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WORLD'S MOST COMPLETE MODEL AIRCRAFT PUBLICATION

PRODUCT REVIEW:

**HOBBY DYNAMICS'  
SPORTEE 40**



MAY 1992

## *Gee Bee* R-2 TEST FLIGHT REPORT



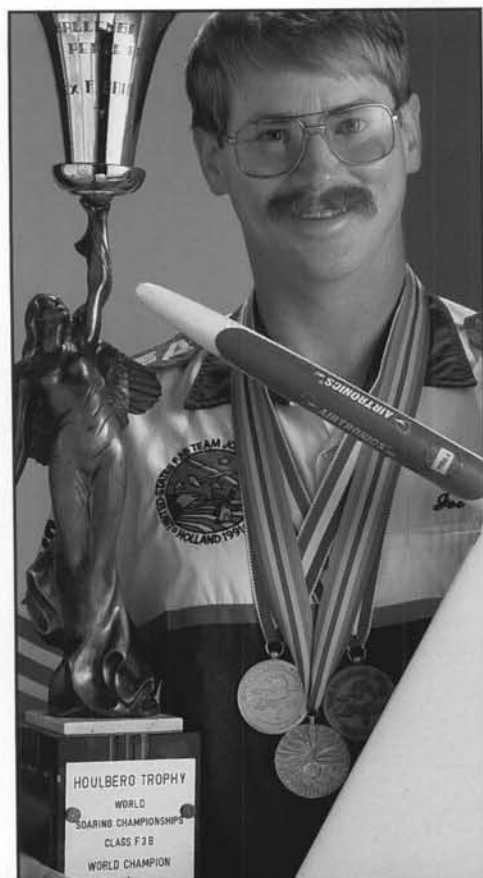
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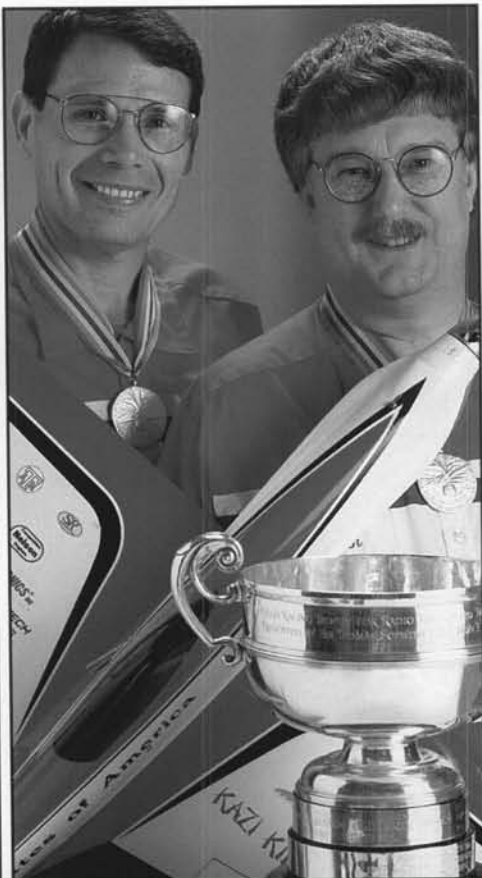


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# MODEL BUILDER

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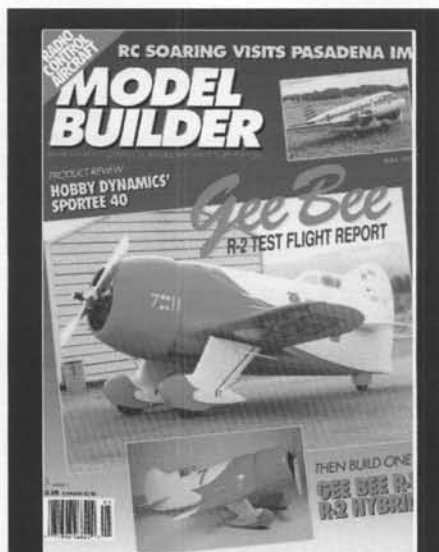
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### ON THE COVER

One of the most exciting aviation events in recent years took place on December 23, 1991, when pilot Delmar Benjamin took to the air in a full-size Gee Bee R-2 Super Sportster replica—story on page 44. Top insert: Beautiful Giant Scale DC-3 was one of the truly exceptional entries at the 24th Tangerine Internats—see page 21. Bottom insert: As if the big Gee Bee R-2 wasn't enough, we're featuring construction plans for a model of the Gee Bee R-1/R-2 Hybrid—see page 42.

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# BILL NORTHROP'S WORKBENCH



A little over 20 years ago, back in '69, '70, '71, the most unbeatable flier in the then fairly young hobby of RC soaring, at least in the very competitive Southern and Northern California areas, was Rick Walters. A gangly 6'-4" youngster, Rick looked like what he was, a high school varsity basketball center, and many of the other RC glider guiders who flew against him were wishing he would either dribble off into the sunset or pay more attention to girls. When he showed up at a contest, the only competition was for second place on down!

