the wee ones into the Wild Blue, and another one of the little Prairie Bird in flight. Check out those fancy wheel pants, will ya?

In case you're brand new here, Fritz is controlling his flea-weights with a normal walkie-talkie voice transmitter. The model is trimmed for left flight under no-signal conditions, will fly straight when it is talked to, and turns right when whistled at. The one bit of information missing is just what he says to it, but I can imagine that it usually goes something like, "That's it, just like that, hold it, hold it, that's it, good"; sometimes punctuated by "Straight, dammit, I said straight!"

Don't bother to test the system, on girls, I tried it out at the pool a couple of days ago and it didn't work! But except for that, isn't it all quite clever?

TOM DAVIS, SEATTLE WASHINGTON, Wee RCer, is next to share his experiences with us. He writes:

"Have you seen the new Kyosho KS-10 micro servo? The complete servo weighs 13 grams, about half a gram more than a Cannon servo. I replaced the heavy servo wire with 29 ga.



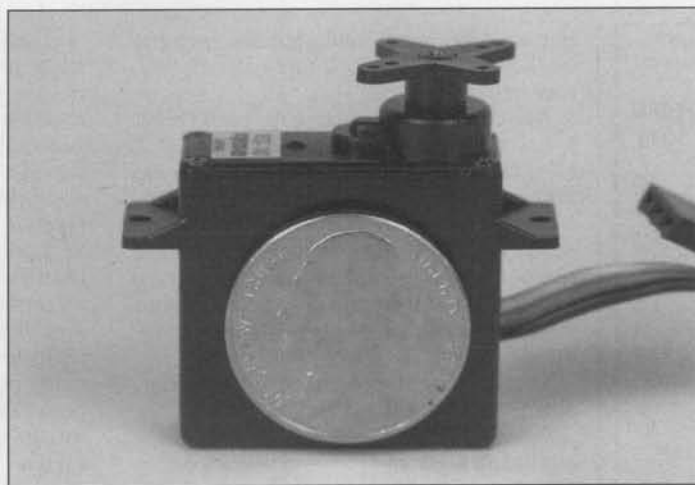
Fritz's CO₂ powered Peck "Prairie Bird," with RC yet. Fliers of larger craft might not believe or accept it, but this is a far greater challenge than any UGLY ever made.

Cannon wire, removed the bottom half of the case including four full-length steel screws, and two thick neoprene servo amp pads. Now the servo weighs an extremely light .25 oz. This is indoor model material! Very exciting! With a similar stripping, the Cannon micro servo weighs .33 oz.

"Here are some specs: Weight, 13 grams; Torque, 1.4Kg/Cm; Voltage, 4.8-6V DC; Motor, Namiki 7mm. x 17mm coreless cobalt, wt. 2 grams. Cannon uses a 10mmx12mm Namiki coreless cobalt, wt. 3.7 grams; Servo Amp, Mitsubishi IC die on ceramic board (very small and optimal. Cannon's Signetics servo amp weighs about three times as much); Speed, .19 sec./60 degrees; Size, WHD 28x26.4x12mm (1.1x 1.04x.47-inch).

"They sell for \$39.95 at Tower; right now they are on sale for \$29.95 (outdated, check current pricing. em), BC1104 Kyosho (connectors. em), BC1105 Futaba J, BC1106 Airtronics.

"In a recent Heathkit catalog, there is a toy called Dragonfly Wings. It has flexible wings that flap when a pulsating signal is applied to them. This piezo-



Tom Davis, of Seattle, Washington, makes a great case for the application of the Kyosho micro servo, including a weight reduction scheme that brings its operating weight down to 1/4 oz. See text!

electric film might possibly make for an ultra light control actuator. Just insert a piece of this film into the trailing edge of a wing, H-stab or V-stab, and send the right signal. If you want semi-proportional control, use an array of pieces. The kit is #SK118 for \$21.95. Have a catalog sent to you, call (800) 44-HEATH. I haven't actually received my kit, but I have high hopes."

Well, Tom's description certainly makes the little Kyosho servo sound attractive, doesn't it? I have seen these little wonders and can add that it is extremely well made, with good clean plastics and a smooth sounding gear train. In fact, you'll find a picture along with this column, with a nickel for

back in the September '89 column. Soon afterwards one of our readers put us in touch with a Wee RCer who was actually using Nitinol in an actuator, and who offered to share the results with us, but nothing has yet appeared. Maybe it'll show up one of these days; in the meantime, if any of you have used it in Wee RC applications, we'd like to hear from you. As for the Dragonfly Wings itself, a quite complete article about it, in-

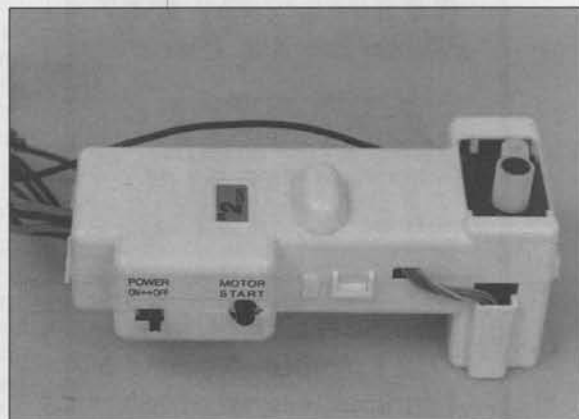


The Cox "Failsafe" airborne module contains all of the receiver and servo electronics and servo type actuator. Removal of the case lessens both width and weight.

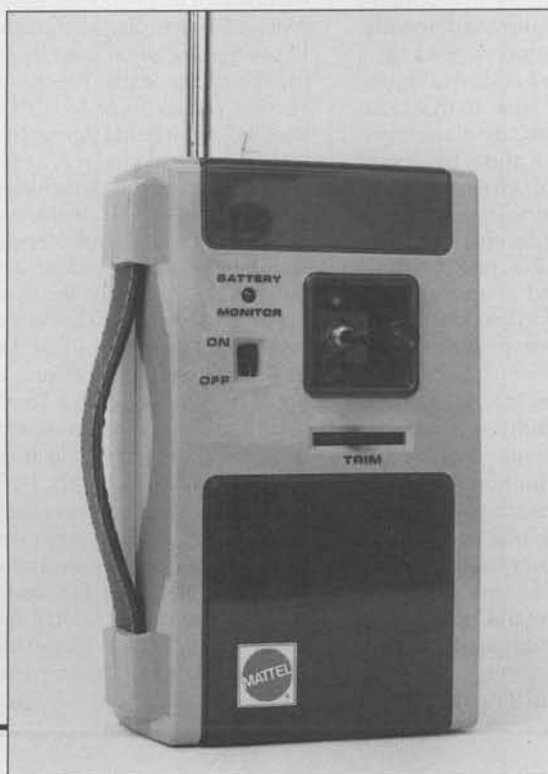
size comparison. The weight savings tricks mentioned are definitely worth your consideration, and, in fact, are descriptive of procedures that can be applied to a lot of our equipment when weight is a factor.

The Heath Dragonfly Wings described makes use of a material and techniques I have mentioned here before. The metal is named "Nitinol," being described as a "shape memory alloy," and has the feature of shrinking whenever a current is applied to it. I discussed more about its properties and sources

including circuits and PC board layouts, appeared in the September 1991 issue of *Popular Electronics* magazine. Anyone



Cox Hobbies' latest entry into the Wee RC equipment field; left-right button operated rudder-only, with a sure-fire method of preventing beginner's over-controlling tendencies.



Good news for owners of the Mattell "Barbie Doll" pulse system. Thanks to the graciousness of Larry Renger, complete schematics for transmitter and receiver are now on hand... send SASE to Eloy.

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out to experiment with Nitinol material would probably learn a lot about its application from this article.

Aw, come on now, you really didn't think I was going to leave you with that "1.4 kilograms/centimeter" torque figure up above, did you? Of course not. In our common non-metric value, it converts to 19.45 oz./in., which is a respectable figure for a servo of that size. In the early days of RC, we flew .40 and .60 engine powered airplanes with servos of that power and never knew the difference.

You'll run into those metric torque figures again, the conversion formulas are:

$$\text{G/Cm to Oz/In:} \\ x 1.389 \times 10^2 (.01) =$$

$$\text{Kg/Cm to Oz/In:} \\ x 1389 \times .10^2 =$$

For those of you on the other side of the pond, to work those values backwards:

$$\text{Oz/In to G/Cm:} \\ x 72.01 =$$

$$\text{Oz/In to Kg/Cm:} \\ x .07201$$

Wouldn't it be nice if we all spoke the same language? At least when we are speaking in English...

COX HOBBIES has recently introduced some RC equipment that is bound to find its way into Wee fliers here and there. They originally appeared as part of an electric powered ready-to-fly package called the "Flyboy," a high-wing Cessna look-alike with 27-inch wings, advertised as flyable by anyone over nine years old. That certainly qualifies most of us! Anyway, the radio used (see picture), called simply "FAILSAFE," is certainly a departure from everything else currently available, something of a mixture of old and new. Single channel, rudder only! As seen, the transmitter uses two buttons, one each for left or right turn. Additionally, and this is where the Failsafe comes in, if either button is depressed and held down, the rudder itself actually stays in that position for a very short period, then automatically returns to neutral. It must be almost impossible to over-control or freeze as many beginners are known to do. To continue to make a turn, the proper button has to be pulsed, the fastest possible rate being at approximately 1/2-second intervals. There is even a rudder trim knob to keep those little ones on a straight course between commands.

Well, the Failsafe system is now available separately; electronics only without the Flyboy airplane. And for you hotshots, it comes with instructions on how to disable the failsafe function, so that the rudder control will stay full over as long as you hold down the button. The procedure is quite simple, requiring only the removal of the right-hand button holder and soldering a jumper across two capacitor leads. Details are included in the instructions.

The airborne unit, consisting of receiver

and one actuator, is quite clever and shows some practical thinking on the part of the designer(s). While it is not exactly in the Fritz Mueller weight class, it does have distinct possibilities for many small airplane applications. Referring to the enclosed photo, you will see the fully contained module, receiver and servo. It is available in two versions, with and without a built-in BEC (Battery Eliminator Circuit). The latter is recommended for electric powered models, and allows use of a single battery for both the radio and the motor; voltage sensing circuitry cuts off the motor at a predetermined point while leaving enough battery power for the RC equipment to get you home safely.

"Flyboy," a high-wing Cessna look-alike with 27-inch wings, advertised as flyable by anyone over nine years old.

There are some limitations to this feature: the system is designed for motors of less than 2.0 amperes current drain. Now keep in mind that the current required for any motor is not determined by the motor itself; definitely not by the number of winds

or resistance as is often thought. The current consumption is affected by a number of additional factors; size and pitch of the prop, gear ratio if a reduction unit is used, and even the weight of the model. As a point of reference, the Cox Flyboy uses an FK130 motor, and a 6x7 prop with a 4:1 reduction. A four-cell 110 mA NiCd battery results in a motor run of about two minutes. Another nice feature of the BEC version is that it is equipped with a motor start button which must be pressed before the motor will run, though the radio will work and can be tested prior to flight.

The non-BEC airborne unit is recommended for those models powered by other types of powerplants, though actually the BEC version can be used by simply removing the motor leads. Weight-wise, the BEC version comes in at 55 Gr (1.94 oz.); the non-BEC type being lighter by one gram. In size, the module is 3-17/32 inches long by 1-11/16 inches wide, including the offsets; i.e., it'll fit a 1-11/16 inches wide fuselage.

The plastic case shown encloses the electronics PC board, and also the self-contained servo. Actually, the servo electronics are on the same board as the receiver, but for installation purposes it can be installed as any normal servo. Therefore, a lot of weight could be removed with a Tom Davis type of treatment, plus by mounting the servo lengthwise, the unit would fit fuselages down to 1-3/8 inches in width. I estimate that it would be quite easy to get the weight down to one ounce, and possibly even a few grams less by removing the case and shortening all the wires. Naturally this does not include any battery weight; don't forget that the larger ones will allow longer flight times, but always with some loss in performance.

continued on page 34

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A MEET FOR FUN!

June 15 and 16 were the dates for the Weilmunster electric meet here in Germany, not far from where I live in Wiesbaden. This meet featured beautiful scenery, good food, and events for electric pattern and electric helicopter. Did I get the priorities straight? This meet was fun! Pattern was on Saturday, helicopter on Sunday.

design 20-cell model is all sheet balsa covered with tissue, and displayed very good vertical performance. Helmut Galinsky's Akrobat with 24 cells handled the gusty winds very well, and showed good vertical performance. The Akrobat is available for DM 400 (about \$240) from Rudolf Freudenthaler Modellbau, Keplerstrasse 15, A-4240 Freistadt, Austria. Freudenthaler, by

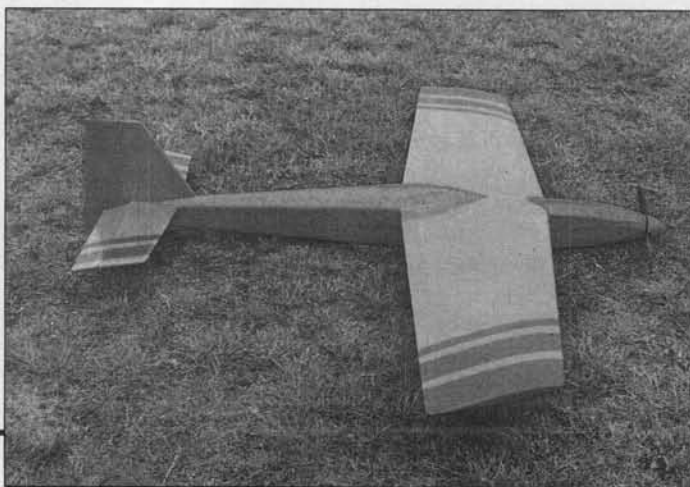


Fred Annecke's scale Bell Ranger can fly for 6-1/2 minutes.

The pattern planes seemed to group naturally into two categories: 14-cell and 20-24 cell, which corresponds to the Astro 25 and the Astro 40 sizes. The Firefly was popular in the 14-cell range; this is a very capable design available from SN-Models, Nettegasse 44, 5024 Pulheim 3, Germany, for DM 235 (about \$140). It has a fiberglass fuselage and sheeted foam core wings, span 145 cm (57 inches), typical flying weight is 2.5 kilograms (5-1/2 lbs.). Jens Bartels' very attractive original design 14-cell Pink Panther also flies very well. Jens says that there will be a construction article on it next year in the European modeling press.

The 14-cell planes are smooth fliers, but those with 20 to 24 cells generally showed better vertical performance, speed, the "high power" look, and better handling in the stronger winds. Heinz Fischer's original

the way, is the World Champion in F3E... a top expert in electro flying! The Akrobat has a 170 cm span (67 inches), fiberglass fuselage, sheeted foam core wings, and a



Heinz Fischer's original design 20-cell pattern plane; all sheet balsa construction with tissue paper covering for light weight.



Fritdjoj Schussler's Firefly; good pattern performance on 14 cells.

flying weight of 2.9 kilograms (6-1/2 lbs.) with 24 cells.

I was very impressed by the performance of the 20-24 cell pattern type electrics; it is too bad that there are none that I know of that are available in the USA. Besides the Akrobat, there are several others available

The Whisper is a neat little helicopter, with very good performance. It is smooth, stable and capable of backwards flight!

here in Germany. One is the Electro-Akrobat, available from Aero-naut Modellbau, Stuttgarter Strasse 18, 7410 Reutlingen, Germany, for DM 398 (about \$240). It has a 170cm span and 2.9 kg flying weight with 24 cells. The fuselage is fiberglass, the wing is sheeted foam core. Another example is the Acrofly, from Geist Electropower, Bahnhofstrasse 13, 6394 Gravenwiesbach 1, Germany, priced at DM 770 (\$350). It spans 155cm, has a 3

kg (6.5 lbs.) flying weight with 24 cells, and has a fiberglass fuselage and fiberglass wings. Pattern flying is a very active competition class here, with at least three major meets a year in my area alone.

The helicopter flying on Sunday was very impressive indeed. Would you

believe a 10-1/2 minute electric helicopter flight, with a hover at the end before landing? I timed it myself and so did several others. This is, I believe, the longest electro-heli flight in the world. Charles Joachim, of Belgium, accomplished the flight with his scale Hughes heli, using a Plettenberg motor and Robbe mechanics. Flying weight of the heli with 30 cells is 4.4 kilograms (9.7 lbs.). And, you guessed it, the cells were special. They are the well-kept secret from Sanyo, the 1800 mAH SCRs! These are available here in Germany from Multiplex and in the USA from C.S. Flight Systems, 31 Perry Street, Middleboro, MA 02346-3117, for \$6.50 per cell. They are the same diameter as the regular 1400 mAH SCRs (sub-C size), but are seven millimeters longer (.3-inch). They are only 8 grams (.3 oz.) more than the regular 1400 mAH SCRs, and have the same high power and very low internal resistance famous in the SCR cells. Keith Shaw, who has been using them for over a year now, says they are a real breakthrough. I am definitely going to try them, too! Any cells that can fly a 10-lb. helicopter for over ten minutes with hovers, round-the-field circuits, and stall turns, are cells that I want to have in my planes.

Fred Annecke's blue-and-white scale Bell Jet Ranger flew on 27 cells with a Plettenberg motor and original mechanics. It was an exceptionally smooth and quiet heli, with lots of power.

It flew 6-1/2 minutes on 1400 mAH SCR cells. Achim Huber's red non-scale heli had Heim mechanics, 28 cells, an Ultra 200 motor, and weighed 5.7 kg (12-1/2 lbs.). It flew seven minutes with 1400 mAH SCR cells.

Horst Wiederhold flew his Kalt Whisper with eight 1400 mAH SCR cells, for 6-1/2 minutes. The Whisper is a neat little helicopter, with very good performance. It is smooth and stable and is capable of very good



Jens Bartels' Pink Panther, 14 cells, very pretty in the air, good flier.

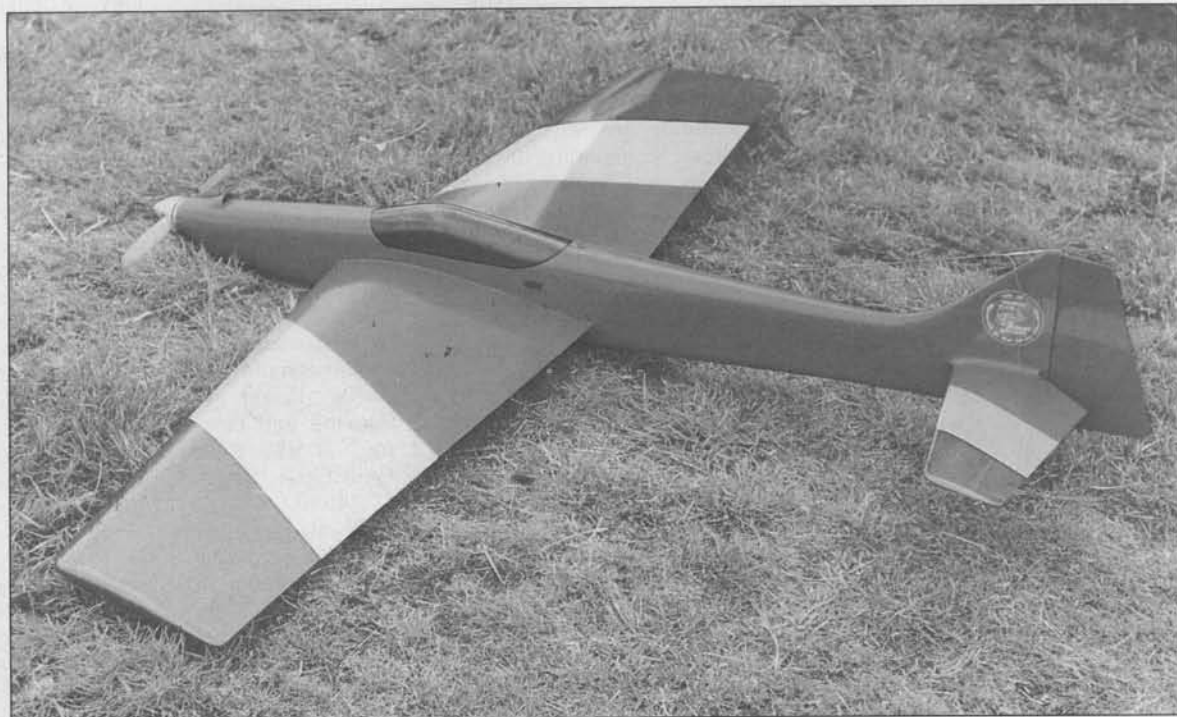
backwards flight! Horst did have a mini cooling fan for the motor, as it gets hot. Horst has used the 1800 mAH SCR cells in the Whisper as well, but found that the limiting factor was the motor, which got too hot to allow flying out the full capacity of the 1800s.

I also have a Whisper, which I have not flown yet (I am just learning to fly helicopters), and I wondered about that when I saw the motor that comes with the Whisper. It tests out very well, but the brush design is unusual. The brushes rely on a pressure fit for contact with the motor leads. There are

control for several months, and I am impressed. Jomar has this packaged with a very attractive clear blue case and aluminum heat sink. The speed control is only 4x5x7mm thick (1.57x1.97x.28 inches) and weighs only 34 grams (1.2 ounces) with wires and connectors. As the wires and connectors will be in the plane whether the speed control is or not, I'd prefer to list the bare weight, but I can't bring myself to remove the wires to find out what the bare weight is. It is most certainly less than an ounce. That ounce is potent!

The speed control uses the latest technology FETS; I measured just 0.005 ohms resistance at 18 amperes draw. This is lower than any other airplane speed control I have measured, and there will be no rpm drop compared to using toggle switches. The workmanship is immaculate; the control uses surface mount technology. This is pretty just to look at! The FETS are mounted flat, which makes this control almost as thin as a card. I very much prefer this way of building a control, as it makes it easy to install anywhere, and the FETS are not sticking up where they get in the way or are vulnerable to damage.

You can use Velcro on the back of the speed control to install it, as I do, or use the



Helmut Galinsky's Akrobat, available as a kit from Freudenthaler Modellbau, is a popular choice for electric pattern competition in Germany.

no pigtail wires for a direct connection to the motor leads. This could very well be the cause of the overheating. Astro Flight sells a cobalt motor for the Whisper that will solve the overheating problem, and then you can use those 1800 mAH SCRs to try to beat the ten-minute mark! Let me know if you do! The Whisper is available from many sources in the USA.

• • •

I have been flying the Jomar SM-4 speed

mounting holes provided on the flat plate aluminum heat sink. The FETS have optical isolation to eliminate radio glitching, and on board-voltage regulation for stability in any flying, winter or summer. The throttle response is completely linear with a 6000 Hertz frequency for completely smooth throttle response. Jomar says the throttle can handle from seven to 28 cells, at up to 40 amps. In fact, I routinely fly this throttle in my Seagull, with six cells and an 05, and in

an Ace 4-40 and Midwest AeroSport with 21 cells and an Astro 40. When I fly it with the Astro cobalt 40, it runs completely cool, hardly warm to the touch, and that is with a

1990 price list from Jomar is \$110.

• • •
Bell Model Aircraft Co. sent me a set of sample plans and a catalog. The plans were

these are the Port Victoria "Grain Kitten," a 1917 biplane designed for a 35-hp engine, to be used as a shipboard fighter. This is a very cute little plane, and I have often thought

"Grain Kitten," a 1917 biplane designed for a 35-hp engine, to be used as a shipboard fighter... a very cute little plane...



Charles Joachim with his Hughes heli. Put in a 10-1/2 minute flight at the annual Weilmunster electric meet in Germany this year.

current near 30 amps!

The best way to fully appreciate this throttle is to fly the SM-4 for awhile, then try any other throttle. You will soon realize just how much the SM-4 lets you take for granted, and how smooth, efficient, glitch free, maintenance free, and versatile the SM-4 throttle is. It is the throttle that I use for most of my

of the P-51A and the P-51D Mustang, for rubber power, in 28-inch span. These plans are well done. They have many other plans, including the Hughes H-1 racer, Boeing B-17G Flying Fortress, Curtiss R3C-3 Schneider Cup racer, Supermarine Spiteful XIV, and the Messerschmitt ME-209V1 1939 world speed record holder. These planes would fly

very well as is with the HiLine mini motors, or scaled up for larger motors. A dollar should get you the Bell catalog, at 650 Pine Crest Drive, Largo, FL 34640.

B² Streamlines sent me a catalog and a sample plan of "Number 15" by Bill Kubiak. I met Bill a few years back at the Boeing Hawks meet, and I was very impressed with his "Number 17." His models feature old timer style construction and very good climb and



Horst Wiederhold's Whisper, a very good flier with 1400 mAH SCR cells.

flying. I have many throttles, so that says a lot! I recommend the SM-4 as the best value for performance and utility that you can buy. It is the one I recommend when asked the question, "What throttle should I get?" It is available at C.S. Flight Systems; check with them for the price. Suggested retail on the

glide performance on 05 (100 watt) motors. They are attractive planes, much like the old timers. I count six of his designs in the catalog; most list for \$12 to \$13.

There are also plans for FF electrics, and some intriguing designs for gas power that would also make good electrics. Among

Achim Huber's original heli turned in a seven-minute flight at Weilmunster.



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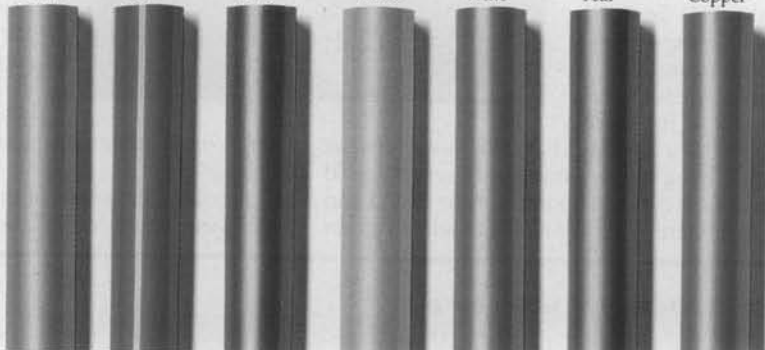
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RC AEROBATICS

BY RICK ALLISON

A TALE OF TWO CONTESTS

This month we have a tale of two contests to spin for you, as the photographs will illustrate. Usually, I don't do contest reports, except for things like the Nats, Masters, and the T.O.C., but this hasn't been the usual year. I didn't make it to the Masters (too far), or the Nats (got waylaid), and the T.O.C. was either last year or next year, depending on your point of view. Then again, the two contests I have for you aren't exactly your normal contests. They were what you might call memorable affairs, both for different reasons. I beg your

Championships held in the town of Airdrie, just a few kilometers north of Calgary, Alberta.

Calgary, as the more well-traveled among you should know, is pretty near smack dab in the middle of the Canadian West, being situated right at the edge of the Great Plains as they rise to meet the Rockies. Getting

local club's September contest by friends and fellow pattern pilots Gordon Jack, of Prince George, British Columbia, "Ranger" Rick Speidal, of Abbotsford, B. C., and Peter

Thannhauser, of Calgary. During the course of observing the usual contest evening amenities

Author Allison's two-week wonder: JR PCM-10, Hanno Special, Ultrakote, 7-1/4 pounds.



Group photo at the Canadian meet, with designer Gordy Jack at far right.

patience. This tale may become a trifle involved.

For me, a trip to another country has always (well, almost always!) been fun and educational, and being able to combine such a trip with a modeling event is a special treat. Wife and number one flying buddy, Joan, and I recently had just such a grand opportunity to attend and participate in the Western Canadian Pattern



Gordon Jack, complete with constant grin.

there from our home near Seattle meant an 800-mile, two-day trek through some of the most gorgeous country on the planet. Goodness, how I some-

times must suffer to bring news of our sport to you!

Actually, the seeds of this whole adventure were sown last fall, with a visit to our

with these worthy northern folk and our gang of local pattern animals (Canadian custom and local tradition demanded several cases of amenities, as I recall...), the fact surfaced that our large local summer "Sound Rounds" contest and the then new Western Canadian Pattern Champs occupied the same traditional date. A fledgling plan to rectify this was immediately hatched, complete with heartfelt promises of reciprocal attendance from both sides of the border.

Naturally, what with one thing and another, after I had sent in the contest report and recycled the empties, I forgot all about it.

I was soon reminded. A letter arrived from Peter Thannhauser, followed by a phone call from Gordy Jack. Let me tell you about Gordy Jack.

Gordon Jack is a great Canadian original,



Dan Boreen and own design, "Tegre," at Airdrie. Inner and outer fiberglass molds. Dan does a great John Wayne impression!

and probably should be declared by the MAAC to be a national aeromodelling resource. Gord is an active and well-known

up-and-coming new pattern pilots from western Canada and the Pacific Northwest into a hat and draws one out. The winner is surprised on Christmas morning with a brand new, completely built, painted and covered Legacy pattern plane, which Gordy personally builds each year.

In his spare time, Gord holds down a full time job as an electrical contractor. It is said of him that he sells his extra energy back to the power companies, but I think this is just a rumor. I do know that Gordy isn't the sort of fellow who you say words like "no" and "can't" to, however. You especially don't say "I'm too busy". I got started trying to figure out a way to make it all happen.

In due course, new dates placing the two contests back-to-back on successive weekends were negotiated, renewed reciprocal promises of attendance were again ex-

circumstance presented a small problem.

Problems are made to be solved, I have heard it said. With the help of good friend and 400 mph builder, Gus Ozols of Salient Designs, Joan and I managed to reequip ourselves with a new Boxer and most of the appropriate support equipment in only a couple of weeks of 16-hour days, leaving almost four full hours for breaking in a new engine and trimming the airplane. This was a piece of cake, due to my almost partially

...aren't exactly your normal contests. They were what you might call memorable affairs, both for different reasons.

complete fund of trimming knowledge, a dead calm afternoon, and the excellent mixing circuits that the JR design engineers managed to nail into my new PCM 10 computer radio. In addition, nobody else was on my channel and waiting for the pin. Heck, we even had time to do the laundry and wind the cat before we packed up to go . . . No sweat.



FAI Nationals at Airdrie were (1 to 3) Jeff LeBouthillier, second: Henry Piorun, first, and *MB* writer Rick Allison, third.

Northwest FAI F3A competitor. Besides flying, he serves on the Canadian equivalents of our contest board and rules advisory committee, plus the MAAC F3A team selection committee, kits, custom builds and sells his own "Legacy" pattern design, and has served and continues to serve as coach and mentor to a large number of western Canadian pattern fliers.

Each year in Prince George, Gordy holds a large, combination contest and clinic exclusively for beginning pattern fliers, called the Tournament of Rookies. And as if all these good works weren't enough, each Christmas, Gord tosses the names of three

changed, and for awhile, everything looked fine. In fact, everything continued to look fine, right up to my trip to the Nats.

Of course, the new dates for the Western Canadian Champs and Sound Rounds were three and four weeks after the Nats, respectively, and you may recall me mentioning that everything I owned in the way of modeling equipment was stolen from my van en route to the Nats. If Joan and I were to make it to Airdrie, this



Harold Miebert's beautifully done Summit III at Airdrie.

Sometime during the preparations, good friend Mike Lance (the 1990 recipient of the Gordy

Jack Christmas Airplane) decided to come along. We stacked everything one layer deeper in the back of the van and lit out for the border.

The rest is photographic history. The trip was grand, the country was beautiful, the weather was perfect, and the natives were

very friendly, especially after we arrived at the contest site, which was Airdrie Airport. As I said, the weather was perfect. Sunny, about 90 degrees, some 3600 feet above sea



Matt Cole shows off his color coordinated, custom made aircraft bag at Sound Rounds. U. S. fliers were definitely more stylish than Canadians.

level. We flatland, sea level-types were amazed at all the Canadians flying airplanes around in air that didn't have any air in it. The fact that they were doing it proved conclusively that it was possible, so we got started trying to figure out what would work (more nitro, which we didn't have, and not much else, which we did have). We decided to prop for speed, trim for thin air, and head back to the hotel.

Back at the hotel, we found even more friendly natives, who were, in fact, in a very friendly mood. The phrases "let's have a pattern contest, heh?" and "let's have a big party, heh?" seem to have nearly identical meanings in most western Canadian dialects. Due to the foresight of the contest management, nearly all of the 41 contestants and most of the officials were staying at the same hotel. I'm pretty sure that this arrangement made the streets of Airdrie a bit safer on Friday and Saturday night than they might otherwise have been. I can't say the same about the corridors of the hotel.

Amazingly enough, when Saturday morning rolled up on the clock, everybody was ready to fly. What followed was a normal enough contest, complete with foul lines, ready boxes, good flying, bad flying, picture taking, balky equipment, technical talk, camaraderie, and heartburn from the field food. Surprised, right?

It's interesting to note that the Canadians have been using an all turnaround format for several years in all classes except Sportsman (which is equivalent to our Novice and Sportsman a nearly identical schedule of maneuvers). The MAAC Expert class flies the same pat-

tern as the FAI F3A class . . . this is the equivalent of our new AMA Masters class. We have adopted the MAAC Advanced pattern for use in our new '92 Advanced class. This leaves the only point of real difference in the MAAC Intermediate/AMA Sportsman classes, where the MAAC Intermediate class is all turnaround, and our '92 Sportsman is a partial turnaround class, having added three scored turnarounds for '92.

The folks who I talked to reported that transition problems to the turnaround style have been few to nil, and that participation in the entry level classes has increased rather than decreased since the change. The "jump" between the MAAC Advanced class and MAAC Expert is exactly the same as the one between the new AMA Advanced and AMA Masters, and again, problems have been minimal. Certainly, the flying I saw at Airdrie in these classes bears that out. Participation was healthy in each class; the winners of each class flew their patterns well, and the overall competency level was fairly high. I was impressed and encouraged that we (AMA) have made the right moves for the future with the changes coming in '92.

The attitude among the Canadians who I talked to regarding the AMA changes was an almost universal, "What took you guys so long?" I have to admit that I really didn't

identical pattern as FAI, and I had a rare opportunity to judge the maneuver schedule that I fly. This was roughly like having an "out of body" experience that went on for over an hour at a time. Very stimulating, and a real eye opener. With an abundant supply of judges, three per line were used. I heard very few complaints about the judging.

Our hosts had a banquet arranged in the hotel dining room for Saturday night, where a good time was had by all. After the banquet, more of a good time was had by all. Sunday morning was an instant replay of Saturday morning, everything ran like a clock, and I was just learning how to fly the airplane without using air when we got to the trophy presentation.

Here's an interesting deal: the host club, the Airdrie Model Aircraft Society, had obtained about 2000 bucks worth of donated goods and services from the hobby industry, local businesses, and the like, and instead of holding a raffle to try and make money like most clubs, they simply read off the list of sponsors, pulling the contestants names out of a hat and giving the stuff away, one goodie to a name. The first item to go was a Module Seven radio set donated by Airtronics. A very classy move, both on the part of Airtronics and the rest of the sponsors, and the host club.

How did the visiting team from the states do? As well as could be expected on short notice, I would say. Mike Lance was first in Canadian Advanced, wife Joan was fourth in the same class, and I nailed down third in FAI, narrowly edging out Gordy Jack, who deserved it for starting the whole thing. Overall, we probably could have flown better, and the equipment probably could have worked better, but I seriously doubt that we could have had a better time!

It's a great life if you don't weaken, as Dave Brown has said. The very next weekend (after arriving home late Monday evening) was the Sound Rounds contest which Joan and I run every year for the local Marymoor RC Club. Over the years, this contest has grown to be just about the largest pattern meet in the Northwest, and running it, like any other large event, is not exactly a spontaneous

affair. It takes advance planning, leg work, lots of time spent on the phone, catering arrangements for the big yard party at our house on Saturday night, time spent to manure the field, lay out the boxes, etc. This time, just to add to the general circus atmosphere, I had a contractor's crew in the backyard of the house, building a new cedar deck, which supposedly was to be finished



Bruce McDannold competed at Sound Rounds with his scratch built, all-wood Cursor. All Monokote finish. Bruce says balsa flies better.

have a good answer for that one.

Another interesting aspect of the affair was the total use of contestant judges. There were no "dedicated" judges; it was expected and accepted by all that by registering, one was volunteering to judge as well as fly, and judge we all did. As an FAI pilot, my task was to judge the Expert fliers. This was extremely intriguing, because they were flying the

well in advance of guests arriving on Friday night, and certainly before the caterer arrived on Saturday.

Normally, all of these preparations are spread out over weeks. Normally, some of this stuff, like the deck, doesn't happen at all. I mean, we don't normally go out of our way to set up situations that resemble a remake of an old Marx Brothers movie.

Well, by this time normalcy was long gone, having been stolen along with our airplanes and equipment, and Joan and I had three days... and nights. The nights turned out to be very important. Fortunately, we have a trained crew. By the time that the Canadian contingent landed on Friday (six pilots, one scorekeeper, one judge, one baby in arms, assorted wives, girlfriends, small children, and two dogs), we were almost ready, having several hours of daylight left and only two days worth of work to do. I was actually smiling, right up to when the next series of disasters struck.

In moving the date for our contest, it seems that someone (who, me?) had overlooked the fact that we were now competing with the largest horse show in the Pacific Northwest for motel space. Motel rooms for 20 miles in all directions were full of the spur and jodhpur set, and I had arriving contestants from all over (who had never needed reservations before, so why bother now?) with no place to stay. Gad. We broke out sleeping bags, collected pillows and bedding, scrounged air mattresses, cleared floor space, and got a tent out to pitch in the back yard.

The crew in the back yard informed me that due to the fact that they hadn't bothered to show up until noon two days in a row, overtime would be necessary to finish the deck. Like, until midnight, maybe. Bang, bang, pound, pound. And then again, maybe even later, if it rained.

The weatherman came on the tube at the evening news with a jovial announcement of a large and unexpected frontal system,

complete with buckets of rain, predicted for Saturday morning, and of course, staying through Sunday. We put the tent away and cleared more floor space.

The first drops of rain arrived. It was right at the point in the movie where you know for sure that Groucho, Chico, and Harpo won't be able to talk, charm, or honk their way out of this one. There were more long faces in my living room than there were at the horse show down the street, and that was counting all the horses.

But the crew in the back yard kept working

Our hosts had a banquet arranged in the hotel dining room for Saturday night, where a good time was had by all.

through the rain. Everybody got bedding. A bathroom schedule got worked out. The club crew got the field work done. The caterer called to say everything was in place for the following day. Pre-registration went like clockwork. Last minute cancellations opened rooms up in the motels. And the rain petered out and quit just about the time that the deck crew announced that they were finished and left. The late night news weathercaster backed off the earlier forecast of extended rain, calling only for scattered showers. We crossed all of our available fingers and went to bed.

Saturday morning came in chilly and gloomy, but mostly dry. The clouds held until the morning sun orientation problem went away and blue sky appeared. From then on, it was a downhill pull. Six rounds, three flight lines, 42 pilots, 232 flights, and not a glitch, twitch, or hitch. Thick, calm,

dream air in which to fly. The Saturday night BBQ came off as a great success. We got all the way to the trophy presentation on Sunday before we had a problem (a minor data entry error in the computer scoring system), and that got solved in minutes. A very successful contest; maybe the best Sound Rounds ever.

The obvious moral is several: Work hard and good things will happen, don't give up the ship, it ain't over 'til it's over, and remember to run out all dropped third strikes.

Thus ends the tale of the great International Enduro Pattern Exchange Tour for 1991. Would we do it all again? Well, I have some of the same Canucks who started all this coming down for our last contest here in a few weeks, and they've already started talking crazy stuff about '92, like adding a couple of more contests to the tour, printing up tee shirts and hats, chartering buses, etc. Who knows? We may start a league and sell franchises.

Speaking of contests, those of you who are contest directors know that the biggest expense and the largest headache associated with a contest is always the awards. For the last several years, I've been using awards from Jennings Products of Hendersonville, Tennessee. The head man is Jim Jennings, a long time Free Flight, RC, and Control Line modeler. Jim has the only line of awards designed exclusively for modelers of which I am aware, and his product line is extensive, attractive, high quality, very reasonably priced, and available on short notice. Contact Jim and ask for his catalog. The address is P.O. Box 1121, Hendersonville, TN 37077, or call (615) 824-0475. Jim knows what you need, and the best thing is that you don't have to explain all about toy airplane contests to him.

That's about all, folks. I'd tell you all about what's on the agenda for next month, but right now, I haven't the slightest idea! See ya at the field.-Rick. **MB**



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Wing Area: 1000/900" Engine: 1.20



SKYBOLT

Wing Span: T/77" B/66" Weight: 20-25 Lbs.
Wing Area: 1625" Engine: QUADRA

PLUG SPARKS

BY JOHN POND

Rekindle Interest In Old Timers

The Old Timer fad has always enjoyed tremendous popularity, but like everything else, interest has lagged at times. Back in 1975, during one of these lulls, the SAM 21 club, in an effort to spur interest, proposed and promoted an Old Timer event for models using the Cox .020 engine. Rules specified a 1-1/2cc fuel allotment and a four-minute max; no minimum size or weight requirements. The inexpensive, lightweight Ace single-channel pulse radio was used by all comers. A surprising



Photo No. 2. The very popular 1/2A Texaco Scale brought out this Aeronca Chief entry by Ernie Wisley, SAM 41. Photo by Jim Alaback.



amount of entries resulted with interest rekindled in Old Timers. A Miss America won the initial contest!

Being so popular, several more contests were held. The event took a turn for the worse when some started using the very expensive two-channel micro proportional radios being produced at that time. Needless to say, with down elevator available, the models could now penetrate and make the landing circle. Only a couple more contests like this were held with interest dropping in single-channel control. Another event ruined by the "gotta-win" hotshots!

In an effort to revive flagging interest in 1/2A flying, Jack Alten, also of SAM 21, undertook to write a set of rules for an RC 1/2A Texaco Event that featured the exclusive use of Cox reed



Photo No. 3. For the new "Bi-Tex" event proposed by SAM 76, an American Eagle by Pete Van Dore. Great looker, great flier!

Photo No. 4. Jim Clark, SAM 15, built and flew this S.E. 5 in the SAM 76 1/2A Texaco Scale contest. Great to see those old biplanes. Van Dore photo.

(Above) Photo No. 1. 1/2A Texaco Bay Ridge Mike built by Pete Van Dore, SAM 76. Yellow Micafilm. Photo by Pete Van Dore.



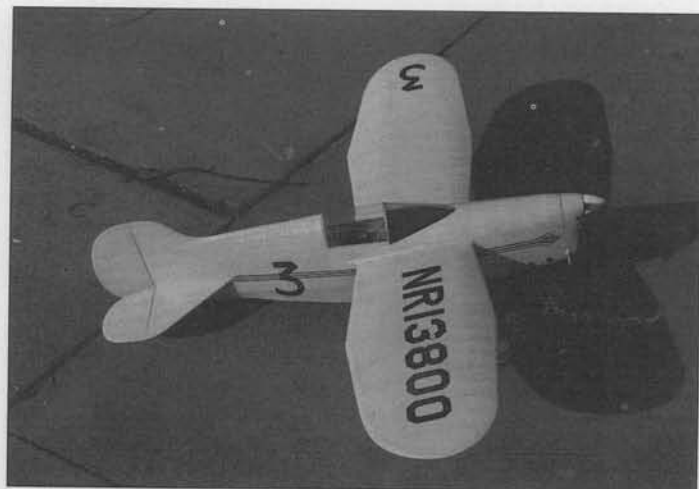
valve engines (Black Widow, Baby Bee, and Golden Bee). This event caught on big. The main reason is that many right-sized kits were available and, best of all, the Cox engine was readily available! An example of this is seen in Photo No. 1.