The plane Rick flew at most of these events was one in his series of designs called "White Trash," a straight-lined, squarish looking, easily constructed model that could have been created by Fred Megow as an addition to his 25-cent kit line. Obviously, to take nothing away from "WT," it was truly the "nut on the end of the sticks" that made the airplane find thermals when there were none around, and generally outperform the many fancier and more expensive designs flown by other competitors. (*Model Builder* published the "White Trash" construction article in its fourth ever issue, January 1972, and the plan is still available.

So why bring this up now? To tell you that Rick hasn't changed at least one of his habits after all these years. Fred Walters, Rick's father, just sent us the following note: "I'd like to report that my son Rick, who flew RC gliders in the early '70s and who you and Le Gray wrote about in *MB*, is now the United States National Champion in big 15-meter sailplanes. He might be on the U.S. team to the 1993 Internationals in Sweden."

Well . . . Rick is still not unaccustomed to winning . . .

## THE SWAN IS HUMMING...

. . . But not singing. Back in the December 1991 issue of *Model Builder*, in this column, it was announced that as of September 26, 1991, Gallant Models, Inc. was taking over

command of RCMB Publications. As we are writing this column, four months have gone by, and this will be the fifth issue published since the changeover, all 1992 issues. We are pleased with the way the transition has been made, and also with the appearance of the magazine. We hope our readers are bearing with the changes, as well as noting that free flight and control line, along with the assortment of radio control subjects, are still holding their respective portions of editorial quantity and quality.

We're extremely proud of the contributing editors whose works have appeared in our magazines over the years, and have enjoyed associating with all of them. In our mind, they represent the cream of the crop!

Our basic plan at the time of ownership change continues; to gradually phase out of the everyday chores, deadlines, and responsibilities of publishing and editing . . . with the hope of retiring and being able to once again resume living, breathing, and participating in the hobby that has been a part of our life for—why hedge about it?—60 years (on September 14, 1992, we'll hit the big seven zero).

Phil Bernhardt, whom many of you will recognize from previous association with us in past years, has assumed the yeoman's burden in his new position of Managing Editor. Many of you will see Phil at shows and flying events in future months—continue to present him with your ideas, tips and suggestions.

And if you wish to contact him, note the new address: 34249 Camino Capistrano, Capistrano Beach, CA 92624. We'll publish a new phone number as soon as the #@\$%^&! phone company installs the service!

Besides our continued presence with *Model Builder*, we'll be continuing our personal contact with many of you through two mediums: the IMS shows and NASCO. The IMS shows, which are not a part of Gallant Models, but are a sepa-

rate corporation, will continue under the leadership of Anita Northrop, with my two cents stuck in when needed. At present, these annual shows include Pasadena, California in January; Orlando, Florida in May (Orange County Convention/Civic Center, 9800 International Drive); Chicago/Milwaukee (coming back in 1993); and . . . well, it's too early to tell you about the fourth one, but it's in the works!

And NASCO? That's Northrop Aeromodelnautic Supply Co. (in fond memory of, and with all respect to Frank Zaic's famed Junior Aeronautical Supply Co., JASCO), through which we will be offering selected construction plans for various types of models, including our own aircraft designs, Charlie Smith's scale aircraft, antique and old timers, vintage RC, free flight rubber and gas, and others. There may also be some specialty items for those who still enjoy *building* models instead of assembling them. See us at the trade shows.

You can contact us through either IMS or NASCO at the same address and phone: P.O. Box 10127, Costa Mesa, CA 92627, phone (714) 723-6057 (if no answer, wait four rings for the answering machine), Fax (714) 723-0913.

## CORRECTION

In the February 1992 "Workbench" column, page 86, at the end of the piece entitled "Important Notice," part of the phone number for Loren Nicholson, of the Orange Coast Radio Control Club, was blocked out and incorrect on the area code as well. Loren's number is (714) 544-4550. If you missed reading this piece the first time around, go back and review it right now, as it deals with an extremely important subject: The future of hobby activity at Mile Square Park, one of Southern California's most popular RC and FF flying sites.

Hope to see you in the very near future, and we'll be back to visit this "Workbench" from time to time. **MB**



Photo taken by Stu Richmond in the "Workbench" home office. Red silked Korda Wakefield still awaiting completion (note wing hanging on door). In Bill's left hand is the "Cloud Chaser," an old timer outdoor rubber stick design by Bruno Marchi from 1938 *M.A.N.* Warning: Do not fly this thing on a warm day without a D.T.! Blue and yellow "Pacific Ace" also hanging on door.



# DEAR JAKE

## Advice for the Propworn

### DEAR JAKE:

Whatever happened to the good old days of nickel gliders and 25 cent plastic kits? This past Christmas it cost me \$1.89 to put a balsa and plastic, rubber band powered "Frantic Flyer" in my grandson's stocking. The same thing, made with better wood and real strand rubber, cost 15 cents when I was a kid, and it flew better!

Have you seen the cost of silk and dope lately? It's no wonder everybody uses the iron-ons, and they're not cheap either. And motors! I could have put a

straight six in my '47 Plymouth for what it costs for a tuned pipe .60 nowadays. Not that I could afford the fuel, anyhow. Thirty bucks a gallon, what an outrage!

Not to mention balsa wood! Do you have any idea what a house would cost if it was built of balsa wood? How about five or six million? Not counting the plumbing! Ecuador is supposed to be an impoverished country. Hah! With what we pay for balsa, they should be buying out the Arabs!

A. Titus Huber, Ohio

Dear Mr. Titus:

*I bet you've still got the first dollar you ever borrowed.*

Jake

### DEAR JAKE:

Is it true that Tommy Smith has been selected as a poster child for adhesive abuse?

Edgar in Eagle's Nest, WY

Dear Edgar:

*No, but in March and April,*

*Tommy was stuck to a poster for a truck and tractor pull.*

Jake

### DEAR JAKE:

You have written in the past about Emotional Torque (a pull between the Earth and attractive airplanes which causes them to spiral in and crash) and Kinematic Ugliness (a repulsion between the Earth and eyesore airplanes which causes them to last forever).

I wholeheartedly believe in these two phenomena. Every gorgeous airplane that I've ever spent hours and hours creating has lasted about as long as it took the paint to dry, while every thrown-together toad of an airplane I've ever had has outlived dirt.

I think I have isolated two additional forces that also play a role in determining an aircraft's life expectancy. They are Dyne to Improve It and Benign Neglect.

Dyne to Improve It is a unit which measures the energy stored in the airframe whenever you tinker with it. This energy doubles when the work you do is unnecessary, i.e., when you fix something that ain't broke. When this energy reaches a critical level, it discharges through the atmosphere, usually creating a radio glitch of sufficient duration to crash your airplane.

Benign Neglect, as the name implies, is maximized when you care so little about your airplane that you completely ignore it. Benign Neglect builds up in the airframe, and in large enough quantities, counters any tendency toward functional anomalies which would draw attention to the model. The result: uninterrupted, incident-free flights.

All these forces are interconnected. Obviously, the Emo-

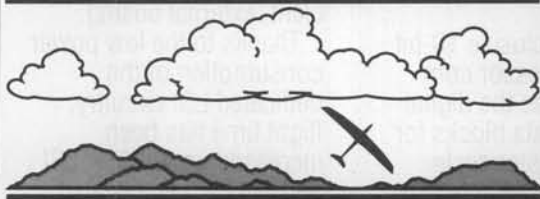
*continued on page 86*

## Just when you thought it was safe to stop building for the soaring season...

# 1992

RC Soaring  
Reference  
and  
Catalog

## Northeast Sailplane Products



Price: \$5.00

Northeast Sailplane Products  
16 Kirby Lane  
Williston, Vermont 05495

## NSP's 1992 Catalog hits the presses!

Northeast Sailplane Products carries the most comprehensive line of RC Soaring kits and accessories in the market today. The NSP catalog is a compilation of information on RC soaring kits and related products, as well as how-to information and articles from some of the most prominent figures in the RC Soaring industry. If you are at all interested in RC Soaring, then the NSP catalog is a reference you must have!

### TAKE A LOOK AT SOME OF THESE FINE NSP PRODUCTS!

Pinnacle Hi Start



Alcyone Open Class Soarer



Sparrow Sloper



To receive a copy of our catalog via first class mail, please send check or money order for \$5.00 plus \$2.00 postage and handling (\$7.00) to Northeast Sailplane Products:

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

# OUR PCM OUR PCM 1024

It's time to take the misconceptions and mystery out of PCM 1024 and replace them with facts.

But first, a little history.

You may know that Futaba introduced the first PCM, or Pulse Code Modulation, radio control systems in 1984 with our 8SGA-P and 8SGH-P systems. Originally developed for interference-free satellite communication, PCM provided R/C enthusiasts with revolutionary efficiency and accuracy.

This first generation PCM, which we named PCM 512, proved extremely popular, eventually being copied by virtually all other R/C manufacturers.

PCM 512 systems remain an important part of the Futaba line, and with constant refinement their performance and popularity is better than ever.

But PCM 512 is not PCM 1024.

## NOTHING COULD BE FINER.

Futaba's PCM 1024 has twice the resolution of the PCM systems available from other radio manufacturers. As the name implies, PCM 1024 digitally segments the 90 degrees of maximum servo travel into 1024 bits, each precisely 0.05 of a degree.

Conventional PCM systems have just 512 segments per 90 degrees,

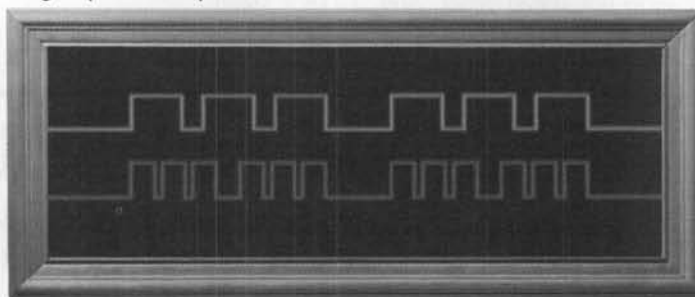
or 0.1 of a degree per segment.

Now that may seem like splitting hairs, but when you're knife-edging along at 100+ miles per hour, those are hairs you may want to split. With PCM 1024, servo action is so smooth that the segments are indiscernible to the naked eye. In addition to being smoother, 1024 offers more precise control and reduced angular error for exacting maneuvers and high speed competition.