The 1/2A Texaco Postal Event was probably the biggest thing to happen to encourage 1/2A Texaco flying. Over 20 chapters participated in the last contest!

Jack Brown of SAM 46 came up with the ultimate in 1/2A Texaco flying by creating a flying scale event based on the 1/2A Texaco rules. Here was a natural as the Black Widow engine flew the 1/2A Texaco model at very realistic scale speeds.

Various SAM Chapters have tried the SAM 46 rules, among those being SAM 41 and SAM 21. On the East Coast, the event has become so popular that it was held at Westover AFB in 1990.

What are we talking about? How about this good shot (Photo No. 2) of an Aeronca Chief built by Ernie Wisley of SAM 41 and



(Left) Photo No. 5. Eut Tileston built this excellent Art Chester Jeep for the 1/2A Texaco Scale at the SAM 21 Hollister Holdup meet.

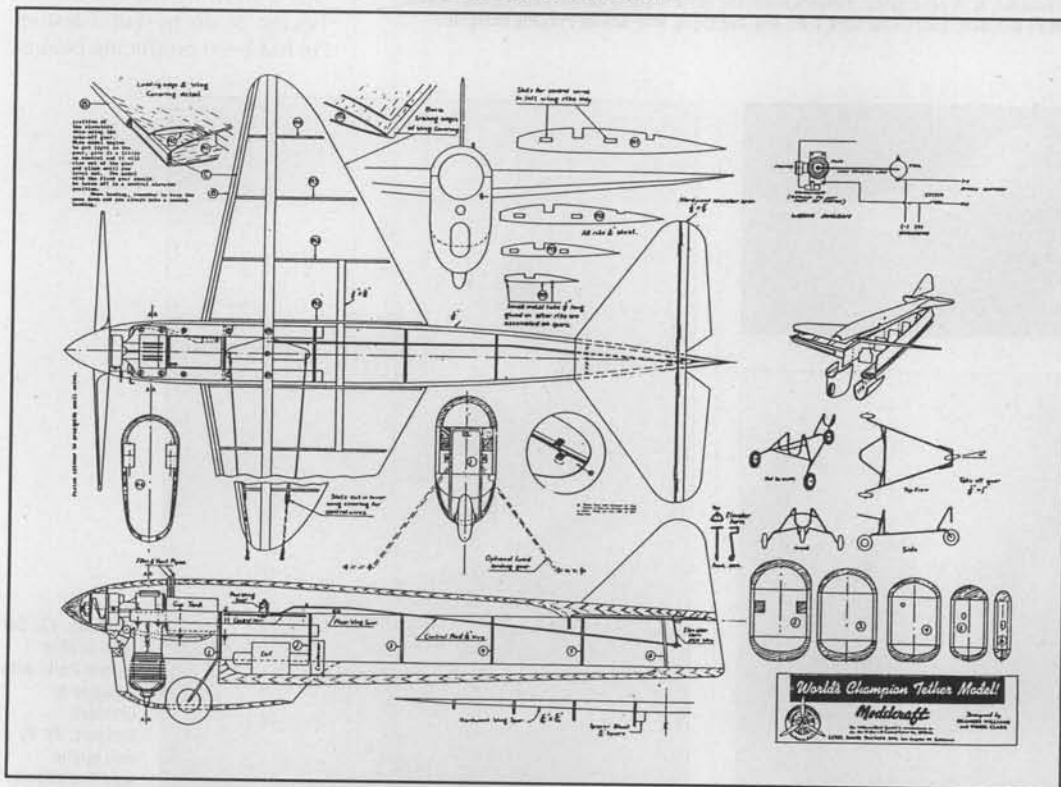
flown at a recent event at Alpine, California. Ernie says this flies as well as any regular 1/2A Texaco model, and looks great in the air!

This finally brings us to SAM 75 which, in their enthusiasm for the new 1/2A Texaco Flying Scale event, has proposed a biplane event to be known as "Bi-Tex." One look at Photo No. 3 showing Pete Van Dore's biplane entry in the form of an American Eagle will warm the cockles of any scale modeler's heart. At this same May contest, another interesting biplane model was entered by Jim Clark of SAM 15 in the form of a WW I S.E. 5. Does Photo No. 4 ever



(Below) Photo No. 6. Beautiful Comet Clipper Mk. 1 by Jim Alaback, SAM 41.

MODEL OF THE MONTH



turn this columnist on!

SAM 75, under the prodding of Pete Van Dore, is so pleased with the showing of biplane type 1/2A Texaco models, they have proposed a follow-on . . . "Tri-Tex"! In other words, a scale triplane! You can just see the Red Baron in his red Fokker or Ray Collishaw with his "Black Maria" Sopwith Triplane. Breathes there a modeler who does not like to see scale models fly and fly well? How can you beat that?

The 1/2A Texaco Scale rules are basically the same as the standard 1/2A Texaco event. Most of the chapters have given up the idea of static judging flying scale models, fearing that too much emphasis would be put on scale rather than flying, which in the long run is what it is all about! Rules in capsule form are:

1. All models to be powered with reed valve Cox .049 engines.
2. Three attempts for two flights.

- Maximum flights are 15 minutes. Total time wins.
3. Flying scale models shall be replicas of full-size aircraft produced before 1943.
 4. Weight rule: 8 oz./sq. ft. minimum.
 5. Gas tank shall be the standard 8cc, using any standard

Photo No. 7. Classic shot of Bernarr McFadden (sponsor of the 1939 Wakefield finals), examining Dick Korda's winning model. Contest manager, Nat Polk, holds the Wakefield Trophy. Korda is on right.



Photo No. 10. Chet Lanzo's original R/C'er flies successfully at last! Bucky Walter finished and flew the model.

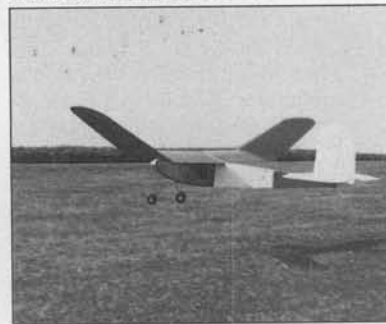


Photo No. 8. It is July 10, 1991, at the SAM 39 Lanzo Memorial Contest that Dick Korda attended, to honor the memory of Chet Lanzo.



Photo No. 9. A good group: Howard Robinson (Dick Korda's bosom buddy); Dick Korda; Mike Granieri, East Coast SAM V.P.; and Joe Elgin, well-known Playboy designer.

commercial fuel. There have been some ideas for changes but as of this writing, the event is still unchanged; one of the main reasons for its continued popularity. Might be well to mention the "Bi-Tex" rules encourage the construction of this type 1/2A Texaco model by lowering the weight requirement to six ounces per square foot of wing area. It will be interesting to see how Van Dore and his SAM 75 members handle multiple wing loadings. Before closing this section off, we would like to present Photo No. 5 showing the latest 1/2A Texaco Scale by Eut Tileston. Eut has been producing beauti-

(Right) **Photo No. 11.** Walt Geary produced this Megaw "Chief" as designed by Walt Eggert. Looks much like his Soaring Eagle without gulled wings.



(Below) **Photo No. 12.** Fun in Italy! Frank Zaic points the way for the Italian team in the 1958 FAI World Champs.



Photo No. 13. Sal Taibi at Mile Square Park, with a gaggle of Brooklyn Dodgers. All fly well and in similar patterns.

ful scale models and this Art Chester Jeep is no exception. Tileston makes them fly well just to rub it in!

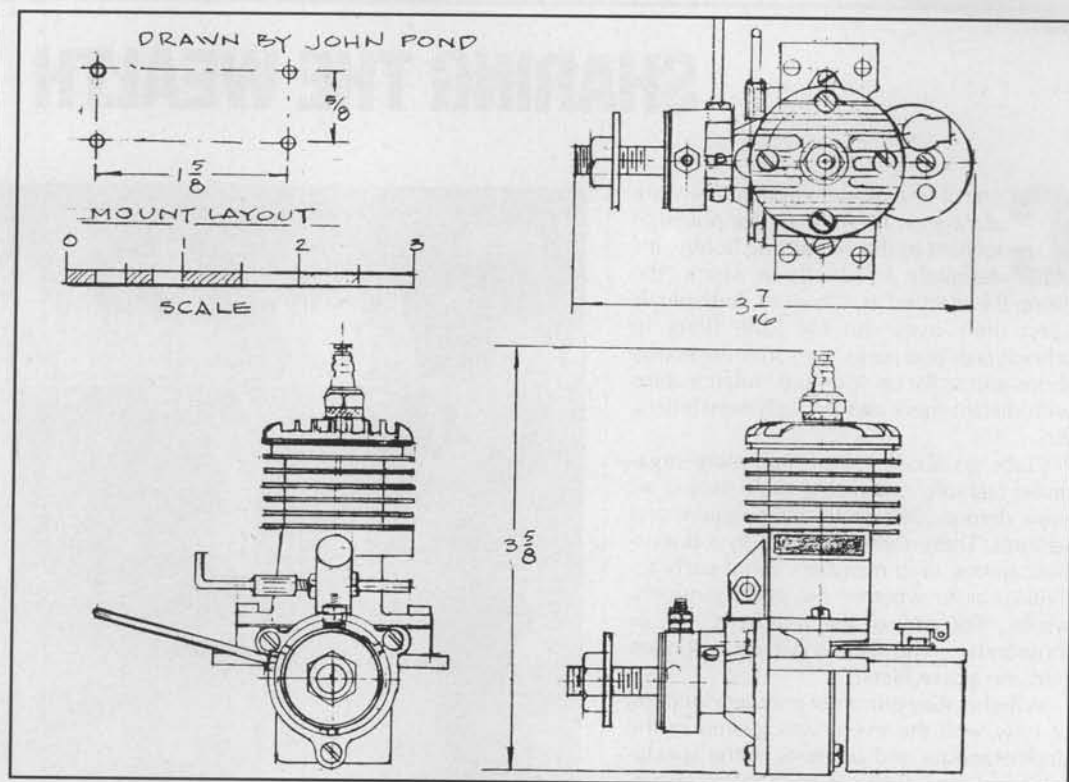
ENGINE OF THE MONTH

It must be a source of amazement to engine collectors in general that Robert McClelland, MECA Secretary-Treasurer, has been willing to loan his rare engines to this columnist for a drawing to be featured in this section of "Plug Sparks."

Bob sent in four engines, which are gradually being printed. This month's subject is the little-known "Dreadnought 24" as built by Jack Keener, a well-known West Coast name in small gas engine designs.

Keener first produced the "Brat" engine while in Los Angeles, where it enjoyed a fair modicum of success. It was not until Ohlsson brought out his 23-size engine that Keener considered an engine of that size.

The earliest advertisement of the Dreadnought engine appeared in the January 1942 *Model Airplane News* under the Berkeley Model Supplies listing. The engine was listed at \$12.50, both in *Air Trails* and *M.A.N.* The last notice was an



ENGINE OF THE MONTH

ad by Skyway Model Airplane Supply in the October 1942 issue of *M.A.N.* announcing an improvement called the "Super Dreadnought."

This engine formed the basis

for Ray Hunter's Hurricane engine in Canada. Ray produced his 24 during and after WWII and enjoyed good sales, as good small engines were at a premium.

During this time, Jack Keener moved to the San Francisco area where he produced such additional designs as the Comet 35 and later the Vivell 35 in con-

continued on page 84

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SHARING THE WEALTH

Control line model airplane fliers are always on the lookout for potential recruits to this rewarding hobby. It's definitely an activity in which "the more, the merrier" is a byword. Individuals keep their eyes out for lone fliers in schoolyards and parks, they troll the hobby shops and strike up "pen-pal" relationships with distant fliers met through newsletters, etc.

Clubs go about it in a little more organized fashion, organizing mall shows, air show demonstrations, training sessions and so forth. There sometimes results a discussion among club members about such activities, as to whether the effort is worthwhile. "Did any of the hundreds . . . or thousands . . . who saw our last demonstration become active fliers?"

Whether they did or not may be a function of how well the event was geared to the understanding and interests of the spectators, and how well the club followed up. Those are things to consider if recruiting new fliers is the goal.

Sometimes the goal isn't necessarily to recruit new fliers, but simply to "share the wealth" of enjoyment that control line fliers take for granted. One club that has made



Greg Beers (left), of the Portland Fireballs, talks about control line flying at Vancouver, Washington, School for the Blind.

1991 a banner year for sharing is the new Portland Fireballs, a group that was formed near the end of 1990 with the name of the old Northwest Aeroliners, a club that had been largely inactive as a group for the past several years. The "Fireballs" name is to become official in 1992. Though the club is basically new, it was made up of experienced fliers and enthusiastic newcomers, a perfect combination for the generation of new ideas and activities.

The Fireballs made a big splash at the Northwest Regionals in May, as reported recently in this column, by giving flying lessons to 30 children and adults . . . including one television reporter. Whether any of them become active modelers remains to be seen, but they certainly had memorable experiences that day, courtesy of the Fireballs.

But the jewel in the club's crown this year would have to be the members' afternoon of giving "handle time" to a group of 25 youngsters from the School for the Blind in Vancouver, Washington.

A report from Fireballs' Secretary, Laura Beers, indicates that the School for the Blind training session was dedicated to the memory

of Steve Macy, son of Fireballs member Frank Macy. Complications of diabetes caused Steve to lose his sight and eventually his life. Frank Macy, a tireless promoter of control line flying and particularly of activities commemorating historical aspects of the hobby, was instrumental in setting up the School for the Blind flying session.

The School for the Blind flying session, which was captured on videotape, was on

June 24 at the Vancouver institution. The main teachers were club president Greg Beers and vice-president Jim Cameron, who prepared for the event by learning to fly blindfolded.

Greg and Jim prefaced the session by explaining what control line airplanes are, how they are made, and how they work. At the same time, examples of planes and handles were passed among the students for them to feel, and a set of lines was strung out for the students' tactile inspection.

"All the talking done, we began the session, taking one child at a time, leading them (if totally blind) to the airplane, handing them the lines, and walking with them to the handle," Laura reports. "One of us would

Control line fliers often say that one of the chief attractions of this type of model aviation is the direct feel of the aircraft...



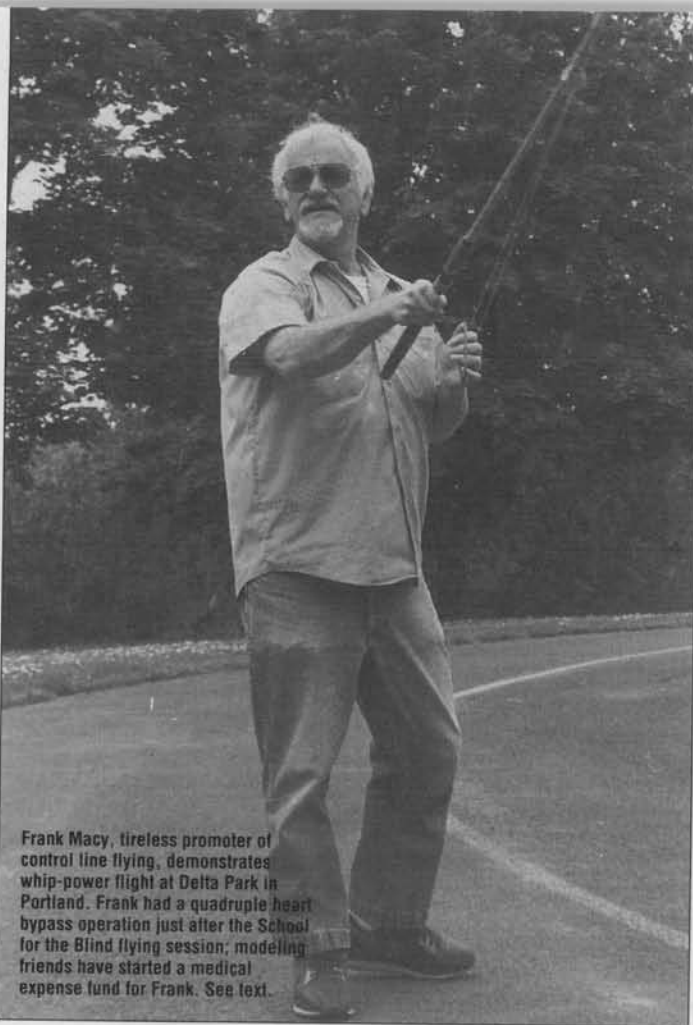
Greg Beers (left) and a teacher from the school introduce a student to control line flying. Greg helped the pilot, the teacher turned the chair.

then show them how to control the airplane and how to hold their arm out. Then the plane was launched, and everyone made at least a couple of laps before crashing - some soloing right off, flying almost full tanks.

"There were many different stages of the children's sight problems, from one-third being totally blind, to others having such things as tunnel vision. We even had one boy who was in a wheelchair, which just took a little extra help from a teacher to turn the chair in the grass. With everyone working together, it worked out fine and everyone got to fly."

The Fireballs gave each newflier a license provided by Frank Macy American Junior Aircraft Co. The licenses for the totally blind fliers were in Braille. Laura reports that the club members headed home "with a great feeling of satisfaction, knowing that we helped those kids experience something they may never have been introduced to otherwise. We sure hope they had fun."

Control line fliers often say that one of the chief attractions of this type of model aviation is the direct feel of the aircraft, which is unattainable through any other kind of model flying. The opportunity for the blind children to share that feeling of flying will be an



Frank Macy, tireless promoter of control line flying, demonstrates whip-power flight at Delta Park in Portland. Frank had a quadruple heart bypass operation just after the School for the Blind flying session; modeling friends have started a medical expense fund for Frank. See text.

experience they remember for a long time, and the Fireballs club can be justifiably proud of having provided that experience.

In the same report, Laura mentions that Frank Macy was admitted to a Portland hospital two days after the flying session for the blind children, and the following day underwent a quadruple bypass heart operation. As this was written in late August, Frank was recovering well, but he was likely to be

laid up for most of the rest of the year.

Because Frank is self-employed and not insured beyond his Medicaid benefits, there was some concern among the Portland club members as to whether all of his many medical bills would be covered. For that reason, a fund was set up to help with any unpaid bills and for medication. Frank Macy has made uncounted contributions to control line model aviation over the past several decades . . . going all the way back to working with the great Jim Walker at his original American Junior company and moving forward to resurrection of the company and reproducing some of the old classics, such as the Fireball. This might be a time when control line fliers could help repay Frank for his work on their behalf.

Those interested can send contributions to U.S. Bank Customer Service, P.O. Box

The plane flown by Paul Walker, 1991 U.S. world championship team member and past Nats winner.



14050, Salem, OR 97309, and mark them for the Frank Macy Account No. 017-606-3931.

In addition to the activities mentioned above, the Portland club has had a couple of fun-fly activities, has attended several Northwest contests, and has been flying regularly at the excellent Delta Park site in northern Portland. For fliers looking to connect with control line activity in the Portland area, information about the club can be obtained from Jim Cameron, 4023 N.E. Bryce, Portland, OR 97212; telephone (503) 287-9620.

QUEST FOR RECORD

Another club that is a virtual dynamo of activity is the Knights of the Round Circle, in Southern California. In addition to putting on a schedule of contests such as the successful "Knights Joust," the Knights this year have been working at setting the unofficial world record for continuous flight of a single control line aircraft. The mark they are shooting for is 64 hours, 33 minutes and 14 seconds, set in September of 1957 by the Prop Spinners of Eugene, Oregon, a club that remains active . . . and very interested in the goings-on at Whittier Narrows in Southern California. *continued*

How's this for a complex treatment in a sport scale plane? A profile F-4F Wildcat seen at the 1991 Northwest Regional Control line Championships.



(The Academy of Model Aeronautics no longer keeps a record for single, unlimited continuous flights . . . the current endurance event has a fuel tank restriction that limits flight time. However, it is believed that the Eugene flight . . . which used a plane fed by a fuel tube running along the flying wires . . . remains the longest single flight.)

The Knights prepared for their assault on the record with exhaustive research, including contacting the Eugene club for all the available data on the Eugene record, which was the subject of considerable published material at the time and later.

The Knights made their first serious attempts at the record in conjunction with their Knight's Joust in June. Four flights were made, with the longest reaching just over 21 hours. It was unsuccessful at breaking the record but project leader Kenn Smith's report in the club newsletter, "Direct Connection," indicates just how serious the Knights are about the effort. Plans were already under way for another attempt immediately on the ending of the June effort.

Excerpts from Kenn's report describe the dedication of the members involved in the June record attempt:

"Working late into the night of Tuesday and all morning and early afternoon of Wednesday (June 12), I was able to get the airplane and equipment to the field shortly after 3 p.m. where Dave Braun was waiting for me.

"We started setting up the equipment, laying out the lights, roping the area off and putting the airplane together and waiting for the trailer to arrive. Later in the afternoon several other club members started arriving and final preparations were made. All was ready to go in plenty of time. A couple of test

...all fliers are competing against each other, with their percentage of the U.S. national record as the score.

flights were put in and final adjustments made.

"As the time for takeoff got closer, the area looked more and more like the preparations for a NASA launching. Generators were running, lights were on all over the place, people were busy with various last minute items. Howard and Tater Mattern were there, setting up our video system, taking video shots, and taping interviews . . .

"At exactly 8 p.m., the 'Spirit of the Knights' went airborne on its way to setting new endurance and distance records. Three hours, 17 minutes later the 'Spirit' was on the ground. A quick inspection showed a

glow plug with a missing element.

"Dave and I searched through our flight boxes for a replacement. A Fox idle bar plug was found and installed. Off the 'Spirit' went just take them when we tried to pay for them. As we left, he wished us luck, and hoped the plugs would make the difference.

"Back at the field, with high hopes, we installed the new McCoy No. 9 and fired up the K&B to reset the mixture. We couldn't get more than 9,400 rpm out of it. The venturi K&B had provided was too small. The engine sounded strong and steady so we adjusted the needle for takeoff and let the 'Spirit' go. All the rest of Thursday afternoon and night it droned on, sure and steady. Friday morning I went home to finish some last-minute contest preparations, confident that I when I returned the 'Spirit' would still be purring along.

"Shortly after 2 p.m. I got a call letting me know that the 'Spirit' was down again. As it was past the time for us to be able to still beat the record by midnight Sunday, there were no preparations to get the 'Spirit' airborne again. The attempt was over. The fourth attempt lasted just over 21 hours. No one was interested in the actual time. It was over.

"When I got back to the field, there were a lot of sad faces and many showed their concern for my feelings about it being over. A lot of effort had been expended by a lot of people. Special thanks go to Al Brush and especially Don Hutchinson, who framed up



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and covered the airplane; Bart Klapinski, who did all the test flying; Dave Braun, Randy Doll, Dennis Moran and Morrie Leventhal, who took three days off work to be there and were there to do everything and anything that needed to be done, night and day, to make the attempt a success; Howard and Tater Mattern, who did all the video work, and the sheriff's department for loaning us several generators to light our night. And thanks to all the many others who loaned their support and time.

"The 'Spirit' is not dead! The attempt will be made again!"

Kenn's report is a testimonial to what can be accomplished by a dedicated group of modelers on a mission. We have no doubt that they eventually will be successful. I hope that Kenn provides some of the technical details of the effort for a future issue. It's also worth noting that this club was able to mount this massive record attempt at the same time they put on an AAA contest, a major event all of its own. From the same newsletter, here are the winners of the second annual Knight's Joust:

Half-A Speed: Bobby Fogg. A Speed: Carlos Aloise. B Speed: Carlos Aloise. D Speed: Bill Nusz. 21 Sport Speed: Carlos Aloise. Formula 40: Carlos Aloise. Jet Speed: Bill Nusz. FAI Speed: Dave Williams. Half-A Mouse Race I (Junior): Bobby Fogg. Half-A Mouse I (Senior-Open): Howard Shahan. Half-A Mouse II: Bob Fogg. Scale Racing (Goodyear): Howard Shahan. FAI Team Race: Aaron/Len Ascher. Texas Quickie Rat: Chris Peter. Formula Unlimited: Chris Peter. ACLA Slow Rat: Chris Peter. Navy Carrier I/II: Keith Trostle. Profile Carrier: Mike Fox. Southern California Low-Tech Carrier: Mike Fox. Profile Scale: Grant Hiestand. Sport Scale: Don Hutchinson. Beginner Precision Aerobatics: Gerald Hansen. Intermediate Precision Aerobatics: Fred Bridgeman. Advanced Precision Aerobatics: Gordon Delaney. Expert precision aerobatics: Jim Hoffman. 80 mph combat: Steve Hills. Half-A Combat: Greg Hill.

Contest directors are beginning to pick up on our offer to provide brief reports on contests. Chris Sackett, the driving force behind the successful North American Speed Society, sends along a report on the Northwest CL Speed Championships in Richmond, B.C., last July.

"We had undoubtedly our best-attended and flown Northwest Speed Championships to date," Chris writes. "Close to 105 flights were made, official or otherwise, at the comfortable Richmond CL field. It seems the way to fly speed these days and make some bread is by flying in Junior or Senior .21 sport and 1/2A profile, as the top three places went to these events.

"Mike Hazel (of Salem, Ore.) now has his two boys flying, and Brent Hazel copped top spot and the money by achieving 114.62 percent of the Junior .21 sport record. Then Joe Rice (of Richland, Wash.) took second overall with a 104.77 percent showing with

continued on page 103

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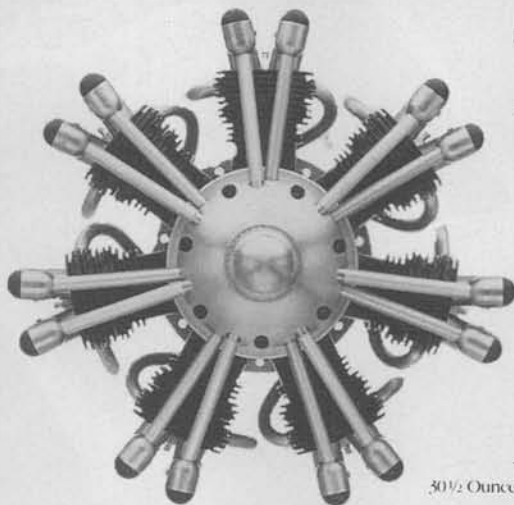
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BY ELOY MAREZ

Ace RC Digipace II

The long awaited Ace RC Digipace II has finally made the scene. Well, I for one, waited for what seems like a long time since I first heard that it was in the works back in Missouri. And I'm sure I'm not the only one. The original Digipace has made a lot of fans, and, no doubt, saved a lot of airplanes that otherwise would have met an early demise due to defective or low capacity NiCd batteries. I'm not really a gambler, but I'd be willing to give odds on this one... the original Digipace has to be one of the biggest selling pieces of RC test equipment ever marketed... if not THE most sold.

The new Digipace actually shares only one thing with the older version; it tests NiCd battery capacity. Other than that... well, as Ace RC puts it:

"The Ace Digipace II is a sophisticated piece of laboratory quality equipment that discharges transmitter and/or receiver nickel cadmium batteries at a fixed discharge rate, down to a predetermined voltage cutoff level, while recording the time it takes to perform the task. After discharging, the Digipace II automatically switches into the overnight charge mode at the C/10 rate, then automatically switches to trickle charge around 17 hours later, so you can leave the batteries on indefinitely, confident they will be safely at 100% charge."

Before we go any further, I would like to refer you to my article on the Ace R/C AT-2000 charger, which appeared in the November 1991 issue of *Model Builder*. In addition to introducing you to the AT-2000, I also explained in some detail all of the terms you will run into in this article; things like "C/10" and "trickle" as mentioned above. If you are brand new to RC equipment or otherwise not clear on such terminology, studying the other article a bit will help you to better understand what the Digipace II can do for you. Also, there are important circuit similarities which will be discussed in detail later on.

Additionally, Ace R/C has prepared and furnishes with each Digipace, a very comprehensive set of instructions that includes not only how to use and operate your Digipace, but also a lot of clear data on how to evaluate your batteries. Some I will touch on here, lightly, as there is really no need to use up space on either my previous material or what you will get with your unit.

Basically, the Digipace II gives you two very valuable pieces of information; (1), the measured capacity of your NiCd packs versus their rated capacity, and (2) the safe amount of flying time you will get from any given pack in a given airplane. The first part might be a little confusing, as we might expect a 500 mAH capacity pack in good condition to exhibit 500 mAH, right? Well, different manufac-

turers use different methods to rate battery capacity, and such things as discharge rate, cutoff voltage, ambient temperature, and even the use (or abuse) the battery has received, will all affect apparent capacity.

Flying time calculations have less surprises, and assuming that you will be using the same instrument throughout your testing, can be quite exact. It is a two-part procedure; you first measure the capacity of the fully charged battery, and then, after a proper recharging,

comes the fun part... you go flying. You should fly 45 to 60 minutes, with an accurate record, of the time the radio is on, and with as little ground time as possible. Then, without any charge time at all, measure the remaining capacity left on your batteries. Now, don't skip this part, we'll keep the arithmetic simple. Besides, you have a calculator, don't you?

Say that your battery originally measured exactly 500 mAH, and after flying 45 minutes, it had 250 mAH capacity remaining. Obviously, you used up exactly half its rated capacity, and could have flown a total of 90 minutes, though I would not recommend any sort of "test to destruction" evaluations! For less simple figures, merely calculate the current per minute: 250 mAH (used) divided by 45 (minutes) = 5.56 mAH consumption per minute. Now, dividing that into 500 mAH (available capacity), we again get our 90-minute possible time.

Remember that this is NOT the power consumption, and thus the available flight time for every radio of the type that you are flying. Many things affect this figure, the least being the basic electronics themselves. There are fixed current values, though very small ones at that. Modern receivers have a current drain of around 10 mills; a drain that does not vary under any conditions. Servos also have a standing current drain of about the same value, but their total drain increases drastically as they are commanded to move and work. This increase, however, only happens while the servo is moving, and not while it is at rest, even though it may not be at its neutral position. An unloaded servo moving rapidly from one extreme to the other will consume between 80 to 100 mills; at full stall, the average size servo will drain half an amp or more. The consumption in your airplane is somewhere in between, and affected by the weight of the control surface, the friction in the linkage, and the weight and speed of the airplane. Such things as a poorly constructed or trimmed airplane, one that requires constant flight corrections, adds to the total servo power consumption. Even you can increase the total; jerky and nervous flight habits all use milliamps!



The Ace RC Digipace II, successor to the popular Digipace I, is used to accurately measure the ampere-hour capacity of all common RC equipment batteries, and even to calculate the available flying time for a given battery in a given airplane. The latest Digipace has some worthwhile improvements - read all about it!

Obviously then, a properly constructed and trimmed airplane will fly longer on a given battery than one with glued-together control surfaces, dragging pushrods, throttles or nosewheels that bottom out before the servo reaches its full travel, etc. Even your choice of control horns and clevis makes a difference . . . think about that next time you are trying to force a Z-bend equipped pushrod into a servo horn and it barely rotates. Sure, you can open up the hole . . . then you've got control slop . . . Z-bends are neither current-economical nor precise.

Now that you know how to increase your available flying time, let's take a look at how the Digipace II goes about measuring it. Well, it does that by discharging the battery at a constant rate, 300 mA for transmitter batteries, and switched at 300 or 500 Ma for receiver packs . . . the latter rate useful for the high capacity batteries preferred by some. This constant discharge rate is maintained until the battery under test is down to 1.1VDC per cell. The II comes adjusted for the most commonly used batteries:

Transmitter: 8-Cell, 8.8 VDC (9.6 VDC Nominal); 9-Cell, 9.9 VDC (10.4 VDC Nominal).

Receiver: 4-Cell, 4.4 VDC (4.8 VDC Nominal); 5-Cell, 5.5 VDC (5.5 VDC Nominal).

For special applications, adjustments can be made for any number of cells; Ace R/C will supply you with the how-to details. The procedure is relatively simple; the degree of accuracy will depend only on the accuracy of the required voltmeter, and your patience.

The discharge time is displayed on a four-digit LCD (Liquid Crystal Display) in minutes, down to 0.1 minute. A simple calculation: Minutes divided by 60 times the discharge rate (300 or 500 mA) gives the measured battery capacity in milliampere-hours.

After the discharge cycle, the Digipace goes into its charge period. As delivered, the charge rates are: Transmitter, 50 mA Constant Current; Receiver, Switched 25, 50 or 120 mA Constant Current.

The charge rate for the transmitter and the 25 mA rate for the receiver can be easily programmed to 85 mA rate with plug-in resistors furnished. Whatever the rate, which should of course be matched to the cells in use, it goes on for "around 17" hours, after which it is automatically cut down to a 10 mA rate, the recommended "trickle" rate at which the batteries can be maintained indefinitely. It should be noted, again as mentioned in the referenced AT-2000 Charger article, that these units are not "peak" or otherwise state-of-charge sensing chargers. That is, they do not sense and reduce the charge rate as the battery reaches a full state of charge. Instead, they are working on a strictly timed cycle, and some cautions stated along with the information are in order.

Connections to the Digipace II are made with 0.10 pin power plugs of the type used to connect AC adapters to many consumer electronic products, and as charge connectors for Airtronics and Futaba transmitters. Ready made cables with the proper connection at both ends are available from Ace R/C for Ace, Airtronics, and Futaba equipment. Two of the necessary plugs come with the Digipace, and others are available both from Ace R/C and Radio Shack (274-1567) to which the proper connectors can be added for any other brands of equipment. The process is simple; only two connections are necessary and all information required is found in the Digipace instructions.

The Digipace II comes in an attractive table-top, sloping-panel black and white case with all connections and controls readily accessible and clearly marked. There is nothing complicated or confusing about its operation, due in part to the clear and concise

labeling of its few controls. As there are basically two parts to the Digipace, one for the transmitter and one for the receiver batteries, there are two sets of switches to set. On the side labeled TX, one needs only to chose between eight and nine-cell packs. There are three LED's (Light Emitting Diodes) that indicate the present condition; CHARGE, TRICKLE, or DISCHARGE. The RX side is effectively the same, except that both the discharge and charge currents must be selected. Unless one is completely new to RC equipment and NiCd cells, the instructions are not even necessary, though in that case they are complete and easy to understand.

The RC hobby now requires batteries of a lot of different capacities, and somewhere along the line you might feel the need to tailor the Digipace II for a special application. Not difficult, at all, except that I am going to get you to read that article on the AT-2000 sooner or later. The charge and timing circuits of those two instruments are quite similar, and how to modify one or the other, or both, is explained in detail in the original article.

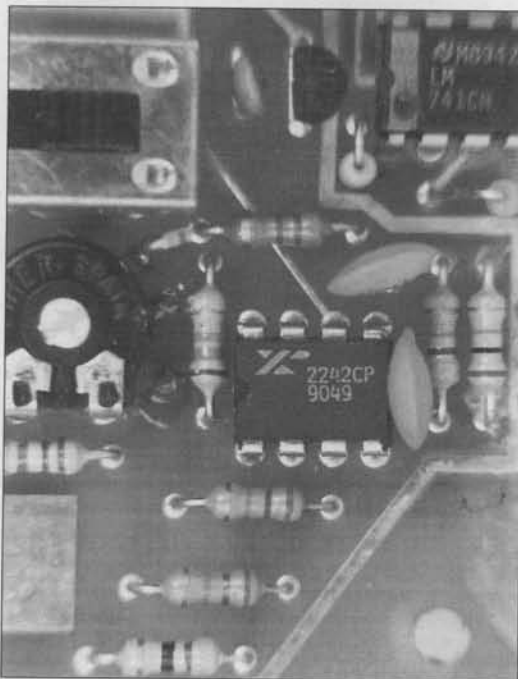
The Digipace comes with a PC board diagram on Page 7 of its instructions, which makes it easy to locate the required components. The charge rate for the transmitter side is controlled by resistor R2; rate for the receiver side being controlled by either one of R18, R19, or R21, as selected by the position of the "CHARGE CURRENT" switch.

The components that control the charge time are C9 and R54, though only R53 need be changed in accordance with the instructions previously given.

Setting the cutoff voltage for batteries with different numbers of cells is done according to instructions from Ace. However, I have found one correction needs to be made if one is using a variable power supply as a calibration source. The procedure calls for connecting the power supply in place of the battery, adjusting it to the correct voltage and setting the Digipace to cutoff at that voltage. Everything is OK while in the Discharge function, but at cutoff, when the Digipace triggers to Charge, the outputs of the power supply and the internal charger are now connected to each other. A number of things might happen . . . none of them good, but easily preventable. Simply connect a diode, any 1N4000 series or equivalent will do, in the positive lead with the anode to positive, from the power supply to the Digipace. The output voltage should be read from the cathode side of the diode, and of course, the common ground.

I firmly endorse the use of an instrument such as the Ace Digipace II as a valuable aid in keeping your NiCd batteries, and thus your airplane, in good health. It should be used religiously with every new battery, every new airplane, three or four times a year under continuous flying conditions, and most certainly at the start of flying, after winter or any period of inactivity. The Digipace II itself works well and reliably and I can unequivocally endorse it. If for some reason or other you can't have your own, do yourself a big favor and borrow your friend's. As improved as they are, NiCds do go west, and wouldn't it be great to have a warning other than "I ain't got it"?

The Ace R/C Digipace II is available only wired and tested from Ace and its dealers for \$159.95. Pre-wired cables are \$3.95 to \$8.49, depending on the type. Note that this one is not available in kit form, as are so many other Ace electronic products. If it were, no doubt, I would have purchased mine as a kit, but it is a complex piece of equipment, requiring a lot of time and patience to assemble. I was told by a number of my friends who assembled the older Digipace from a kit that they did not enjoy the project, so possibly the no-kit decision was the proper one. So use the time to build an airplane, but protect it with a Digipace! **MB**



Resistor R53, identified here, can be changed to tailor the charge time to any desired period. Details are included in the text and in the preceding article (November issue) on the Ace R/C AT-2000 Charger. Both units use similar circuitry.

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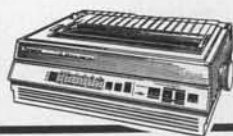


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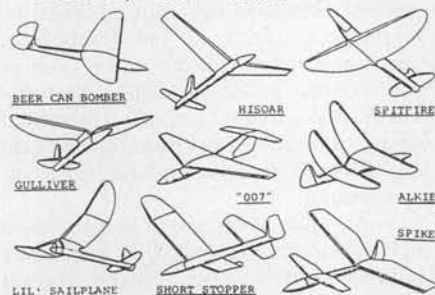
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CORNER continued from page 14

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- Receiver, non-BEC, No. 9043060X @ \$29.95.

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Following is a compendium of what Wee RC plans and flying information I have on hand, all on 8-1/2x11-inch paper...

FLYING TIME! You say that you need a model to fly some of these goodies in? Well, I can help with that also. Following is a compendium of what Wee RC plans and flying information I have on hand, all on 8-1/2x11-inch paper that I can have reproduced down at the corner copy center. Any three are yours for the asking, though in this case a 5x7-inch envelope with three loose stamps will be required... some plans are fatter than others.

If more than three plans are required, I have to ask for a donation to the international stamp fund; for those overseas friends who do not have access to US stamps for their SASE and postage for whose material is paid for on this end. The asked for donation is \$1.00 per plan, without the need for a self-addressed envelope as I will furnish the large one required. Doesn't quite add up, does it? Well, it is because the last time I made this freebie plans offer I was drowned with requests for all the 13 plans then listed. They were all honored, even though I knew that few, if any, would ever build all 13 of those little airplanes. Anyway, if you are definitely going to build something, plans are here for the asking. The list includes:

1. RC Mini-Scale. General information about wee airplanes, RC equipment installation, power, adjusting and flying.
2. Pulse Rudder-Only Flying Techniques. A bible on how to trim and fly single-channel small airplanes.
3. Fizz-Wizz. 27.75-inch wingspan cabin type high-winger for CO₂ power. Built-up construction. Plan is 1:4.

4. Guided Mite. 21-inch wingspan cabin high wing design for .020 power. Solid sheet wing and sides. Full-size plans.
5. Kirby Kadet Glider. Scale primary glider, 30-inch span. Built up wing, solid-sided fuselage. Half-size plans.
6. The Leastie Beastie. 37 square inches, 12-inch span for Cox .010. Shoulder wing, sheet wing and sides, half-size plans.
7. Lil' Roughneck. Low-winger looking somewhat like a Taurus. 22-inch wing, for Cox .010. Sheet construction, plan 1:3.
8. Lil' Sep. High wing cabin, 25-inch span for .020. Built-up wing, sheet fuselage. Plan is at 1:2.5.
9. Micro Super. Wee RC from England. Cute all-built-up cabin for .020-.030. 25-inch wing, full-size plans.
10. Mini-Corben Super Ace. Cox .010 scale! Built-up wing, sheet fuselage, 17-inch wing, 1:4 plans. Build one for Scale-Masters!
11. Minnie Most. 18-inch span shoulder wing for .010 power. Sheet construction throughout, plan is 1:3.6. Correct @ 3.6!
12. MMS-1. Mini-Mini-Saucer No. 1. A 4-inch wide x 8-1/2 inch long flying wing challenge, for .010. Full size plans.
13. Nieuport 11. Scale biplane for .020 to .049, 25-inch span, built-up wing, sheet sided fuselage. Plan is 1/3 size.
14. Pageboy. Cabin type high-winger, all sheet construction for .010 power. 15-inch span, full-size plans.
15. Prophet. Low-wing cabin, scale-like. Built-up wing, sheet fuselage. Span 24-inches, .020 engine, plans are 1:4.
16. Rivets. Scale Goodyear for .020 power. Built-up wing, sheet fuselage. 28-inch span, half-size plans.
17. Smallest Sperry Messenger: Wee scale biplane for .010. All sheet construction. Span 10-1/2 inches, full-size plans.
18. Sunday Fun. Top pod mounted .020 boosted glider, built-up construction.

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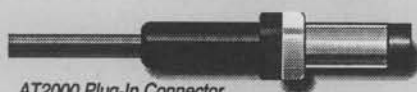
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FUTABA 1991

7UAFS SUPER SEVEN

SALE
\$319⁹⁶
FUT074



FUT052	5UAP PCM W/R129DP - 4 SERVOS	279.96
FUT074	7UAFS SUPER SEVEN FM SYSTEM	319.96
FUT075	7UAFP SUPER SEVEN PCM SYSTEM	379.96

Dual conversion 1991 receiver, all nicads and charge, servo reversing, trainer system, control panel with ATV-4 standard servos, programmable mixing on 7ch systems. PCM models have a 10 bit microprocessor for high resolution.

9 CH PCM 1024 SYSTEM

SALE
\$669⁹⁶
FUT090



Dual Conversion 1991 receiver, 3 dual rates, 3 Snap roll functions, LCD Screen, programmable mixing function, precision gimbals, timer and tachometer, programmable memory for up to six different models, (4)S5101 competition servos.

FUTABA 1991

4NBL ATTACK SYSTEMS

SALE
\$109⁹⁶
FUT043



1991 Micro receiver. All NICADS and charger. Aircraft version with 3 standard servos. Glider version with 2 micro servos and 250MAH battery. Electric version with electronic speed control and two (2) micro servos. Servo reversing.

FUT043	4NBL AM SYSTEM W/3-148	109.96
FUT045	4NBL AM SYSTEM W/2-133	154.96
FUT046	4NBL ELECTRIC SYSTEM W/2-133	174.96

CONQUEST SYSTEMS 1991

6 CH FM

SALE
\$189⁹⁶
FUT061



The new 1991 series of Conquest systems from Futaba all feature dual conversion receivers, standard S148 servos, trainer system, servo reversing and full nicads.

FUT041	4NBF FM DC SYSTEM W/3-148	139.96
FUT042	4NBP PCM DC SYSTEM W/3-148	209.96
FUT061	6NKF FM DC SYSTEM W/4-148	189.96
FUT062	6NKP PCM DC SYSTEM W/4-148	239.96

SERVO SALE

AIRTRONICS

AIR4102	STANDARD SMT H.D. SERVO	17.96
AIR4141	MICRO SERVO W/METAL GEARS	44.96
AIR4732	HI TORQUE CORELESS B.B. SERVO	49.96
AIR4737	HI SPEED CORELESS B.B. SERVO	49.96
AIR4741	H.D. CONTEST B.B. STD. SERVO	34.96
AIR4831	MINI B.B. SERVO	29.96

FUTABA

FUTS30	H.D. B.B. SERVO G	29.96
FUTS33	B.B. MICRO SERVO G	29.96
FUTS48	LOW PROFILE STD SERVO G	16.96
FUTS133	B.B. MICRO SERVO J	29.96
FUTS134	1/4 SCALE H.D. SERVO J	39.96
FUTS136G	COMPACT 108" RETRACT SERVO	49.96
FUTS148	LOW PROFILE STD SERVO J	16.96
FUTS5101	SMT B.B. STD SERVO	31.96
FUTS9101	SMT HT HS B.B. CORELESS SERVO	44.96
FUTS9201	SMT HT B.B. AIRCRAFT SERVO	44.96
FUTS9301	SMT HT CORELESS SERVO	44.96
FUTS9601	SMT MINI B.B. CORELESS SERVO	44.96

ROYAL

ROY0101	TITAN SERVO JR	13.96
ROY0102	MINI TITAN II JR	17.96
ROY0103	MICRO TITAN JR	23.96
ROY0104	MAXI TITAN JR	23.96
ROY0061	TITAN SERVO FUTABA G	13.96
ROY0062	TITAN SERVO FUTABA J	13.96
ROY0063	TITAN SERVO AIRTRONICS	13.96
ROY0064	TITAN SERVO WORLD MOLEX	13.96
ROY0065	TITAN SERVO WORLD/ARISTO "S"	13.96
ROY0066	MINI TITAN II FUTABA G	17.96
ROY0067	MINI TITAN II FUTABA J	17.96
ROY0068	MINI TITAN II AIRTRONICS	17.96
ROY0069	MINI TITAN II EXPERT MOLEX	17.96
ROY0070	MINI TITAN II EXPERT/ARI "S"	17.96
ROY0091	MICRO TITAN FUTABA G	23.96
ROY0092	MICRO TITAN FUTABA J	23.96
ROY0093	MICRO TITAN AIRTRONICS	23.96
ROY0094	MICRO TITAN EXPERT MOLEX	23.96
ROY0095	MICRO TITAN WORLD/ARISTO "S"	23.96
ROY0096	MAXI TITAN FUTABA G	23.96
ROY0097	MAXI TITAN FUTABA J	23.96
ROY0098	MAXI TITAN AIRTRONICS	23.96
ROY0099	MAXI TITAN WORLD/ARISTO "S"	23.96

MAGNUM

40 FSR

Inflation Fighters. The Magnum Series of engines are all Schnuerle for great top end and low reliable idle. The Pro Series features twin ball bearings. All engines include a muffler.

\$74⁹⁶
MAG401



MAG110	MAGNUM GP 10FSR R/C W/MUFF	42.96
MAG210	MAGNUM GP 21FSR R/C W/MUFF	40.96
MAG250	MAGNUM GP 25FSR R/C W/MUFF	49.96
MAG400	MAGNUM GP 40FSR R/C W/MUFF	54.96
MAG211	MAGNUM PRO 21FSR CAR	87.96
MAG251	MAGNUM PRO 25FSR-BB W/MUFF	69.96
MAG401	MAGNUM PRO 40FSR-BB W/MUFF	74.96
MAG451	MAGNUM PRO 45FSR-BB W/MUFF	79.96

ROYAL **\$74⁹⁶** .45 ROY0450

The perfect engine for the advanced trainer or sport airplane. Schnuerle ported, twin ball bearing and muffler. Easy to adjust carb for maximum top end and low reliable idle.



ROY0250	ROYAL 25 R/C ABC W/MUFFLER	54.96
ROY0281	28 R/C ABC W/MUFFLER	59.96
ROY0400	40 R/C ABC W/MUFFLER	69.96
ROY0450	45 R/C ABC W/MUFFLER	74.96

RJL

61 R/C

Schnuerle scavenged side exhaust, front rotary valve, double ball bearing, 18 oz. Comes complete with muffler.

\$98⁹⁶
RJL610



SAITO

FA-65G GOLDEN KNIGHT

Smooth running, excellent idle and plenty of power to replace "40" size two stroke engines. An excellent choice for scale airplanes up to 8 lbs. or aerobatic midsize aircrafts.

\$214⁹⁶
SAT650G



SAT450S	FA-45S ABC 4-CYCLE	159.96
SAT500	FA-50 4-CYCLE ENGINE	169.96
SAT650	FA-65 4-CYC. R/C W/MUFF	189.96
SAT800	FA-80 4-CYCLE R/C W/MUFF	219.96
SAT900	FA-120 4-CYCLE R/C W/MUFF	289.96
SAT901	FA-120S GOLD SPECIAL 4-CYCLE	309.96
SAT500G	FA-50G GOLD 4-CYCLE	189.96
SAT650G	FA-65G GOLD 4-CYCLE	214.96
SAT800G	FA-80G GOLD 4-CYCLE	239.96
SAT902	FA-120SDP DUAL PLUG & PUMP	339.96
SAT600T	FA-60T TWIN 4-CYCLE	498.96
SAT990T	FA-90T FLAT TWIN	389.96
SAT992	FA-130T DP TWIN PLUG	498.96
SAT993	FA-130T TWIN ENGINE 4-CYCLE	449.96
SAT994	FA-270TDP TWIN PLUG & PUMP	798.96
SAT995	FA-270T TWIN 4-CYCLE	669.96
SAT996	FA-300T 50CC TWIN 4-CYCLE	689.96
SAT998	FA-300TDP TWIN PLUG & PUMP	829.96
SAT997	FA-325-R5 RADIAL 4-CYCLE	1398.96

ISC INTERNATIONAL

ASP 40

The perfect engine where high power and a reliable idle are required. To insure long life the cylinder has been chrome plated and the crankshaft is supported with two ball bearings.

\$73⁹⁶
ISC540



ISC540	ASP 40RC W/MUFF	73.96
ISC541	ASP 46 FSR ABC W/MUFF	79.96
ISC542	ASP 46H FSR ABC WO/MUFF	79.96
ISC543	ASP 61 FSR RING W/MUFF	89.96
ISC544	ASP 61 FSR ABC W/MUFF	94.96
ISC545	ASP 91 FSR ABC W/MUFF	124.96
ISC546	ASP 1.08 BX FSR W/MUFF	179.96
ISC500	ZENOAH G-38	189.96
ISC501	ZENOAH G-62	264.96
ISC505	ZENOAH G-23	184.96

YS ENGINES

.61 FS **\$249⁹⁶**
YSE610

Unique pressure system, ABC piston-sleeve, ball bearings, excellent workmanship all add up to a high performance long lasting contest/sport engine.



YSE450	.45 SIDE EXHAUST ABC W/O MUFF	129.96
YSE451	.45 REAR EXHAUST ABC W/O MUFF	129.96
YSE120F	1.20-4C W/PUMP & SUPERCHARGER	369.96
YSE610	.61 LONG STROKE SIDE EXHAUST	249.96
YSE611	.61 LONG STROKE REAR EXHAUST	249.96

SHIPPING & HANDLING: UPS Ground Continental U.S. \$4.95 (Free on Total of \$100+), UPS Air \$4.95 plus 10% of Subtotal, UPS Next Day Air \$14.00 plus \$1.00 per lb. of Shipment total, C.O.D. add \$4.95, U.S. Mail \$4.95 plus 10% of Subtotal.

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ACE1002	Prodigy Sailplane	59.96
ACE1004	T-Max19-30 Sport	47.96
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ACE1007	QuasoarSailplane	129.96
ACE202	Ace High Glider MK II	24.96
ACE203	Whizard 1/2A Trainer	22.96
ACE205	All Star Biplane 1/2A	27.96
ACE206	Pacer 1/2A Sport	24.96
ACE207	Match None 1/2A Sport	24.96
ACE210	GLH II Foam Wing	19.96
ACE211	GLH II Built-Up Wing	21.96
ACE212	Alpha 1/2A Trainer	24.96
ACE220	Super Pacer 25 Sport	36.96
ACE222	T-34 Scale 35-45	52.96
ACE223	4-40 4/Cycle Sport Airplane	49.96
ACE224	4-60 4/Cycle Sport Airplane	62.96
ACE225	4-20 4/Cycle Sport Airplane	41.96
ACE226	4-40 BiPe Sport Airplane	59.96
ACE227	4-120 4-Cycle Sport Airplane	114.96
ACE228	4-120 BiPe 4-Cycle Sport Plane	124.96
ACE229	Seamaster 40	74.96
ACE230B	4-60/90 4-Cycle BiPe	87.96
ACE231	Seamaster 120	154.96
ACE232	Bingo 40-60 Sport	69.96
ACE5025	Extra 230 25% 72 in.	179.96
ACE5030	Extra 230 30% 87 in.	219.96
ACE5033	Extra 230 33% 96 in.	229.96
ACE5040	Weeks Special 72 in.	269.96
ACE5045	1/4 SC Clipped Taylorcraft	209.96

ASTRO FLIGHT

AF11017	Porterfield Deluxe w/geared 25	179.96
AF11018	Porterfield	59.96
AF11020	Challenger	35.96
AF11021	Viking Old Timer	35.96
AF11022	Mini Challenger Standard Kit	27.96
AF11023	DLX Mini Challenger w/Motor	99.96

AIRTRONICS

AIR0208	Olympic II, Sailplane	54.96
AIR0211	Sagitta 900 Sailplane	84.96
AIR0212	Sagitta 600 Sailplane	58.96
AIR0213	Olympic 650, Sailplane	34.96
AIR0218	Eclipse Electric Sailplane	37.96
AIR0219	Eclipse Deluxe Electric Kit	66.96
AIR0220	Legend 113 in. Sailplane	189.96

BRIDI MODEL DESIGNS

BRD047	XLT Pattern	93.96
BRD050	Vagabond 40	63.96
BRD053	Terrel Sailplane	21.96
BRD054	Kastaway Sailplane	25.96
BRD207	Flipper Sailplane	21.96
BRD300	Krafty 25	36.96
BRD305	Krafty 60	62.96
BRD600	Gyro Quickie 500 Racer	41.96
BRD700	Ultr Chaos Sailplane	71.96
BRD701	Escape Pattern Airplane	93.96
BRD702	The Big Bee Trainer .90-120	139.96
BRD703	Bizzee Bee Sport	189.96

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COX0415	Typhoon w/Engine	119.96
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COX0425	Fairchild 24 w/2Ch Radio System	119.96
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COX0465	Sundance Electric w/2Ch Radio	199.96
COX0474	EZ Bee II w/Engine	69.96
COX0475	EZ Bee w/2Ch Radio System	159.96

DCU MODELS

DCU100	Dragon Fly Sailplane	54.96
DCU200	Super Dragon Fly Sailplane	84.96
DCU300	Stryker Sailplane	74.96

DOUGLAS AIRCRAFT

DOU100	Silhouette Slope Sailplane	37.96
DOU200	Quicksilver 52 in. Slope Glider	49.96
DOU300	Electric Breeze	47.96

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DSC006	Hammer 20	35.96
DSC008	Stampe SV4 45-60	83.96
DSC009	Powerhouse	59.96
DSC010	Hammer 40	54.96
DSC011	1/2-A Eindecker	19.96
DSC012	1/5 Piper PA-12	119.96
DSC013	RC Special	64.96
DSC014	P-47 Thunderbolt	59.96
DSC015	Stearman 75	77.96
DSC016	Bearcat F-8	59.96
DSC017	Focke-Wolf FW-190	59.96
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DSC402	Curtiss Robin CX-5	27.96
DSC501	Phophet 941 Sailplane	64.96
DSC502	LeCrate Sport	29.96
DSC503	Lucifer	28.96
DSC601	Ariel Sailplane	21.96
DSC602	Caliph Sport-Trainer	28.96
DSC701	Heron	29.96
DSC801	Fly Baby	19.96
DSC901	Chabria	19.96

DURACRAFT

DUR200	Dura-Plane II	39.96
DUR300	Dura Bat	54.96

DYNAFLITE MODELS

DYF2001	Wanderer 72	23.96
DYF2002	Bird of Time	56.96
DYF2003	Mini Bird	31.96
DYF2009	Freedom Slope Sailplane	52.96
DYF2010	WindriferSailplane	41.96
DYF2012	Drifter II Sailplane	22.96
DYF2013	Apogee 100 in. Sailplane	35.96
DYF3002	Fun Scale P-5140-60	63.96
DYF3009	Piece O'Cake MK2 (Gas or Elec.)	24.96
DYF3010	Butterfly MK3 (Gas or Electric)	46.96
DYF3011	Fun Scale P-5125-40	46.96
DYF3012	Fun Scale Cessna 30-45	37.96
DYF3013	Fun Scale Corsair 40-51	59.96
DYF3014	Spitfire Fun Scale	59.96

EZ PILOT

EZS0800	Cessna 25	119.96
EZS0801	Super Cub 25	134.96
EZS0803	Decathlon 25	139.96
EZS0804	Zero 25	149.96
EZS0805	Zero Sen 40	259.96
EZS0807	Reno Formula L Blue	144.96
EZS0808	Reno Formula L Red	144.96
EZS0809	Reno Formula M Yellow	144.96
EZS0824	Calin 25	189.96
EZS0831	Supra Star 25	169.96
EZS0850	Calin 45	539.96
EZS0973	F-16 USAF Thunderbird	199.96
EZS0978	F-18 Hornet	339.96
EZS0978	Extra 230 25	144.96
EZS0980	Extra 230 40	249.96
EZS0984	Giant Bud Light Laser	699.96
EZS0987	Focke Wulf 190	259.96
EZS0988	Diabolo 120	394.96
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EZS0995	Lata 1700E RTF	154.96
EZS1005	Kona 1700T Sailplane	124.96
EZS1007	Balla 1700E Electric w/aileron	164.96
EZS1015	Super Chipmunk 40-60	219.96
EZS1020	Super Chipmunk 120	399.96
EZS1024	Deathlon 40 (60-1/2)	249.96
EZS1031	Fairchild PT-19 (62-3/4)	259.96
EZS1033	P-51 Dallas Doll	259.96
EZS1035	Dago Red Mustang (56)	259.96
EZS1037	P-51 Mustang (56)	259.96
EZS1055	Christian Eagle 40-50	299.96
EZS1062	Supra Fly 45 (59)	294.96
EZS1064	Cap-21 (57-3/4)	239.96
EZS1065	Big Supra	599.96

FLITELINE R/C MODELS

FLN150	Scat Cat 500 Racer	29.96
FLN200	Fun Fil 40	29.96

GOLDBERG MODELS

GBG040	Electra Deluxe	44.96
GBG041	Electra Standard	27.96
GBG042	Mirage 550 Electric Plane	49.96
GBG052	Super Chipmunk	84.96
GBG053	Ultimate BiPe	119.96
GBG054	Vector 40 Trainer RTC	99.96
GBG056	Eagle II	49.96
GBG057	Freedom 20	39.96
GBG059	Sophisticated Lady	34.96
GBG060	Gentle Lady	22.96
GBG061	Eaglet 50	34.96
GBG063	Anniversary J-3 Piper Cub	59.96
GBG064	Sky Tiger	54.96
GBG065	Junior Tiger .15-.30	44.96
GBG296	Super Floats	34.96
GBG678	Electric Power Pod	34.96

GM PRECISION MODELS

GMI001	Rainbow Runner 25	57.96
GMI002	Rainbow Runner 45	69.96
GMI003	Sunbird 40	57.96
GMI004	Sunbird Jr. 10	42.96
GMI005	Bumble Vee .049 Electric	19.96
GMI006	Killer Vee	26.96
GMI008	Killer Vee 40	51.96
GMI009	Thermal Charger Electric	46.96
GMI010	Sunbird 120	134.96

GLIDE ONE MODEL

GOM100	Outlaw Slope Sailplane	29.96
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HIROBO HELICOPTERS

HIR956	Shuttle XX Assembled w/Enya 35	394.96
HIR957	Shuttle XX Assembled w/o engine	289.96
HIR961	Shuttle ZX Assembled w/Enya 35	399.96
HIR962	Shuttle ZX Assembled w/o engine	299.96
HIR968	Shuttle ZX Kit	289.96

HOBBY DYNAMICS

HDDFANT	RFB 600 IAN Trainer	94.96
HDDGB20	Gobee 20 Trainer Kit	44.96
HDDGB40	Gobee 40 Trainer Kit	59.96
HDDSPTE40	Spotee 40 Trainer Kit	55.96
HDDULT20	Ultra 20 Trainer Kit	44.96
HDDULT40	Ultra 40 Trainer Kit	54.96
HDDP51	Mustang Sport 25-45	54.96

HOBBY DYNAMICS cont'd.

HDDMK14	Spitfire Sport 25-45	54.96
HDDP39	P39 Aircobra Sport 25-45	54.96
HDDME109	ME109 Messerschmitt	54.96
HDDSCUBE	Cub Electric	54.96

HOUSE OF BALSA

HOB024	T-6 Texan 15-20	29.96
HOB025	Two-Tree Glider	22.96
HOB026	2 x 4 Glider	16.96
HOB027	2 x 6 Glider	18.96
HOB040	P-51 Mustang	29.96

IMEX PRODUCTS

IME9500	Imex 40T RTF Trainer	109.96
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JACK CALDWELL MODELS

JCMSE1	Swift AT Slope Sailplane	42.96
JCMSE2	Swift 46 Slope Sailplane	42.96
JCMSE3	Mini X-Cell Slope Glider	59.96

K & A MODELS UNLIMITED

KAM100	Mini-H Slope Glider	27.96
KAM150	Karm-U Slope Glider	44.96
KAM200	Dago Red Sailplane	24.96

KALT HELICOPTERS

KLH8300	Enforcer 30 Helicopter RTF	319.96
KLH8400	Enforcer 30 Helicopter Kit	299.96

LONG TAI SHIN MODELS

LTSK40	Das Ugly Stick ARF	129.96
LTSK60	Das Ugly Stick 60 ARF	149.96

BOB MARTIN MODELS

MAA024	ET-25 Trainer	24.96
MAA029	Pussycat 78 in. Sailplane	22.96
MAA031	Boccat Sailplane	26.96
MAA032	Talon Sailplane	26.96
MAA044	ET-40 Trainer	44.96
MAA100	Coyote w/Durelene Fuselage	59.96
MAA110	SR-7 w/Durelene Fuselage	79.96
MAA120	Katie II Sailplane	54.96

NORTHEAST AERODYNAMICS

NEA020	Train-Air 20	49.96
NEA050	Train-Air 40	63.96
NEA075	Bel-Air 40 BiPe	87.96
NEA080	Bel-Air 60 BiPe	99.96
NEA100	Sport-Air 40	69.96
NEA500	40 Hydro Floats	29.96

PAUL'S FLYING STUFF

PFK01	Deknight Special F-1 Racer	124.96
PFK02	Thunderquickie II 500 Racer	47.96
PFK17	P51 Fiberglass Kit	114.96
PFK19	F86 Sabre Kit	159.96

PICA ENTERPRISES

PIC01	Spitfire	104.96
PIC02	T28B	109.96
PIC03	Focke Wulf 190 D-9	109.96
PIC04	Waco F-3	116.96
PIC05	Duelist Z-40	109.96
PIC06	Cessna 182	121.96
PIC07	Bucker Jungmeister 60	112.96
PIC12	1/5 Scale Waco .61-1.20	169.96
PIC13	1/5 Scale Aeronica Sedan	169.96
PIC14	1/5 Scale Cessna	159.96
PIC15	1/5 Scale T-28B	169.96
PIC16	1/5 Scale Spitfire	179.96
PIC17	1/5 Scale P51 Mustang	209.96

PIERCE AERO MODELS

PIE100	Paragon 118 in. Thermal Glider	64.96
PIE110	Ridge Rat 49 in. Slope-Low Wing	39.96
PIE124	Gemini M-T-S Sailplane	79.96

ROYAL PRODUCTS

ROY1003	Corsair Senior .60-.80	164.96
ROY1005	FW-190 Kit .60-.80	159.96
ROY1006	F8F Bearcat .60-.80	164.96
ROY1007	P-51D Mustang .60-.80	172.96
ROY1008	Stuka Kit .60-.80	159.96
ROY1009	ME-109 Kit .60-.80	164.96
ROY1017	P6E Hawk .60-.80	219.96
ROY1100	B-17 Kit	229.96
ROY1101	B-25 Kit	179.96
ROY1102	P-38 Kit	244.96
ROY1103	C-47 Skytrain Kit	214.96
ROY1200	1/4 SC Super Cut	326.96
ROY1201	1/5 SC Corsair/50CC	489.96
ROY2007	Ecosoar RTF Sailplane	84.96
ROY2008	Electrosor RTF Electric	97.96
ROY2008	Powersoar RTF Powered Sailplane	84.96
ROY2021	20S Royal-Air RTF Sport	79.96
ROY2022	20L Royal-Air RTF Sport	79.96
ROY2023	20T Royal-Air RTF Trainer	82.96
ROY2024	40H Royal-Air RTF Trainer	99.96
ROY2026	40L Royal-Air RTF Sport	99.96
ROY2027	40T Royal-Air RTF Trainer	99.96
ROY2030	Peashooter	284.96
ROY2031	Stearman PT-17	284.96
ROY2032	Reliant	284.96

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SHELDON'S HOBBIES

SHS800	1 oz. Posi-Cure Cyanoacrylate	3.29
SHS802	1 oz. Posi-Cure + Cyanoacrylate	3.29
SHS700	2 oz. Posi-Cure Cyanoacrylate	5.49
SHS702	2 oz. Posi-Cure + Cyanoacrylate	5.49
SHS900	Insta-Set Spray 20 oz.	2.49
SHS901	10 oz. Insta-Set Refill	7.96
SHS902	1 oz. Un-Cure Debonder	2.96
SHS905	Sheldon's 5 Min. Epoxy 9 oz.	6.96
SHS915	Sheldon's 15 Min. Epoxy 9 oz.	6.96
SHS930	Sheldon's 30 Min. Epoxy 9 oz.	6.96
SHS920	Sheldon's 5 Min. Epoxy 4.5 oz.	3.96
SHS921	Sheldon's 15 Min. Epoxy 4.5 oz.	3.96
SHS922	Sheldon's 30 Min. Epoxy 4.5 oz.	3.96

SIG MANUFACTURING

SIG700	Piper J-3	49.96
SIG704	Ryan Sta	94.96
SIG705	450 Mustang	51.96
SIG708	Komander	54.96
SIG709	Liberty Sport	79.96
SIG710	Skybolt	76.96
SIG711	Kougar MKII	51.96
SIG714	Smithy Miniplane	61.96
SIG715	Kavalier	53.96
SIG716	Doublet II	31.96
SIG718	Kiwi	48.96
SIG721	Kadet Junior	33.96
SIG722	1/4-Scale Clipped Wing Cub	134.96
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PRICES SUBJECT TO CHANGE



SUCCESSFUL OREGON FLY-IN

Congratulations to Oregon Miniature Aircraft Squadron No. 1 on the occasion of its Tenth Anniversary Fly-In, held August 10-11, 1991. O.M.A.S. divided its meet by having a fun-fly on Saturday and then on Sunday an I.M.A.A. style fly-in featuring Big Birds.

O.M.A.S. has an outstanding flying site, featuring a 50x400-foot paved runway and an irrigation lake adjacent to the runway. The lake provides plenty of area for model float planes or amphibians to take off and land.

The field is located near Forest Grove, Oregon, just west of Portland. It is rented from a farmer who owns the surrounding orchards and corn fields. The clubhouse also serves as a concession stand, serving locally made specialty sausages and hot dogs and beverages. Although the outhouses are not brick, they are well made and very clean; this fact helps to keep our spouses happy. Perhaps I will have to write a book on the finest flying site outhouses I have visited around the world!

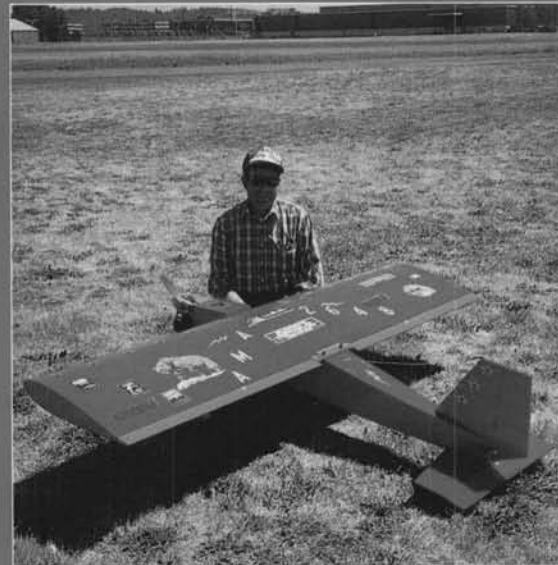
Six members of the Lesser Seattle Giant Aircraft Squadron (LSGAS) were able to find their way to the O.M.A.S. flying site, where we unlimbered ten Big Birds. Each of us managed at least three flights, devastated the snack bar and got lucky at the O.M.A.S. prize drawing, taking home kits, hats and gift certificates donated by local hobby shops.

All of the Big Bird pilots who have attended O.M.A.S. fly-ins over the past ten years wish them continued success. We only hope that Big Bird pilots from O.M.A.S. will let us return the hospitality by attending our Fly-Ins in Washington.

• • •
Several years ago a farmer purchased my Nosen Gere Sport biplane with intentions of doing some crop spraying. The gentleman refused all help and suggestions. He seemed to feel that if he could plow a straight furrow with his John Deere, he could fly a toy plane. I never heard how the crop dusting went, but I would imagine the only dust generated was

when the poor old Gere impacted the ground. The crop spraying was not a bad idea and the concept has been put to practical use, because Mr. John Cyr, Director of Electronic Service at Iowa State University, wrote explaining that his department is using RC models to dispense "natural insecticides," or bugs.

Mr. Cyr is seeking information on large,



(Top right) Fred Hostetler, chairman of Oregon Miniature Aircraft Squadron #1, poses with his Byron Beechcraft G-61 powered. (Top left) Walt Hale did a nice job of flying this Miles AR-20, an obscure WW II plane that never saw production. Super Tigre .90 two-stroke. (Above right) Dale Gunter enjoys flying this Santich kit of the giant UltraHots. S.T. 3000 powered. (Above left) Lloyd Marhol shows off his original designed Grizzly Bear; 80-inch wingspan, 14 lbs., and a glow-ignitioned Webra Bully makes this plane move out.

slow flying radio and telemetry controlled planes that are capable of delivering the bugs at an altitude of 10 to 20 feet without damaging the little varmints, and without the expense of full-scale aircraft.

It will be a pleasure to communicate with Mr. Cyr about his request because nothing

O.M.A.S. has an outstanding flying site, featuring a 50x400-foot paved runway and an irrigation lake adjacent to the runway.

makes me feel better about my Big Birds than seeing them used in a practical way, whether they are used to laser tag some big

bully dictator's tanks for destruction or to gently lay a carpet of "natural insecticides." Big Birds are capable of doing it all.

Big Bird pilots will no doubt wish Iowa State University well in its application of our favorite size planes, and will be forthcoming with a lot of good ideas to help I.S.U.'s program be a resounding success.

AERODROME 92

In the September issue of *Model Builder*, Editor Bill Northrop mentioned "Aerodrome 92" in his "From the Workbench" editorial column. I would like to reinforce his comments with some of my own, and offer Big Bird pilots some ideas

on where to obtain World War I plans for Big Birds.

Aerodrome 92 will be a gathering of WW



John Carlton and Jack McKnight blot out the sun when they fly these 1/3-scale clipped wing Taylorcrafts. John uses a Q.52 and Jack uses a Sachs 3.2 for power.

I aircraft (models and full size) on September 5, 6 and 7, 1992, near Lake Guntersville, Alabama.

Quarter-scale I.M.A.A sized planes will be the order of the day and Hank Iltzsch will be the model coordinator for the model portion of the event.

If you would care to view the site without actually going to Alabama, Dick Hansen can take you there via videotape. Simply order Videotape Number 11 from Hansen Scale Videos. Dick not only visits the Aerodrome 92 flying site, but also takes us to the Northwest International Scalemasters Contest, visits Dan Parsons, and shows us the Northwest Seaplane Championships. It is a very good tape.

Aerodrome 92 looks like a pleasant site, and with many vacation facilities close by, you could make this your family vacation spot for 1992.

Now that your interest is aroused, perhaps you will be seeking some plans in order to build a big World War I Flying Machine for Aerodrome 92. Jim Kieger's Replicraft drawings provide some of the best WW I plans available anywhere. Jim's ultimate goal is "to provide the most accurate and highly detailed drawings of World War I aircraft ever produced." The plans are drawn from original factory shop drawings.

Replicraft currently has nine sets of plans available, that include the Hanriot HD-1 (one of my favorite World War I planes), a



(Top right) Jim Gray calls his disguised Big Bee an S.E. 2-1/2. Strobes on guns, Big Bird uses a Sachs 3.7 engine with a C.H. ignition. (Top left) Bill Failor scratch built his Sopwith Triplane. S.T. powered bird weighs 21 pounds and has a 69-inch wingspan. (Above right) Dave Weigandt flies this Laser 200 with great precision. It's powered by an O.S. Gemini 300 Twin, weighs 17-1/2 pounds, and has a 98-inch wingspan. (Above left) K.O. Weber did a nice job of covering his Bridl Bizzie Bee. Lake O.M.A.S. in the background.



The infamous 'Kent Valley Blue Bellies' are seen seeking shade shortly after devastating O.M.A.S.'s concession stand. From left, Bennie Phillips, Dave Miner, K.O. Weber, John Carlton, and Chuck Willcox.

average price is around \$325. If the kits are as fine as Nick's design work, you are going to get a great plane.

These are a couple of ideas for you from sources you may not be familiar with, but should be capable of supplying you with some interesting building projects. It is not always easy to find new items that will interest everyone, but it is fun trying.

The best laid plans of mice and men often require alteration, to paraphrase an old adage, and so it is with my electric project. It became apparent to me that there was no way to finish my Stampe biplane in time to enter it at the Northwest Model Exposition, which is held the first weekend of February each year. A framed-up Nosen J-3 Cub was dangling from the hangar rafters, so the Cub will be my first electric-powered project.

Roland DV 1a & b, the Sopwith Pup, Thomas Morse Scout, Sopwith Camel, Sopwith 1-1/2 Strutter, Nieuport 27, S.E. 5a, and the Bristol Scout.

Bill Effinger also has five quarter-scale sets of plans available that include a Spad C-XIII and Fokker D-VII. I like Bill's plans because his planes have light loadings and good construction techniques.

Bob Holman has at least seven sets of World War I plans that include a Rumpler C. IV and an Albatross D.V. A. Bob's plans are of good quality and are very flyable. Many of his plans are drawn by English designers.

Rich Uravich, the owner of Plans and Plastics, has two new sets of plans available.

qualify as a Big Bird. Proctor kits look almost too good to cover when framed up.

There are plenty of plans and kits available, so if you start building now it would be possible to complete your plane and work it into a proven flier before Aerodrome 92. Building season will be upon us by the time this column hits the newsstand, so it seems like an excellent time to give you some ideas for winter building projects.

Consolidated Aircraft Co.'s biplane trainers from the 1920's have always been some of my favorite planes and I recently became aware that Hobby Horn has some of Hal Osborne's plans available. I ordered a set of PT-3 plans and soon received a fair set of drawings for a 69-inch wingspan model that had a .45 cu. in., four-stroke engine recommended for power. With a little work, it will be possible to enlarge the drawing so that a bigger engine may be accommodated. Hobby Horn also included its catalog with the PT-3 plans. The catalog not only has a full array of plans for models of all sizes, but has a large inventory of model supplies available for mail order.

Nick Zirol's Big Bird scale designs have always been excellent fliers. Now it is possible to order many of Nick's Big Bird scale planes in kit form from The Aeroplane Works. Chuck Gill, head honcho at The Aeroplane Works says that the kits are complete and contain high quality merchandise that may be purchased without plans, should you already have a set.

The kit line includes everything from a big Stearman biplane to a Sukhoi Su-26M. The



(Top) Len Bosman has plans for this Lysander. Quadra 38 and Futaba radio. (Above) Ben Almojuela flies giant electric planes. Cobalt 60 powered Showmaster x2; 84-inch wingspan, mica film covering, Futaba radio.

The Stampe will be put on hold and used with one of Bob Boucher's new, larger, more powerful electric motors.

As soon as the Cub project was put on the front burner a cowl had to be selected, and as T&D's cowl for my Fleet biplane had proven very rugged, a quick call was made



Fred Seiler powers his Fokker D-7 with an S.T. 2000. Radio is Airtronics. Plane weighs 16 pounds.

They are a 75-inch Fokker D-7 and an S.E. 5a. These planes feature Clark Y airfoils and conventional construction using light plywood and balsa. Many difficult-to-build scale details are available in preformed plastic.

Rich's models lend themselves very well to Aerodrome 92, because many of the full-size planes that will be there are replicas that use modern methods of construction to make the old birds much easier to fly.

If you prefer a World War I plane in kit form, you will not find any better than Proctor Kits, because they are complete, authentic, and have excellent quality wood and fittings. Proctor's Big Bird kits are the Albatross D 3a, Nieuport 28, Nieuport 11, and a 1/6-scale Jenny that is big enough to

to T&D. Steve and Kim Durecki were kind enough to include a catalog of their products, with a very nice J-3 cowl, which is constructed of glass cloth and custom white epoxy. The cowl is of excellent quality and made with good material; no pinholes have been evident, even after a light sanding with 220 grit sandpaper as recommended in the instructions.

The Cub is of unknown manufacture. I sent Steve a pattern of the firewall, and it so happened that a Nosen quarter-scale Cub cowl was a perfect fit. Not only was the cowl

The Jet Box is made for Multiplex radios, however, it would not be difficult to add spacers to custom fit your own transmitter.

delivered, but the origin of the kit was identified. T&D Fiberglass Specialties has a very extensive line of these quality cowls and wheel pants; it would be difficult to name a cowl that is not in their inventory.

Several friends in the RC hobby business informed me that my modeling time would diminish now that I am in the RC work force and this has proven true. I seldom just go flying anymore, but do attend more fly-ins than ever before, and actually fly more.

My Bridi "Big Bee" and Multiplex radio are proving to be rugged campaigners. So far this summer, I have only had to adjust the valves on my Saito 270 and keep my batteries on trickle charge in between fly-ins.

The re-hab project on the Cessna 180, mentioned in a spring issue of *Model Builder*, sits anxiously awaiting more T.L.C., with some finish work and radio installation left to perform. I still hope to have the 180 airborne before the flying season is over.

Quite a few pilots have observed my use of a transmitter tray during this flying season, and I have been asked how I like using one. Transmitter trays may not be for everyone, but I really enjoy using my Multiplex Jet Box and the L.R. Taylor tray for my "Specialist" radios. A tray or transmitter holder frees your hands and fingers for their most important job: flying your plane. They also allow a more relaxed flying stance that enables you to concentrate on maneuvers and landings.

We have all observed pilots shaking so hard that they nearly drop the transmitter. If the RC pilot uses a transmitter tray, he is relieved of the stress of holding the transmitter.

Multiplex's Jet Box is available from Beemer R/C. The Jet Box is made for Multiplex radios, however, it would not be difficult to add spacers to custom fit your own transmitter. Multiplex transmitters are quite wide, so width would not be a problem.

Taylor trays have not been advertised for some time, so I am doubtful that they are still available. That is too bad, because they were very nicely made, but I imagine that the market is small.

K.D.I. sells a very nice-looking unit that just hooks over the shoulders and the pilots observed using them seem very happy with them. One of the advantages to the K.D.I. is that it is easy to put on and remove after each flight. If you have not tried a transmitter holder, you might find it makes your Big Bird flying more enjoyable. Expect to get some wisecrack comments, but do not let that keep you from trying something new that no one else has had the courage to try. If Big Bird pilots were a timid lot, there would be no Big Bird pilots.

Duane Sanders attended our last L.S.G.A.S. Fly-In in July, and displayed Model Aviation Products' line of RC model support equipment. Most of M.A.P.'s products would prove very useful to Big Bird pilots.

M.A.P. distributes an item called a "Prop Sock" that will allow you to store seven propellers up to 25 inches in length. This is a quilted unit that will provide good protection for those expensive, big propellers.

"Secure Rap" enables you to hold your foam rubber around battery packs and receivers without ruining the foam with tape. The Velcro straps also let you easily unwrap the foam when you decide to move your

batteries and receiver to another plane.

"Bucket Bag" turns a five-gallon plastic bucket into a very servicable field box. The Bag has many pockets inside and out to hold all your tools and makes them easily accessible.

A practical device to check out the balance point of your latest Big Bird is difficult to find, however, M.A.P.'s "Balance Bug" is a very sturdy unit that is capable of supporting most of our giant size planes when we are examining our handiwork to see if we have the balance point at the correct spot.

ADDRESSES OF COMPANIES MENTIONED IN THIS COLUMN

T&D Fiberglass Specialties: 38624 Mt. Kisco, Sterling Heights, MI 48310; (313) 978-2512.
Aerodrome 92 Information: Ryder International Corp., Arab, AL 35016; (205) 586-1580.
Hansen Scale Aviation Videos: 108 S.E. Stacy Ct., Portland, OR 97266; (503) 653-2578.
Hobby Horn: P.O. Box 2212, Westminster, CA 92683; (714) 893-8311.
Replcraft: 1400 Gomes Road, Fremont, CA 94538.
W.E. Technical Services: Rt. 1 Box 2900A, Santa Rosa Beach, FL 32459.
Bob Holman: Box 741, San Bernardino, CA 92402.
M.A.P.: P.O. Box 26017, San Bernardino, CA 92406.
Plans and Plastics: 15 Newcomb Trail, Ridge, NY 11961; (516) 929-4132.
The Aerodrome Works: 2134 Gilbridge Rd., Martinsville, NJ 08836.
Beemer R/C West: 17252 E. Falcon Dr., Suite #3, Fountain Hills, AZ 85268; (602) 837-0311.
Proctor Enterprises: 25450 N.E. Eilers Rd., Aurora, OR 97002; (503) 678-1300.
K.D.I.: 10426 S.E. 206th Place, Kent, WA 98031; (206) 854-8053.

Big Birds "Book of the Month" is a golden oldie, *Nothing by Chance* by Richard Bach, published by Avon and available from Hurst Corporation, 959 Eighth Ave., New York, NY 10019; Library of Congress Card number 69-18139. If you love flying and biplanes, this book is for you. To say that R. Bach is to aviation what J.S. Bach is to music may be going a bit too far, but Richard Bach tells a fine tale.

Go fly a Big Bird! It's good for you! Bruce Edwards, 8304 53rd St. Ct. West, Tacoma, WA 98467; (206) 564-4416. **MB**

John Carlton did a nice job of installing the instrument panel in his 1/3-scale clipped wing Taylorcraft.



USA FLIERS TAKE TOP 2 PLACES IN F3B WORLD CHAMPIONSHIPS

I told you so! No, I didn't say our guys would win, necessarily, but I did say that the USA had selected one of its best F3B teams ever! Now get a load of just how well they did! Just in time to make this issue, I received a telephone call from Mark Allen of Flite Lite Composites. The news that he bore was truly exciting, and sounded almost too good to be true. The US FAI/F3B Team did extremely well in Holland this past August, taking an amazing TOP TWO places in the final standings plus a respectable 26th place.

It has been ten years, but once again the

USA has a resident world champion RC soaring pilot! Team member Joe Wurts is



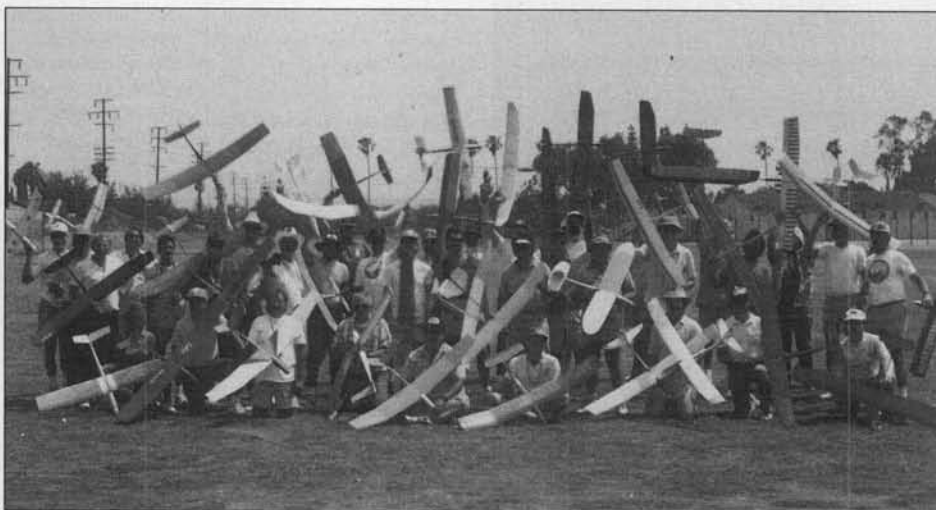
Brian Agnew, the man who "won it all" at the '91 AMA Nats, including HLG, also took first place at the Annual ISS Hand Launch contest in Riverside, California, with his Vertigo design. Contact Flite Lite Composites, where Brian works, for availability.

the one! Congratulations Joe, I don't see how you'll be able to top THIS one ... unless you repeat in 1993!

Second place in the world championship standings was Daryl Perkins! Congratulations Daryl! Just HOW LONG have you been flying RC??? Can I still call this beginner's luck? (Yeah, in a pig's eye!)

Third place US Team Member, Larry Jolly, either had an off day or two or he had technical difficulties with his Mueller Comet 89T/91T (I'm not sure which of the two he flew). I don't know the whole story, but Larry's 26th place finish is definitely NOT indicative of his F3B skills. However, if Larry chooses to compete again (and I don't know why he shouldn't) watch your backs, 1 to 25, Larry will be coming through!

I have no idea WHY with this kind of excellent finish the US TEAM didn't also take the first place team trophy. I would



The standard group photo taken at the 1991 Annual ISS Hand Launch Contest. Still plenty of diversity in those 60-inchers!

think that first and second places would carry an awful lot of weight in the team scoring system; enough weight that no matter what the third man did, it wouldn't much matter. Oh well, the third place trophy is still very good.