More simply put, by designing our own LSI chip, we are able to cram more information into the same amount of time. Again, we're splitting hairs, or in this case, microseconds. But why wait?

With PCM1024, you move the control stick and the servo reacts. You don't have to appreciate art to like that kind of response.

## BUSING, INTEGRATION AND EFFICIENCY.



PCM 1024 packs twice the data into the same time frame as PCM 512

## FAST FRAMING. NO WAITING.

On the topic of speed, one of the most common misconceptions about PCM is that there is a delay, or lag in control stick-to-servo response. While this was true of the earliest PCM systems, PCM 1024 provides instantaneous response.

Futaba's exclusive 10-bit microprocessor compresses the digital data blocks for faster cycle repetition, providing a frame rate that is twice as fast as conventional PCM systems. Have we lost you yet?

It is a fact that older PCM systems required more current to operate their receivers, and that is where our exclusive LSI technology comes into play.

LSI, or large scale integration, combines the CPU-Memory-Input/Output Controller into one unit instead of three to eliminate the need for inefficient, external busing.

Thanks to the low power consumption of the dedicated LSI circuitry, flight time has been increased up to 25%. LSI and SMT assembly also reduce the size and weight of the receiver, further increasing the efficiency of the total airborne package. In fact, the R129DP/PCM



PCM 1024(right) provides virtually stepless servo action by dividing rotation into 1,024 individual angles, each just five hundredths of a degree. That gives you the extra edge in accuracy and precision control.



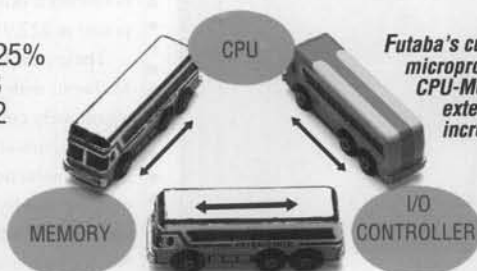
# IS THE BEST. IS EVEN BETTER.

1024 receiver is 25% lighter than our 8 channel PCM 512 receivers of just a few years ago.

## CHOICE OF CHAMPIONS.

The list of World and National Champions selecting PCM 1024 for competition is impressive and growing by the day.

In aircraft, USA Pattern Team members Bill Cunningham, David Von Linsowe and Canadian Ace Ivan Kristensen fly exclusively with 1024, as do international stars like Wolfgang Matt and Giichi Naruke. World F3C Champion, Yukihiro Dobashi, Robert Gorham and Wayne Mann are among the many top chopper pilots to choose 1024. And World Champion drivers Tony Neisinger and Kent Clausen and National Champions Rick Hohwart and Ralph Burch Jr. have taken PCM 1024 to the winner's circle countless times. When performance counts, these experts all count on Futaba PCM 1024.

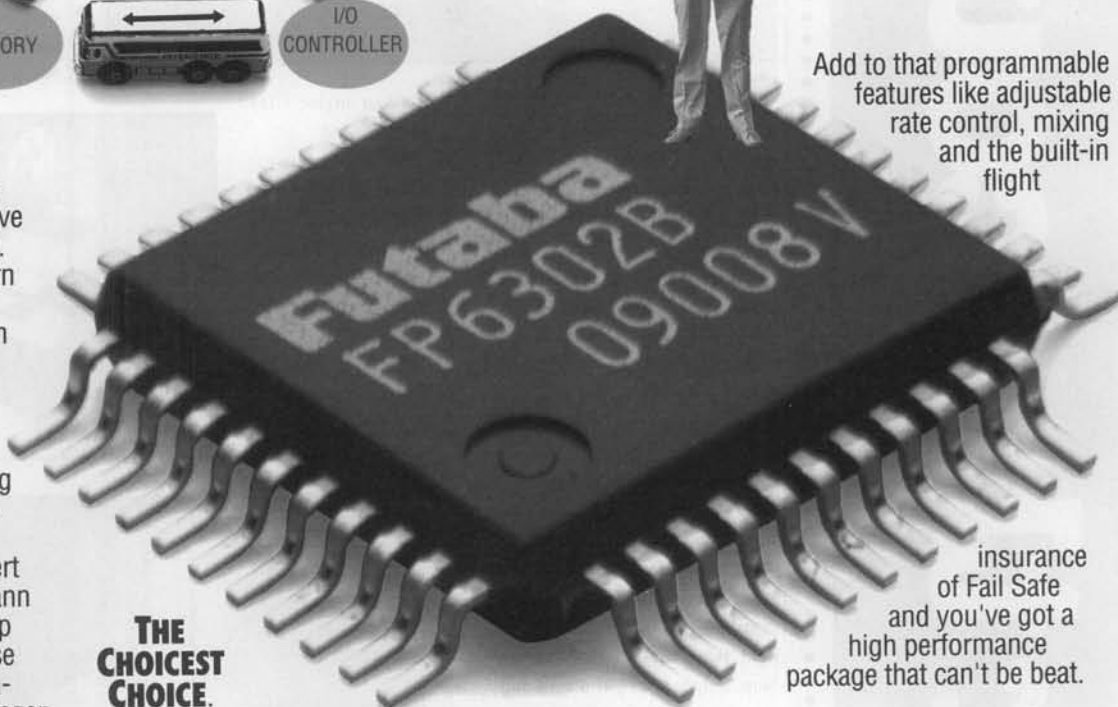


*Futaba's custom PCM 1024 microprocessor eliminates CPU-Memory-I/O controller external busing to increase efficiency.*