Third place for us is good considering what we are up against internationally. The many well practiced and seasoned F3B competitors in Europe, who compete in F3B like Americans compete in thermal duration, come from a disproportionately larger pilot "pool." These F3B pilots come from countries not much bigger than most states in the USA, so travel times and expenses are diminished, and they tend to know each other better and can practice together more easily as a team. Germany has a two-tiered F3B national competition system for "farming" world champions. F3B to them is like TD to us. Statistically, I

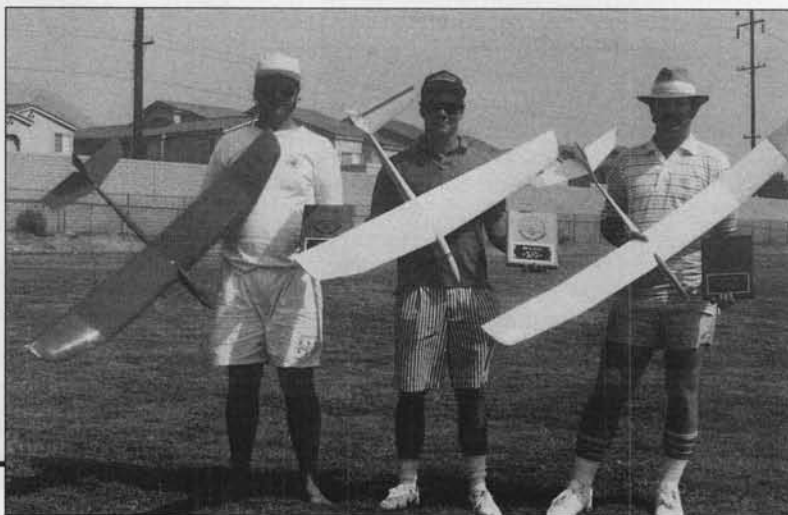
don't believe we are as likely to come up with the really good TEAMS on a consistent basis. We did extremely well this year, perhaps in part because it was a single-state team of talented Southern California fliers who were also friends.

It will be very, very interesting to see the reports coming out of Holland this winter in the modeling press.

FIRST, SWEEP THE AMA NATS, THEN SWEEP THE WORLD CHAMPIONSHIPS; A MANUFACTURER'S DREAM COME TRUE

Not only did Mark Allen's Flite Lite Composites kits take first place in four out of six

The top three at the ISS RC HLG Contest: (L to R) 3rd place Mark Grand and his Zephyr, 1st place Brian Agnew and his Vertigo, and 2nd place Keith Schwemmer and his scratch built "Mos-gitta" (reduced size Sagitta).





Do you remember your first solo? I'll bet Todd Rausch does! After only about a half-hour of over-the-shoulder coaching, he was flying well enough to be left on his own.



Do you remember your first landing? It wasn't planned was it? They never are. Got lucky, though, it landed in a relatively soft bush on a ridge saddle next to the slope with zero damage! Yeah, he's smiling!



Remember, always keep away from the hill by turning away from it! The lift usually extends out and up more than you expect, so don't be afraid to venture out! Whatever you do don't get in the sink behind the hill!

official soaring events at the 1991 AMA Nats (including a 1-2-3 sweep of Standard Class) ... but now this! The top two finishers at the world championships were Flite Lite F3B Eagles!

(In case you missed last month's column, Flite Lite Composites kit aircraft took first places in: Class A HLG - the Vertigo, at that time an Agnew/Allen joint product; Class B 2-Meter - the Falcon 600; Class C Standard, 1-3 were Falcon 800's; and Class D Unlimited - the Falcon 880.)

I knew that Daryl and Joe had been practicing with F3B Eagles, and I suspected that's what they took with them to Holland. However, when Mark called to tell me Joe and Daryl won, I had to ask Mark if they won with his Eagles! He didn't boast, but boy, did he ever have the bragging rights!

Mark gives the F3B Eagle design credit primarily to Joe Wurts, who designed the wing planform and picked the airfoils. If I remember correctly, the fuselage was a joint

design effort with Joe and Mark contributing equally. Daryl was instrumental in refining the design. Mark says Daryl is particularly good at "feeling" what isn't right with a model's performance or handling. He does this without any preconceived aerodynamic theories related to "why" something isn't right. Mark says this was an invaluable help in perfecting the F3B Eagle design.

The foam core cutting and fuselage mold work and layups were primarily Mark's efforts. One sheeted foam core wing which came late in the development featured the SD-7003 airfoil. It turned out so well that Mark decided to make a wing mold from it. He and Brian Agnew made the molds. When Joe and Daryl flew the F3B Falcons with the molded SD-7003 airfoil wing, they liked it better than the original RG-15 wings they had been flying. It didn't "look fast" at first, but the distance lap totals of the SD-7003 wing were impressive. Speed times improved as the refinements that Daryl suggested were implemented. In Holland, speed times with Joe as the pilot were consistent mid-18's, not the best, but very good and obviously competitive. One lesson learned with the SD-7003 was to NEVER reflex the trailing edge in speed or distance (not even 1/16") or a noticeable degradation of performance will occur. This airfoil is cleanest with the TE "cusp" left as designed! (See Airfoil of the Month for SD-7003.)

On a different note, watch for future news about Flite Lite Composites Thermal Eagle. This new design, according to Bob

McGowan, is a slightly better thermal duration competition machine than the very popular and well proven Falcon 800/880. This new ship uses the SD-8000 airfoil and a slightly longer wing (optional 112 or 118 inch spans). A skinny, F3B Eagle like fuselage completes the basic changes in the Thermal Eagle. (See Airfoil of the Month for SD-8000.)

Anyone wishing to order a Swift, Falcon, or Eagle from Mark should be advised there may be a month-long delay in receiving the kit. Currently the demand exceeds the supply, a situation which should improve over



Mark Allen, of Flite Lite Composites, launches a scratch-built electric powered glider prototype based on a Swift fuselage. Mark designs very good aircraft as witnessed by the recent top honors at the AMA Nats and one-two finish at the World Champs in Holland this past summer.

the next few months as production levels are beefed up and as Brian Agnew (AMA Nats champion) comes aboard to help out. Contact Flite Lite at 466 Primero Court, Suite E, Cotati, CA 94931, 707-792-9174, be sure to tell them you heard about it in *Model Builder!*

BEGINNER'S TIPS, PART 4: NOW THAT YOU CAN FLY, HOW DO YOU LENGTHEN YOUR FLIGHT TIMES?

You can certainly have a lot more fun with your model sailplane if you can keep it flying longer than the 20-second glide time afforded by the average hand toss, or the two-minute glide to the ground from a hi-start launch. For model sailplanes there are two primary types of lift available; thermal lift and slope lift. For the majority of Americans, thermal flying sites will be the most handy, so we'll touch on thermal flying first.

WHAT IS A THERMAL?

Everyone knows that hot air rises. A thermal is a naturally occurring, rising body of warm air. This warm air may only be slightly warmer than the ambient temperature, but that's enough.

There are two main "models" which represent the physical appearance of thermals: the intermittent "bubble" or doughnut shaped vortex ring, and the "dust devil" which is a column of warm, twisting,

Bob McGowan and his baby daughter pose with the Falcon 800 Standard Class design which swept one-two-three at the '91 Nats in Class C (Std.). Bob prefers the quick handling of the 100-inch Falcon 800 over the 112-inch 880 for better landing scores.



rising air (see Figure 1). Visible by virtue of the dust that they sometimes suck into the sky, dust devils are the more widely recognized form of thermals. Otherwise thermals are not visible.

HOW DOES A THERMAL FORM?

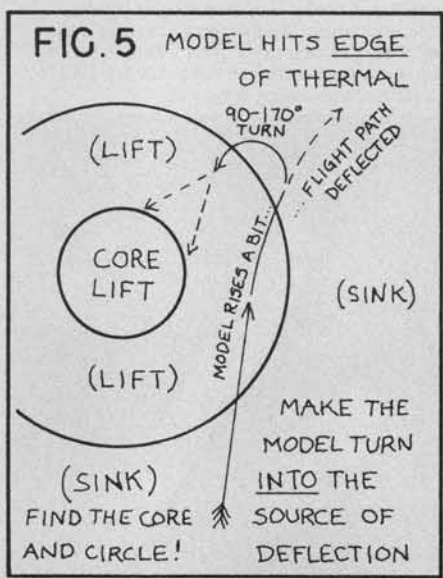
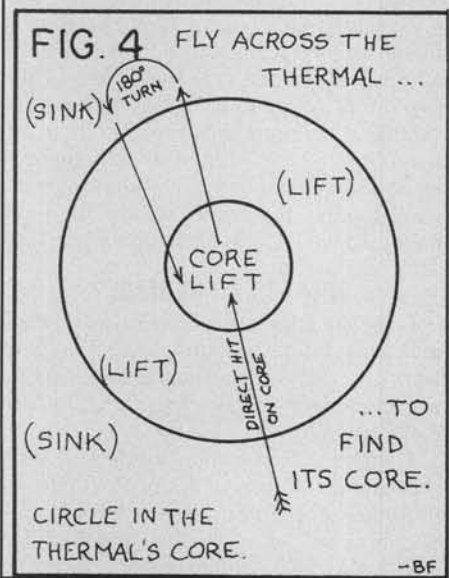
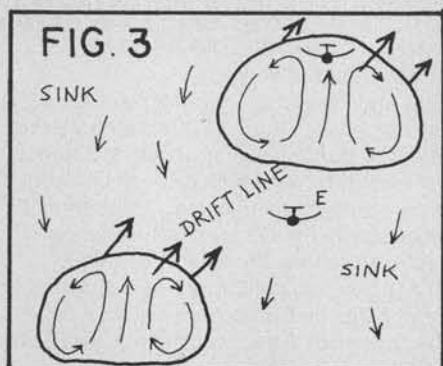
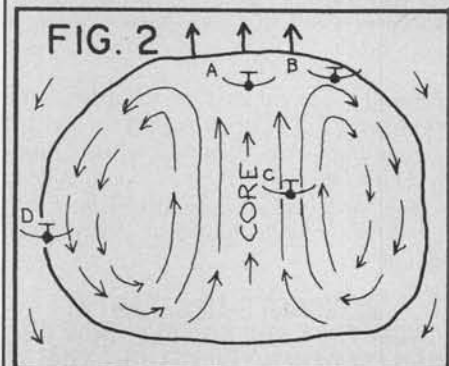
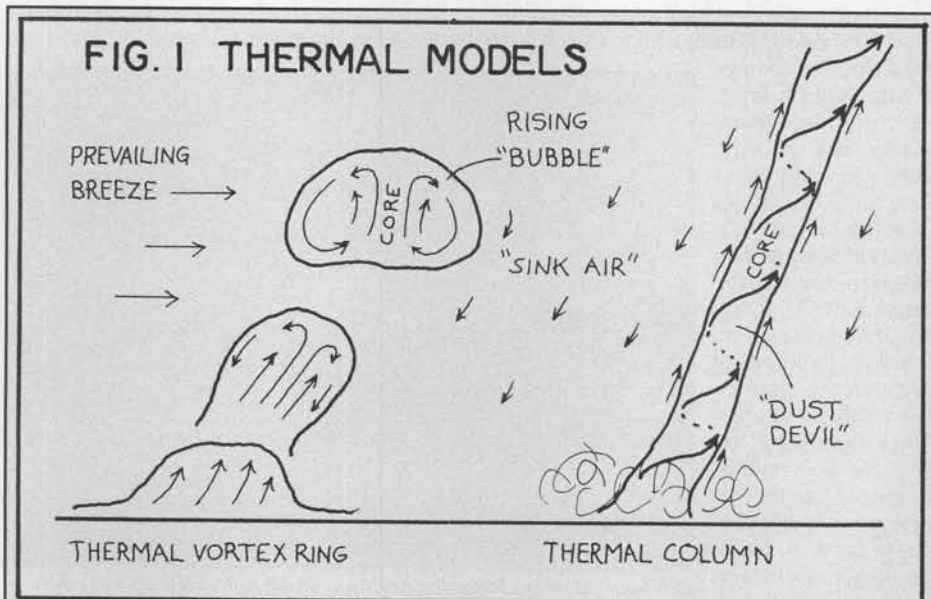
Thermals are formed when cool air passes over a source of heat and becomes warmed by it. The thermal source can be literally any large surface which is warmer than the air

that surrounds it. The sun is the energy source for practically all naturally occurring thermals. Surfaces absorb heat from the sun and then give off this heat to the air.

A few of the most common thermal sources are: graded or plowed earth, dry grassy areas, man-made surfaces such as large roof tops, or even a paved parking lot. Even unlikely sources produce thermals. I have seen sea birds thermal over warm coastal bay waters. I have seen vultures thermal

over commuter parking lots very early in the morning where 60 or more cars with hot engines were parked together.

Certain dense surfaces, concrete for example, which has a great deal of thermal mass, are slow to heat and slow to cool. Concrete will continue to give off weak lift for a while even after the sun has set, but in the morning it might be worth avoiding. Alternatively, dry, grassy areas heat more rapidly, giving off lift early in the morning,



Junior flier Kevin Bauder (age 12) of Riverside, CA, flattened the wings of a 2-meter Gnome (Midway Model's kit), gave it ailerons and coupled rudder, spoilers, and a raised (1") horizontal stab. Only the sixth plane he's ever owned, he's so good that Dave Wilkins (fellow ISS'er) said of him, "I hope he discovers girls real soon 'cause he keeps beating us adults!"

but they cool rapidly, pooping-out late in the afternoon.

Heat CONTRAST builds strong thermals. Lack of heat contrast kills thermals. If you were flying over a large, dry lake bed in the desert at noon in July with no wind, YOU would be as hot as a baked potato, but you would be as likely to find a thermal as a snow flake!

Thermals tend to be cyclic, coming in periodic intervals of time, often quite regular. Bubbles of boiling water make a good analogy. If you can imagine a puffing steam locomotive traveling down a track you have yet another picture of a periodic thermal. During contests, one flight group can take off and EVERY model will go up practically without respect to location. The next group will launch and the field's cycle will be in sink. The models will be on the ground in two or three minutes.

Breezes can be very turbulent and turbulence can be mistaken for lift. However, this "lift" only lasts long enough to trick you into flying an exploratory circle, then it's gone! A real thermal lasts a lot longer and will take you up for minutes at a time, provided you can stay with it.

HOW DO YOU USE THERMALS?


The first step is recognizing a thermal when your model encounters one. Obviously, you would expect the model to go up. True, most of the time that's what happens, but not always. Sometimes the model is mysteriously turned to another heading without your control input.

Let's look at the internal structure of one thermal model, then place a few sailplanes inside each. This way we can predict what will happen to your sailplane as it encounters a similar thermal on your next outing.

Figure 2 shows the classic thermal bubble or vortex ring, or perhaps even the top of a thermal column. This phenomenon is practically impossible to see due to the gentle nature of most thermals near ground level. However, the soaring birds and insect hunting birds (like swifts and swallows) can find them for you, marking their presence by their actions. With a large enough swarm of birds, the outer limits of the bubble will be very graphically defined.

In Figure 2, the model sailplane 'A' is passing through the center of the thermal bubble or what could be the center of a thermal column. In this case, the effect of the lift on the model is most obvious. It goes up. As it enters the thermal, it may also encoun-

AIRFOIL FILE NAME: sd8000



Line #	Stn. %	Upper coord.	Stn. %	Lower chord	Line #	Stn. %	Upper coord.	Stn. %	Lower chord
1	00.02	-0.175	00.02	-0.175	16	43.08	5.780	50.91	-2.024
2	00.14	0.460	00.44	-0.749	17	48.92	5.553	56.26	-1.744
3	00.73	1.194	01.37	-1.315	18	53.99	5.256	61.57	-1.459
4	01.77	1.948	02.78	-1.814	19	59.03	4.894	66.76	-1.179
5	03.24	2.686	04.68	-2.225	20	64.00	4.478	71.77	-0.910
6	05.14	3.377	07.06	-2.544	21	68.83	4.017	76.56	-0.662
7	07.48	4.000	09.91	-2.776	22	73.48	3.521	81.05	-0.445
8	10.23	4.548	13.22	-2.929	23	77.90	3.000	85.18	-0.268
9	13.38	5.012	16.94	-3.008	24	82.04	2.466	88.91	-0.132
10	16.91	5.389	21.04	-3.020	25	85.87	1.936	92.17	-0.040
11	20.77	5.675	25.48	-2.969	26	89.34	1.434	94.92	0.013
12	24.95	5.872	30.20	-2.864	27	92.41	0.984	97.11	0.032
13	29.40	5.978	35.16	-2.710	28	95.03	0.607	98.70	0.026
14	34.06	5.996	40.31	-2.514	29	97.15	0.321	99.67	0.009
15	38.90	5.929	45.58	-2.284	30	100.00	0.000	100.00	0.000

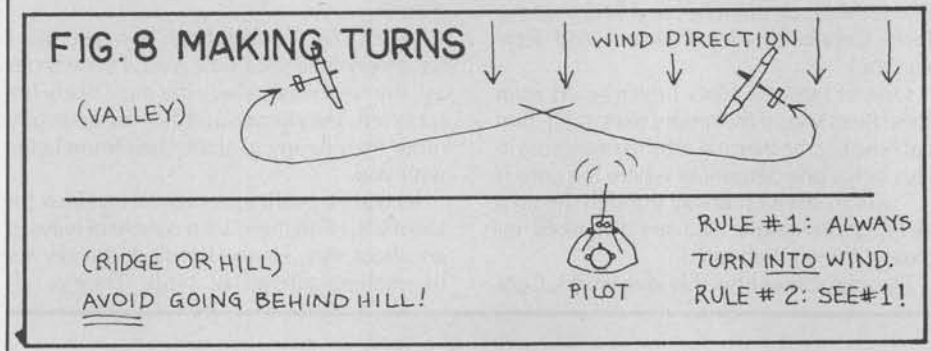
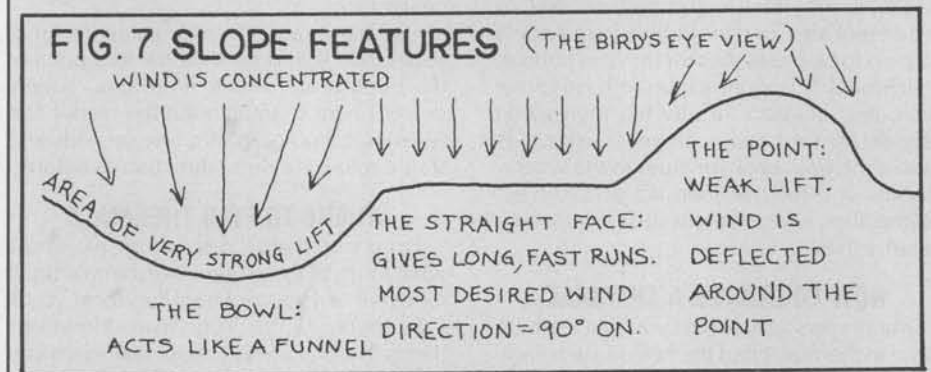
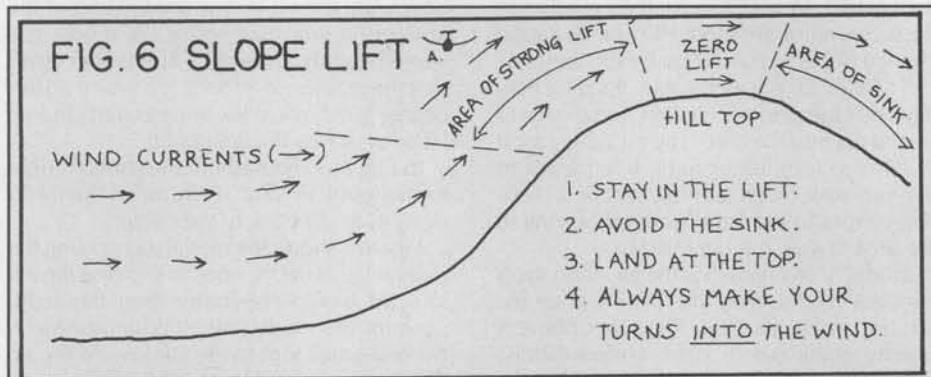
Maximum thickness.....8.74% at 25.0% chord
Maximum Camber.....1.90% at 48.9% chord

ter a slight increase or decrease of speed, or a change in the pitch angle of the fuselage, or even severe turbulence... thermals can sometimes be rough places to fly.

Because the thermal is cooling as it rises, the top of the thermal is expanding outward to make room for the warmer air that is

pushing up from below. Models at the top of a thermal may find they have a difficult time staying centered.

The model 'B' may be pushed away from the core of the thermal and into the sink surrounding the thermal. Providing it can center its circles over the core, this model



Single coats of multiple colors of K&B Epoxy Paint over a white base did the job for Jerry Snedden on his Falcon 880. This design took top honors in Unlimited Class at the AMA Nats.

will continue to climb strongly.

Model 'C' in Figure 2 will experience the strongest lift inside the thermal and soon will be up with 'A' where it too will be "maxed out" on the top of the bubble. Sometimes models rising in the strong core vertically



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12x10, 12x10W, 12x11, 12x11N, 12x12, 12x12N, 12x13, 12x13N,

12x14, 12.5x9, 12.5x10, 12.5x11, 12.5x12, 13x9, 13x10 **\$7.95 EACH**

13.5x9*, 13.5x12.5, 13.5x13.3*, 13.5x14, 14x6*, 14x8, 14x10, 14x12, 14x13*, 14x13.5*, 14x14, 14.4x10.5, 14.4x12, 14.4x13*, 15x8, 15x10, 15x11*, 15x12, 16x8, 16x10, 16x12 **\$12.95 EACH**

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"pass through" other models just outside the core.

Model 'D' will experience the weakest lift, possibly even turbulent, "zero sink air." Relative to the vortex as a whole, it would

continue flying straight when lift is encountered. When the lift turns to sink, note how far you've come and turn 180 degrees around. Begin circling at the center.

Figure 5 shows how this is done if the

AIRFOIL FILE NAME: sd7003



Line #	Stn. %	Upper coord	Stn. %	Lower coord	Line #	Stn. %	Upper coord	Stn. %	Lower coord
1	00.03	-0.186	00.03	-0.186	16	43.25	5.171	51.16	-1.980
2	00.13	0.438	00.46	-0.741	17	48.35	4.859	56.48	-1.723
3	00.70	1.172	01.41	-1.285	18	53.50	4.494	61.75	-1.450
4	01.70	1.932	02.84	-1.759	19	58.64	4.086	66.90	-1.167
5	03.13	2.677	04.76	-2.141	20	63.72	3.649	71.88	-0.887
6	04.98	3.372	07.18	-2.438	21	68.67	3.197	76.64	-0.628
7	07.24	3.993	10.07	-2.660	22	73.45	2.744	81.12	-0.403
8	09.92	4.526	13.41	-2.809	23	77.99	2.304	85.24	-0.220
9	12.99	4.961	17.15	-2.888	24	82.22	1.884	88.96	-0.082
10	16.44	5.292	21.27	-2.900	25	86.11	1.494	92.21	-0.008
11	20.24	5.518	25.72	-2.852	26	89.60	1.139	94.95	-0.052
12	24.36	5.639	30.46	-2.752	27	92.64	0.824	97.13	-0.057
13	28.76	5.658	35.43	-2.608	28	95.19	0.547	98.72	-0.037
14	33.40	5.581	40.57	-2.428	29	97.24	0.310	99.68	-0.011
15	38.25	5.415	45.84	-2.217	30	100.00	0.000	100.00	0.000

Maximum Thickness.....8.39% at 24.4% chord
Maximum Camber.....1.60% at 38.3% chord

appear to be in sink. However, remember, the ENTIRE VORTEX IS RISING relative to the surrounding air. Model 'D' stands a good chance of being passed up by the thermal.

If Model 'D' is a lone eagle, it's pilot may have no clue as to which direction (if any) to turn to get into the core. The best thing for it to do is to turn left or right. If left leads to definite sink, keep turning left in a 180-degree turn to the right heading! Staying in the area of sink is a big mistake.

Model 'E' in Figure 3 is the guy who spots a model in a thermal, flies over to enter the lift, but arrives too late. The other plane is rapidly going out of sight. Unfortunately, that thermal has passed through already. Model 'E' may need to find another "ride" in a different area, or if the bubble frequency is known to be close, wait for the next bubble.

If Model 'E' is a lone eagle, and is in strong sink, and unaware of any lift, then going straight forward makes the most sense. Get out of the sink. Look for clues to the whereabouts of a thermal then act accordingly. Remember, where there is sink, somewhere nearby there is lift.

HOW TO CENTER A THERMAL

Many years ago, when I was first learning how to thermal, I had the help of such early LSF Level V, FAI record setters, and AMA or SOAR Nationals champions as Chris Adams, Terry Copeland, Rick Pearson, and Jerry Krainock.

One of the best rules I ever heard from these fliers was; if the model rises in lift, find out how big the thermal is by flying across it. This helps one determine where the core is ... usually about halfway through the area of lift. (You should also see a marked increase in the climb rate.)

Figure 4 shows how this idea works. Con-

thermal is entered off-center. Again, see how wide the lift is. Toward the end of the area of lift you may notice the model has veered slightly to the right. This is your tip off that the main core is to the left. Make a 180-degree turn back to the left and start circling halfway across the area of lift.

In Figure 4 the dashed line shows a right turn mostly in sink. Turn more than 180 degrees to get back to the center.

Figure 5 shows the model just grazing the outer edge of the thermal. In this case the left wingtip would rise faster than the right, pushing the model into sink immediately. Make a quick turn to the left toward the tip that came up. See how wide the core is and center it.

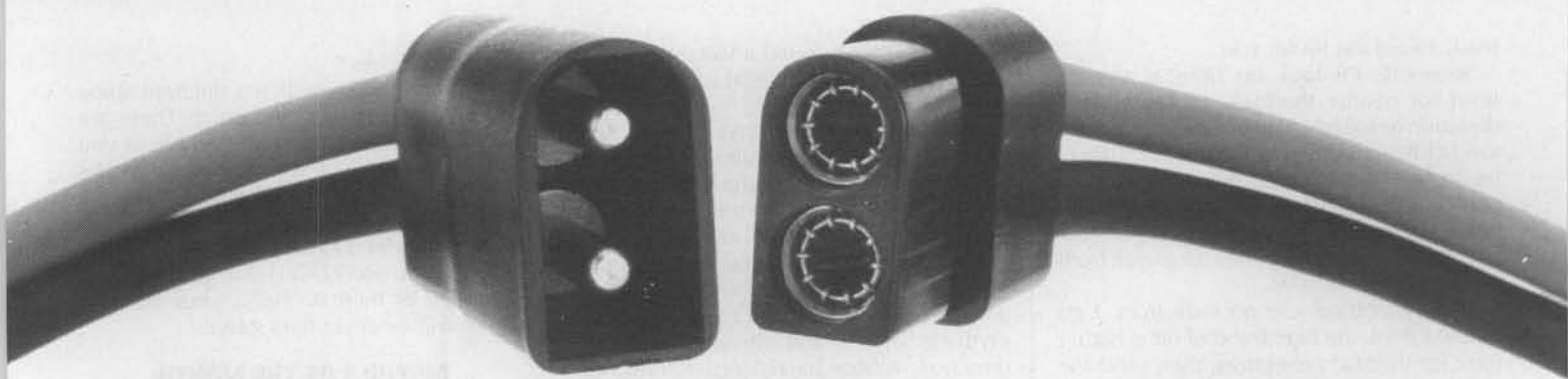
Figure 6 shows how to re-center if part of your circle is in sink. Note the mid-point of the circle's arc which is in sink. Ninety degrees later straighten out the model and re-enter the core. Wait a few seconds and start circling the same direction as before.

WHERE TO FIND THERMALS

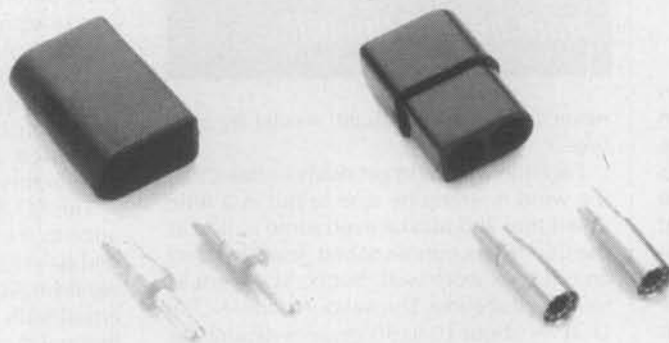
From our earlier discussion, we know what kinds of things generate thermal lift. It follows that if you go where they form, you'll find them, right? Very true. However, thermals don't always cooperate when you want them to, so it's best to have a backup plan.

When I fly at a new field, or a field that I have very little stick time over, I sometimes ask the "regulars" where the most likely hot spots are. They know, and they are generally more than happy to share their knowledge with you.

If I want a challenge, I go out and look for thermals. I find there are a couple of ways to go about this. Firstly, I look at the sky for thermalling aircraft or birds. They've al-



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ready found the lift for you.

Secondly, I'll look for signs at ground level for nearby thermals. Shifts of wind direction or speed can sometimes be indicators of lift nearby. These are detected simply by feeling the wind on your face or by observing unusual wind in nearby trees and grass. Thermal columns are like big invisible vacuum cleaner hoses. They suck in air from all sides and take it up.

Thirdly, if there are no indicators, I go where I think the likelihood of lift is high. I look for thermal generators, then send the sailplane over to check them out.

Fourthly, if I haven't a clue, I'll fly a large, cross-field zig-zag pattern upwind (see Figure 7), like a sailboat tacking upwind. I find that I see the plane rise in lift much better from the side. Also, in the zig-zag pattern, I never cross the same dead air twice (a BIG no-no!).

Finding thermals takes practice. There is no substitute for a trained eye and an experienced "thumb." Give yourself time to learn!

WHAT IS SLOPE LIFT AND HOW DO YOU USE IT?

Slope lift is a simpler animal to understand. Slope lift is entirely dependent on wind and hillsides. Yes, there are exceptions to the "hillsides" part, such as large buildings and rows of trees, but for the most part, we depend on hills, cliffs, mountains or sand dunes. Wind hits the hillside and has nowhere to go but UP along the face of the slope! This upward flow is the slope lift we fly in, and as long as the wind blows, the lift is right there in front of the hill.

Like rocks in a river flow, this fluid we call air bounces up and over the "rock" we call a hill. At quite some distance above the hill we still find the air trying to get up and out of the way of the air bouncing up below it. This is called wave lift and it is an extension of the slope lift. Depending on conditions, using wave lift can get your model so high it can become hard to see.

Find a hill with an area at the top or along the face near the top that is large enough to make a controlled landing (if you are a beginner, it will probably be a controlled crash). Tall grass or soft bushes in the landing zone are preferred to rocks, trees, stumps, or fence lines.

Lone eagle beginners may find slopes an unforgiving place at first, so if you have access to an experienced pilot/teacher, you are way ahead of the game. If not, be prepared to do a lot of repairs! Don't worry, you can fix it if you built it. Repairs are a lot like jig-saw puzzles, easy, but time consuming. Just be sure to save all the pieces.

Find a hill that faces as close to 90-degrees to the prevailing breeze as possible. The steepness or grade of the hill and the speed of the wind determines the strength of the lift, so pick a steep hill if you can. The length of the face of the hill determines the width of the area of lift, so pick a wide slope too ... if you can.

After you have found a suitable site and have hopefully gained legal access to it, it's time to fly.

All trim flights must have already been completed and your model proven to be flyable prior to arrival at the slope. Once at the slope, it is difficult to trim a model and risky to fly an untrimmed model.

Pick a time of day that's going to be windy, climb to the top of the hill, and prepare your model. Don't rush, check everything; rudder and elevator travel and direction, rubber bands secure, radio on. Get in the habit of wiggling the transmitter sticks before throwing the model. This will assure you that both the RX and TX are turned on. Do it every time you fly and you'll

ALWAYS, always, ALWAYS
... when learning to fly slope, keep your plane out away from the hill, away from behind the hill...

never launch a 'free flight' model by mistake.

Face the wind and get ready to launch. If the wind is strong be sure to put in a little down trim and maybe even some ballast at the CG (try six ounces at first, lead shot and an old sock work well, but be SURE not to foul the pushrods). Throw your model NOSE DOWN about 10 to 30 degrees depending on the strength of the breeze and the angle of the wind coming up the hill. Doing it right will take practice, but a good throw will prevent instantaneous pitch-up and stall after release.

The model should fly without a heavy throw. The stronger the wind, the closer you will get to just letting it go out of your hands with a gentle nudge.

ALWAYS, always, ALWAYS ... when learning to fly slope, keep your plane out away from the hill, away from behind the hill, and ALWAYS make your turns AWAY from the hill (see Figure 8). Traverse the slope left-right-left-right and try to stay in the lift zone (see Figure 6). You will find that you are always flying with the fuselage angled somewhat into the wind to keep from being pushed back into the slope. This is similar to a sailboat tacking upwind.

The best place to land is in a soft bush or in some tall grass at the top of the hill. When you get better at piloting, you will learn how to land at your feet at the edge of the hill or even catch the model with your free hand. But don't rush it. Your first landings will no doubt be unintentional anyway!!! And don't be upset if the covering material gets holes; bring along some cellophane tape and keep flying. Don't be upset at crashing. YOU WILL EVENTUALLY CRASH. However, as I was once told when I first flew, "You built it from a hundred pieces, you can surely fix it

from two pieces."

In Figure 7 you will see different slope faces: bowl, straight, and point. These are arranged in descending lift strength as you will see from the wind vectors. All slopes provide some lift if they face the wind. Some are much better than others.

As I have said before, you can't LEARN HOW if you don't DO IT. So, go ahead and try slope or thermal flying, your learning curve will be amazingly steep!

AIRFOILS OF THE MONTH: SD7003 AND SD8000

Earlier in the column I mentioned these two airfoils, the SD-7003 and the SD-8000. They were designed by the team of Selig and Donovan and tested at Princeton's low velocity wind tunnel. They are being used in at least two of today's most advanced, high performance sailplanes by Flite Lite Composites, probably many others as well. I would by all means recommend cutting foam cores if you would like to try either of these airfoils. This assures the greatest fidelity to the profiles (balsa busters might try the less critical, flat bottom S-3021).

The SD7003 is a good choice for a clean F3B model. It has very low drag and can fly long distances very efficiently. It may not be the fastest airfoil around, but it is a good compromise airfoil for multi-task soaring.

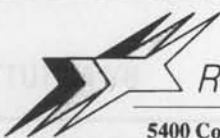
The SD-8000 is very similar in appearance to the SD-7003 but is slightly thicker and has slightly more mean camber. It too would make an excellent multi-task sailplane airfoil with a slightly greater emphasis on thermal duration.

Both the SD-7003 and the SD-8000 can be found in a technical journal called "Soartech NO. 8, Airfoils at Low Speeds" published by Herk Stokely, 1504 N. Horseshoe Circle, Virginia Beach, VA 23451. At last inquiry, the price was \$15.00 for the 395-page, one-inch thick book. At this price, I doubt the printing is fully covered. It's a must-have item for any serious sailplaner and scratch builder, so get on it.

Printouts are courtesy of "Foiled Again" by Cygnet Software, 3525 Del Mar Heights #237A, San Diego, CA 92130, (619) 792-8021. This is a very handy, time-saving, scratch-builder's rib or airfoil template-making tool that's well worth the modest \$45.00 investment. That's two, three, maybe four hours' worth of your time. If time is money, the program pays for itself the second or third time you use it, it saves that much of your time!

TIME TO FLY

As always, if you need to contact me for soaring related questions, my phone is ready. All I ask is that you call between 7 p.m. and 9 p.m. (Pacific time) Monday through Friday. I can also be reached on weekends, but my schedule is unpredictable. Phone (714) 245-1702, or write to Bill Forrey, 3610 Amberwood Ct., Lake Elsinore, CA 92530. Note the new ZIP code, please! I prefer phone calls. **MB**



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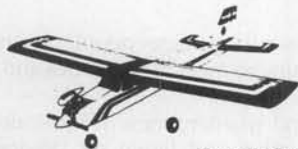
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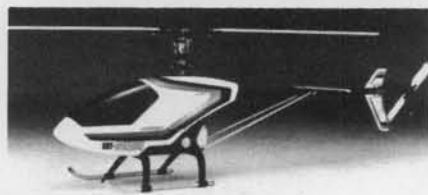
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AVIATION EXPO '91

Expo '91 was held August 7 through 11, 1991, marking the tenth anniversary of the Big Birds at Byron's. And what a show it was! Because it was also the 50th anniversary of the attack on Pearl Harbor, the Expo staff slated several extra-special events, one of which was the Confederate Air Force's "Tora, Tora" team appearing daily to open the "Striking Back" show. Another was the presence of three of the crew of the Enola Gay, the B-29 from which the first A-bomb was dropped, on Hiroshima, Japan, August 6, 1945.

Crew members present for the entire five days of the show were pilot Paul W. Tibbets, bombardier Thomas Ferebee, and navigator Theodore J. VanKirk. These gentlemen were set up in a tent at the center of the grounds for the purpose of meeting people and signing autographs. To say this was a popular exhibit is an understatement. From the time the gates opened until the grounds closed,

Because it was also the 50th anniversary of the attack on Pearl Harbor, the Expo staff slated several extra-special events...

there was a long line of people, young and old, waiting to meet these heroes and to get their autographs.

A brand spanking new 1/5th-scale B-29 was unveiled and flown on Wednesday. Unfortunately, engine problems caused the flight to be terminated early, and on final, approximately 100 feet out from touch-down, all four engines failed and a smooth dead-stick landing was performed by pilot

continued on page 60

(Left) This'll get a smile from Eloy Marez. Dennis Brooks, from Kansas City, KS, proudly displays his Mode 1 license plate. Hmm . . . steering wheel in his car must pivot up and down for throttle! (Right) Newest Byron show team member, Gary Oliver, of Mankato, MN, and his Byron P-51 show plane.



The Flight Line. Can you imagine slipping back 35 years to one Citizen's Band frequency for all?





(Top) In 1929 in flight. Mysteriously repetitive in-flight engine failures caused forced landing in tree. Light damage lets the new B-29 during final checkout. Pilot Ken Ryan holding transmitter. Any volunteers for a hand launch?



Col. Thacker's traveling companion, Harry Woods, with his vest-pocket size MiG-15.



The "Enola Gay" flight crew who delivered the first A-bomb to Hiroshima, Japan. Left to right: Paul W. Tibbets, pilot; Thomas Ferebee, bombardier; and Theodore J. Van Kirk, navigator.



The chief honcho and honchoess of the famous Aviation Expo, Byron and Lajune Godbersen.



Now you're talking! Bob Violet's prototype T-33. A jet with wings will appeal to modelers who have been timid about tackling high-tech modern military machines. It's IMAA legal.



Beautiful Travel Air "Mystery Ship," flown by Paul Grubich, of Cedar Rapids, Iowa. Just over 1/5-scale, and a nice flier.

"Okay, folks. The barbecue's ready!" No Byron Expo would be complete without the awesome "A-Bomb." This one rattled windows half-a-mile away!

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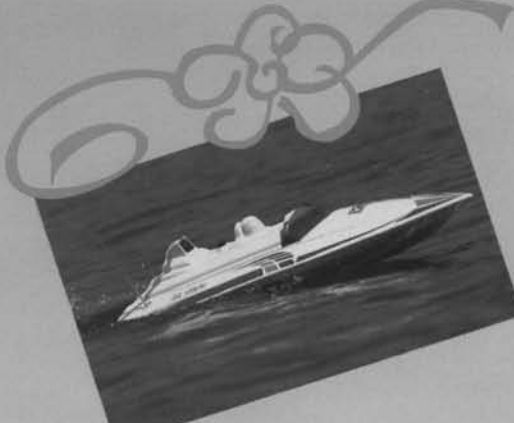
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"The R/Cer's Partners"



Bob Parkinson's new "Barracuda Too" 60-sized sport aerobatic plane.



Lou Lugero with his BVM F-16, stock setup with KBV 82 engine and BVM retracts.



Mark Frankel's F-401 Skyray. See text for more info.



During lunch break each day, the planes were lined up so the spectators could get a better view and talk to the pilots. Note the 5000-foot runway.



RAAMS FAN FLY

Someone once said, "All roads lead to Rome," and if you fly ducted fans, Rome, New York, was the place to be on July 27-28, as the Rome Academy of Aeromodeling (RAAM) held its second annual Fan-Fly. Participants came from six northeastern states and Canada. The event was held at RAAM's local flying site, an unused portion of runway on Griffis AFB. This is a nice field, about 5000 feet long. The only restrictions to flying were a chainlink fence at one end (about 1500 feet away) and a full-sized C-5 Galaxy parked on an adjacent runway. For obvious reasons, we were asked to stay clear of these areas. Unfortunately, during the weekend, about four planes insisted on sifting themselves through the fence.

We arrived early Saturday morning and began setting up. Around 10 a.m., we received a pre-flight briefing and afterwards, open flying began. The pilot line was divided into seven flight stations, marked A through G. Each station had four or five frequencies assigned to it. When you wanted to fly, you were given a pin with the corresponding station number on it. You then got your transmitter from the impound. Then you started your plane and taxied out to your flight box. The frequencies and the boxes were spaced far enough apart that only one interference problem was noted the whole weekend. That was between a six-meter transmitter and a 72 MHz receiver. No more than three planes were allowed to fly at any one time.

There were 45 to 50 planes in attendance, with about 38 registered pilots. Most of the planes were flown, but some had problems which prevented them from flying. The weather was good overall. Saturday was cool and slightly windy, and Sunday was calm and warm.

There were a number of interesting planes at the event. Mark Frankel's Douglas F-4D1 Skyray, a 1/7-scale model, faithfully reproduces the U.S. Navy's first delta-wing fighter, which was developed in the 50s and saw service until the late 60s. Mark's Skyray is a fairly large plane; about six feet long, with a four-foot wing span, and all-up weight of 19 pounds. Yet this monster flies with a single Dynamax O.S. 91 fan system. When you look inside the top hatch, the fan looks too small, plus it carries two large square fuel tanks on either side of the fan and a small header tank up top. Because of its large delta wing, the weight is spread out, which lowers

the wing loading. This is how you can get away with flying a 19-pound plane with a single Dynamax fan unit. Other features include a set of Platt 90-degree rotating gear with Robart struts, removable drop tanks and inflight mixture control.

Mark's model is patterned after a plane that was stationed at Lakehurst, N.J. NATF. It was used for catapult testing for four years, until 1962. Mark plans to later add a scale cockpit, gear doors, functioning drop tanks

The event was held at RAAM's local flying site, an unused portion of runway on Griffis AFB, a nice field, about 5000 feet long.

and tail arrestor hook. He flew the plane several times during the weekend, both with and without the drop tanks. I personally think it flew faster without them. While it was no speed demon, it flew quite well. Landings were very nice; smooth, slow and right on the center line. Mark gave away a set of plans, as part of the event awards. The Skyray will soon be released as a semi-kit, which will include a fiberglass fuselage and wing panels.

Bob Parkinson came down from Canada with his latest design, the "Barracuda Too." It's basically a 60-sized version of his popular 90-class 'Cuda, but with a few changes, most notably the rounded intakes, plus he moved the horizontal stab on top. The engine is installed inverted into a new rail-mounted fan system. It sports foam core wings and a new vinyl plastic fuselage with wood formers. The new plastic is the same material used to make credit cards, and is stronger and less likely to crack than his previous vinyl. This new material is being incorporated into all his kits. The Barracuda Too weighs six pounds and uses a stock O.S. 61RE pattern engine.