*Superstar pilots like Ivan Kristensen and World Class racers like Ralph Burch, Jr. are among the many top competitors relying on PCM 1024.*

Add to that programmable features like adjustable rate control, mixing and the built-in flight



## THE CHOICEST CHOICE.

Futaba PCM 1024 is available in a wide selection of complete systems to suit the requirements of all types of RC hobbyists, from beginner to old pro. 9, 7 and 5 channel aircraft, 9 and 7 channel helicopter and 3 channel dual stick or

pistolgrip 1024 systems give you the perfect choice of the perfect pulse. 3 and 9 channel 1024 receivers, and special high resolution servos, like the new, coreless S9000 series let you easily expand and customize your system.

insurance of Fail Safe and you've got a high performance package that can't be beat.

## THE PERFECT PULSE IS PERFECT FOR YOU.

Now you know the real story behind the most advanced PCM systems money can buy. PCM 1024 is the ultimate in servo resolution, frame rate speed and technology. And PCM 1024 is only available from Futaba, the World Leader in Radio Control.



*From the contest-proven 9VAP to the brand new 3UCP, Futaba gives you a wide range of purpose-built PCM 1024 systems to choose from.*

# Futaba®

**FUTABA CORPORATION OF AMERICA**

P. O. Box 19767/Irvine, CA 92713-9767

# 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.

## CONCEPT 30 SR HELICOPTER

The Concept 30 RC helicopter, manufactured in Japan by Kyosho in a handful of different versions, has established itself as one of the

- helicopter, shell out another \$19.95 (plus shipping) for the Concept 30 clutch installation removal tool
- produced by Z Enterprise, 4155 Eastlake Rd., Muskegon, MI 49444.
- The hex-shaped tool clamps tightly



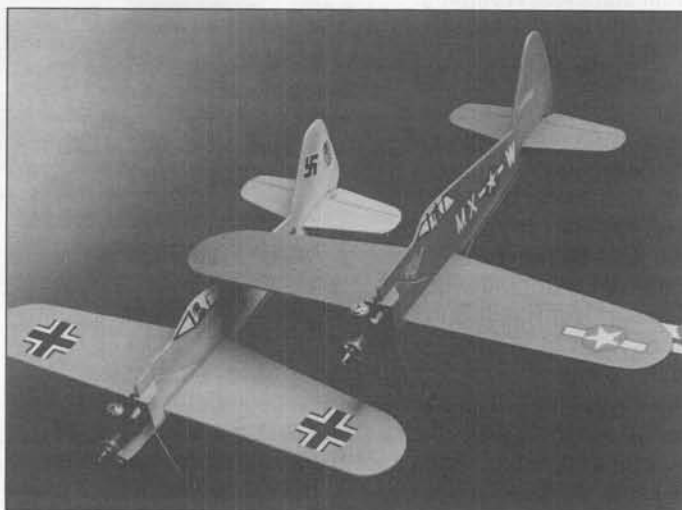
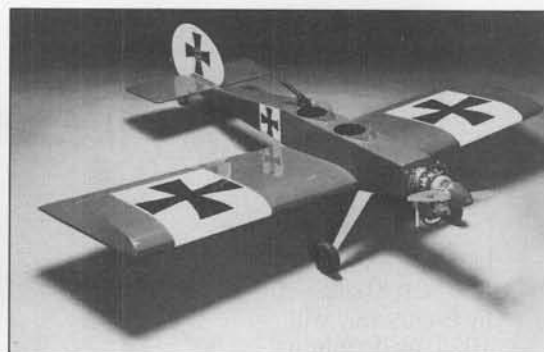
best and most popular 30-size RC helis ever produced. Great Planes Model Distributors, who imports the machine into the U.S., sends word that they are now handling the latest version of the Concept: the Concept 30 SR, an upgraded version of the Concept 30 SX, which is no longer available. Changes incorporated into the SR include a slightly longer tail boom and main blades, metal pivot balls everywhere except on the tail, a stronger and stiffer servo frame, stiffer landing gear and rotor head, a taller main shaft, and a whopping 24 degrees of total main rotor pitch angle... all of which is said to contribute toward smoother forward flight, better autorotations, easier setup, longer lasting linkages and fewer boom strikes. It's a real hot-dogger's dream, designed for .32-.34 heli engines and five-channel heli radios.

Suggested retail on the new Concept 30 SR is \$569.95. More info: Great Planes Model Distributors, P.O. Box 9021, Champaign, IL 61826-9021; (217) 398-6300.

## NIFTY CLUTCH TOOL

Now that you've shelled out the bucks for the new Concept 30 SR

to your engine's 1/4-28 threaded crankshaft, allowing the supplied spanner wrench to exert all of its force against the clutch alone. No possibly damaging force is applied to the crankcase, crankpin, conrod or piston, as in most other commonly seen



methods of clutch service. Don't forget to tell Franklin Zadonick (the "Z" in Z Enterprise) you read about his company's product in *Model Builder*!

## NEWS FROM MIDWEST

For beginning CL fliers, Midwest Products is coming out with its new "Famous

- Fighters of WWII" series of profile 1/2A ships, all designed for Cox reed-valve .049s. The series includes the P-47 Thunderbolt and Focke-Wulf FW-190 shown in the accompanying photo, as well as a Japanese Zero and F4U Corsair. All span 21-1/2 inches, and all but the Corsair are considered skill level 1 kits and sell for \$19.95; the Corsair, on account of its inverted gull wing, is labeled a skill level 2 kit and is priced at \$22.95.

These new kits are typical Midwest, with precise die-cut parts, a genuinely complete hardware package, full-size plans, Success Series instructions that include painting and flying tips, and colorful self-adhesive decals. Novice builders, even first-timers,

should have no trouble whatsoever getting any of these simple models in the air in short order.

At the other end of the size spectrum is Midwest's "Giant Sweet 'n Low Stik." As the pic shows, it's a variation on the Ugly Stik theme, a big low-wing taildragger designed for up to 2 cu. in. gasoline engines or 240 to 270 size four-stroke twins. Span is 86





inches, with a flying weight of around 17 pounds. The airplane sports a thick semi-symmetrical airfoil for almost trainer-like flight



characteristics—all in all, this ship sounds like an excellent way to get started in the field of Big RC.

The folks at Midwest advise that these \$249.95 kits are being produced in limited quantities, so if you're at all interested, don't wait too long to examine the kit first-hand at your local hobby shop. The Giant Sweet 'n Low Stik is produced by Midwest Products, 400 S. Indiana St., P.O. Box 564, Hobart, IN 46342; (219) 942-1134.

### MINI SERVO

Futaba's new FP-S3002 servo is intended particularly for use in sailplanes, small helicopters and other models requiring high torque from a compact package. The S3002, which lists for \$79.95, puts out 45.9 oz./in. of torque and uses metal gears for extra strength, yet measures only .62x1.21x1.18 inches—the same size as Futaba's S9601 coreless mini servo, which shares the same case. Transit time is listed at 20 seconds for 60 degrees of travel. Other features include a waterproof and dustproof case, and a shock and vibration resistant potentiometer. From Futaba Corp. of America, 4 Studebaker, Irvine, CA 92718.

### NEON COVERING FILM

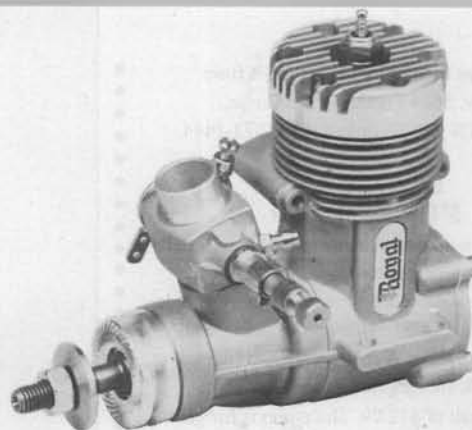
Coverite has expanded its still relatively new line of 21st Century Film by adding six new high-visibility *neon* colors—neon yellow, neon blue, neon red, neon green, neon orange, and neon pink—bringing to 18 the total number of colors being offered. The new neon colors go for \$17.95 for a 27x72-inch roll. Check out the new colors at your favorite hobby dealer, or if you'd like to find out more about 21st Century Film in general, contact Coverite, 420

Babylon Rd., Horsham, PA 19044; (215) 672-6720.

### PROP DRIVEN F-14

The engineers at Great Planes Model Mfg. have done a creditable job of coming up with a jet-like, propeller-driven RC model designed to appeal to modelers who are intrigued by today's ducted fan jet models but who are put off by the complexity and high cost. The Great Planes model is loosely patterned after the F-14 Tomcat, and although they've taken some major liberties with the scale outline, there's no denying the model does retain the general appearance of the full-size aircraft.

Despite its looks, however, the Great Planes Tomcat is a completely conventional RC model aircraft—it uses a standard .60-.75 two-stroke mounted in the nose and swinging a standard tractor prop, and is basically of standard balsa and plywood construction. Span is 58-1/4 inches, and the controls used are the normal four (plus a fifth for retracts, if you really want to do it right). No kit price was mentioned, but you can get this and any other info you may need by contacting Great Planes Model Mfg. directly at



P.O. Box 788, Urbana, IL 61801; (217) 367-2069.

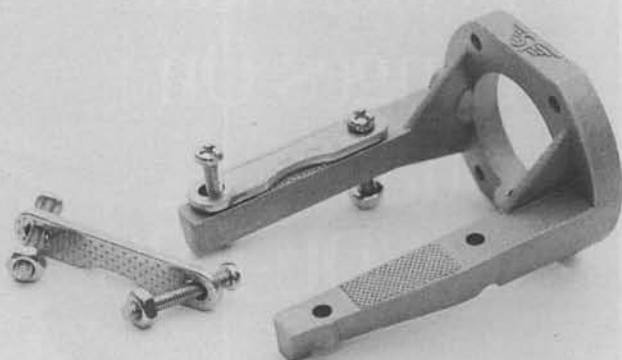
### ROYAL .46

Royal Products is producing a new longer-stroke version of its .45 RC engine, bumping it up to a .46 that delivers more torque and is

Denver, CO 80217-5026; (303) 778-7711. Suggested retail on the new Royal .46 is \$124.95.