Takeoffs looked easy and Bob said it will fly off grass as well. Because of its 60-size engine, it can be flown in some of pattern classes. I estimate its speed was about 100 mph. You could also equip it with a set of mechanical retracts. Selling price will be slightly more than his Saber, including fan, and will be available by the time you read

this. For more info, give Bob a call at (705) 436-7041.

Vinny Calano, of Marlton, New Jersey, flew a rather large-looking Regal Eagle. He took original Regal Eagle plans and enlarged them by 25%, to fit two Dynamax fans with two O.S. 77s. Then he added a very different Pink Panther paint scheme. To keep it light and simple, Vinny used Monokote over a balsa frame, and no retracts. This retained the classic good flight characteristics of the Regal Eagle. Other features include plug-in wings with two 20 oz. fuel tanks. The span is 69 inches and the fuselage length is 82 inches. Because it's not very fast, Vinny is planning to install a pair of O.S. 91's to really make it go!

As with most jet rallies, there was a large contingent of Violett planes. Leonard "Maxwell" Smart, of Plattsville, New York, who never flew a jets before, finished and test flew his Aggressor on Wednesday, and made his second flight at the Fan-Fly. He is very excited and pleased with the way it flew. He had a pretty pearl-white, red and purple paint job with gold prism letters. It features gear doors and an O.S. 91 engine. I saw two other Violett planes with the O.S. 91 engine. Until this event, I'd never heard of people using the O.S. in the Violett fan system, and suddenly there were three. All three were happy with the performance of the engine.

Greg Garneau, of Montreal, Canada, had a super Violett F-86, done up in the Golden Hawks Canadian show team colors (They have since changed their name to the Snowbirds). It's a representation of the full-size one on display at the city park in Bellville, Canada. Greg had a very interesting tuned pipe in his F-86. It's an experimental pipe of Bob Violett's, which incorporates a unique pressure tap system. Bob has welded a hollow airfoiled, cast aluminum piece to the stinger of the pipe, which extends down in front of the exhaust. A small hole faces toward the exhaust opening of the pipe, and a fitting on top is where you attach your pressure line. It's set at the precise distance from the exhaust for maximum pressure with minimum exhaust restriction.

So about now you're wondering what this thing is for. Well, in a normal installation, the pressure tap is installed in the side of the pipe. Some of the expanding gases inside the pipe are forced through this tap and into the vent lines of the fuel tanks, thus pressurizing the system and providing positive



Greg Garneau came down from Canada with this BVM F-86 Saber.



Two of the winners at the event; left, Dwight Aube, Best Performance; and Dave Malchione, Best Finish and Best Scale.



Bob Rullie, from Westboro, Massachusetts, did extensive weight reduction on his Byron F-18 to get it down to 17 pounds, but it was worth it to see it fly. Features Rossi 90 engine and Econokote control surfaces.

fuel flow. Here is what Bob feels is the problem with that system. A common turn-around maneuver with a jet model is the Split-S. This is sort of a throwback to the way the pattern guys used to fly. After a fly-by, the plane is put into a steep climb. At the top of the climb, you roll the plane upside down, pull back the power, pull up and dive straight down. Sometime during the pullout you advance the power back to full. Now you're flying straight and level at full power, in the opposite direction, ready for the next maneuver. The reason you pull the power back is so you don't over-rev the engine and over-stress the airframe.

Now back to the pressure tap. At full power, the fuel tanks tend to swell a little

from the pressure. When you roll inverted at the top of the Split-S, the fuel in the tanks sloshes to the top over the pressure tubes. When the power is reduced the excess pressure in the tanks forces some of the fuel out of the pressure lines and into the pipe. This cools the pipe and could flood out the engine. With this new tap, the excess fuel is vented out the back of the plane, thus eliminating the problem. If you'd like to try one of these pipes, give Bob a call.

Dave Malchione and his father, of Kenneth Square, Pennsylvania, brought two matching Violet F-16s, both sporting a very scale-looking gray camouflage paint scheme. For obvious reasons, they didn't fly them together. But two other fliers did manage to

put on a paired flight demo. During a lull in the flying, Vern Smith and Dave Latsha decided to do a little formation style flying with their BVM Vipers. This was totally unrehearsed. The only commonality is the planes and that they fly at the same field in Pennsylvania. I personally love this type of flying, and hope it will become a regular jet event. It shows the spectators what these planes can really do.

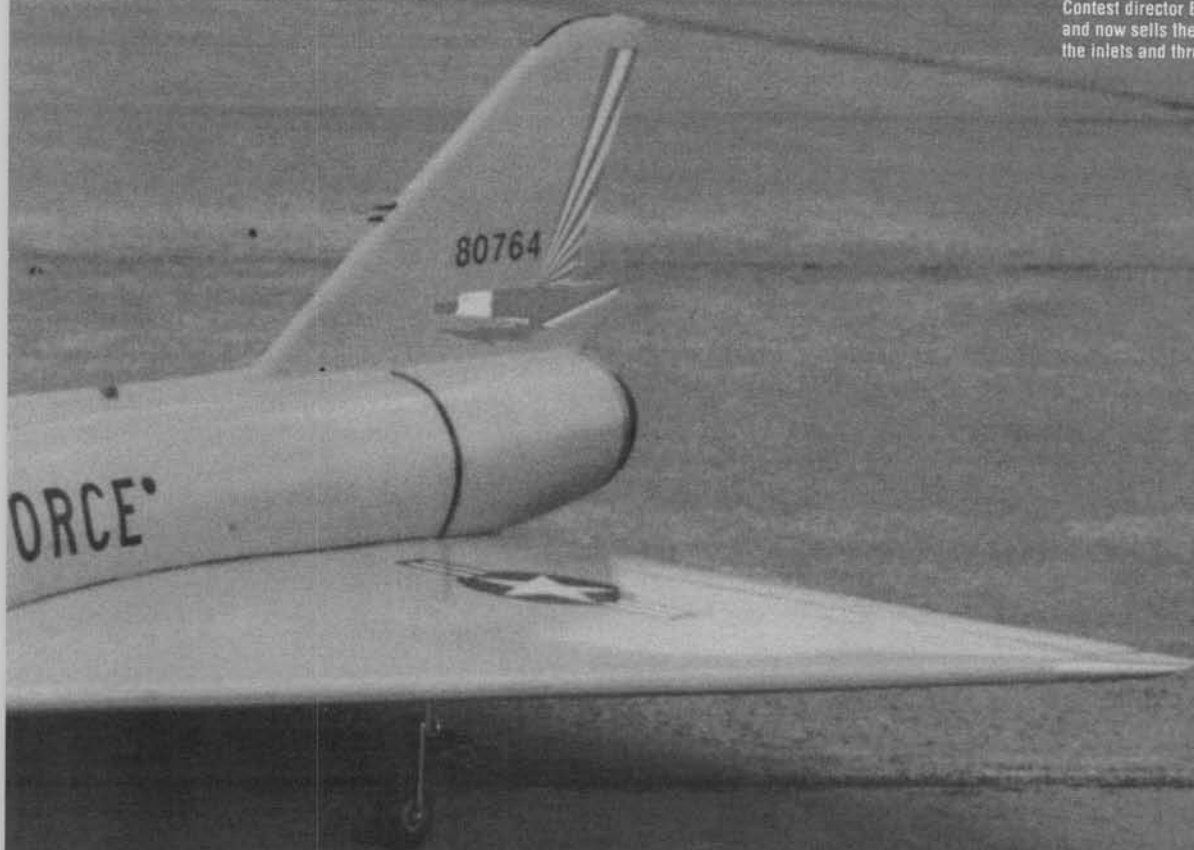
Sunday was another great day and it wasn't long before the action was hot and heavy. There were several JMP Starfires in attendance and they flew with their usual zeal, especially Hernay Serrand's blue Navy model... one of the fastest planes I've seen. It was smoking! I asked him what was done



Lou Lugo's Byron Kfir with desert camouflage. Stock Byron setup with D.S. engine and Futaba radio.



Vinny Calano's large twin Regal Eagle. See text for details.



Contest director Eskill Ringdahl scratch built this F-106 and now sells the kit. It's all-balsa construction, including the inlets and thrust tube. No fiberglass or foam.

to soup up the engine. The only thing he would tell me is that he installed a spraybar and barrel out of an O.S. 77 carb into the body of the 91 carb. The 77 barrel has a nice ball link throttle arm on it, and eliminates the problem of the arm breaking. Other than that, he wouldn't say.

Later on Sunday, the same thing happened to him that happened to me a few months ago. His fan exploded during a high speed pass. This blew the top hatch off and caused a less-than-graceful landing. It got beat up enough that Hernay decided to scrap it. But this won't slow him down, he always seems to show up with some of the fastest planes.

At noon each day, the flying ceased and

all the models were lined up on the runway for a static display. This gave the spectators a chance to look over the planes and to talk to the pilots, plus it gave yours truly a chance to get some photos. During the display on Sunday, each of the pilots was given a ballot and asked to vote for the best plane in each of four categories. It was no surprise that Mark Frankel took Best of Show with his original F-4D1 Skyray. Dave Malchione was the only double winner, taking Best Finish with his BVM F-86 Saber and Best Scale for his BVM F-16C Falcon. Best Performance went to Dwight Aube, flying his sizzling red Coca-Cola Startire II. Each of the winners received special custom trophies to commemorate their special effort. In addition,

each voting pilot drew numbers which corresponded to a raffle prize.

Over thirty manufacturers and suppliers donated a wide variety of prizes, ranging from a Futaba radio, K&B 82 engine and fan unit, to discount coupons. My friend Larry got an Airtronics servo valued at about \$45, plus lots more, in his bag. Thanks to all the companies that donated the prizes; it really helped make the event a success. Also, thanks to contest director Eskill Ringdahl, event coordinator Art Arro, and everyone who helped out. We really enjoyed this event, with the fireworks, the banquet and great flying weather. I'm looking forward to next year. As Arnold Schwarzenegger would say, "I'll be back." **MB**

Ken Bryan. The plane was flown Friday but engine problems again occurred. This time, Ken wasn't so lucky, as all but one engine packed it in before the plane could be brought back to the field. With great expertise and a bit of luck, Ken managed to set the plane down in a large tree, resulting in minimal damage. We were all assured that

minutes, or 32 hours. This works out to about 12.7 min. per flight or pin time.

The busiest frequencies were channels 40, 42, and 18. Odd channels present were 15, 23, 25, and 33. There were no crashes due to radio interference. All pilots who crashed were interviewed, and only one claimed interference, but later admitted he had an electro/mechanical failure. There were no battery failures this year. Again, there were many more prop jobs than ducted fans. As with last year, half as many jets flew during their time period as the prop jobs in their time slot. This is understandable as the ducted fan power plants are more temperamental than others.

We had another first for Expo . . . a wedding! Two of our longtime show members, Paul Edmonds and Cindy Snyder, got hitched on Saturday evening, in front of the 1/5-scale chapel. Of course, the Striking Back

team had its fun. When Paul arrived at the hangar on Saturday morning, his Zero was decorated with hearts pasted to the 'meatballs,' toilet paper was liberally hanging on it, and a string of pop cans was attached to the tail. With much hoopla, Paul was made to taxi the plane up and down the runway at high noon. EVERYONE within a two-mile radius knew when they tied the knot at the wedding, as the "Bang Gang," under the expertise of Fred Anderson, chief set-blower-upper, fired off a bunch of aerial rounds from Big Bertha, the ack-ack gun, plus a couple of window-rattling ground charges. Well done, gang!

To highlight Byron Originals' latest scale kit, the Russian Sukhoi SU-26m, Clint McHenry, from central Florida, performed an exciting aerobatic routine each day of the show with his 1:1 SU-26m. Just prior to Clint performing his routine, Striking Back team member, Rick Alter, flew an aerobatic routine with the Byron 27% scale SU-26m, which sported the same colors as Clint's plane. Timing was such that when Rick landed, Clint came

roaring in from the north to perform his routine. Clint got together with Rick one morning before the show so that Clint could see just what the model would do. It wasn't long before Clint was telling and showing Rick, via sign language, how to perform the knife edge spin and pin wheel. Rick did just as Clint told him, and was performing these maneuvers, particularly the knife edge spin, almost flawlessly. Rick said he didn't have quite enough rudder throw to perform the pin wheel properly.

FLEW LIKE FULL-SIZE PLANE

Clint told me that apparently the model flew just like his full-size plane. We couldn't get him to fly the model, as he said the last time he tried RC, he promptly crashed. Clint told me he was really interested in getting into RC, and as we live only several miles from one another, perhaps we could get together and do some model flying. Of course, he wants an SU-26m model, but realized that he would have to learn to fly RC first. Looks like it might be an interesting winter ahead.

Clint was the first American ever to fly the SU-26 in Moscow, Russia. He was building models at age six and learned to fly at age 15. He was a little young to fly in WW II; he was an aviation cadet when the war ended. He retired from Eastern Airlines after 36 years and flew everything from DC-3's to wide-bodied jets. To date, he has logged over 36,000 hours of flight time. Clint started flying aerobatics in 1942, and flew his first airshow in 1946. He entered competitive aerobatics in 1971. Since then, he has won more than 40 unlimited events and gathered a long list of trophies, awards and honors, including three U.S. Nationals Champion-



Clint McHenry (left) with Rick Walter and his Byron Sukhoi SU-26M. Clint flies the full size one. See text.

the big B-29 would be repaired and flown at Aviation Expo '92.

Weather on the first two days was overcast, with a few showers, but this did nothing to dampen the fliers' spirits, although one beautiful Byron P-51 was flown into the low overcast on Wednesday morning and totally destroyed when it came out of the overcast too low to the ground for the pilot to recover.

Once again, as in years past, the creme de la creme in giant scale prop jobs and ducted fans were present in copious numbers. Just viewing these beauties was mind boggling. The workmanship is unbelievable. According to Tom Pease, the frequency guru, there were 286 pilots participating. Tom said that on Saturday morning, 350-plus planes were counted in the tent area. There were over 100 planes that came and went Wednesday and Thursday. It was estimated that 550 models were inspected during the five-day event.

A majority of the modelers brought two or three airplanes with them. I inspected four models all owned by one person; two were ducted fans and two were giant scale. Out of the 286 pilots, 50 were hangar queens who did not fly. There were 1,125 flights logged over the five-day period, for a total of 20,550.2 minutes of time the pins were in use. This works out to be approximately 342.5 hours. Of course, some of this time was diddling time, where the plane was not flown, but the pin was used if the modeler needed to check out his plane. The Byron Team flew 151 times for a total of 1,921



Col. Bob Thacker, complete with ever-present necktie, and his "sorta" F-20.

ships and three International Aerobatic Club Championships. He has been a member of the U.S. Team eight times and won four world medals.

Clint is a real gentleman. Once meeting Clint, it's easy to understand why he is called "Mr. Nice Guy" by his friends and associates. Clint owns and operates the



Long-time show members, Paul Edmonds and Cindy Snyder, tied the knot in front of the 1/5th-scale chapel on Saturday evening. See text.

Pompano Air Center in Florida, and is the importer and dealer of the SU-26m. Clint tells me he was in Russia recently, and that the Sukhoi factory has a two-seat version of the SU-26m in the works that should be very popular.

Ken Bryan, the SU-26m Byron kit designer, tells me that modelers have been using SD 4.2 engines and have been experiencing aileron flutter problems. The instruction manual states that the Zenoah G-62 and SD 4.2 engine would fit in the cowling. The prototypes were not flown with these engines. If you must use these larger bore engines, the ailerons need to be counter-balanced, ala the P-47 and P-51. Ken said they have made a change in the aileron control horns. If you have one of the early kits and Byron hasn't sent you the new ones, contact the main office. If you bought your kit directly from the factory, they should have already sent you the mod. If you bought your kit from a bonafide Byron dealer, contact them to take care of it.

One of the show team members is flying the SU-26m with an SD 3.7. He did not use aileron counter-balances and has not experienced aileron flutter. However, I strongly urge that you counter-balance the ailerons. If you have any questions on how to do it, get in touch with me and I'll send you a sketch or explain over the phone and also furnish the Byron part numbers.

There were a couple of new planes present which will soon be available as kits. Bob Violett, of BVM, flew his proto T-33 ducted fan model. I didn't get to talk to Bob about its particulars, but it's performance was very good. This should be a popular kit and it is IMAA legal. I know for a fact that this model

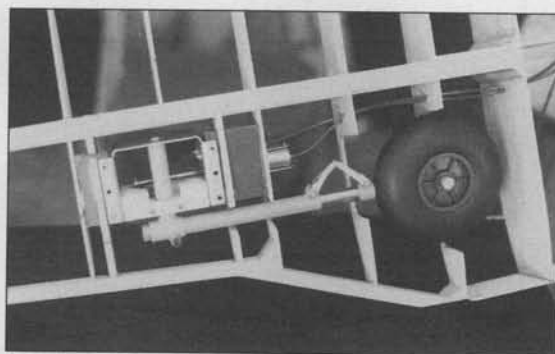
is scale, down to the last rivet, as Bob and his crew spent many hours measuring the full size T-33 that is hangared at American Aero Services in New Smyrna Beach, Florida.

The other model was the 30% Ultimate 300. True, there are several Ultimate kits on the market, but according to Dick Coles, of Bradenton, Florida, this one is of all-wood construction. With a Sachs 4.2 and smoke system, its all up weight is 21 pounds. Dick said it is an exceptional performer and he was still getting used to its flight characteristics. It will be available from Paul Scherer Plane Shop in bare bones configuration. All you have to do is cover it and install the equipment. Price is \$950.00. If you are familiar with the Paul Scherer planes, you know that they are works of art.

Another new product from the fertile minds of Robart was pneumatically operated retracts for 1/5-size models

such as the Pica and Byron P-51. These retracts are RUGGED. The legs are constructed from hardened steel and have spring-loaded struts. They are simple to install and operate. They should be available by the time you read this.

There were 49 exhibitors displaying and



New retract unit for 1/5-scale from Robart.

selling their wares. This area was well attended throughout the show and some very good bargains were available.

As in past years, there were seminars, with the top experts in their fields giving talks and demonstrations on various subjects pertaining to RC modeling. These were also well attended. There were women's activities scheduled throughout the day Wednesday through Saturday. The Arts and Crafts tent appeared to be a popular place for the gals, as it was crowded every time I passed it.

The "Byron Bash" has been around long enough to establish a clientele of modelers who show up year after year, and it is like old home week meeting modelers whom you haven't seen for a year. Like everyone else,

I look forward to meeting these people. Some of my favorites are Bob Thacker and Harry Woods, from California. They show up every year with something different in ducted fans, and they have one heckuva good time. Bob had a "sorta" F-20. He says it was the paint job that made it look like an F-20. In fact, a good paint job will make anything look good. Beauty is only skin deep, but ugly goes clear to the bone! This old curmudgeon is the king of put downs. Bob sounds rough, but peel back that tough exterior and you will find a real gentleman. Anyone dumb enough to fly an F-82 non-stop from Hawaii to New York needs to put on a good front!! Bob says his plane is a Cobra and is powered by a Picco .80 and Hurricane fan system. The model weighs about nine pounds, and speed straight and level is about 130 mph. Finish is K&B Epoxy and Monokote, which Bob says is the standard of the world. I guess retired Air Force bird Colonels have a right to be opinionated. Hah!

A HILARIOUS FLIGHT

Harry Woods had a small MiG-15 ducted fan model which he flew semi-successfully several times. The flight that I witnessed was hilarious. Harry and Bob's setup was located near the north end of the 600-ft. long runway. Just before firing up the model, he stopped a young lad of about 12 years and asked him if he could run fast. The lad answered in the affirmative, at which time Harry told him: "As soon as I get this plane running, I will hand it to you and you are to run as fast as possible to the south end of the runway and place it on the end of the runway, facing towards me." The kid said he understood.

Harry fired up the model, handed the plane to the kid, gave him a big salute and told him to get cracking. The kid took off at a dead run. Now, the flight line was in full operation and was crowded with people. You can imagine the looks on their faces when this kid comes running down the flight line, with a screaming ducted fan model in his hands, and weaving in and out of the crowd. The lad eventually made it to the south end of the field and instead of putting the plane down, he stood there holding it. After much jumping up and down and many hand signals, Harry finally got the lad to place the plane on the runway and release it. Upon release, the plane slowly gathered speed and managed to get airborne about three-quarters of the way down the runway. By this time, the spectators got wind of what was going on, and cries of "Go, Go, Go," were heard as the plane made its takeoff run. When it broke ground, there was a massive roar of approval from the crowd. Harry managed to get the plane to about a fifty-foot altitude and a 180-degree turn to downwind, and made two passes up and down the field before the model de-

continued on page 102

WING STRUCTURAL DESIGN

I've been intending to write about this for a long time. The thing that finally got me started on it was some recent correspondence on the subject with reader Jim Stevens, of White Rock, British Columbia, Canada. Thanks for the push, and for your valuable suggestions and corrections, Jim.

There are a lot of good model-airplane wing designs, and a lot of bad ones. I'm sure many of you, like me, have glanced at the wing structures on a number of published model plans and said to yourself, "Oh, No!" There is nothing to prevent the publication of poor designs, and it happens frequently. Don't trust everything you see in print.

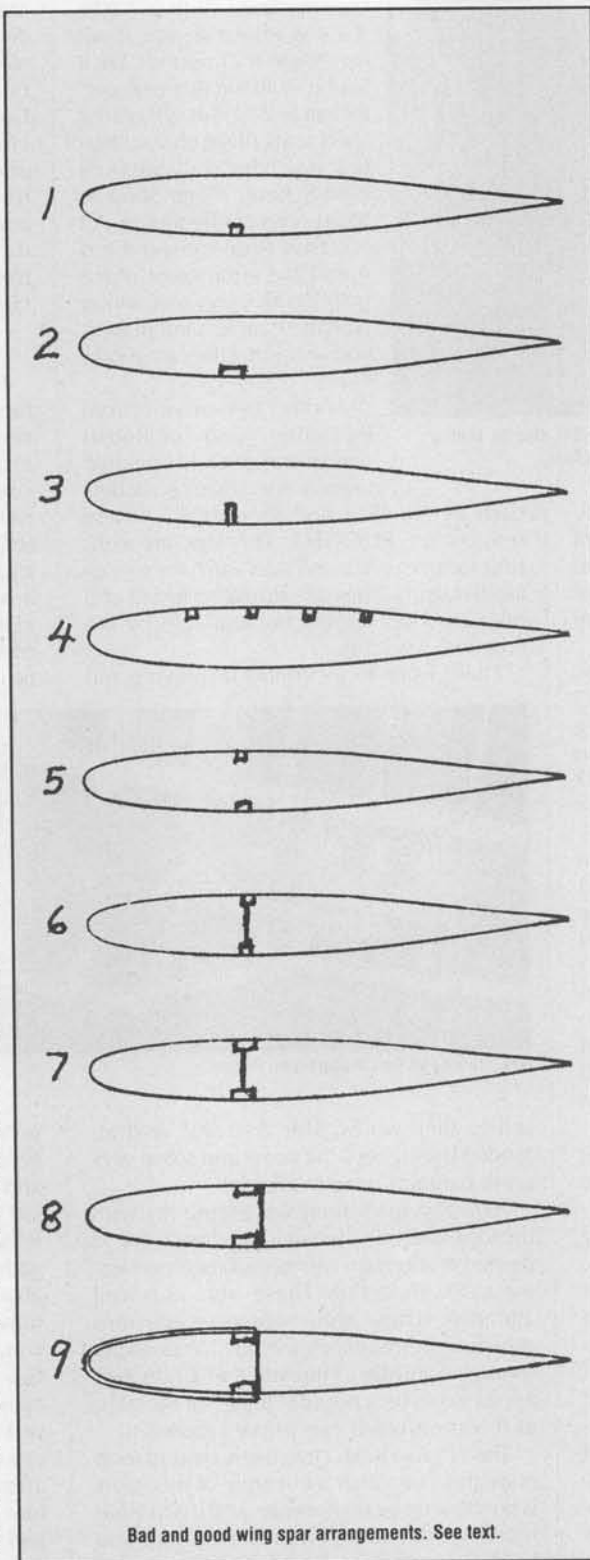
This won't be a formal dissertation on engineering structures, but rather a common sense look at the differences between good and bad wing design. Good structural design is as easy to do as bad design, if we understand the loads to be carried and a little about configuring load-carrying members.

WHY WEIGHT?

I used that title for this column for October 1988. In the event that one or two of you have forgotten what I wrote then, let me repeat a small part of it, as without knowing why low weight is important there is little incentive for improving the structural design of our models.

Why is weight bad? A few of the negative effects of weight in an airplane are:

1. In order to support a heavier plane the wing must generate more lift, hence there is more induced drag, therefore the top speed of the model is reduced.
2. The stall speed, landing speed, and takeoff speed must be greater with a heavier plane, in order to generate the required greater lift at or near maximum lift coefficient.
3. Greater weight means more inertia which says a heavier plane will require a longer takeoff run.
4. And a longer landing run.
5. And a longer dive to recover from a stall.
6. The minimum looping radius of a heavier plane is greater.
7. A heavier plane will have greater moments of inertia about all axes, so the response to all control commands will



Bad and good wing spar arrangements. See text.

be slower.

8. The rate of climb of a heavier plane is less.

9. A heavier plane has more kinetic energy in flight, so it will crash harder, doing more damage to itself and to anything it hits.

10. A heavier plane will break more props in poor landings.

11. A heavier plane will cost more because it requires more materials.

12. A heavier plane is harder to carry.

13. A heavier plane may require a more powerful engine, which will cost more money and burn more fuel.

14. If a larger engine is not used in the heavier plane, the engine will still be operated at higher throttle settings, therefore it will still burn more fuel.

So, I, for one, am interested in the lightest possible airplanes.

LET'S DESIGN LIGHTER WINGS

First, let's look at the natural laws of beams, as a cantilever wing serves as a beam. A cantilever beam is defined as having one end anchored in a wall. An airplane wing panel may be anchored into the wall of a fuselage, but if the wing is above or below the fuselage, one wing panel is anchored into the other, so the result is the same. A complete wing is really two cantilever beams coupled together at the center, with a distributed lift "load" upward and a concentrated weight load downward at the center.

The whole wing is a complex beam which consists of simple beams or beam elements. In the simplest case, the wing has a single spar which carries essentially all of the bending and shear loads. As it turns out, this simple single-spar design is usually the best design in terms of strength-to-weight ratio, and one of the easiest to design and build. Let's get into the reasons.

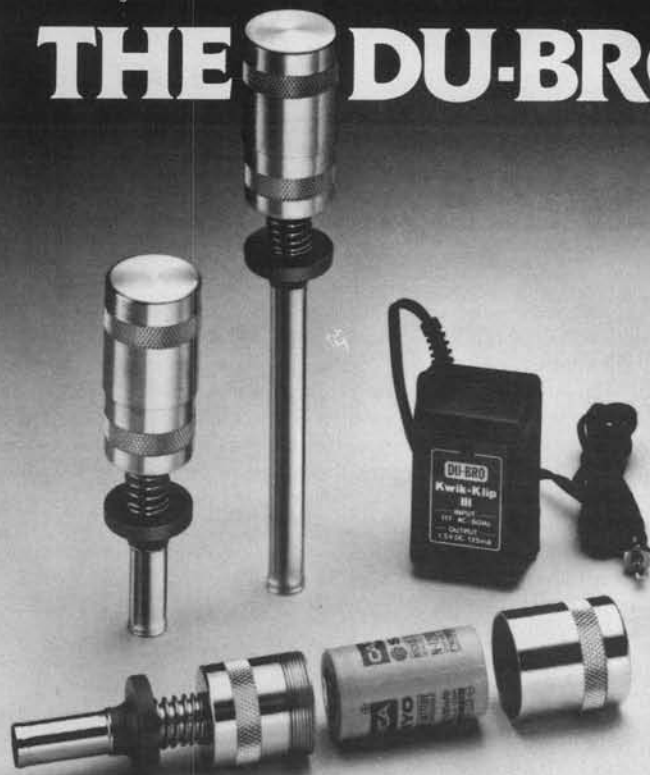
BEAM CROSS SECTIONS

We know that a yardstick is much stronger and stiffer in the direction of its width than it is when loaded in its flat dimension. As a matter of fact, the strength of a simple beam of rectangular cross section is proportional to the width of the cross section, but proportional to the square of the depth (thickness) of the

continued on page 93

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ALL ABOUT ARFS

BY ART STEINBERG

AFTER FLYING CLEANUP... YUCK!

My favorite kind of flying is RC planes powered with reciprocating engines, though I must admit that sailplanes and electric models do hold a great deal of attraction for me. Certainly they are far more quiet, but their biggest advantage to me is that they are clean! Anyone who has had to cope with cleaning the grease and gunk from a model

built-up models, but there are some differences which occasionally crop up. So let's take a look at some of the methods used to clean models in general, and ARFs in particular. For our purposes, we will assume that we are using glow fuel rather than gasoline based fuel, as it is the unconsumed oil in the glow fuel which ends up on our airplanes. Gasoline-type fuels tend to be

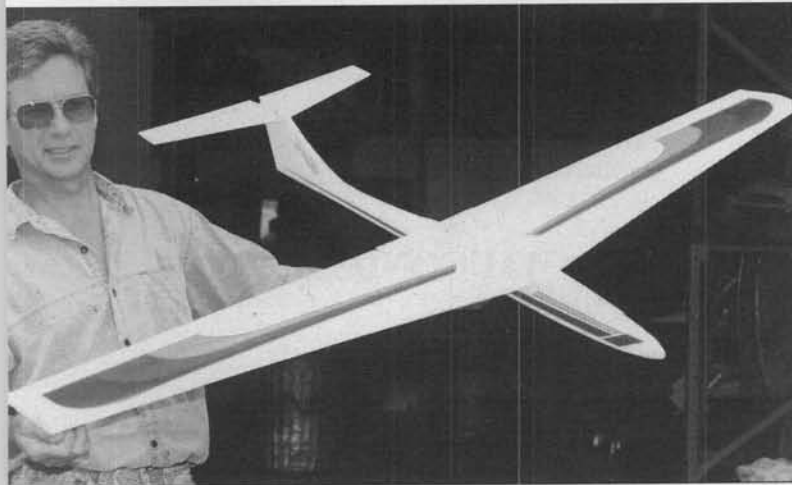
consumed more efficiently during combustion and leave virtually no residue on the airplane, so for the purpose of this dissertation, we will deal with glow fuel residue.

The deposits seen on the airplane are usually quite clear, and so may at times be hard to spot without running a hand over the surface of the model. A point we should mention at this time is that blackish deposits usually indicate

trouble, primarily that there is abnormal metal-to-metal contact somewhere in the engine, and the black discoloration in the exhaust actually consists of tiny metallic particles. These bits of metal may be coming from an obviously loose muffler fit, and this can be easily remedied by properly tightening down the muffler. But if the problem is an internal one, the engine is probably due for some kind of overhaul. In any event, if the engine residue is black, discontinue further operation until the cause is determined and rectified. Before tearing down the engine, look at the most obvious areas where trouble can occur, such as the

exhaust system, the cylinder head, and the back plate.

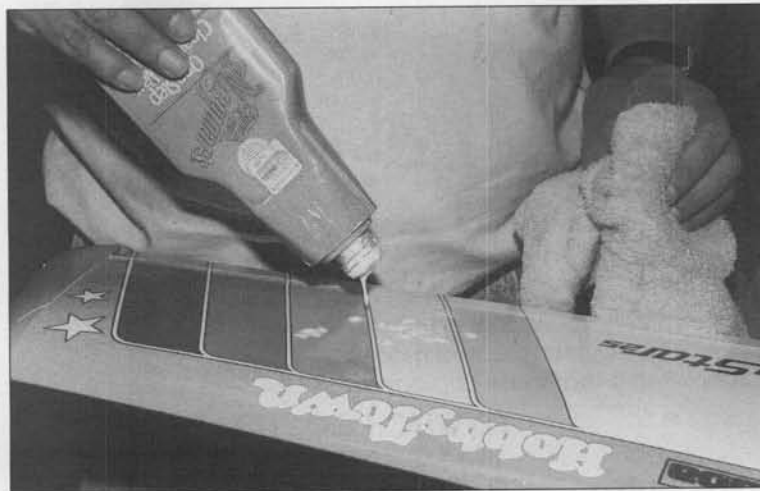
Some engines run much cleaner than others, and tend to burn the fuel more efficiently. Some engines leak fuel and oil all over the place, from every possible opening, and these are unbelievably difficult to cope



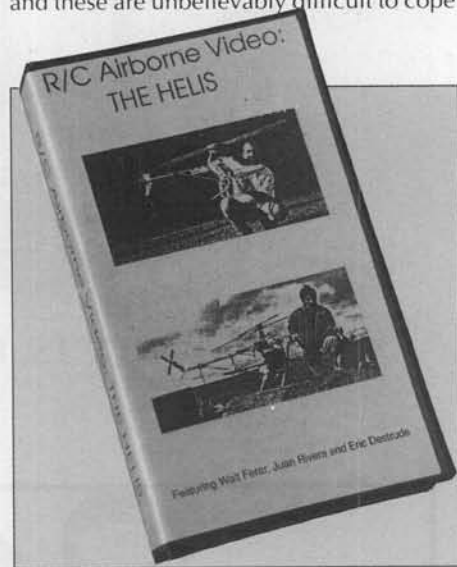
Mark Smith, of Dynalite Models, and prototype of new ready-to-fly slope soarer, the "Freedom."

airplane knows what I'm talking about, an unpleasant job, quite difficult to get done properly. I don't know how many times I've taken the time to thoroughly wipe down my model at the field, only to get it home and find it is still covered with engine residue.

The proper cleaning of ARFs is in most respects similar to the cleaning of regular



One method of keeping your ARF sparkling clean is to give it a coat of auto polish!



Truly mindblowing video shows unbelievable footage shot from RC helicopters. See the "Bruiser," a chopper which can lift over twenty pounds! Also full of technical information. A must see!

with. Often times when questioned about this, the manufacturer will claim that this is normal for this particular engine, and one must just learn to live with the problem. I suppose that such an engine will never suffer from insufficient lubrication, but nevertheless, when I come upon a really clean burning engine, I treasure it.

Going back to the early days of RC, one of the most popular airplane cleaners for Monokote and other surfaces was Windex or similar type glass cleaners. These still remain a fairly efficient way to get the grease off models, and many modelers save a little money by mixing up their own, using various proportions of water, alcohol, and ammonia, with sometimes a touch of blue food coloring to lend the mixture an air of authenticity. If you'd like to get really fancy about all this, one of the finest plane cleaners I have ever found was K-Mart's house brand of aerosol glass cleaner. It comes in a generous-sized spray can, and the price is ridiculously low. When you spray this on your model, it foams up all over the place

like whipped cream. You follow up with a vigorous wipe-down with a soft paper towel, and like magic, the airplane is squeaky clean. And speaking of paper towels, the economy non-absorbent types just won't do the job, so if you use them, buy the more expensive deluxe, fluffy kinds.

Now if you really want to know how to get a plane super clean, the folks to watch are the ones who fly pylon or pattern, or compete in scale. One pattern flier told me his secret for field cleaning. He sprays his airplane with glass cleaner, then carefully wipes it down not with paper towel, but with a clean cloth diaper! He claims that paper towels, even the good quality ones, will impart minute scratches to Monokote or painted surfaces, so he uses diapers exclusively. He laid out the money for a dozen or so rump wrappers, and tosses them in the washing machine whenever necessary.

Having cleaned the plane at the field, he

Some engines leak fuel and oil all over the place, from every opening, and these are unbelievably difficult to cope with.

then repeats the process again after arriving home, in the comfort of his workshop. He scrubs the nooks and crannies with cotton Q-Tips and an old toothbrush, and when he is all finished, close examination usually discloses that the plane still has a light film or haze all over, which is only visible when held under a strong light. He gets rid of this film by buffing down the model one last time with a fresh, clean, diaper. He also does one more important thing every few weeks. He actually polishes the entire airplane with a coat of high quality automobile polish, and his current favorite is a brand called "Pro-Polish" which he particularly likes because it contains teflon. However, in the past I have seen him use Meguiar's automobile polish with excellent results. While the polishing routine works well on any model airplane finish, it is especially effective when applied to ARFs with pre-decorated foamboard type construction, such as the EZ line of ARF warbirds and pattern planes, as these models

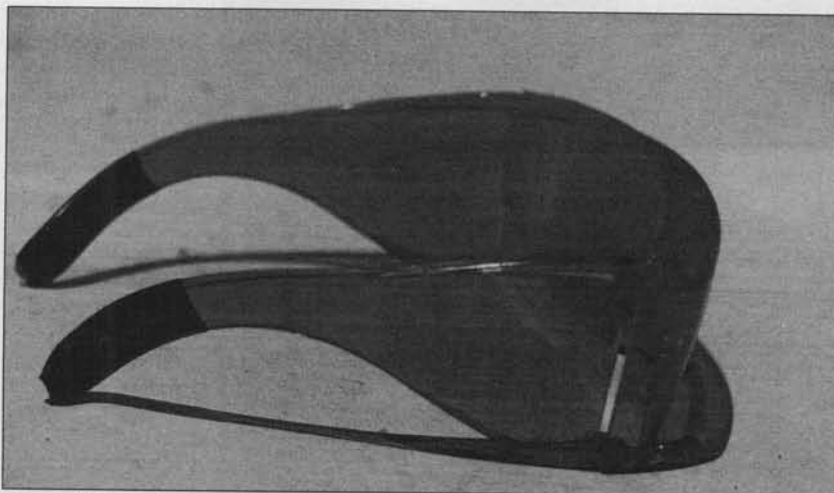
can be made to gleam and sparkle with a little effort. The polish will also remove most stains and crushed insects, but once in a while a stubborn spot is encountered and

will require some kind of solvent for removal. If the glass cleaner doesn't work, try a detergent cleaner such as "409", or straight alcohol. Another useful solvent is naphtha, which is the same substance used for cigarette lighter fluid.

All of the aforementioned cleaners are harmless to almost any finish I can think of, but some horrendously stubborn spots may need to be attacked with really strong solvents such as acetone or lacquer thinner. These must be used with the utmost caution, as they will destroy most painted surfaces and dissolve a good many plastics.

They don't seem to seriously affect Monokote and other do-it-yourself shrink films, but they will take the color right out of the vinyl-type shrink coverings used on the vast majority of ARFs. So when in doubt, do a test in an inconspicuous place before using any solvent.

Surely there must be dozens of ways to clean airplanes which I have never heard of, and if any of our readers have other methods to suggest, we'd all like to hear about it, so let me know and I'll pass the word through this column. (Going back to even earlier RC, before Monokote, when doped silk and



If you use this type of sunglasses, you'll notice that eventually the folded temples cause abrasions where they touch the lenses. This can be easily prevented with shrink tubing placed over the temple ends.

nylon were the covering standard, lighter fluid was number one in our club for clean-up. We used to buy it by the carton, but then there was more of it... butane lighters were

just coming on the scene. wcn).

And speaking of hearing from you readers, my mail has taken a most interesting turn of events ever since I wrote about earning my ham license. Much of it has been from other hams, congratulating me on my achievement, and telling me about their experiences in the field of amateur radio. One excellent example read as follows:

Dear Art:

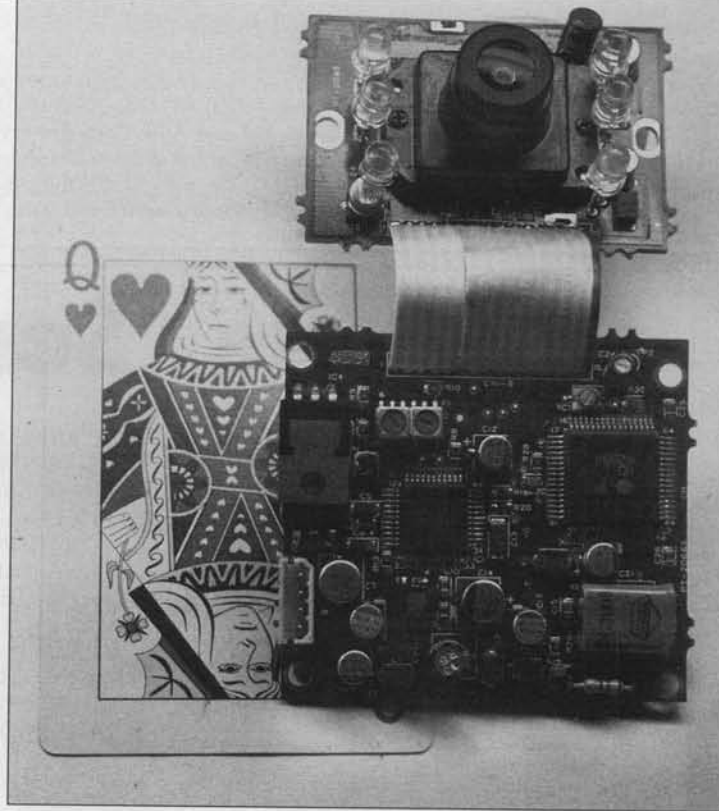
Who am I? A longtime subscriber to Model Builder, one of the few hobby magazines I read cover-to-cover. Have been a ham for 10+ years... hold a General ticket. For the last two years have settled on RC soaring (2M) and rubber free-flight.

Now... get with the code and get your ticket for the low bands, and we can talk on 20 meters. I chat with your coast regularly. Enjoy your articles... keep up the good work.

Allan Buttrick N1CLZ
Ridgefield, Connecticut

I understand Allan has a lot of other interests, such as astronomy and model railroading, so he's really a man after my own heart, and as soon as my duties allow, I intend to follow his advice and pursue an advanced ham ticket. This ham license of mine continues to open more

and more new vistas, and the latest one to interest me is RC airborne video. My brain could hardly comprehend one mind boggling letter I got, in which a reader described



Example of a monochrome micro video camera as available from Supercircuits. Ideally suited for RC airborne video applications by licensed ham radio operators.

his RC airborne video system, whereby he operated his model by observing the image transmitted to a TV monitor. The remarkable thing was that he was actually able to successfully fly above the clouds!

My involvement started last year when I

viewed a video tape from RC World Video called, "RC Airborne Video, Aerial Video and Still Photography for the RC Flier," which was an absolutely fascinating documentary of shooting still and video photography from fixed-wing RC model airplanes.

The subject matter and the detailed way it is covered should get the blood pumping in even the most jaded modeler, and I guarantee it will get you thinking about this new dimension in RC flying. Recently, I received an updated version of this tape with addi-

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The subject matter and the detailed way it is covered should get the blood pumping in even the most jaded modeler...

tional footage, and it is so remarkable that I watch it over and over. Now they've released an entirely new video called, "RC Airborne Video: The Helis," which is another spellbinding production of video shot from model helicopters. What these folks have been able to achieve is outstanding in every respect and should be on every RC modeler's "must see" list. Both tapes are available from RC World Video, 1403 Bayview Drive, Hermosa Beach, CA 90254, telephone (213) 372-9166. The tapes cost \$19.95 each, plus \$4.00 S&H; worth every cent.

Now as if that wasn't enough, this company also operates under the name "Supercircuits" at the same address, and they offer just about everything needed to equip an airplane or helicopter for aerial video. They offer ATV transmitter plans, kits, partially built semi-kits, downconverters, and even a micro video camera weighing only 2.2 ounces! Exact size is 3-3/4x2-3/8x7/8 flat, costing \$196.95. All products are described in the spec sheets, which I'm certain they'll send our readers on request.