### UNIVERSAL ENGINE MOUNTS

One of the many unique and interesting items described in



therefore able to swing a higher pitch prop at the same rpm as the old .45. The new .46 retains all of the .45's desirable features, including an ABC piston/liner, dual crankshaft ball bearings, and a directionally adjustable muffler with a removable noise baffle. We assume the new .46 is a drop-in replacement for the .45—same physical size and mounting bolt

Hobby Lobby's just-released Catalog 19 is the Clamping Engine Mounts, a kind of "universal" type mount offered in two sizes, 1-3/8 and 1-11/16 inches between the beams, and which require no drilling for the engine mounting bolts. That's because no such bolts are used; the engine's mounting lugs are instead *clamped* to the beams with heavy steel plates. Makes for quick engine mounting, removal and thrust adjustments. The mounts themselves are cast from an aluminum/zinc alloy and can be drilled for a steerable nose gear strut with the engine either upright or side mounted.

We received our office copy of Hobby Lobby's new Catalog 19 just before going to press, and can honestly say it makes for some fun, interesting reading. You can get

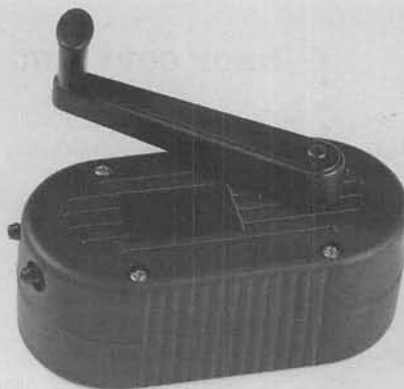
pattern—and that the .45 will be discontinued, but you can verify these for yourself by writing or calling Royal Products Corp., P.O. Box 5026,



your own copy merely by requesting it from Hobby Lobby, 5614 Franklin Pike Circle, Brentwood, TN 37027; or call (615) 373-1444.

### MANUAL FUEL PUMP

Hobby Dynamics has come out with a geared manual fuel pump that combines both compact size and high volume into one package. It's made of durable glass-filled nylon and works in both forward and reverse. A fuel nozzle and filtered fuel can clunk are included as well, for a suggested retail of \$12.99. The pump is for glow fuel only, and should be available in shops by the



### KWIK HINGES

## When High Performance Hinges On Quality, Get DU-BRO.

DU-BRO's Kwik Hinges assure smooth flight control and easy installation. Hinges are simply inserted by using a hobby knife to make a slot into the wood. Kwik Hinges consist of a super thin, extremely strong material featuring 140 glue pockets per side. The combination of glue pockets and C/A glue offers a secure bond to your aircraft. Sizes are available in either (24)  $\frac{3}{4}$ " x 1" pre-cut hinges or in (2) 2" x 12" sheets allowing you to cut your own.

For a Free Catalog send \$1 for shipping & handling:

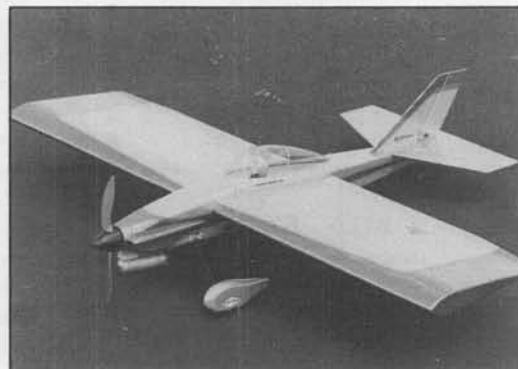
**DU-BRO**

DU-BRO Products • P.O. Box 815 • Wauconda, IL 60084

time this issue comes out. It's being distributed by Hobby Dynamics Distributors, 1405 Fieldstone Rd., Champaign, IL 61821; (217) 355-0022.

### "WILD THING" MODS

Ron Eigenschink is the head man at Precision Aero, a kit manufacturer located in Oconomowoc, Wisconsin. Among that company's kits is a sport RC ship called the "Wild Thing." Ron recently wrote to say that Precision Aero is now producing



a dress-up kit that transforms the Wild Thing into a sort of pylon racer look-alike; a look at the photo confirms it's a pretty slick looking ship. Included in the kit are landing gear, wheel pants, canopy, tail wheel setup, wheels, a pilot figure and instructions, all for \$19.95 plus \$4.50 S&H. An information package on the Wild Thing and the other Precision Aero kits is available by sending \$3.50 to Precision Aero, 1561 River Highlands Dr., Oconomowoc, WI 53066.

### GODFREY'S EXTRA 300

The incredibly powerful full-size Extra 300 competition aerobatic aircraft is now being offered as a 1/4-scale replica, both in kit form and framed up, from Bob Godfrey of Precision Aviation Design. With a span of 80 inches, area of 1113 squares and flying weight around 16 pounds, the model should be an equally spectacular performer when powered with something on the order of an O.S. 300 or piped Webra Bully, as was the prototype.