Another firm which specializes in ATV transmitter boards for RC purposes is P.C. Electronics, 2522 Paxson Lane, Arcadia, CA 91007-8537, telephone (818) 447-4565. They also sell a micro video camera for \$229, weighing just four ounces, and they offer some spec sheets which include some really detailed information on the rewards and pitfalls of airborne video systems.

(WARNING: Please note that **all** of the video equipment mentioned herein is for operation on ham bands, by licensed amateur radio operators only. Anyone else using this equipment is subject to heavy fines, just as they are for using 6-meter RC equipment without at least a technician's license. wcn-W6MGK)

I'd like to take this opportunity to thank all those who so generously give of their time and effort to furnish me with information which helps me to write this column, and I am always happy to hear directly from our readers. Write me at 2267 Alta Vista Drive, Vista, CA 92084. All letters with an SASE are answered promptly, or you can telephone me at (619) 726-6636, or FAX to (619) 726-6907. **MB**

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Wayne Mann

Curtis Youngblood

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The **X-Cell** line continues to prove itself again and as the industry's leader, with versatility, quality, and performance to meet the demands of all flying styles.

1991 USA FAI Team Trials

- 1st-Curtis Youngblood-X-Cell .60
- 2nd-Wayne Mann-X-Cell .60

1991 USA Nationals

- FAI- 1st-Curtis Youngblood-X-Cell .60
- 2nd-Wayne Mann-X-Cell.60
- Int.- 1st-Robert Akers-X-Cell .60
- 2nd-Eulace Mallory-X-Cell .60
- 3rd-Kent Officer-X-Cell

1991 Kyosho .30 Challenge

- FAI- 1st-Wayne Mann-X-Cell .30
- Int.- 1st-Kent Officer-X-Cell .30
- Novice- 2nd-Jim Robertson-X-Cell .30
- 4th-Mark Gheblian-X-Cell .30
- Scale- 1st-Ted Schoonard-X-Cell Hughes

1991 Michigan Champs

- FAI- 1st-Wayne Mann-X-Cell .60

1991 N.J. "Nats Tune-Up" Contest

- FAI- 1st-Lance Murphy-X-Cell .60

Curtis' Choice of Winning Equipment:

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- #3694 M.A./USA N.H.P Tail Blades
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- #0552 M.A./USA

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- #3694 M.A./USA N.H.P Tail Blades
- #0232 M.A./USA Tail Speed-Up Gear
- #0561 M.A./USA Pro-Paddles
- #3951 M.A./USA Magna-Pipe
- #4327 M.A./USA Magna-Fuel 30%
- #4231M M.A./USA Power Concepts
- #3817 M.A./USA JMW Expert Gyro
- #0803 M.A./USA Torque Tube Drive

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F-4 Phantom slope soarer, built and flown by Bob Powers, flashes by over the beach at Cape Cod, Massachusetts.



Bob Powers makes a close pass for the camera at White Crest Beach on Cape Cod, Massachusetts.

Bob Powers is a master modeler and hard-core glider pilot. You can find Bob on the sport thermal field, at thermal contests, and on the slope... both on inland hills in his native New York and on Atlantic Ocean coastal dunes. I talked to Bob after watching a 42-minute flight of his slope soaring McDonnell Douglas F-4 Phantom.

Model Builder: This is an amazing airplane to watch. How did you pick the Phantom as a slope soaring subject?

Bob Powers: Well, I had a Royal Phantom kit framed up and sitting on the bench and never got around to putting a motor in it. Since I started in sailplanes a couple of years ago my fuel power flying has tapered off. One of my glider flying buddies suggested I set it up as a slope soarer.

SLOPE SOARING AN F-4 PHANTOM

BY DAVID GARWOOD



Bob Powers with his Bob Martin Coyote on an inland slope soaring site in upstate New York.

MB: How much slope building and flying experience did you have before this project?

Powers: I've built a Bob Martin Coyote and a Douglas Aircraft Quicksilver and flown them for a year or two.

MB: What modifications did you make to the kit to convert it to a glider?

Powers: Basically, sealed up the landing gear doors, and built a nose block to replace the motor, prop, and spinner. It has aileron, rudder and elevator control and I balanced it as shown on the plans.

MB: How do you like the way it flies?

Powers: It was nose heavy at first. I took about half a pound out of the nose, which moved the CG back an inch and now it flies fine. You do have to pay attention to it in the air, and needs a 30-mph wind.

MB: Would you do anything different if you

could do it again?

Powers: I'd lighten the tail by building the fin and elevator up from sticks instead of sheeting, to save some nose weight, which would allow it to fly in lighter lift. I'd also build larger ailerons.

MB: You've been building and flying RC for over 20 years. I've seen your aerobatic routines with scale WW II warbirds, your CAP-20, your biplane and your helicopter. How did you get started in sailplanes?

Powers: A few years ago, I began paying more attention to soaring columns and articles in magazines. It got me thinking about sailplanes and since I didn't have a winter building project lined up, I decided to build a (Ace R/C) Quasoar. Some of the glider pilots I met showed me what slope soaring was all about, so my next plane was a (Bob

Martin) Coyote, then a (Douglas Aircraft) Quicksilver. One buddy suggested the Phantom could fly as a power scale sloper.

MB: What advice would you have for experienced RC fliers who've never flown a glider?

Powers: Every RC flier should try thermal and slope flying. Not everyone will like it, but it's a new challenge requiring some new skills that can be learned from practice. Remember the exhilaration as you progressed through the different phases of learning to fly powered RC aircraft, from trainers to the hotter pattern style? It's there again with gliders. I think power fliers would particularly like slope flying because, with the right plane, the speed and aerobatic capabilities are very similar to the kind of flying they are accustomed to. **MB**

Chopper Chatter

BY JAMES M. WANG

I have already logged about 100 flights on my Concept 60. Just as Great Planes advertises, "Concept 60 is designed with the beginner and FAI in mind." It is amazing that the model can be so docile in hover and still be aerobatic. It is one of the easiest to hover 60-size models that I have ever flown, and that covers almost every 60-size model produced since 1975. But, the best compliment for the Concept 60 is that it does slow forward flight better than any model.

Helicopters are relatively easy to fly in fast forward flight, as they handle like an airplane. In hover, helicopters are not too difficult to control either. However, most helicopters are harder to handle in slow forward flight. Part of the reason is that when flying forward, the rotor downwash is not blown straight downward as it is in hover, nor blown back as in fast forward flight,

A pair of gorgeous models built and flown by author's friend Jim Westhoff. An X-Cell 60 Custom in front and an X-Cell 40 in the air . . . good hot-dogging machines, with very nice control response characteristics.



James Wang's new Concept 60 is being flown by MB flight test team member Mike Donnell. In the quest for speed, a MAC aircraft tuned pipe is added. The model is extremely smooth in hover. These chaps must really trust their building, but please don't hover the model so close, the mechanics may not fail, but the radio can glitch.



The author's friends are crazy about speed! This demon belongs to Eric Bauer, of GPA Hobby. It's an X-Cell 30 with an O.S. 61 RFN, fitted with Shadel's modified ABC piston and sleeve. It has a Hatori 666 muffler mounted on a modified Magna header. This combination is really too much for the 30-size frame and not recommended. Note the polished, chrome-like landing struts.



rather, it is interfering with the fuselage at an angle. Furthermore, the speed is too low for weathervane effect. Therefore, most of time we see RC helicopter pilots either hovering or buzzing around at fast speeds. Some FAI maneuvers, such as the slow Figure 8, are designed to test a pilot's handling of very slow forward flight. I was quite surprised to find that Concept 60 is the first helicopter to actually make slow, slow forward flight a breeze. Hovering the Concept 60 is a cinch. But high speed forward flight with the stock wood blades is disappointing. The model pitches up and down. Also, every time a high-G hotdogging maneuver is attempted, the blades make annoying blade slap noise due to aerodynamic vortex interactions.

Just as I was about to write off the model as a failure in hotdog, and maybe only good for beginner's FAI maneuvers, I tried a set of 195-gram Hi-product SC-60 fiberglass blades on the Concept 60. With the heavier blades, the model becomes a joy to fly in

high speed forward flight. The hotdogging becomes crisp, too. I just ordered a pair of Zig-Saw glass blades from Miniature Aircraft USA, because Dwight Schilling recommended them to me. As the stock wood blades are quite light, around 145 grams, I suspect that if you can mill out extra slot space yourself and add some lead to bring each blade weight to 190 grams, it will not be pitchy in high speed. As I explained in the September 1991 *Model Builder*, turning each Hiller paddle leading edge down by one degree will also reduce the nose-up tendency, and it works on the Concept. But don't overdo it; too much negative incidence on the paddle can cause the model to dive in high speed forward flight!

We will have a full review on the Concept 60 soon. So far, it is still in one piece, and my friends and I all like it very much, except that the price tag is quite high and ball bearings on the control bellcranks are not included.

I was quite surprised to find that Concept 60 is the first helicopter to actually make slow, slow forward flight a breeze.

First on the agenda for this month is the piston locking tool from OnBoard Systems, a very nicely machined brass item that costs only \$8.95. On one end, it has a hex socket for use as a glow plug wrench. The other end can be threaded into the glow plug hole in the engine cylinder head, to lock the piston and

Another X-Cell 60, belonging to Louis, the co-owner of GPA Hobby. This is a genuine 60 X-Cell with 60-size engine. The Hatori 666 muffler is very quiet and gives great idle and superb smoothness in hover, but noticeably less power at the top end as compared to a tuned pipe.



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prevent it from moving as you loosen or tighten the crankshaft nut. I have tried it on 30 to 60-size engines. It works fine and will not damage the engine. This tool is a must for every Concept and Enforcer owner. Imagine, on the Concept 30 you will not have to remove anything to tighten a loose prop nut. This is much better than jamming the piston by sticking a piece of wood into the exhaust port. And don't even think about shoving a screwdriver into the exhaust port to prevent the crankshaft from turning! The piston locking tool is made in Canoga Park, California, by OnBoard Systems. It can be found in hobby shops or call OnBoard at (818) 999-3952.

Next item is the Performance Speciality ABC piston and sleeve sold by Dave Shadel. As I mentioned a few months ago, Dave revived my old O.S. 61 SFH by installing one of his Performance Specialty ABC piston and sleeve sets. Dave is a world-famous RC pylon racer, and has won many national and world titles. He knows engines! My O.S. 61 SFH, with Dave's

piston and sleeve, idles better than the stock engine, has a smoother transition, and more top end power. In hover, the engine sounds so smooth there is no four-cycling sound at all. I am using a stock O.S. 6H carburetor.

The 61 SFH is the old Long Stroke engine. I always liked this engine, but Great Planes has discontinued supplying it in the US, because American modelers seem to think the long-stroke design causes vibration in hover and leads to side frame cracking. So O.S. only sells the 61 SFN Short Stroke in the US. In Japan and Europe, you can only find the Long Stroke SFH. I have run both engines, and I think the Long Stroke has more power. O.S.'s information sheet rates the SFH at 1.85 hp and the SFN at 1.8 hp. If you want the Long Stroke you can either go abroad, or buy the RC aircraft O.S. 61 SF, which does not have a heat sink. Interestingly, for RC planes, O.S. only has the Long Stroke and no Short Stroke. Does this mean the airplane guys are not worried about vibration?



(Above) No, it's not the latest in airborne radar. It's a new concept for beginner training gear. A hula hoop is used on this Concept 30. The hoop is joined to the skids with two 3/8-inch wood dowels. (Left) Kyosho rep Dwight Schilling holds the new Predator plastic fuselage from Rave's Manufacturing. It is vacuum formed from conventional transparent canopy material, and is designed for the Concept 30. Very sharp looking! (Below) The piston locking tool from OnBoard Systems. It is an extremely useful tool for tightening or loosening the engine crankshaft nut. The right end can also be used as glow plug wrench.



helicopter world

You can either send your engine to Dave for installation, or order Dave's ABC piston and sleeve set and install it yourself. If you are not sure you can change the piston and sleeve properly yourself, then send the engine and let him do it for you. The piston and sleeve set is not cheap, around \$100, but any factory replacement will also cost \$100.

Dave's piston and sleeve are milled from bar stock, using a numerically controlled milling machine. The sleeve features something he calls 'arched port' timing. Dave has set the exhaust timing higher than the stock O.S. engines, but you can request any particular timing that you want.

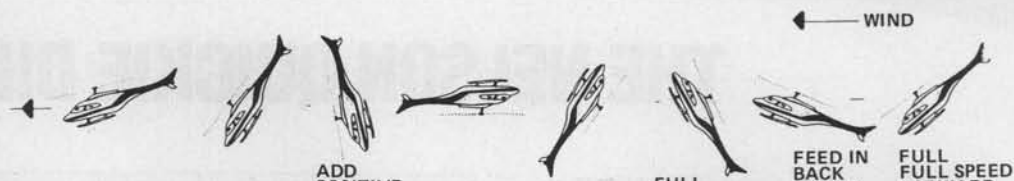
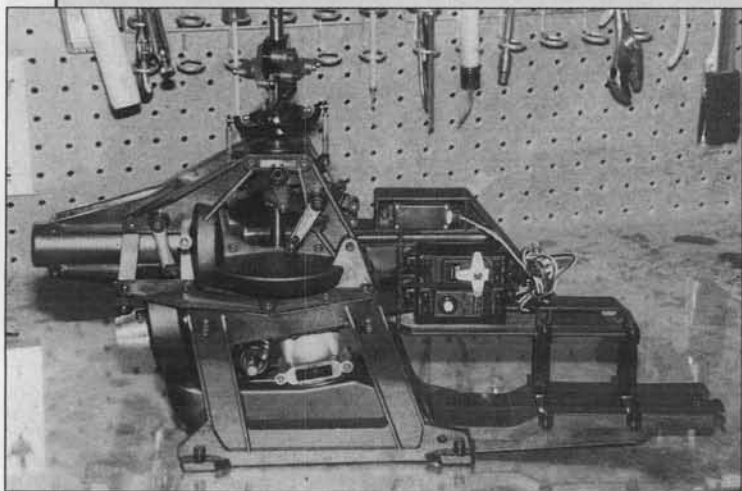
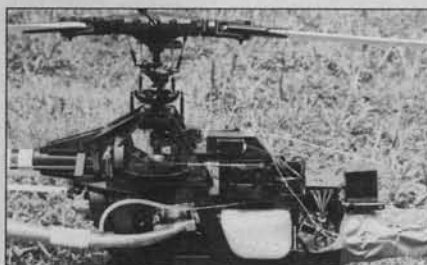


FIGURE 1: The text explains how to do the forward flight tumble maneuver. It is easier and prettier to do it in the downwind direction.

Recently, due to a tail rotor drive wire failure, I crashed my Champion. After the crash, my 'Shadel' engine was still engaged in the idle-up setting, so it was screaming at 25,000 rpm without any blades. Finally, the connecting rod snapped and the engine screeched to a stop. Examining the inside showed that part of the piston skirt was chipped off. I filed the jagged piston skirt smooth and installed a new connecting rod. Amazingly, the same engine ran again in the rebuilt Champion.

The first few flights were rough; the engine threatened to quit. After five or six flights, the piston seated in again, and the engine was again pulling the 10-pound Champion like a rocketship. Though not as good as before, it still had very impressive power.

continued on page 97

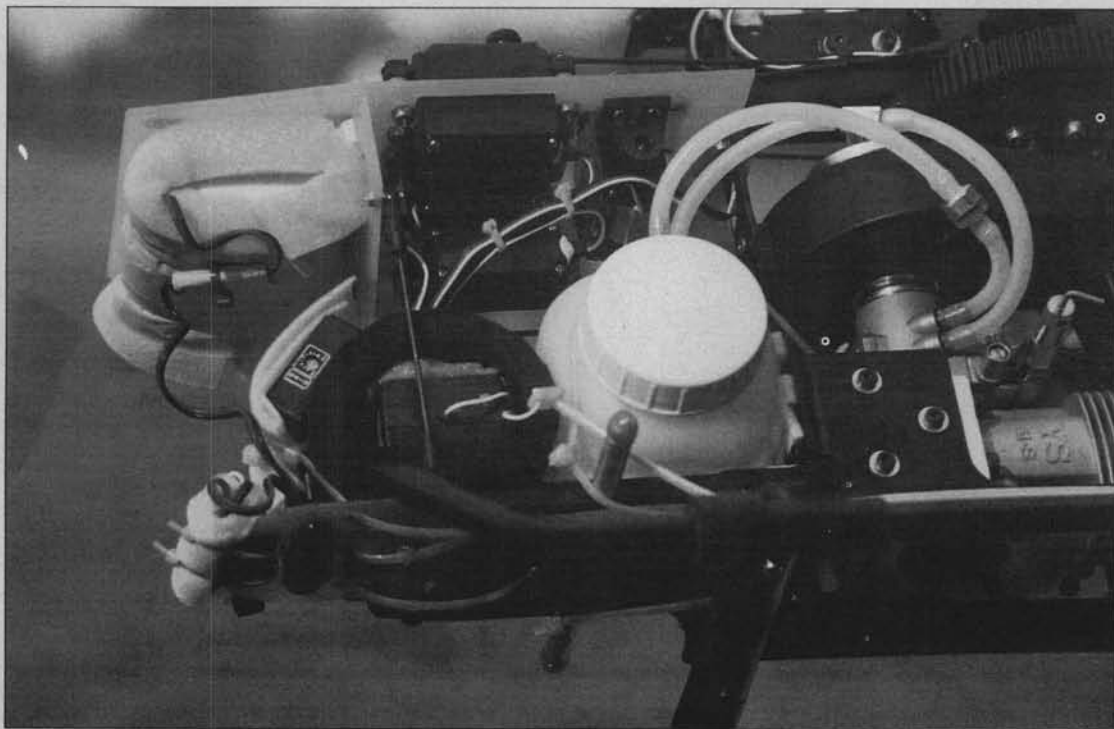


(Far Left) Author's Concept 60 under construction. Notice the close resemblance to the original Concept 30.

They are almost identical, and they hover identically, too. There is an optional seven-piece ball bearing upgrade set for the control bellcranks. (Above left)

This picture shows Rave's fiberglass servo tray for the X-Cell 60. It is guaranteed for life, including crashes. Notice that the radio switch is mounted on a fiberglass plate on the bottom, and a pushrod is added from the top tray to the bottom frame. This pushrod on each side significantly increases the torsional rigidity of the old wood or fiberglass servo tray.

(Left) The Concept 60 with Futaba Super 7 flight pack installed. Comparing this picture carefully with the workbench photo will show that a plywood plate has been added in front of the servo tray. This is to extend the battery forward for proper balance. An aluminum plate was also made to mount the gyro well forward. The main rotor head is identical in design to Concept 30. Note the static droop angle on the blades, and the generous 500cc fuel tank.



THE NELSON QUICKIE DILEMMA

The Nelson Quickie engine has now drawn an editorial from AMA's Bob Underwood in the *Model Aviation* October 91 issue relative to what it could do to racing and what will be needed if Quickie is to survive.

You may or may not agree with Bob's comments because at first they sound as though leaning towards the "Chicken Little" complex, however, after reading the entire column you will note he raises several good points that must be considered if all the raised scenarios come true.

The main crux deals with those who will not plunk down the cost of a Nelson and insist on racing in only those contests that do not allow usage and if allowed, not race at all. Bob suggests this could be the start of the decline towards extinction.

I personally do not believe this will happen on a large scale, and this year's Nationals is a good example. I had a couple of



The finalists in the "Ron Haddad Memorial" trophy dash: (l-r) Kevin Matney calling for Rick Bork, Dan Kane Jr. and Sr., Bill Comber with caller Jim Warner (rear) and Dave Latsha with his caller Vern Smith (rear).

The top finishers at the 18th annual Hobby Stop "Silver Cup" Quarter Midget race are: (l-r front) Dane Kane, Jr. with the meet's best time, Dave Latsha 5th, Phil Zuidema 3rd, Craig Grunkemeyer 2nd, and Dennis Summer 1st. In the rear (l-r) is caller Dane Kane, Sr., Les Haddad, caller Vern Smith, caller Ron Gage, caller Joe Dodd, CD Rex Knepper, and caller Ken Heatlie. Missing was Steve Kovach, who finished 4th, but had to leave early to, believe it or not, catch a plane.



FAST TIMES AT THE QM RACE

1. Dennis Sumner	1:17.31	20. Allen Booth	1:28.89
2. Craig Grunkemeyer	1:17.31	21. Derek Wodziak	1:20.48
3. Phil Zuidema	1:17.77	22. Jim Warner	1:26.30
4. Steve Kovach	1:23.51	23. Henry Maurus	1:21.39
5. Dave Latsha	1:18.39	24. Rick Cromer	1:29.54
6. Bill Comber	1:20.69	25. Ken Heatlie	1:21.32
7. Vern Smith	1:19.92	26. Al Schwartz	1:24.00
8. Rick Bork	1:20.13	27. Ray Blake	1:33.00
9. Gail Jacobson	1:20.35	28. Bob Hisey	1:20.38
10. Joe Dodd	1:20.65	29. Rick Moreland	1:24.10
11. Ron Gage	1:22.66	30. Neal Rehm	1:25.56
12. John Albritton	1:19.87	31. David Beazley	1:21.05
13. Donny Weidman	1:20.05	32. Jim Gager	1:25.50
14. Kevin Matney	1:22.79	33. Jerry Sorosiak	1:36.70
15. Dave Carpenter	1:21.78	34. Richard Steine	1:23.08
16. Rex Knepper	1:22.78	35. Dave Gohn	1:23.89
17. Dan Kane Jr.	*1:16.15	36. Bob Petrinec	1:24.55
18. Joe Cohen	1:28.18	37. Dan Kane Sr	1:21.86
19. Rich VanHulle	1:33.26		
*Fastest-time			

conversations with people who felt the entry level would be extremely low because of various competitors' refusal to spend several hundred dollars for an entry-level engine.

The entry was less than last year by about 20 people, however, 78 entries is what I consider a whopping big meet and there are several reasons for less people attending, including those who did not wish to compete against this super-engine.

There were at least eight who had to cancel at the last moment for various reasons, who if they had attended, could have put the entry level just under last year's record. I talked to a couple of people who stated they didn't attend because they felt

the entry numbers were too high, leaving not enough racing.

I think, in time, the people who are adamant against the Nelson Quickie engine will realize what a great piece of art it really is and after comparing the cost of what they currently have invested versus the cost of a Nelson, will see that there is not too much difference.

Now on to something better. Since 1974, Les Haddad of the "Hobby Stop" in Toledo, Ohio, has sponsored an annual two-day Quarter Midget race that most racers feel is the premier QM race in the Midwest and maybe the entire country. The number of contestants is usually indicative of the quality, and this year's entry level at 37 is prob-

ably as high as, or higher than any other QM meet anywhere, including the Nats. There were entrants from Minnesota, Pennsylvania, Maryland, Michigan, Georgia, Virginia, Illinois, Indiana, and of course, Ohio.

Round One started with Jerry Sorosiak, Bob Hisey, Derek Wodziak, and Dennis Sumner, whom I mention because Dennis was the first guy on the board, with four points giving him a lead that he never relin-

Dave Latsha fire's his Nelson while caller Vern Smith holds in preparation for a heat.



quished through nine rounds, even though he was tied for the lead several times. He ended up two points down and all alone in first place, with the luxury of no fly-off, which is always a nice way to end a contest.

The reason I point out Denny's accomplishment is not just to tell the world about one winner at one particular contest, but rather to tell you a little bit about how far this accomplishment really extends. You see, this is not the first time Dennis has won the "Silver Cup" race. Fact is, he's won the last four races using the exact same airplane and, I believe, the same prop in three of them!!!

This may not seem like much to many of
continued on page 95

CD Rex Knepper, along with race sponsor, Les Haddad, present the winner's trophy to Dennis Sumner.



Four straight years the S&H Team, Dennis Sumner and Ken Heatlie, the old man and the kid, have won this meet with this same model. Quite an accomplishment!



Father and son, the Kanes, both Dens and both racers. Unfortunately the senior doesn't quite keep up with the junior anymore but he try's. Here they show off their Fast-Time and Ron Haddad Memorial trophies.



FREE FLIGHT

BY BOB STALICK

USA Has Winners!

Congratulations to Randy Archer, who recently won the coveted FAI Power (F1C) World Championships. The young man from Arizona showed the rest of the world how to fly the event, as a first-time member of the USA team. The World Champs were held in Yugoslavia this past summer, at which time the

Archer's win was over 44 contestants from 16 countries. Perennial top placer, Eugene Verbitski, from the USSR, placed second in the seventh flyoff round. Archer made a 512 in his seventh flyoff, and Verbitski mustered 442. Archer's win, coupled with Ken Phair's 23rd placing and Ken Oliver's 27th

and 27th for Bob Isaacson, placed the U.S. F1A team in second place, just behind the Russians. Seventy-five individuals and 25 teams were entered in the F1A event.

In Wakefield (F1B), Roger Maves flew to 24th place, Norm Furutani ended in 36th, and George Xenakis was 43rd, giv-



Ron Hoag won a K&B 3.25cc last year and built this AstroStar for it. First big gas model for Ron.

Slovenians and Croats were at odds with the central government. Just the thought of flying where the possibility of armed hostilities might break out at any moment would cause some consternation among the contestants, but even so, most of the countries that usually compete were present.

Len Sherman won first place in Scale at the NW FF Champs in 1991. Flying this rubber-powered P-38. Monocoque fuselage, built-up surfaces. Props rotate in opposite directions to eliminate torque problems. Weighs in under seven ounces.



New F1C world champion, Randy Archer, holds an F1J model at Lost Hills in 1989. Photo by Bruce Augustus.

place, earned the US F1C team a seventh place overall. First place in the F1C team event went to China.

In the Nordic (F1A) event, Jim Parker placed a strong 3rd behind two contestants from the USSR. Parker's placing, along with 19th spot for Randy Weiler

ing our team 10th place. The Canadians placed 11th on the team list, with Tony Mathews posting a fine 2nd place, only 19 seconds out of first on the fourth flyoff round.

So, kudos to our stalwart competitors for an excellent bit of flying at the top level in the



world. To pull out a first and a second in the individual events is worth crowing about.

DECEMBER THREE VIEW: SINISTORSE MULVIHILL BY JIM BROOKS

This month's three-view is from "Flyoff," the newsletter of the Brooklyn Skyscrapers. Bob Hatschek, editor, introduced the model with the following endorsement: "... very favorably impressed by the performance of this model at Lawrenceville... especially the climb... and Jim was asked to provide this article. How well did it do? Sinistorse kept maxing through the eight-minute flight, and was prevented from going for the nine by two very long retrieves and a cloudburst that ended the meet a bit prematurely. Final placing was second for the individual Mulvihill trophy and second in Mulvihill team."

By definition, Sinistorse is a structure which spirals upward to the left when seen from the center; e.g., certain leaf forms. Take a close look at this ship. It is set up for left-handed flying... because Jim Brooks is left-



Bruce Matthews and the Clini Pusher. Model actually flies, although it's very touchy under power or glide (but not both). Bruce said something about needing more nose weight.

handed. However, if you are right-handed, all you need to do is reverse the obvious left-handed comments (it's a pun, son!).

"The model is my first Mulvihill design. After a twenty-year layoff, I returned to modeling four years ago, and have slowly begun to learn Wakefield with CF composite, Kevlar, and aluminum structures that are ever thinner, lighter, and more rigid. Next will be hesitation props, VIT or variable pitch.

"I thought that a much simpler model could be successful in Mulvihill, so I laid down a design which reminds me of my Slim Jim (Zaic Yearbook, 1965), which is simple, light, easy to fly, glides well and handles wind.

"In the first year or two of rubber, I tried to fly right-right. Several problems emerged; 1) The model zoomed too much during the burst, and this initial power was wasted on a high-speed pass over the cars. 2) The cruise was too flat. 3) The model would not turn in the glide without an autorudder, and 4) I kept hitting myself in the back of the head with the stab on launch. As a left-hander, I'm about as coordinated on the right side as a tree sloth with vertigo.

"Under the combined influence of three excellent Wakefield fliers, namely Cam Ackerly, Doug Rowsell, and Tony Mathews, I switched to left-handed props (hence no more mis-aligned stabs after launching) and a left-right pattern (hence no more high-speed zoom and a steeper angle of attack on the cruise).

"The glide circle is achieved

DARNED GOOD AIRFOIL: LA-01489

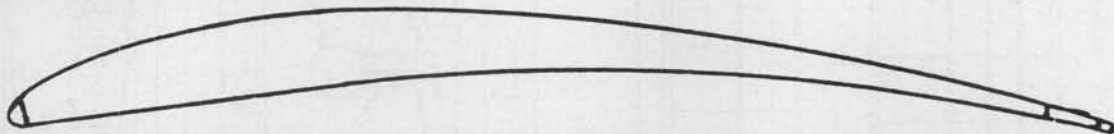
Lizyura is a Russian Nordic (F1A) flier, and his models are state-of-the-art for the USSR in this event. The airfoil used on his wings is the one featured this month and comes from the very excellent French publication, *Vol Libre*. For your information, the construction of the airfoil features carbon fiber on the top and bottom cambers of the ribs at the wing joiner locations. Lizyura uses a single steel wire at the center.

As you look over the section, you will notice the trailing edge droop or "hook." This feature

makes for an excellent gliding section, but one that tends not to behave well in the zoom phase of circle tow launch. I have no performance figures for Lizyura's section.

The original wing is constructed with straight, non-geodetic ribs, using a D-Box at the front 30% of the airfoil. The wing is a straight taper at both the leading and trailing edges. The tips are swept from the front. Lizyura uses a variable incidence stabilizer to control the tow, zoom and glide phases of the flight.

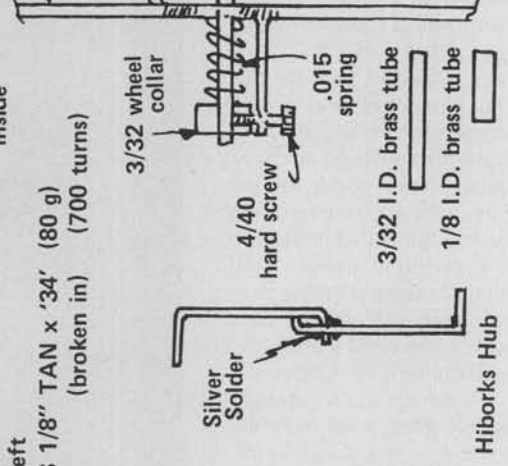
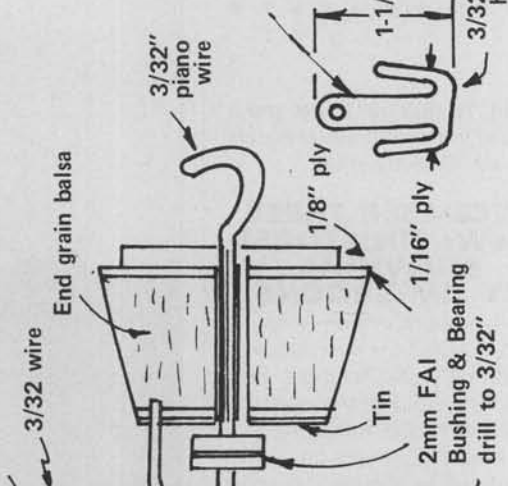
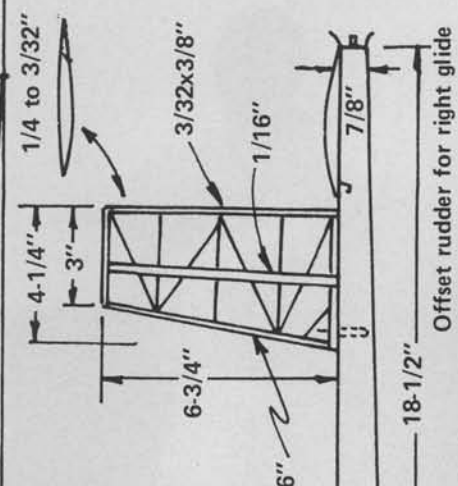
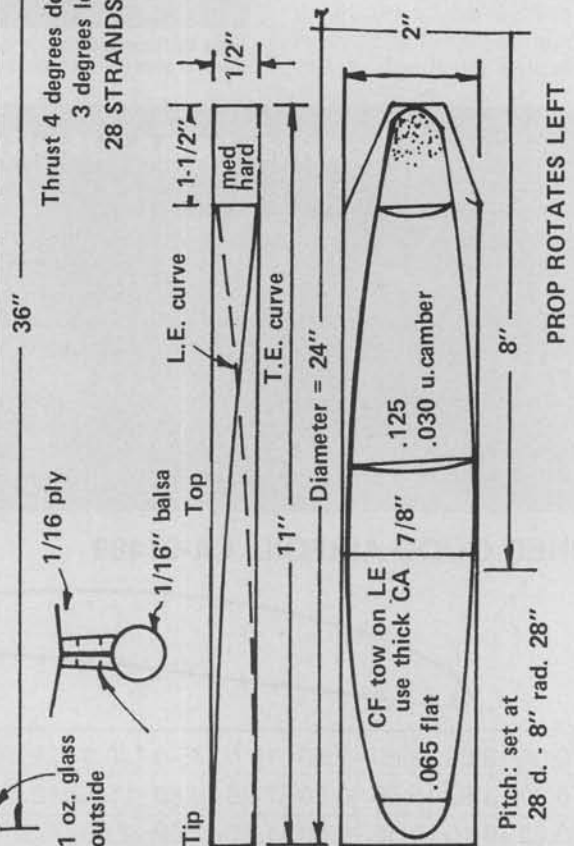
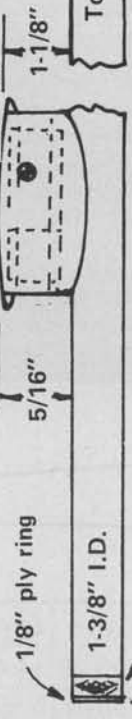
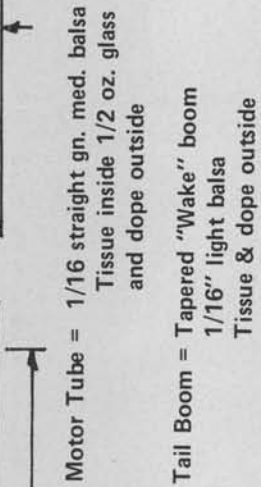
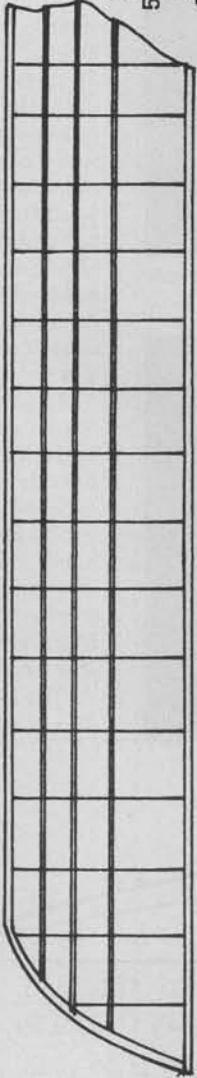
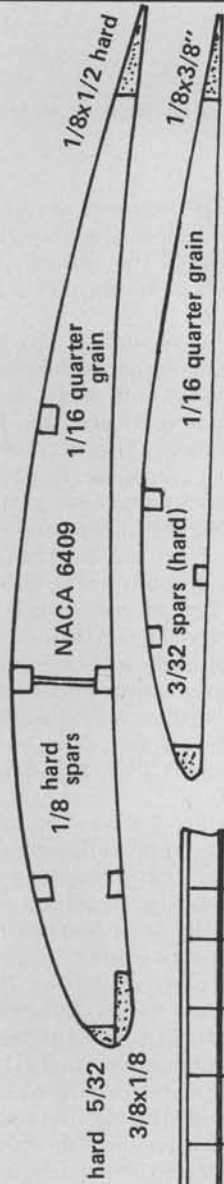
DARNED GOOD AIRFOIL: LA-01489



STA	0.00	2.50	5.00	7.50	10.0	15.0	20.0	25.0	30.0	40.0	50.0	60.0	70.0	85.0	100.	115.	130.	145.	150.
UPR	0.80	3.92	5.55	6.80	7.99	9.80	11.23	12.4	13.29	14.4	14.95	14.9	14.6	13.45	11.63	9.26	6.10	2.40	0.70
LWR	0.80	0.15	0.50	0.90	1.26	2.00	2.66	3.37	4.10	5.55	6.80	7.70	8.20	8.35	7.55	6.07	3.23	1.00	0.00

SINISTORSE MULVIHILL
by Jim Brooks

1/4"-washout Both Tips Washin - left
Flat - right



FREE FLIGHT

by deflecting the rudder for right turn. The power burst is controlled by minute left thrust adjustments, at around three degrees left, and a small amount of washin on the left inner wing panel. On my Wakefield design, I discovered that the difference between a steep, rolling climb in the burst, followed by a steep cruise or a zoom or crash, is less than 1/4-turn of a 2-56 screw controlling left thrust. I adjust downthrust approximately four degrees to maintain a steep cruise, and keep the CG at 70%, adjusting stab incidence to obtain a flat glide.

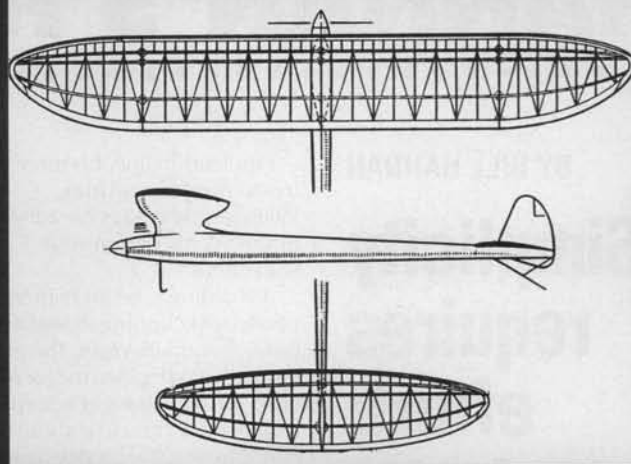
"Fiddling about with these adjustments should produce a model which will climb almost vertically left with one and a half right rolls during the burst, then downshifting into a high angle-of-attack steeply climb-

ing left cruise.

"Glide is adjusted to wide right turns. The washin on the left wing will tighten the glide in a thermal, but will not produce a spin unless the turn is initially too tight. The tip washout improves stability.

"I used 80 grams of rubber . . . two Wakefield motors double length, and I haven't experimented with more power, so far. The prop is simply carved from 1/2-inch sheet, set at 28 degrees at an 8-inch radius, producing a non-helix with plenty of tip washout. It seems to get the model to above average height.

"The noseblock and hub are based on the Hiborks hub. As I am terrible at building anything out of metal at close tolerances, this hub design allows me to produce a light, positive, easy-



DECEMBER MYSTERY MODEL

I have this vague recollection that once before, in this column, I featured this model (*Right! wcn*); however, I cannot find a record that such is the case. So, with that little confession out of the way, I would like to present to you this British FAI Power model (as they were called back then). This ship actually won first place in the event in 1955. You now have enough clues to be able to identify the model. With all of that in mind, what was the name given to the ship? If you know that answer, you should send your best guess in to Bill Northrop, c/o *Model Builder* magazine. Your name and answer will be placed in the proverbial hat, along with all of the others with the correct answer. If your name is drawn out, you win a free subscription to *Model Builder*. Easy, huh? Now, what is the name of that ship?



to-build unit with materials available at any hobby shop.

"Although there's no claim that this is an early morning winner, the design should be competitive at anybody's Mulvi or Open Rubber contest. So far, in its first two contests, Sinistorse has a first at Camp Borden, Canada, with three maxes and a second at the US Nats with nine maxes for 39 minutes total.

"The next version will contain a direction location transmitter. Without a radio beacon, I was unable to return in time to attempt the nine-minute max at Lawrenceville before the thunderstorm hit. The next version will also go on a diet. At 125 grams without rubber, a five-minute max without lift may be pushing it.

"It might be worthwhile to experiment with the wing . . . changing from an NACA 6409 to something thinner and with

greater aspect ratio; however, the present design is easy to trim and is stable.

"For those of you who suffer from a right-handed disability, reverse almost everything I just said."

Well, there you have it. A nice straightforward Mulvihill for your consideration. Here in the northwest, Phil Hainer has maintained for many, many years that it is better to fly Mulvihill models to the left, under power, and he has several designs that do so. Phil, however, does not change the direction of the prop rotation, as is the case with Sinistorse. Build one for yourself and do some experimenting. If you are considering using a thinner airfoil section, may I suggest just using a thinner version of the 6409, such as the NACA 6407.5.

NOSTALGIA RULES

Recently, I noted that the new and complete set of nostalgia rules are off the press and available for your purchase. Unfortunately, I misquoted the price. So, if you are looking for the

continued on page 92

George Moul is the 1991 winner of the Fellowship of O.C.'s Vernon Challenge. This secret group annually stages a Mulvihill competition for its members only. Winner takes the trophy, complete with a full bottle of Silk Tassel or equivalent.

HANNAN'S HANGAR

BY BILL HANNAN

“Simplicity requires effort; complexity is a snap”

Our lead-in line this month is from model builder, Clive Wienker, who says he adheres to this as his design motto . . . sometimes!

According to a San Francisco newspaper clipping shared with us by George Benson, the government has decided the Moffett Field dirigible hangar is surplus to requirements. How about the AMA buying it for a permanent indoor model site?

AIRPORT DECOR

Comet Model Airplane & Supply Company founder Bill Bishop reported that earlier this year the San Francisco airport

featured a display of childhood memorabilia, and among the nostalgic toys were some stick and tissue model airplanes. Do any of you know which ones?

AT ANOTHER AIRPORT LOCATION

Model builder Jim Poche, of River Ridge, Louisiana, attended ceremonies honoring the memory of Jimmy Wedell, Harry Williams and the Wedell-Williams airport site. During 1931, the Wedell-Williams team fielded a fine and effective group of air racers, which placed second, third and fourth in the Thompson Trophy race. Additionally they operated some 40 aircraft in their general aviation business, which included a flight training school and an airmail route, which eventually became part of Eddie Rickenbacker's Eastern Airlines. Presently the Wedell-Williams Museum is the only

Rare 1911 cast-metal Bleriot toy spans less than three inches, and is believed to have been sold as a souvenir during early aero meets.

state-owned aviation museum in this country.

SAVE THOSE TOY AIRCRAFT!

Antique toys, especially the metal variety, continue to escalate in value, or at least in price. Most desirable, of course, are well-preserved originals. However, as these items were intended to be playthings, perfect examples are rather scarce and

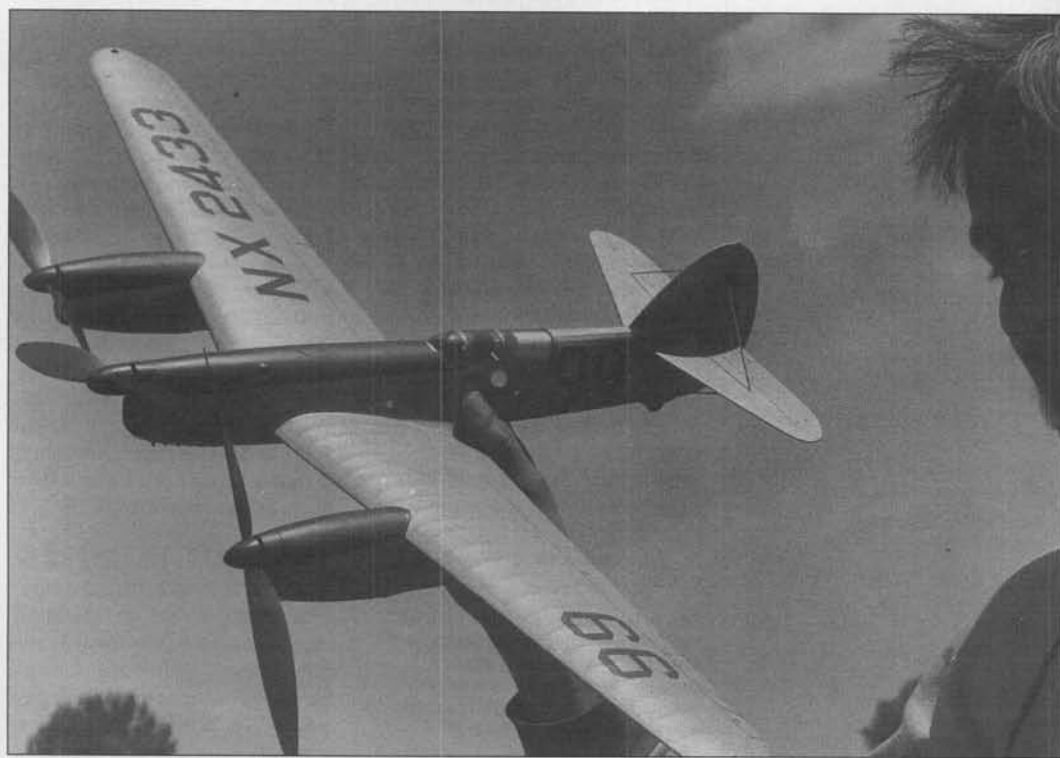
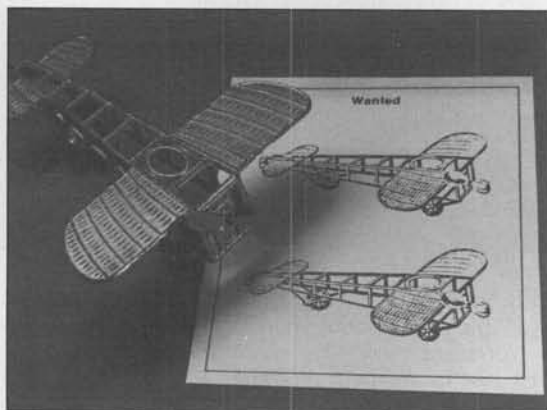
if the primary appeal is personal pleasure, restoration may be a acceptable approach to creating a charming display piece.

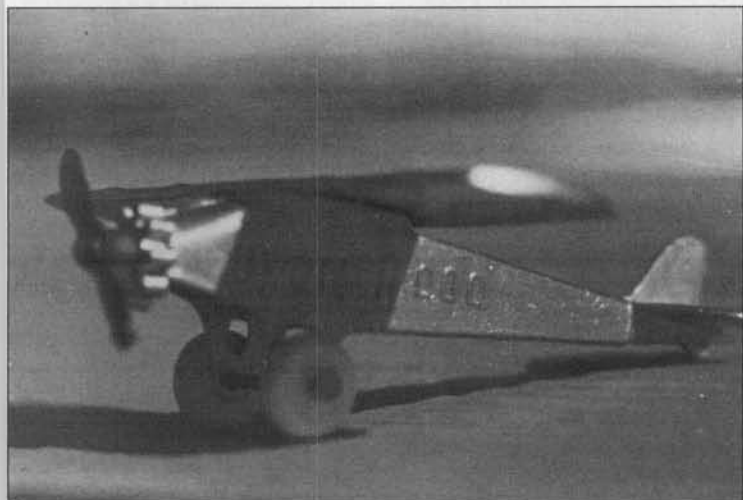
very expensive. Others, in more plentiful supply, may be damaged or have missing parts. While purist collectors caution that restoration could decrease a toy's value, if the primary appeal is personal pleasure, rather than as an investment, restoration may be a perfectly acceptable approach to creating a charming display piece. And who could be better qualified to do such work than experienced model builders?

The little cast-metal Bleriot shown in our photo was brought to the Hangar by Merl Olmsted, and is thought to date back to 1911. Such toys were manufactured in France, but may also have been made or distributed in the United States by Calumet Manufacturing Company of New York. The Bleriot was in nearly mint-condition, lacking only a propeller, so restoration involved only the making of a replacement Chauviere airscrew, plus installation of a bearing and shaft to permit it to revolve freely.

The second example pictured is a Tootsietoy 11X 214, possibly from the late 1920s or early 1930s. Now in Bill Warner's

Engineer Paul Strenik with his impressive rubber-powered Bellanca Trimotored racer. Photo by Lubomir Koutny.





Tootsietoy 11X 214, as restored by Bill Warner. More details in story.

extensive toy collection, the aircraft was badly in need of repair and refurbishment when received. Bill describes its rehabilitation: "Restored the little Tootsietoy Mono by disassembling the wing from the die-cast fuselage; wire-brushing and filling rust pits with primer coats, before painting and re-assembling. A missing wheel was duplicated in wood by turning on a drill press. A new propeller was cast from epoxy in a plasticine mold, using the intact blade as a pattern. It is a cute toy now, and half the fun is fixing 'em up. I have also recently redone an abominable 1937 Lincoln Zephyr Taxi imitation (Chinese cast-iron) with much grinding, filling, turning of wheels on the lathe, etc. It's acceptable to me now, although a serious collector would be appalled. But what the heck... how can you ruin an imitation?"

We agree, and advise readers to stay on the alert for old metal toy aircraft at garage sales, swap-meets and flea markets. Whether restored or not, they make delightful conversation pieces and nostalgic reminders of our youthful years.

ONE OR TWO WINGS?

Georges Chaulet, of France, notes the continuing monoplane

Barry Roth's unusually clean and organized work area, with Albatros D II Peanut underway.

versus biplane preference discussions among model builders, and says: "... after all, birds are not biplanes!" To which we can only reply, why not build both kinds?

Vern McIntosh sent in a model

Just one corner of Gil Caughlin's marvelous model workshop. Note engines on wall, scale model in progress, etc. On opposite side of room is a miniature lathe, milling machine and disc sander mounted on turntables, permitting easy rotation to front of workbench.

kit advertisement from a 1933 Universal Model Airplane News: "After considerable experimenting, we have found that flying models must have a wing span of at least 15 inches to assure ease of construction and good flights. All Star (brand) models conform to this requirement."

So much for Peanuts and Pistachios...

DARE WE PRINT THIS?

From the Glastonbury, Massachusetts, "Airflow" newsletter, expertly and entertainingly edited by Vance Gilbert, we extracted a few lines from an article written by Mrs. Barbara Tanner Wallace, entitled "A Truce in the Battle Over Modeling."

Like many modeler's wives,



HANNAN'S HANGAR



Barbara experienced the aggravation of her husband's hobby interfering with domestic bliss, having such complaints as feeling like a widow when he is immersed in his shop for long hours; attending contests in far-away places, and maybe worse, being drafted to hold his model airplanes for winding when he does take her along. "When you marry a modeler, you are a stooge for life."

Barbara's patience finally expired when her husband, Pete, announced that he would be attending the Flying Aces Contest in Geneseo without her, **on her birthday!** Needless to say, marriage relations became severely strained, and Pete took to locking his workshop door at night, for fear its contents might

Ruby, Major Lindsey Smith's cat, learning to wind a Sopwith Triplane in England!

STRATEGIC DETAIL INITIATIVES

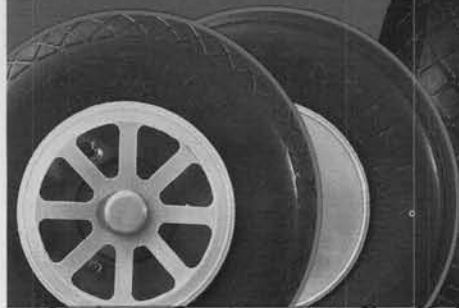
SUPER DETAILED STRUTS AND HIGH PERFORMANCE AIRCRAFT WHEELS AND TIRES FROM ROBERT PUT YOUR MODEL IN TOP GUN FORM!

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For more fun detailing ideas, send a SASE to Robert.



Reach for
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somehow be endangered. Oddly enough, Barbara gives Pete credit for thinking up a suitable form of appeasement, which served to relieve her pent-up frustration and hostility: Carefully selecting an old Peanut Scale model which did not fly properly anyhow, he gave it to Barbara, saying: "This is for you, I know how much you've wanted to smash my planes this week, so here's your chance to do it."

Wrote Barbara: "That gesture, that sweet little gesture, was almost enough to make me forget my anger, and send him to Geneseo with my blessings. Naturally, when faced with that gesture, there was only one thing I could do. And as I tore that plane apart, feeling the balsa wood snap between my fingers and falling gently into the waste basket, I smiled. A feeling of peace settled over me. 'Let him go to Geneseo,' I thought to myself, snapping the tail piece in two, 'we're even now.' It was as simple as that. Okay, to be honest, the look of horror on my husband's face while I destroyed his plane helped speed along my feelings of peace and understanding.

"Over time, a mutually satisfying arrangement has developed in our now happy home. Whenever my husband has a plane that's beyond repair, or warped, or just not up to his standards of design, he gives it to me to store in a special place.

"Then, the next time he's late for a dinner party or spills dope on the den rug, I don't lose my temper. I simply rip the wings off one of those little suckers, and turn it into dust.

"So, modelers, here's my advice to you. The next time your hobby gets out-of-hand, give your spouses, girlfriends, etc., one of your planes to do with as they wish. I guarantee it will make them feel better and give you a few more hours of uninterrupted quality-time with the planes you love so much. As for me, my husband's planning to go to Geneseo again this year (yes, on my birthday) and I've already got my plans for the weekend. It's red and yellow, and my husband told me last week that he just couldn't get it to fly right."

THOUGHTS FOR THE DAY

"One of the things that is so priceless about being an aviation nut is the far-flung friendships one makes with kindred souls. That seems to come under the 'Quality of life' thing that politicians like to spout about . . . but ignore when it comes to fostering grassroots aviation.

"Well, Bob, perhaps the famous science fiction writer, Ray Bradbury, explained it best: "The trouble with politicians is that's all they are."

MARK TWAIN II?

Practically every eulogy to the late Johnny Clemens has mentioned his remarkable sense of humor. Perhaps he came by it naturally, because, according to Bill Bishop, Johnny's boss at Comet Model Airplane & Supply

And as I tore that plane apart, feeling the balsa wood snap between my fingers and falling into the waste basket, I smiled.

Company during the 1930s, Clemens was a relative of Samuel (Mark Twain) Clemens!

Dick Johnson shared his feelings about Johnny's funeral service, describing the upbeat ceremony as "a going-away exercise," and said that John Worth, Joanne Hughes (Johnny's lovely daughter), and Pancho Morris, right-hand man at Johnny's Dallas, Texas hobby store, all spoke in cheerful ways . . . "I cannot remember when I heard laughter in a chapel before."

STEALTH PEANUT

Retired airline Captain Ed Toner noted that he has recently developed a Stealth Peanut. Regretfully, it did not show up well in the photo he sent, although his beautiful daughters displaying it certainly did!

At any rate, it employs the latest rubber-powered ducted fan technology, based upon the work of M. Fillon, Hewitt Phillips, and David Aronstein, but incorporating an afterburner thrust augments.

Ed explains: "At first I had a problem with it leaving a shadow on sunny days, but I corrected that by using a celluloid structure and saran-wrap covering. Now the only thing visible is the dethermalizer fuse, which, of course, leaves a realistic smoke trail, like the real thing."

ON THE INTERNATIONAL SCENE

Although the results are not yet in for any of the three major overseas international free flight scale contests, we have an advance report from Shoichi Uchida that the Nagoya, Japan Proxy Peanut contest has attracted entries from Australia and Israel, as well as the United States.

And from England, Reg Boor noted that Interscale '91 expected entries from Australia, Czechoslovakia, France, Latvia, the Netherlands, New Zealand, Russia, Sweden and the USA. We think this international cooperation is marvelous!

SIGN-OFF TIME

"The reasonable man adapts himself to the world; the unreasonable one persists in trying to adapt the world to himself. Therefore, all progress depends upon the reasonable man." Adapted from the *Journal of Irreproducible Results*, via Bill Kincheloe. **MB**

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Soldering Tools



Model 1210



Model 910



Model 300



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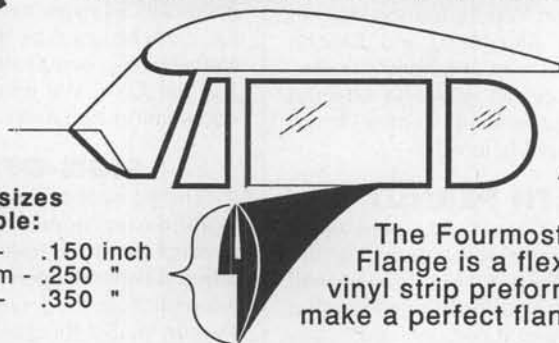
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SPARKS continued from page 27

junction with Earl Vivell. It is not definitely known how much Keener had to do with the Madewell 49 but the Keener influence can be easily seen.

Next month, we will present the 19 version, which differs only slightly from the 23.

FIFTY YEARS AGO, I WAS...

Latest letter from former newsletter editor of SAM 41, the San Diego Aeroneers, Jim Alaback, included Photo No. 6 of a Mk. 1 Comet Clipper, vintage 1938. Jim says the model was built for free flight, from the original plans, and kept as authentic as possible. The model is powered with an original Brown Jr., Model D, using a pre-WW II Comet "Air Speed" 14-inch propeller. The engine is shut off via an Austin-Craft pneumatic flight timer. Covering is silk (what else?) with clear dope finish with some color trim. The only thing that can be considered modern on the model is a dethermalizer, well hidden under the fuselage.

As Jim says, "During the time I was building this 1938 kit, won at a meet and finally built in 1941, I suddenly realized that it was 50 years later! Of course, pylons were the thing then (1941) so I built the Clipper as a sport model with Comet 35 power. This new Clipper will follow the same trend; a sport/fun model that I will display at the Jean, Nevada SAM Champs."

MODEL OF THE MONTH

This month, we are pleased to present the plans and the history of the development of the V.G. Racer as so successfully used by Virgil Clark and Granger Williams.

With control line racing becoming so popular in 1949, and the big speed annual coming up in Long Beach, the pair built racers. Granger had two in the general lines of the Keith Ryder powered with Atwood Champion and Hornet engines for the Class C event. Virgil Clark built a modified Jim Walker Fireball kit using an Atwood Torpedo 29 for Class A and a scale ME-109 for the Class B event employing a Bunch 45 engine.

At that time, the contestant was allowed to re-enter. Granger and Clark cleaned up; Williams taking first and second in Class C, and Virgil Clark winning both Class A and B.

Encouraged by the results, Granger built a smaller version of the Ryder design using a Torpedo 29 for the Class A event. This model formed the basis for the V.G. Racer kitted by Modelcraft. Barney Snyder changed the original name of "William & Clark Special," feeling this name was too long.

Williams now decided to modify the V.G. models and install Hornet 60 engines. Wings were increased in area with less taper. The firewall was changed to accommodate radial mounting of the Hornet engine. Among the lightening features was cutting off all heavy parts of the crankcase, including the

mounting lugs, turning the head and cooling fins to a smaller diameter, drilling a hole in the crankshaft, and substituting a disk of magnesium. Four ounces were saved!

Virgil painted the airplanes, one in red, one blue, and one white. All three flew alike. Performance was constantly being refined with various pitch and shape propellers.

Entered in the next meet as Williams and Clark Specials, the models proved their worth by claiming speeds of 112 mph (Williams) and 110 mph (Clark). The Torpedo powered version won Class A at 99 mph! About this time, Granger figured that if a Torpedo 29 could closely approach the performance of a McCoy 60, two Torpedos would be better. This resulted in a twin fuselage model that did 106 mph. Shades of the North American Twin Mustang!

With constant experimenting going on, speeds of 120 mph were attained. Hoping for even better performance, the models were painted, waxed, and engines tuned. The models justified all the work but alas, during one flight, after several laps, the up-line parted at the handle, causing a dive into the ground with total disintegration. This was the first time they failed to check the lines. A lesson learned the hard way, especially when the second model could do no better than 112 mph for second.

A new model for standard Hornet engines was built by Granger, but the call of military service put an end to that. However, at a later date we will be pleased to present three-view drawings of the model called the "Speed King" built in October of 1946. Of particular note is that all speeds were attained using spark ignition.

50TH ANNUAL WAKEFIELD REVISITED

Stu Bennett, one of the early Oakland Cloud Duster founders, sent in Photo No. 7 that he had found in his old files. It shows Bernarr McFadden, famed publisher, examining Dick Korda's winning Wakefield model at Bendix, New Jersey, after Korda's sensational flight of 43 minutes, 29 seconds. Nat Polk (of Polk Bros., NY) is holding the highly coveted Wakefield Trophy, put up by Lord Wakefield of Hythe, back in 1928. Dick Korda is on the right.

McFadden was a well-known health fanatic and body exerciser. He published several popular magazines (including the early issues of *Model Airplane News*). At this time, McFadden was the oldest licensed pilot in the United States. Talk about keeping fit, he not only preached health but participated in it!

The winning Wakefield model almost didn't pass the processing when it was measured at one or two square inches oversize in wing area. This was quickly solved by Dick Korda, by trimming 1/16 of an inch off the trailing edge. This did not affect the performance one whit!

Returning to the photo, seen on the right is Al Casano, along with Bill Winter, who

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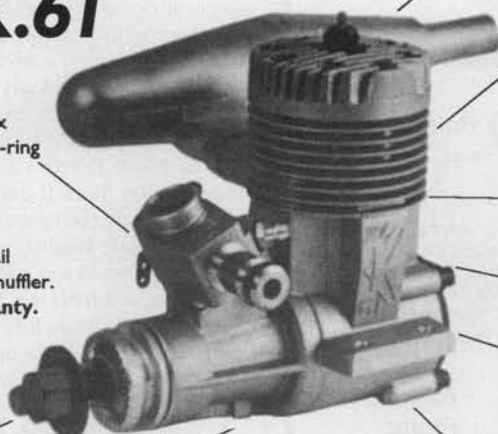
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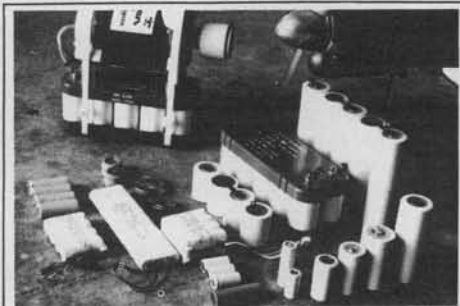
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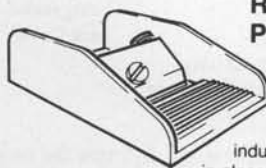
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were the timers who clocked the winning flight on August 6, 1939. The photo originally came from Teen Becksted, noted model flyer, who has resided in Hayward, California, for the last twenty years.

Korda's model, kitted by Megow, turned out to be an extremely successful rubber-powered model kit. Even to this day, the Korda Wakefield will give a good accounting of itself. Korda's interest in modeling waned after WW II and eventually he got into full-scale soaring gliders. Of late, Dick has had some health problems, but apparently has recovered to the point where he was able to attend the SAM 39 Lanzo Memorial Contest in July. Korda is seen in Photo No. 8. Outside of some gray hair, he compares favorably with the prior photo.

SAM 39 LANZO MEMORIAL CONTEST

The foregoing paragraphs on Dick Korda are a natural lead-in for the Lanzo Memorial Contest put on by Chet's fellow club members, SAM 39.

We are indebted to Bucky Walter, who sent in the write-up, results, and photos of this meet taken by Bob Redinger. Bucky reports the weather couldn't have been better on those two days. He credits the late Buck Zehr, who always tried to arrange for good weather. This brought out 39 contestants from seven states. It was interesting to note in the results that each state had a first place winner in at least one of the events.

With such a good crowd, Photo No. 9 shows what a great day it was for flying. Joe Elgin is holding what looks like a Bleriot for the 1/2A Texaco Scale event. (Eight entries . . . it's catching on!)

One of the highlights of this meet was the initial flight of Chet Lanzo's R/C'er. Erroneously called the Racer, it is anything but that, as Photo No. 10 shows the very shallow climb out. Chet built a 12-foot model and crashed it before the RC Event at the 1936 Nats. Bucky completed rebuilding the original model and took the first flight of the day in honor of Chet. As Bucky says, it casts a big shadow!

An interesting fly-off developed in Class C Ignition with all three contestants (Davidson, Mulholland, and Jenkins) flying Playboys. Joe Elgin timed winner Larry Davidson, but only by two seconds over Fred Mulholland!

Among the rare models on the field was the design of Walter Eggert called the "Chief." This was scheduled to be kitted by Megow (for whom Walt worked), but the upcoming Ranger and other hot performing models precluded issuing a large model. Walt Geary was responsible for building the model shown in Photo No. 11. The design resembles a Soaring Eagle very closely except for the gull type wings. Another pretty design by Eggert.

Probably the best part of this meet was the use of the private airport owned by Cleland J. Wingart. Bucky says the meet was such a success, SAM 39 will make this meet an annual affair. Be there!

FUN STUFF

Everyone knows how the Italians get very serious about attention to detail on their models and flying style, and Art Watkins submitted Photo No. 12 from the Italian SAM Chapter. This is strictly a "gag" shot as the boys are intent on retrieving an FAI model at the 1958 World Championships. As can be seen, Frank Zaic is pointing the way to the driver, Pegurari Voluemo. This old car needs all the help it can get, hence the "manual" starter in the rear!

READERS WRITE

Received a most interesting photo from Sal Taibi (Photo No. 13) showing Sal with three sizes of his Brooklyn Dodger. Noted on the left side is a six-foot version using an Orwick 64 for power, a four-footer originally designed for an Ohlsson 23, while the smallest one features Cox .010 power.

Sal states the six-foot and four-foot versions have recently been approved as Old Timers by the SAM Board of Directors. As a matter of interest, Dick Drake built the six-foot and .010 versions, while Taibi produced the four-foot model for sport flying with a Cox Babe Bee .049. The photo was taken at Mile Square Park in Fountain Valley, California.

OBIT NOTICES

We are a little slow in acknowledging the passing of Barnett Kernoff in June. Barnett originally hailed from Pennsylvania, where he ran a silk weaving plant. He will be remembered by eastern modelers for his interest in rubber powered models.

The loss of "Barney" (he hated that name) is a loss to his Tyro Model Co., which produced excellent kits of the Playboy Senior and Bay Ridge Mike. Excellently thought out, these models were winners for many years.

Failing health due to respiratory problems forced Barnett to abandon the kit business. Members of SAM 21, to which he belonged, will remember his accomplishments fondly.

Was recently talking with Frank Womack of SAM 21 about Old Timer modelers and what some were doing, when he inquired if I knew Harley Elmore in Phoenix, Arizona, who was doing a lot of airframe and engine work for EAA members. Regretfully, it was revealed that Harley had died in the first days of August. Elmore (who was affectionately called "Hardly Anymore") was the first secretary-treasurer of the fledgling SAM Old Timer organization. At that time, Harley resided in Aurora, Colorado, and was quite close to the Colfax Airport where the SAM Champs were held.

After his beloved wife died, shortly after the third or fourth SAM Champs, Harley lost interest in modeling. Eventually, he drifted to Arizona where he became an engine specialist. We are going to miss those corny jokes he used to tell. In some respects he was quite similar to Johnny Clemens when it came to after-dinner speeches. I can still hear the corn popping in the aisles! **MB**



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HEATH MIDWING 1/2A RC

BY STUART WARNER

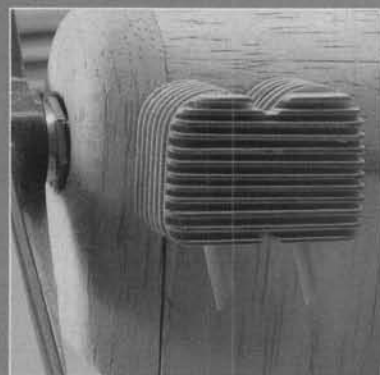


Susan Murphy, holding Stuart's Heath Midwing, with the sun setting on Lake Erie and a flock of sailboats.

As is the case with many scratch-built models, this one was the result of a search for an out-of-the-ordinary and obscure aircraft . . . to use for our local SAM 1/2A Texaco scale event. The basis for this model was the 1937 Peerless rubber model plan. The original aircraft was built in 1933 as a raceplane powered by an A-40 Continental engine. Its similarity to the more famous Heath Parasol is quite evident as the shape of the wing trailing edge is a dead giveaway. The more publicized Church Midwing is actually a well modified Heath Midwing. For those of you wanting to do more research, the original plane was granted ATC 495.

The first step in this project is to study the plans. You will note that the wood grain has been shown to indicate the different types of wood. These woods may be easily substituted to suit your building style or whatever is in your building box. The wing tips and stabilizer outlines just cry out to be laminated.

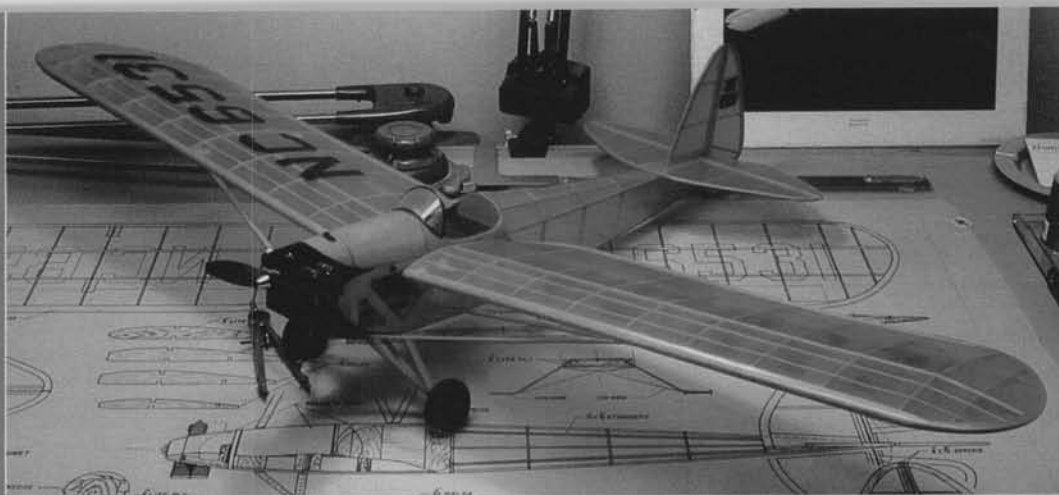
This is the direction I went, but built-up sections will work just as well. I have indicated both on the plans. If you have not as yet discovered See-Temp, now would be a great time to try some. I have become dependant on this material for every step of the construction. As construction



Built-up scale engine cylinders. Stuart is obviously a glutton for punishment, but its beautiful work!

progresses, I will try to give some of my scratch building tips and show how to build some special tools. So let's begin!

I generally begin with the fuselage and right away is my first use for the See-Temp pattern material. Note that the primary structure of the fuselage is made of 1/8-inch or 3mm Lite Ply. Use a utility type knife and score the See-Temp to make a pattern for the



The completed Half-A RC Scale Heath Midwing resting on the plans from which it sprung . . . sprang . . . flew!

fuselage sides. The utility knife has a very stiff blade, allowing you to trace the curved outlines from the plans freehand. A metal straightedge is used to assist for tracing the straight sections. Using a #11 type of knife will lead to problems because the blade flexes and will wander from the pattern or straightedge. The patterns can be dressed up with sandpaper to get to the desired finished shape. The round inside corners can be final shaped with sandpaper wrapped over a dowel.

For straight lines, I find that it is easier to use a utility knife and a metal straightedge than it is to use a jig saw for thin plywood. Build two identical sides with the 1/8-inch balsa nosepiece forward of the firewall attached to the Lite Ply. Once the two sides are completed, the cross pieces can be cut to length and the fuselage box completed over the top view of the plan. Note that the firewall has down-thrust planned in. Just glue the firewall between the fuselage sides using the forward edge of the Lite Ply as a guide. The cockpit floor is made of both balsa and Lite Ply. The Lite Ply of the cockpit floor will form the top of the wing spar box.

Once the cockpit floor is in place, finish the wing spar boxes,

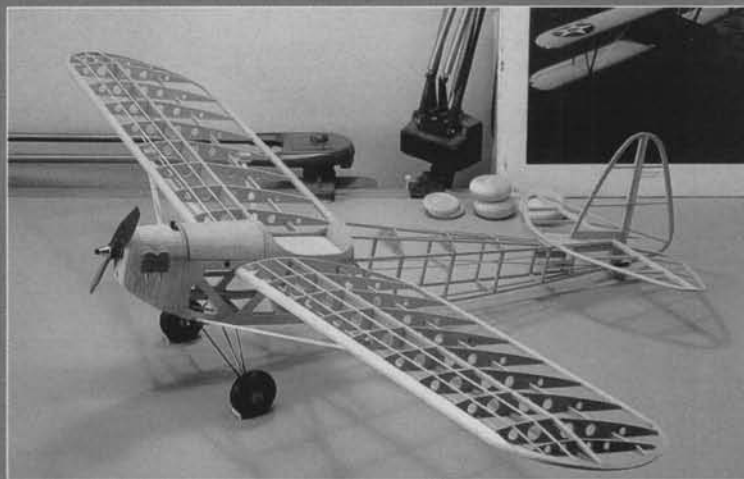
I would recommend that if you are going to use flexible pushrods that you install them now, because from here on the fuselage gets a little cramped to work inside. I prefer to use Sullivan's small cable pushrods. I substitute 1/32 wire for the cable and the installation is almost invisible.

The turtledeck and fuselage bottom formers can now be added. Before the stringers can be added to the bottom, the main landing gear mount and .078 wire has to be installed. The forward .031 brace wire is added after the main landing gear is installed. This wire is attached to the fuselage bottom by gluing it into a slot cut in the Lite Ply bottom piece. The forward brace and cross brace wires can now be soldered to the main landing gear wire. Because I like Trexler wheels on my oldtimer, I made a special axle by soldering a brass tube over the main wire. The tube should be at least 3/32 longer than the axle wire. A hole can then be drilled through the tube, top to bottom, so that a cotter pin can be used to secure the wheel on the axle. I used the cotter pins from the large DuBro hinges which can be purchased separately in packages. The true scale wheel size is close to 1-1/8", but I felt that this was too small for

flying and landing on grass.

The top and bottom of the last bay of the tail are both filled in with sheet. The cockpit rim, hatch and forward nose section are carved from soft balsa block.

The firewall is made from Lite Ply. The back side, where the



The Heath before being dressed in its cloak of orange silk and many, many thinned coats of clear dope. Trexler wheels.

engine blind nuts will mount, is reinforced with 1/32 ply. The engine mounts on a 3/32 ply thrust wedge sanded to give two degrees of right thrust. Again, this is an excellent place to use the See-Temp for the pattern making. With the hard pattern created by the See-Temp you can cut the Lite Ply pieces without the use of a jig saw and only a utility knife. The Cox Texaco .049 can now be blind nutted in place. One nice thing about this installation, no needle valve extension is required. The nose block can be shaped to fit over the engine. The dummy engine can now be fabricated. I made mine from layers of 1/16 balsa.

No those aren't alternate sheet tail surfaces. They're 3/8-inch plywood forms around which the laminated balsa outlines are bent.

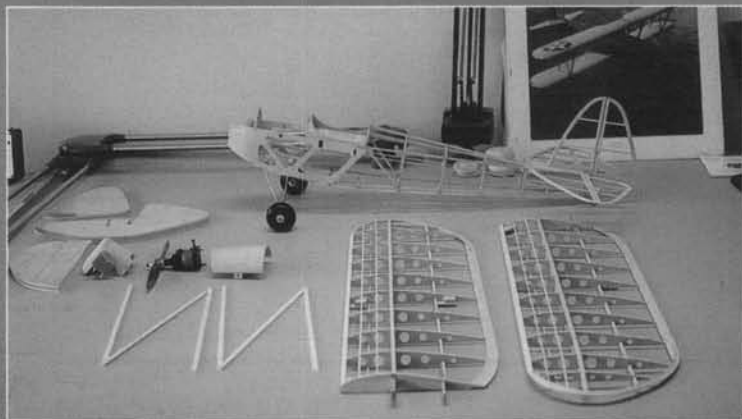
The head fins were made from 1/32 plywood strips spaced 1/32 apart. These were then sanded to shape. I attached my dummy cylinders to the top half of the removable cowl. Note that the top half and front of the cowl are glued together as one piece.

If you intend to laminate the tail outlines and wing tips, you should have the 1/16 strips soaking. I cut my laminating patterns from a piece of 3/8-inch plywood. This is inexpensive and can be purchased in 12 x 24-inch sheets at most DIY type stores. The pattern can be cut to the size of the inside of the outline shown on the plans.

Again, I used See-Temp to transfer the pattern from the plan to the wood. Once the pattern is

cut, nail it to a slightly larger piece of wood for a backer. I usually place a piece of wax paper or plastic wrap between the pattern and the backer. This will help when the laminations are finally glued together to keep them from sticking to the pattern or backer.

Another trick is to use plastic electrical tape stretched around the perimeter of the pattern to keep the laminations from sticking to the pattern. It is "quick and dirty," but it works great. I generally soak the strips for 48 hours maximum. Once the strips are pliable enough, they can be bent around the pattern. They can be held in place by small wood blocks nailed into the backer board. This should be left for at least 48 hours, or until the wood is almost completely



dry. The laminations can now be carefully removed from the form, glued together with a white glue and placed back on the form to dry. If you try to glue the laminations together while they are too wet, the glue will not bond well, thus the reason for letting the assembly dry first. It will take at least 48 hours for the glue to set. While this is a very drawn out process, the results are well worth it. The result is a very strong and thin outline.

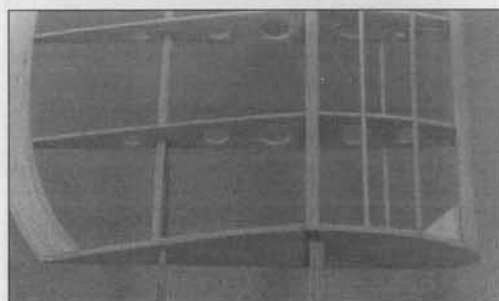
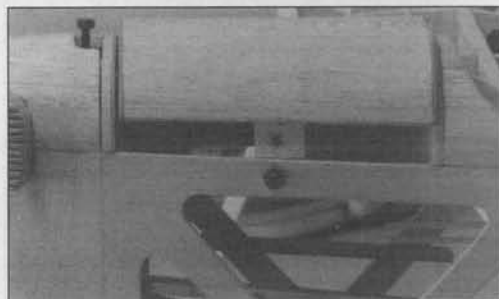
If you wish, you can build up the surfaces, using the patterns furnished. The strips closest to the hinge lines are spruce. This adds some strength to the thin tail surfaces and provides some meat to set the hinges into. The spruce is backed up with a strip of balsa to give some surface to fasten the covering to. Note that the rudder post goes full length, and extends to the bottom of the fuselage. These surfaces can be hinged with your favorite flavor of hinges. I find the small, flat type with the removable pin the easiest to install and use because the surfaces can be covered and then assembled. Once these surfaces are finished and covered they can be installed on the fuselage.

The wing is of conventional construction. If you desire to laminate the tips, use the same procedure as used for the tail. The only difference is that the strips used should be 1/16 x 1/2. The root rib (#1) should be made of Lite Ply, particularly if the wing is to be removable. All other ribs are of light 1/16 balsa. The #2 rib is a #3 rib cut shorter at the trailing edge and sanded to fit the 3/16 x 1/2, pre-shaped trailing edge. The spars should be cut and tapered to the tip from where they cross #4 rib. If the bottom, rear spar is sufficiently tapered, the depth of the bottom slots in rib #5 could be cut shallower. The dihedral joint/wing joiners are made from 1/8 plywood. The forward joiner is doubled for strength. Note the step cut in the top of the forward joiner. This must be done so that the wing will fit into the spar box correctly. The wing is sheer webbed with vertical grain 1/16 sheet out to where the struts are attached. As before, the See-Temp proved to be very valuable for transferring the patterns from the plan to the wood.

The struts are made from 1/4 x 3/32 spruce for strength. If you use balsa, you will be constantly replacing them. I reinforced the top side of the "N" joints with 1/2 oz. fiberglass cloth. Because the wings on my model are removable, the struts take a lot of abuse. I used modified small Robart flat hinges to mount my struts, although I understand they are no longer made. If you can find some, they are great. Cut the hinge in half. Pull it apart and affix the one half to the strut mounting point, and the other half to the strut. This makes a neat pop-off mounting. A similar mounting point can be made by cutting a conventional, loose-pin hinge apart and mounting it the same way.

Covering can now be completed on the airframe. I chose to use Japanese silk, but any conventional covering can be used. The original plane was overall orange with a black nose trim and registration numbers. See-Temp...one more time! When making the pattern for the registration numbers, just place a piece of See-Temp pattern material over the plans and scribe the pattern onto the material. The resulting pattern can be used to cut the numbers out of covering material or to cut a masking pattern for painting. The pattern can also be used to locate the lettering in the correct location on the wing. The same technique can be used to trim the nose. Chartpak ITC MACHINE 60PT./M15560C rub-on transfer lettering is so close to the original tail registration lettering that "only its mother would know the difference."

The guidance machinery may now be installed. I used Futaba S-133 micro servos along with a micro 2-channel receiver and a 250 milliamp battery. The servos should be placed at the rear of the hatch area. The battery pack is fastened to the rear of the firewall in a vertical position. I have found that a Velcro strap works well for this purpose. The receiver fits between the servos and the battery pack. With the equipment in this position, I needed no ballast to achieve a 33 percent-of-chord balance. I fitted a mini-switch and charge plug into the instrument panel face.



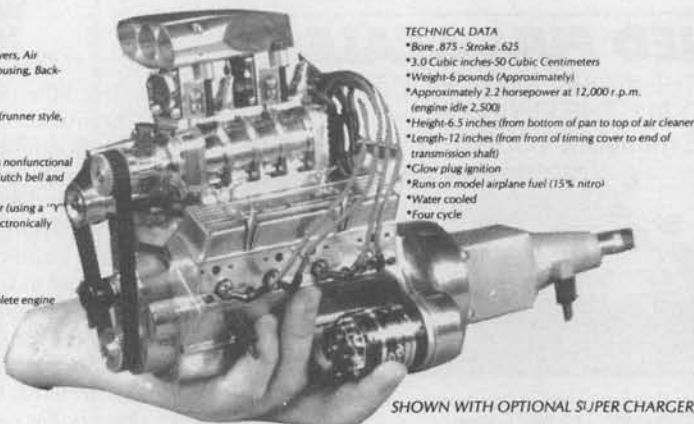
(Top) Cox engine nestled in its removable balsa cowl. Plenty of cooling available. (Center) Neatly structured hatch carved and hollowed from balsa block. Note ply end plates to prevent wear and tear, and 2-56 locking bolt. (Bottom) Close-up of left inboard wing structure.

The all-up weight of my bird is 19-1/2 ounces and that is with what must be a quart of clear dope on the silk. This plane should be able to be built at about 16-1/2 ounces total weight. With 300 square inches of wing area, this would result in an 8 oz. wing loading and should produce a real "floater" which should fly almost hands-off. **MB**

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FREE FLIGHT cont. from page 79

rules, a list of eligible model designs and engines, you can get yours from Bob Larsh for a mere \$2.00 plus two first class stamps. You might ask Bob for a list of his available plans. He has a number of full-sized plans

for Nostalgia ships you cannot get elsewhere. If you want the list, just say so when you order your Nostalgia rules. Bob's address is 45 S. Whitcomb Ave., Indianapolis, IN 46241.

ROLLED TUBES AND BALSA BENDING MADE EASY

The recent issue of "Free Flight," newsletter of the National Free Flight Society, carried this helpful tip for those who like to bend, roll or twist balsa sheet and strip. The usual process is to soak it in hot water for an hour and then wrap it around the prepared form and wait until it dries. Well, a product for your consideration is called "B-Brite." It doesn't stink like ammonia, and it works better. It can be purchased in stores catering to the homebrew/winemaking trade. I understand that you use one tablespoon per gallon of water, soak the balsa, rinse and wrap onto the form.

I haven't tried the stuff yet, but if it keeps the little strips from kinking or the sheet tailbooms from splitting, I am going to try it. So should you.

LIDBERG'S LATEST

Al Lidberg has done it again. This prolific scale model plans man has come out with a new idea . . . Mini-Replica Old Timers with printwood to go. The three ships new to the lineup include: the Buzzard Bombshell with an 18-inch wingspan, Struck's New Ruler with a 20-inch span, and the Brofman Sunduster at 19.5 inches. The printwood for these ships contains all curved parts, including ribs, formers and bulkheads where appropriate. Of course, you also get the excellent full-sized plans and a construction booklet. Right now, Al has a special introductory offer; you get all three kits mailed in a box or mailing tube for \$21.00 postpaid. If you only want one of the kits, it will be mailed in a manila envelope for \$6.00 each plus 90 cents postage. Add \$2.50 for the special box.

Al has developed quite a nice line of plans, and these little old timers give his line of models a fine boost. Contact Al directly for the plans list or kits: Al Lidberg, 814 E. Fordham Dr., Tempe, AZ 85283.

WORKSHOP HUMOR BY GRANT CARSON

This little piece of writing came via the "Thermal Thumber's" newsletter, edited by Stan Buddenbohm. I chuckled my way through the piece because it is something that I could have written. I especially liked Grant Carson's reference to the one-foot-square building area. It seems like mine continues to shrink to that size as time goes on. I hope you enjoy the article as I did.

DIHEDRAL MEASUREMENT: In my workshop, there are four increments. From least to most, they are: the height of a small dope bottle lying flat, the height of a small

continued on page 108

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cross section.

The earliest airplanes had very thin wings, which were very weak, as the wing spars were no deeper than the wing thickness. These early wings, therefore, had to be supported by rigging that consisted of struts and wires. Modern airplanes have reasonably thick wings for aerodynamic and structural reasons. Because the strength goes up as the square of the spar depth, we should use the entire maximum thickness of the wing as the depth of the main (and probably only) wing spar.

TENSION, COMPRESSION, SHEAR, AND BENDING

Wings are loaded chiefly in bending, but bending is not a simple thing like tension. Bending actually involves compression (on the top of the wing), tension (on the bottom of the wing), and shear (in the middle).

If we simply put a spar in a slot on top of the wing, and another spar directly below it on the bottom of the wing, we do not have a single beam whose depth equals the thickness of the wing . . . until we put in a "shear web," that is. Without a shear web, the wing will have relatively little resistance to bending forces, and the upper and lower spars described will give essentially only twice as much strength as the upper spar or the lower spar alone would give. Example: put two yardsticks, each a fifth of an inch thick, on top of each other and apply a bending load. As they deflect, they will slide on each other and support only twice the load that a single yardstick would support.

Now glue the two yardsticks together, flat side to flat side, throughout their length. This new beam will support not twice as much as a single stick, but four times as much, as its depth has doubled and two times two is four! The glue, in shear, turns the assembly into a true single beam, keeping the upper half from sliding on the lower half.

But our glued-up-yardstick's beam is still much wider than it is deep, and depth is what counts most. Let's improve things some more. Instead of gluing one yardstick directly to the other, separate them by a light shear web, so the total depth of the I-beam we have made is one inch. This new beam is five times as deep as a single yardstick, so it will support 5 x 5 or 25 times what a single flat yardstick will, but will be little more than twice as heavy!

If we increase the height of the shear web in our yardstick I-beam, so the total beam depth is two inches, its bending strength would be an amazing 100 times that of a single flat yard stick, and it would weigh little more than the one-inch-high I-beam.

The shear web must be of adequate strength, but it is not difficult to design light shear webs that will give us I-beams with almost the strength we would get from a solid rectangular-cross-section beam of the same width and depth, with relatively little

weight in the shear web itself. The reason for this is that the part of a beam that is doing the most work is the outer layers or fibers. The material near the center of the beam is contributing very little to resisting the bending load, and we don't need much material there to resist the shear loads.

WING SPAR ARRANGEMENTS

You may now look at the figure (You haven't already been peeking, have you?). As the leading edge and the trailing edge of the wing have little depth, they contribute little to the bending strength of a wing,

therefore in the following comparisons we will ignore them; in fact I won't even show them on the sketches. We will also ignore any strength that the wing covering might contribute, and any shear strength in the wing, unless shear webs are specifically shown. It is intended that the spar shown in example No. 1. is 1/4 x 1/4, and the maximum thickness of all the airfoils shown is two inches.

Example No. 1 would be too weak to merit discussion.

Example No. 2 has the same poor strength-
continued on page 104



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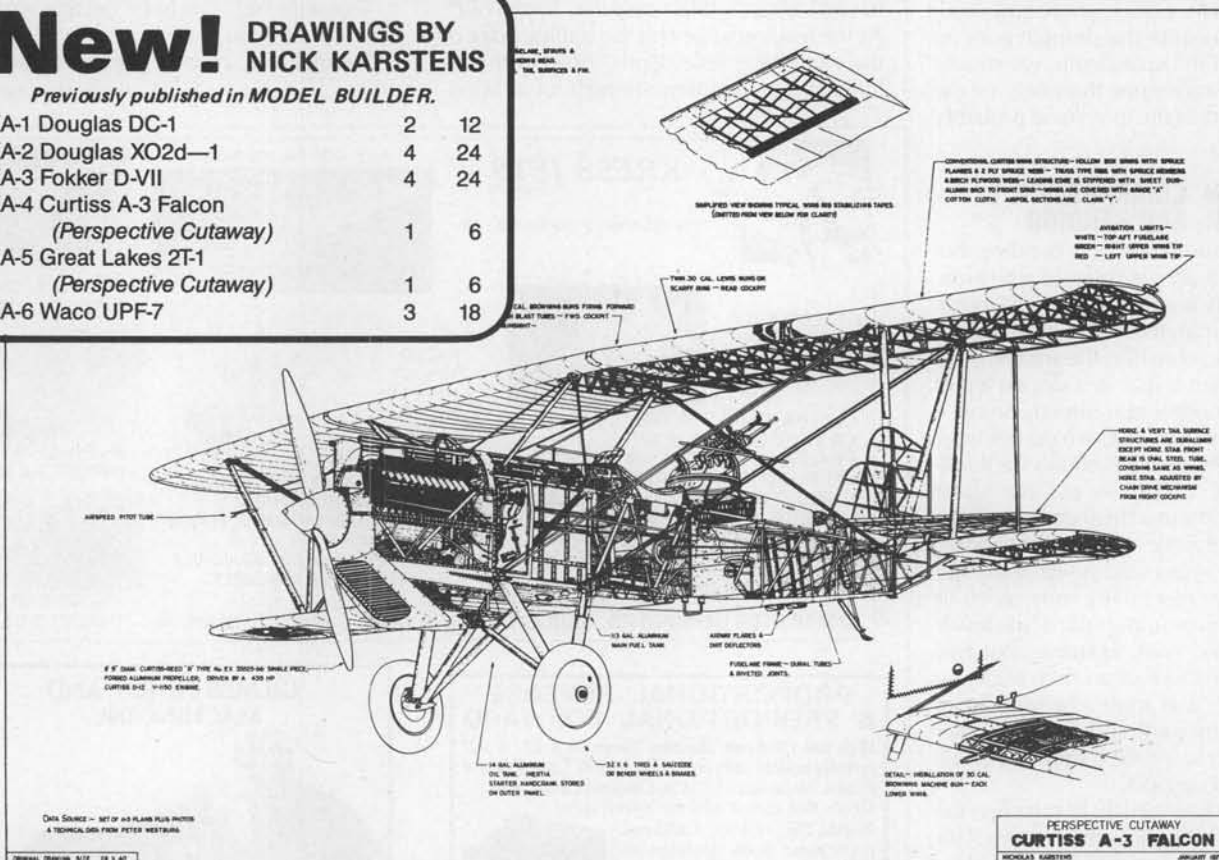
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MODEL BUILDER

you, but in QM circles, it is quite a high mountain to climb. The competition is very fierce at this meet because it is saturated with "name" racers of high caliber. I cannot think of any other name race in the country that is dominated by one person as much as this one, and that includes Brother Shadel at the Nats or the NMPRA Championships. Wherever Dennis ranks, he has to be at the top along with other noted guys like the aforementioned Dave Shadel.

Anyway, there certainly were other people racing at the "Silver Cup," and these guys aren't exactly chopped liver either. Craig Grunkemeyer was second and I can't tell you how many times I've wrote about this guy's accomplishments; in fact, wait until next month when I report on the T.U.R.N. Quarter Midget Championship race in Rough River, Kentucky!

Dennis and Craig matched personal fast-times at 1:17.31, however, the meet's best time was turned in by Dan Kane, Jr., with a very respectable 1:16.15. This is another guy who will be heard from shortly, because every time I see him, he gets better. He's paying his dues and is about to leap up there with the "name" guys, I guarantee.

Third place went to Minnesotan, Phil Zuidema, with a best time of 1:17.77, only a blip away from the other guy's best times. Phil is another consistent flier who is usually hovering around the top.

Fourth was "The Old Geezer," as he calls himself, Steve Kovach, from Georgia, and fifth was Dave Latsha, who previously has won this race and every other top race known in QM circles.

Sixth place went local hero and Weak Signals member, Bill Comber, who actually tied for 5th but as in all racing, ties must be broken and Billy ended up on-the-bubble, one position away from a very prestigious piece of silver.

In 7th was Vern Smith, with a best-time of 1:19.92. Vern is Dave Latsha's caller, so these guys finished very well; both were in the top ten.

In 8th was another local guy and Weak Signal member, Rick Bork, who doesn't compete much nationally, but is highly competitive and probably would do well if he was to travel a bit.

Placing 9th was another "Old Geezer," in fact, he IS the old geezer, Gail "Jake" Jacobson. You name it, Jake has won it. Can't say enough about this guy's accomplishments. He's always lurking near the top somewhere and the old dude is tough to get by, I guarantee!!!

In 10th was Grunkemeyer's racing partner and caller, Joe Dodd, who strange as it may seem, did not have a birthday that weekend. I heard it was the week before...

After the heat racing was completed there was another short contest held to determine the fastest of the fastest. This dash was named in memory of Les Haddad's brother

and partner in the hobby business, and is called the "Ron Haddad Memorial Trophy Dash."

The idea is to take the top 12 fliers by times, regardless of scores and pit them against one another until one is the final victor. Four heats are run and the winners of these heats race each other for the "Ron Haddad" trophy. This usually results in a terrific final and the '91 version was exactly that.

In the dash were: Dan Kane Jr., Dennis Sumner, Craig Grunkemeyer, Phil Zuidema, Dave Latsha, John Albritton, Vern Smith, Rick Bork, Derek Wodziak, Joe Dodd, Bill Comber, and Dave Beazley.

After four exciting heats, still around for the final-four were Kane Jr., Latsha, Comber, and Bork. An indication of the intensity in these heats is: the first four finishers in the regular racing didn't even qualify for the final trophy dash

So it was go-for-the-marbles, and as soon as they rounded the first pylon it appeared someone had jacked Comber up a couple of notches, because he leaped out into a lead, and after a couple of laps had a very comfortable lead of about 300 feet. Billy was really flying, right on the sticks and moooooovinnnn!!

The remaining three were dicing for position back and forth, and how they missed each other is anybody's guess. This all went on until the eighth lap and that's when "Momma Fate" arrived and struck poor Billy Comber, who now knows the true meaning of "the agony of de feets," because a quick turn at Number One resulted in that agonizing sound of a wing folding and Bill's racing was over for this day.

Two laps later, Dan Kane Jr. pulled away from the rest of the pack to win the trophy dash with a very nice 1:15.05. We all wondered what Comber's time would have been but woulda, shoulda, coulda's don't count here, and that's racing folks!! Dane Kane has the bragging rights for a year, which he deserves.

Included is a list of all the entrants and their fastest time, and I'm certain I can speak for all of them by thanking Les Haddad for his continuous support of QM racing by hosting this race, to CD Rex Knepper for taking the time to run it, and to the members of two Toledo clubs, the Flying Tigers and the Weak Signals, who completely staffed this event. Thanks to all of them for another great "Silver Cup." In addition, the many companies who donated everything from radio's to foam cups must be acknowledged and they are: Airtronics, 5-Star Manufacturing, Badger Air Brushes, Carl Goldberg Models, Futaba, Great Planes Dist., Hobby Dynamics, Hi-Tech, Horizon Hobbies, Midwest Products, Pacer Tech, Sig Mfg., Gager Aircraft Supply, and Matney's Models, who donated a kit for the meets best-time. Speaking for Les and all the competitors, we would certainly like to thank all these organizations for their very generous contributions. **MB**

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PLACE	CONTESTANT	MODEL	FUSELAGE	WEIGHT (lb)	MAIN ROTOR BLADE					TAIL BLADE
					DIAMETER (in)	CHORD (in)	BLADE	WEIGHT (g)	TWIST	
1.	Curtis Youngblood	X-Cell	None	9.68	58	2.5	M.A. Rotor-Sport Sym.	185	0	NHP
2.	Kenneth Wayne Mann	X-Cell	Triumph	10.00	61	2.5	Zig-Saw (FG)	190	1.5	NHP
3.	Robert Gorham	TSK Blackstar	M.A. Long Ranger	12.50	61.75	2.36	Zig-Saw (FG)	186	1.5	Hi-Product
4.	Cliff Hiatt	Kalt Omega	Kalt Epsilon	11.25	61.50	2.36	Zig-Saw (FG)	196	1.5	NHP Mod.
5.	Tom Dooley	Kalt Excalibur	Kalt Epsilon	11.25	61.50	2.36	Zig-Saw (FG)	185	1.5	NHP
6.	Daniel Chapman	Schluter Champion	None	11	56	2.55	Stock Wood	180	0	Kyosho Con. 30
7.	Ted Schoonard	X-Cell	Triumph	10.2	61	2.36	Zig-Saw (FG)	196	1.5	NHP
8.	Tim Schoonard	X-Cell	None	10	61	2.36	Zig-Saw (FG)	196	1.5	NHP
9.	Yasunobu Muraki	Hirobo Eagle	Blackshark	10.56	61	2.36	Zig-Saw (FG)	185	1.5	NHP
10.	Dwight Schilling	Concept 60	None	10.56	61	2.36	Hi-Product 660	193	0	Stock
11.	Peter Cooke	Concept 60	None	10	60.25	2.36	DY-F1 (FG)	190	0	Stock
12.	Wendell Atkins	Schluter Magic	None	10.25	61	2.5	Hi-Product SC-60	190	0	Stock
13.	Stanley Olzaski	Concept 60	None	10	61	2.76	DY-F1 (FG)	178	0	Stock
14.	Bob Belluomini	Schluter Magic	Magic Ranger	11.6	60.25	2.76	Hi-Product SC-60	198	0	Hi-Product
15.	Thomas Dalusio									
16.	Leonard Sabato	Kalt Excalibur	None	10.5	57	2.5	Stock Wood	190	0	Stock
17.	Mike Mas	Hirobo Condor	Hirobo Nova	11	61	2.3	IBS (FG)	200	0	Stock
18.	Stan Stockman	X-Cell	Blackshark	11	60	2.36	DY-F1 (FG)	185	0	NHP
19.	Dave Finkelstein	TSK Blackstar	None	11	61.75	2.36	Zig-Saw (FG)		1.5	

PLACE	CONTESTANT	ENGINE								
		ENGINE	TYPE	MODIFIED EXHAUST TIMING	MODIFIED INTAKE TIMING	GLOW PLUG	FUEL	NITRO (%)	CARBURETOR	EXHAUST
1.	Curtis Youngblood	OS61SFN		Yes	No	Fox R/C Long	KB 500 H	12.5		Wisper Tech
2.	Kenneth Wayne Mann	OS61SFN	Ring	Yes	No	Enya 3	Magna	30	Super Tigre	Magna U-Pipe
3.	Robert Gorham	YS6	Ring	No	No	Enya 3	Power Master	30	Y.S.	Hatori 666
4.	Cliff Hiatt	OS61SF	Ring	Yes	Yes	Enya 3	Magna	30	Super Tigre	Hatori 666
5.	Tom Dooley	YS61	Ring	No	No	Enya 3	Magna	30	Y.S.	Hatori 666
6.	Daniel Chapman	Enya 60		Yes	No	OS8	Byron	35	Enya	Wisper Tech
7.	Ted Schoonard	OS61SFN	ABC	Yes	Yes	Enya 3	Magna	30	Super Tigre	Magna U-Pipe
8.	Tim Schoonard	OS61SFN	ABC	Yes	Yes	Enya 3	Magna	30	Super Tigre	Magna U-Pipe
9.	Yasunobu Muraki	OS61SFN	ABC	Yes	No	Enya 3	Coolpower	30	OS 6H	Hatori 666
10.	Dwight Schilling	OS61SFN	Ring	Yes	Yes	Enya 3	Coolpower	30		Hatori 666
11.	Peter Cooke	OS61SFN	Ring	No	No	Enya 3	Magna	30	OS 6B	Hatori 666
12.	Wendell Atkins	Rossi 60	ABC	Yes	No	OS 8	Tower	30	SuperTigre	Hatori U-Pipe
13.	Stanley Olzaski	OS61SFN	Ring	No	No	OS 8	Coolpower	30	OS 6B	Hatori 666
14.	Bob Belluomini	OS61SFN	ABC	Yes	Yes	Enya 4	Magna	30	OS 6H	Hatori U-Pipe
15.	Thomas Dalusio	Not Avail.								
16.	Leonard Sabato	Webra 61	ABC	No	No	Enya 4	Coolpower	30		Hatori 666
17.	Mike Mas	Enya XLP60	ABC	No	No	Enya 3	Byron	35	Enya GP	Hatori 666
18.	Stan Stockman	YS61	Ring	No	No	Enya 3	Coolpower	30	Y.S.	Hatori 666
19.	Dave Finkelstein	Not avail.								

Note the 666 is a muffler

helicopter world

continued from page 73

The low speed idle is still better than almost any stock engine. Hence, I have no holdback recommending Dave's piston and sleeve set to anyone. What more can you ask? It idles better, hovers without roughness, has instant pickup in transition, and loads of power on the top end. And one thing I can't figure out is that this ABC unit does not feel tight like the stock ABC unit. E the engine on the first crank. You can reach Dave Shadel at Performance Specialty, P. O. Box 3146, Gardnerville, NV 89410, or telephone (702) 265-7523.

• • •

At the US F3C helicopter team trials, I noticed that almost all the contestants had modified engines. I recently tried a modified O.S. engine myself. This one was done by Royce Brademan. I have seen some helicopters with Royce's modified engine, and they breathe very well. Royce takes the engine completely apart to make sure all the bearings seat properly. He deburs the engine, and modifies the ports, timing, crank, etc. If you have a new engine, any size from 30 to 80, Royce will blueprint it for you.

The advantage of blueprinting is that it will increase power, improve the idle, make it run smoother, and you don't have to buy a new piston and sleeve set. All you have to do is tell Royce what you want your engine for (scale, hot dogging, FAI, speed, etc.), what fuel you use, and what exhaust (muffler or what kind of tuned pipe) will be used, and Royce will modify the engine to get the most performance for your need. The cost will vary accordingly. He does the work in his shop at home, so the work is not one of those rushed jobs.

There is nothing wrong with off-the-shelf engines, except they just come off the assembly line without each one being examined and custom fitted. Blueprinting adds that human touch to finish off the product. For example, the standard O.S. 61 RF pattern engine is around \$200, but O.S. sells a specially selected 61 RF with the same design, but parts are custom fitted by hand. This special 61 RF is called the Hanno Special and costs \$400. The point is, the materials in the engine are fine, it is that extra human fine-tuning that costs time and money.

All of my blueprinted engines idle better. But you will get maximum power improvement from blueprinting only if you use tuned pipes (either U-shaped, V-Tech, or other pipe). If you intend to use mufflers (like Hatori 666 or any other type), blueprinting will not give as much gain on top end power, because the power gain comes from increased exhaust timing that makes the tuned pipe more effective. Out of all the exhaust systems on the market, my favorite is still the Hatori or Magna U-shaped pipe. They are quiet and give about ten percent boost.

If you are building a new helicopter and have a new engine, then I highly recommend sending it to Royce for blueprinting. You can reach Royce in Virginia, in the evening, at (703) 799-9643. Depending on how radically you want the engine modified, the cost will be around \$35.00.

(By popular demand, the checklist compiled by James Wang of the specifications on the helicopters used by 18 of the 19 contestants in the recent 1991 US FAI F3C Team Trials (Model Builder, October 1991) is being included in this month's "Chopper Chatter." - wcn).

• • •

I recently made a very dumb mistake, that I hope you will not repeat. I was happily flying my helicopter, when suddenly I heard my beginner friend yell, and his model thumped to the ground. I landed my model immediately, set the transmitter on the ground, and ran over to help him. Suddenly, we heard my model go into full power, take off by itself, and then cartwheel across the field before it decided it had enough tumbling exercise for the day. What caused it? We found out that a gust of wind had blown my

RADIO			GEAR RATIO	DRIVEN	TORQUE TUBE TAIL DRIVE
TRANSMITTER	SERVO	GYRO			
JR PCM 10 single stick	JR4031	JR120	9.1:1	Yes	Yes
Futaba 9VH	9201	153BB	9.1:1	Yes	Yes
Futaba 9VH	9302	153BB Modified	9.7:1 5.5	Yes	No
Futaba 9VH	9201	153BB	9.8:1 5.52	Yes	Yes
Futaba 9VH	9201	153BB	9.78:1	Yes	Yes
JR Century 7 single stick	Futaba 131S	153BB	9.1:1	Yes	No
Futaba 9VH	9201	JMW	9.1:1	Yes	Yes
JR PCM 9 single stick	JR4001 JR4031	JMW	9.1:1	Yes	Yes
Futaba 9VH	9201	JR120	9.7:1 5.3	Yes	Belt
Futaba 9VH	9201	153BB	9.7:1	No	Yes
Futaba 9VH	9201	153BB	9.7:1	Yes	No
Futaba 9VH	9201	152 Modified	10:1	Yes	Yes
Futaba 9VH	9201	153BB	9.7:1	No	Yes
Futaba 9VH	9201	JMW	10:1	Yes	Yes
Not Avail.					
JR PCM 10	JR4001	JR120	9.6:1	Yes	Yes
JR PCM 10	Futaba 131S	Airtronics 50-1	9.5:1	Yes	Belt
Futaba 9VH	9201	JR120	9.1	Yes	No
Not Avail.					

HOVER RPM	AEROBATIC RPM	HOVER PITCH	AEROBATIC PITCH	AUTOROTATION PITCH
1700	1700			
1320	1900	-5 6 11	0 6 10 -1 6 10	5 6 13
1200	1650	-2 6 12	-3 6 9.5	-4 6 12
1260	1700	1 5.75 11	-2.5 4.5 8.5	-4.5 5.75 13
1285	1640	-1 6 10	0 4 8.5	-3 6 11
1850	1850	-5 5 14	-5 5 14	-5 5 14
1350	1750	-2 6 13	-4 6 13 -5 6 13	-5 6 14
1400	1750	-2 6 13	-4 6 13 -5 6 13	-5 6 14
1100	1600	-2 6.5 14	-2 4.5 9.5	-4 6 12
1100	1600	-4 8 11	-2 4 9	-4 6 11
1000	1500	-1 6.5 10.5	-4 5 9	-4 5 11
1850	1900	1 4.5 8	-6 4.5 12	-2 5 14
1100	1600			
1300	1800	-1.5 6.5 10	-2.5 6.5 8.5	-5 2 11
1050	1500	-3 7 10	-5 5 10	-5 5 13
1500	1600	-7 0 9	-7 0 9	-7 0 9
1400	1800	-2 6 9.5	-3 5 9.5	-5 5 13

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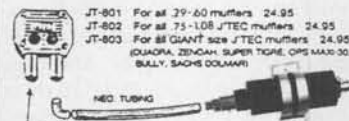
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transmitter over on the ground (I set it upright). It fell over face down, and the throttle stick was knocked into full throttle and full left tail rotor command. Never leave the transmitter sitting upright on the ground; especially with the engine running!

A few months back, I received a letter asking me questions regarding blade weight on autorotation and helicopter control characteristics. I was asked which blade does better auto; one with lots of tip weight, or a uniformly heavy blade? The writer also wanted to know how he could add the lead weight, such that blade inertia would increase, but control response would not be reduced.

The answer to the first question is that it is the blade swinging inertia that determines the rotor rotating inertia. A light blade with a heavy chunk of lead at the blade tip does just as good in autorotation as a heavier blade, with the weight equally distributed along its entire length.

The answer to the second question is that if the inertia of the two blades are the same, they will give similar cyclic response, because when designers calculate the roll characteristics of a helicopter, only the blade swinging or flapping inertia is important... not how you get the inertia.

In general, it is better to attain the desired inertia by adding lead weight at the blade tip, rather than using very heavy wood. The reason is that the lead can be added near the leading edge, to bring the blade's chordwise center of gravity closer to the leading edge. This has the added benefit of preventing blade flutter, divergence, improper track, and it also helps stabilize the entire helicopter. This also means the total blade weight can be less and, hence, the helicopter is lighter.

However, using blades with little inertia or lots of inertia will only affect the initial roll rate of the helicopter, and **not affect** the final, steady state roll rate. This means that a helicopter with low inertia blades will start rolling the moment you bang the cyclic stick over, but a helicopter with heavy inertia blades will take a little longer before it reaches the full roll rate. Once they start rolling, however, they will roll at an equal rate. Thus, only the first quarter of an axial roll will show much difference in response. This is because helicopter roll rate mostly depends on the helicopter fuselage inertia, rotor head flap stiffness, and swashplate deflection. If you want a faster roll rate, then increase the swashplate deflection and tighten the rotor head by adding shim washers, or squeeze on the rubber dampers.

The *Forward Flight Tumble* maneuver, shown in an accompanying sketch, is very impressive, and not as difficult as you might think. Just fly the model full speed in the downwind direction and pull the nose up as if you were doing a loop, but at the same time, feed in negative collective pitch. The idea is not to let the model gain altitude.

When the model reaches a 90-degree vertical position, you want about six or seven degrees negative collective pitch in order to suck the model forward. Keep holding the back cyclic stick, and slowly release the negative pitch until the model levels again. Ideally, the model should tumble in perfectly level trajectory. Stretch out the tumble as long as possible to look impressive. On a windy day, if doing it downwind, I can stretch it out to about 200 feet. It is more difficult to do it upwind because the model will not weathervane, and wants to yaw, and the tumble cannot be stretched as long.

Another thing I've noticed is that model helicopters with scale fuselages perform forward flight aerobatics much better than pod-and-boom models. Fuselage models loop and roll better, and they climb higher in pull ups, and penetrate through wind better. Adding a scale fuselage may add weight, but the helicopter ends up flying faster because of the significant reduction in drag. The only drawback is that the mechanics may be more difficult to get to and the whole thing takes longer to build.

Our last topic is "neural network technology" and the RC helicopter. Recently, an Air Force officer contacted me about some research on using RC helicopters to demonstrate neural network technology. What is a neural network? Neural network is the cutting-edge research area in computer science. It means programming the computer to give it human brain neural ability to let the computer think and learn by itself. It is best explained by citing Arnold Schwarzenegger's new movie, "Terminator 2," as an example. In the movie, Arnold plays an advanced robot, and says that he was designed and programmed to have the latest neural network technology, which allows him to learn. What this Air Force officer wants is to let neural network computers learn to fly RC helicopters as a realist task, to prove the feasibility of neural network technology.

It is no big deal to design an autopilot that can fly remote-piloted aircraft. But what is unique about a neural network autopilot is that it can learn from its past, and do new tasks that have not been programmed or taught to the computer. For example, we will teach the neural network computer to fly RC helicopters (in this case a Kalt Whisper) in indoor calmness. Once that is proven successful, we will turn on a giant fan, blowing on the model. The neural network will then, based on its knowledge of how to fly in no-wind situations, learn in a few seconds to fly in the wind! So far, only humans have this ability to use past knowledge to cope with problems that have not been previously encountered. The final phase of the research will yield an RC helicopter that can do any maneuvers and FAI aerobatics that humans can. It can correct instantly for wind, gust, cg offset, engine problems, mechanical failure, etc. "Hasta la vista." (James... you and the Air Force officer better change your brand of whiskey! wcn). **MB**

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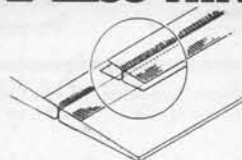
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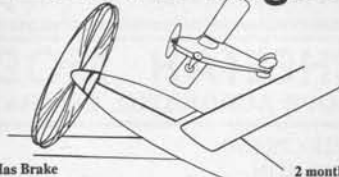
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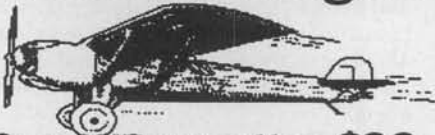
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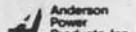
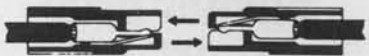
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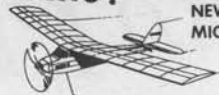
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STRICTLY SCALE *continued from page 61*

ceded it wasn't going to fly any more and ended up landing down over the hill at the south end of the field. Harry got a well-deserved standing ovation from the crowd.

Two other friends, Dick Coles and Rick Mixon, from Bradenton, Florida, were there with their mini air force. They had a new member with them, Gary Dunlop, who is fairly new to this hobby, and he had a beautiful Yellow Aircraft Spitfire and a Ron Scherer T-Craft. I happened to inspect these aircraft and upon commenting to Rick Mixon about the excellent workmanship, Rick said it should be, as Gary was used to doing fine, close-up work . . . as an Orthopedic Surgeon. Welcome to the sport, Gary, and I hope you can keep these characters in line. Incidentally, Dick Coles operates a great hobby shop in Bradenton, called Plane Things, located at 3509A Manatee Avenue West. Look him up when in the area; I guarantee Dick will be glad to see and talk with you.

My Zero survived another year unscathed. I want to thank Ross Kasparak from Astor, Florida, for helping me with plane maintenance and being my spotter when flying the "Striking Back" show.

Kudos to Joe Schumacher, Vice President/Airshow Director, who put Aviation Expo together, and who, under often trying circumstances, kept things on track and running smoothly. Many thanks to Byron Godbersen, founder of Midwest Industries and Byron Originals, for throwing open his beautiful facilities once each year, and allowing us modelers to enjoy and participate in the "World's Greatest Modeling Event."

In addition to those full-time Midwest and Byron Originals employees who are involved, there are many volunteers who donate their time and efforts to make this show a success. The majority of these people have been participating since the first event in 1982: Flight Line Operations, Bob Hess; Transmitter impound, Marilou Hess and Barb Westinburg; Transmitter Evaluation & Aircraft Inspection, Paul and Cindy Edmonds; Ace R/C Inc.; Phil Maxwell and the show team assisting Phil; Frequency Control, Tom Pease, family and friends (and he has lots of friends); Building Forum, Steve Westinburg; Narration and Special Programs, Jerry Schumacher. The show team consisted of Rick Alter, Eric Clapp, Jim Duke, Paul Edmonds, Larry Fair, Lynn Jorgensen, Mike Kieffer, Gaylen Mohr, Gary Oliver, Jim Phillips, and yours truly.

Joe Schumacher and his staff are already planning for Aviation Expo '92, to be held August 12-16. Make plans to attend. You won't regret it! I'm sure that our visitors from Europe, Scandinavia, United Kingdom, Australia, and Japan will be back. 'Nuff said. Al Tuttle, 4223 New Haven Court, Port Orange, FL 32127; telephone (904) 760-4246. **MB**

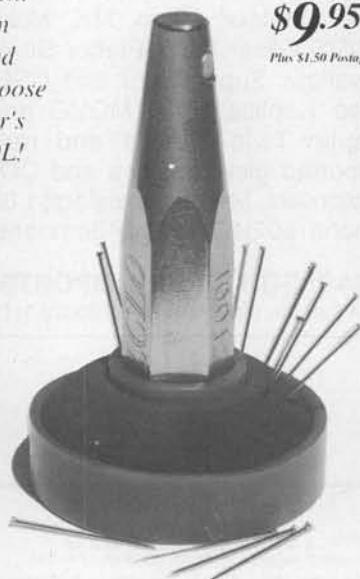
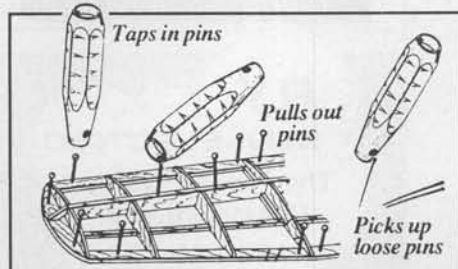
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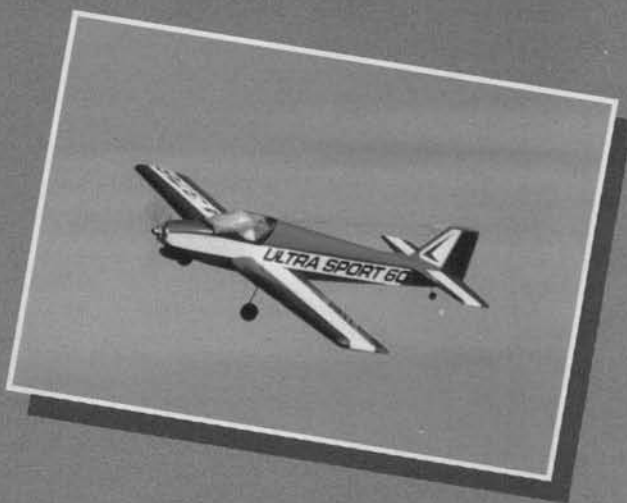
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DESIGN *continued from page 93*

to-weight ratio as No. 1, because we only widened the spar, doubling both its strength and its weight.

Example No. 3 weighs the same as No. 2, but has twice the strength of No. 2 and four times the strength of No. 1, because we doubled the depth of No. 1, while keeping the width the same. Example No. 3 has two practical disadvantages: the deep slots are harder to make and they weaken the ribs more.

Example No. 4, with a number of shallow spars or stringers, is no better in strength-to-weight than No. 1, (neglecting the covering). Why so many models were designed something like this, I will never know. Putting the

spar(s) on the top instead of the bottom does help on light rubber-powered models, however, for positive-g loads only, as the lower covering can take a little tensile load, but the upper covering can take no compression.

Example No. 5 is no better than No. 2, as with no shear web, the upper and lower spars can move with respect to each other, as did the unglued yardsticks.

"I" BEAMS

In example No. 6, we have a true "I" beam. Simply by adding the shear web to No. 5, the strength is raised from a relative value of two up to 64! You doubt that? Look at the arithmetic. We have now effectively increased the depth of the beam by a factor of eight and eight squared is 64.

By the way, we don't need to cut the ribs in two to put in a continuous shear web. Shear webs, unlike tension or compression members, don't have to be continuous. In fact the shear-resisting web members of big beams or "trusses" are often separate diagonal braces welded or riveted between the spar caps or chords (not wing chords). *(Old time modelers will remember the trussed-beam spars in Ben Shereshaw's beautiful, big gas models. wcn.)*

Sheet balsa pieces glued between the spar caps and between the ribs make ideal shear webs for model wings. The shear webs should be installed with the grain vertical, because the shear web usually has to carry some compression or tension loads in addition to pure shear loads. Dihedral will also add a sizable compression force in the shear

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web near the center of a wing in flight.

Example No. 7 has a little better strength-to-weight ratio than No. 6, because we have put a greater percentage of our spar cap material out at the maximum thickness of the wing.

In example No. 8, we made the installation of the shear web simpler by gluing it to one edge of the spar caps instead of centering it between them. We made a "C" beam instead of an "I" beam. Good. We used a little more material for the shear web, making it heavier, but it is probably easier to get adequate glue joints between shear web and spar caps in this case than with an I-beam. The strength of an unsupported C-beam is less than that of an I-beam because it is asymmetric and will tend to twist or buckle sideways when subjected to a bending load. When used as a wing spar, however, the ribs probably provide plenty of support to the "C" spar.

"D"-SECTION SHEETING

Number 9 is just fine (I ain't a poet and I know it). This final example, which adds leading edge or "D"-section sheeting, solves our last little problem; that of getting enough torsional rigidity. If your model lumbers along, lack of torsional rigidity may never be a problem to you, but put in enough power to move out with that baby, and you are apt to find some problems you will wish you didn't have.

In a model I designed and built a couple years ago, I decided to omit the "D" sheeting to save weight. Bad decision! after test flying it I had to rip all the covering off the wing, add the leading edge sheeting, and recover. (I tested the torsional stiffness of the original wing at 4.8 ounce inches per degree, and the "D"-sheeted revision at 192 oz.in./deg., a 40 to 1 improvement.) At low and medium speeds control was normal, but as the speed increased the aileron effectiveness would drop to zero and actually reverse phase. That is, I would command right roll, and the poorly-designed critter would roll left.

What was happening? Deflected ailerons put aerodynamic twisting forces on the wing panels, the raised aileron twisting its panel to a higher angle of attack and the lowered aileron twisting its panel to a lower angle of attack. With an adequately stiff wing the amount of this twist is negligible, but with a twisty wing it can be serious. A lowered aileron is supposed to increase the lift on a wing panel, but in this case the lowered angle of attack due to twist induced by the lowered aileron was enough to reduce the total lift on that wing panel instead of increase it. Vice versa for the other panel with its raised aileron.

There is another "aeroelasticity" problem that may crop up as the result of a wing that is torsionally flexible. Airfoils have pitching moments which tend to twist the wing to a lower angle of attack. At high speed with a

torsionally soft wing, the resulting twist can be enough to put the plane into a dive from which it cannot recover.

TUBES ARE STIFF IN TORSION

If the tremendous improvement in wing spar strength that one gains by using a shear web isn't enough to sell you on their use, maybe I can sell you a shear web from the standpoint of torsional stiffness. Try this little test. Roll a sheet of typing paper into a tube an inch or two in diameter. With one hand at each end of the tube, check it for torsional stiffness. It has almost none. Now glue the overlapping edges of the sheet together and try twisting it a second time. This time it has great torsional stiffness. Without a shear web in the spar, the torsional rigidity to be gained by sheeting the forward part of the wing is little. A shear web in conjunction with "D" sheeting provides a closed tube which is very rigid in torsion.

Some modelers may think the reason for sheeting the leading edge is to maintain an accurate airfoil section up front. That may be a secondary reason (primary on thermal soaring models), but the big improvement forward sheeting (plus a shear web) offers on all models is torsional stiffness in the wing.

FOAM-CORE WINGS

We have been talking about built-up wings, but if you are using foam core wings you will have all the torsional stiffness you

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need. The foam core itself is quite stiff torsionally, and the skin over the foam adds still more torsional stiffness. There the whole wing is a closed tube.

The bending strength of a foam core wing is very good, if the skin is a good material such as balsa or plywood. In terms of strength-to-weight ratio, however, I think a well-designed built-up wing can beat a foam core wing. I see several reasons for this. In most cases the foam core has more strength in compression and shear than we really need, and one-pound-per-cubic-foot foam is the lightest available to us. Furthermore, the strength-to-weight ratio of the foam is poor.

The other big structural advantage of a built-up wing over a foam core wing is the fact that we put the I-beam spar at, or very near to, the maximum thickness position of the airfoil, to gain a highly-effective deep beam. Most of the structural weight is therefore where it will do the most good. The skin over a foam core, which provides the bending strength, is just as heavy back near the trailing edge as it is at the thickest part of the airfoil, so we are carrying a lot of skin where the skins are close to each other. The effective beam depth in those areas is therefore small and the bending strength gained from much of the skin weight is small.

In commercial production, at least, a foam-core wing can be built faster than a built-up wing, but for the lightest possible wings of adequate strength and stiffness, I prefer built-up wings.

The case for the foam core wing can be improved by hiding tapered wooden spar caps under the skin near the max thickness point of the wing, or by putting a thin tapered layer of carbon fiber between the foam and the skin at the thickest point, then using a lighter skin. One-thirty-second-inch balsa skin over foam is plenty for a sixty-size model, if one of these spar enhancements is used, and especially if a slip-off wing mount is also used.

TAPERED SPARS

I just mentioned tapered spar caps in connection with foam wings. By all means, use tapered spars in your built up wings too! Most model wings are made with constant-section spars. That isn't because untapered spars are best, it is because balsa and spruce sticks are bought untapered; and also, it is easier to make the rib notches the same size.

The case for tapered spars is clear. Have you noticed that if a wing fails in flight (someone else's, I hope), it almost always

A foam-core wing can be built faster... but for the lightest wings of adequate strength and stiffness, I prefer built-up wings.

folds at or near the center. With constant-section wing spars it would be surprising if it failed anywhere else, because the bending or breaking moment is greatest at the center of the wing and decreases to zero at the wing tips. As far as resisting flight bending loads go, we don't need any wing spar right at the tips. We need to put in only enough structure out there to resist handling loads and landing abuse.

As the load we must support with each section of the wing gradually decreases toward the wing tips, we can build lighter wings if we taper the spars so their cross section gradually decreases toward the wing tips. I always use spruce, Alaska cedar, fir, or equivalent spar caps, and taper them by at least two to one in each dimension. For instance, in a recent hot-dog aerobatic sport design of mine, the wing spar caps were 3/8 wide by 1/8 deep in the center, tapering to

1/8 wide by 1/16 deep at the tips. These spar caps weighed approximately half of what untapered caps of the same strength would have. The shear webs were also of less thickness near the tips, further reducing the weight.

Always try to run the spar caps straight through from wing tip to wing tip without a center joint, for low weight and unquestioned strength. Therefore, if you are building more than four-foot wings, don't buy your spar caps in the model shop, cut them from a piece of lumber. Making big-bird wings in two pieces for transportation, costs a lot in weight, unfortunately.

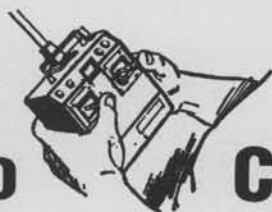
TAPERED WINGS

Pattern models have tapered wings. I always design tapered wings for my sport aerobatic models, for these reasons: They look better, they are more efficient aerodynamically, they make possible higher roll rates and better snap rolls, and they can be made lighter (Don't make the taper ratio too severe, or you will invite tip stall when you don't want it). The reason tapered wings can be lighter is that the center of area and therefore the spanwise center of lift of each wing panel is closer to the fuselage than for a rectangular wing, therefore the wing spar doesn't have to be as strong. Sure, tapered wings take longer to build, but for my objectives they are worth it.

PARTING WORDS

If I make this any longer our Editor will beat me, but someday we will talk about leading and trailing edges, and ribs. Meanwhile, light is right. Don't add weight. See the light and build light. If a part or an area never fails, you are probably building it stronger than it needs to be, therefore, too heavy.

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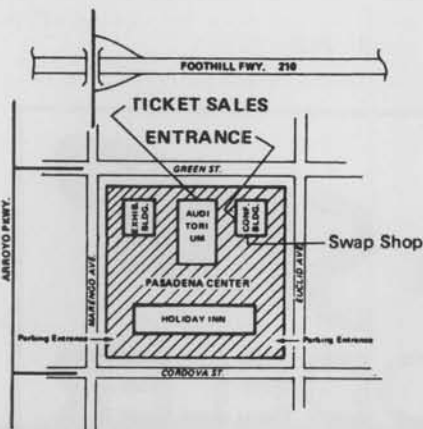
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FREE FLIGHT cont. from page 92

dope bottle on its side, the height of a small dope bottle standing upright, and the height of a big dope bottle. Anyone who needs a more incremental system is pretentious.

WEIGHT OF BALSA: In my workshop, there are three weights. There is that which is so stiff that it can't be cut with a razor knife. When I find that kind, I use it for shims to level furniture. There is also that which is so light that it tears with the blade of a used razor knife, and one has to use a new blade. That's the best stuff. And then there's the rest, which is most of what I have.

SIZE OF BALSA STICKS: In my workshop, 3/32 square is the universal size. Anything smaller, I put my fingers through the structure several times before it's finished. Anything larger, I can glue some 3/32 together. Why buy odd sizes?

SIZE OF WORKING SURFACE: In my workshop, a one-foot-square area. That's not what I would prefer, but the way Fate has decreed. If I'm about to build a big model, I clear my workbench. But within an hour of starting, the workbench is so littered with tools, dope bottles, beer cans, and so on, there I am again working in a one-foot-square area.

RATE OF BUILDING: In my workshop this is a variable, depending upon whether there is a Spaghetti Western, Arnold

Schwarzenegger, or Australian Road Warrior movie on the tube. If I removed the TV, I would build a lot more, but what's the point? I already have the garage ceiling filled with dogs that don't have the grace to fly away.

LENGTH OF STICKS CUT TO FIT: In my workshop, there is only one length, but two approaches to achieving it. The first is to cut the piece too short at the outset. The second

The social aspect of my workshop: In my workshop, I am KING! I can escape my responsibilities and do unsocial things...

is to cut the stick too long and then sand it too short. With either approach, in my shop, the length of a stick cut-to-fit is too short.

GLUING WITH CYANOACRYLATE: In my workshop, I'm safe if I glue parts pinned to the building board. But if I try to glue parts held in my hand, there are two possible outcomes. One is, my fingers get glued together. The other is, my fingers get glued to the airplane. In the latter case, I usually destroy a goodly piece of the airplane getting my fingers free. I consider the result

skillful if only my fingers are glued together.

KEEPING CA FROM CLOGGING IN THE TUBE: In my workshop, I have followed a dozen tips concerning how to keep CA from clogging in the tube, but I've never managed to completely empty a bottle, except for the time that I damned well was going to get that last bit out, and I did, all at once in the middle of the building project.

THE SOCIAL ASPECT OF MY WORKSHOP: In my workshop, I am KING! I can escape my responsibilities and do unsocial things, like watching an Australian Road Warrior movie while I glue myself together. Except that my family uses my workbench for putting away anything that needs putting away in the garage, because that one-foot-square area is the only free horizontal space in the garage. And, except that we installed an intercom (bad idea!). Ah, me! Well, at least in my workshop, I am king when I've cleared the rubbish from my one-foot-square space, and the family is asleep. Then, I can watch an Australian Road Warrior movie and glue myself together. Then life is sweet!

AGAIN THE END

Thanks for sticking with me through another "Free Flight" column. I hope you are planning your building projects for the upcoming winter months. I am. I'll share them with you as the time goes on. I wish all of you good thermals until we meet again next month. **MB**



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