Some of the Extra 300's noteworthy design

*continued on page 54*



### Tools

TAO001A	Taig Lathe	269.00
HLAE801	Solingen Balsa Planer	7.40
HLH625	Balsa Stripper	12.60
HLMO0002	Modelers pins, 50.	3.40
HLPS111	Permanent sanders set	33.40

### Building Boards

GR503	Laminated balsa 50 x 13"	43.50
GR645	Unitized balsa 39 x 10"	26.60

### 2x4 Connectors to make workbench, shelf

HLKE300	Workbench set	22.90
HLKE200	Storage unit set	39.90

### RC airplanes, glow powered

HLA121	1:4 Scale Cub	228.00
HLA128	DH82A Tiger Moth	209.00
HLA3731	Golden Eagle Biplane	226.00
HLRM1480	Romeo	139.00
HLSC232	Taurus Plus	309.00

### Telemasters, Funster

HLA105	Telemaster 70 ARF	174.00
HLA107	Senior Telemaster	135.00
HLA111	Telemaster 40	79.50
HLA112	12"6" Telemaster	339.00
HLA108	RCM Funster	79.80

### RC electric sailplanes

HLA130	Freshman	39.00
HLA131	Graduate	59.00
HLSC204	Excel WS 10	148.00
GR4207	Elektro-UHU (1.9M)	88.00
GR4208	Pink	105.00
GR4264	ASW 22 B270	279.00
GR4266	ET 200 RTF	127.00
GR4270	Elektro Junior ARF	179.00
GR4271	Cherry ARF	238.00
GR4274	Solar-UHU	128.00
HLA1324	Sinus	284.00
HLA1328	Sunfly	368.00

### RC Electric fast boats

GR2175	Taifun hydroplane	99.00
GR2118	Systems	89.00
GR2166	Cobra	52.00
GR2171	Key West	49.00
GR2173	Eco-Speed	59.00
GR2174	Key Biscayne	99.00

### Electric RC airplanes

GR4675	Race Rat racer	77.00
GR4678	Fokker E.III	99.00

GR4681	Zoff	97.00
GR4684	Partenavia P.68	118.00
HLAN1329	Aerofly	138.00

### RC Sailboats

GR2116	Miramare	326.00
GR2169	Collie	119.00
HLKK1423	Tina	138.00

### RC Steamboats

GR2126E	Glasgow (electric)	389.00
GR2126S	Glasgow (steam)	569.00
HLKK2026	Victoria steam	587.00
HLKK2028	Alexandra steam	568.00

### RC scale boats

GR2147	Bugsier tug	177.00
GR2160	Pegasus	276.00
GR2163	Sea Commander	167.00

### Complete hi-start outfits

HLH721	for under 2 meter	85.00
HLH722	for 2-3 meter	97.10
HLH723	for 3-4 meter	125.20

### RC helicopter

HLA400	Sport 500	199.00
HLA401	Sport 500 with collective	285.00
HLA404	Sport 500, assembled	412.00

### Snow skis for RC airplanes

HLBB160	6" single	11.75
HLBB180	7" single	12.75
HLBB200	8" single	13.75
HLBB240	9-1/2" pair	35.70
HLBB270	10-1/2" pair	38.25
HLBB300	11-1/2" pair	40.80

### Kavan starter

HLFK111	Kavan starter	25.90
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### "PFM" adhesive

HLIMP001	"P.F.M." adhesive-seal	9.95
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### CO<sup>2</sup> Motor

HLMO3700	CO <sup>2</sup> Motor	36.30
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### Merco Engines

MER30D	30 RC Diesel	99.00
MER30RC	30 RC Engine	65.00
MER35RC	35 RC Engine	67.00
MER40RC	40 RC Engine	69.00
MER50RC	50 RC Engine	112.00
MER61RC	61 RC Engine	114.00

### Hobby Lobby Videos

VIDEO1	UHU, Elek, Jr., Pink	9.00
VIDEO2	Sunfly, R. Rat, Hi-Speed	9.00
VIDEO3	Freshman, Graduate	9.00
VIDEO4	Key West, Systems, Cobra	9.00
VIDEO5	Telemasters	9.00
VIDEO6	Taifun, Key Biscayne	9.00
VIDEO7	Sport 500 helicopter	9.00
VIDEO8	Sailboats, Tina, Miramare	9.00
VIDEO9	ASW 22 B270, Excel	9.00

### Hobby Lobby's ORACOVER Plastic Covering

78" long, 24" wide rolls:

HLOR00	Clear	7.97
HLOR10	White	7.97
HLOR11	Lt. Grey	7.97
HLOR12	Cream	7.97
HLOR40	Green	7.97
HLOR42	Light Green	7.97
HLOR50	Blue (Medium)	7.97
HLOR52	Blue (Dark)	7.97
HLOR53	Blue (Light)	7.97
HLOR71	Black	7.97
HLOR81	Brown	7.97
HLOR20	Red (Dark)	8.97
HLOR22	Red	8.97
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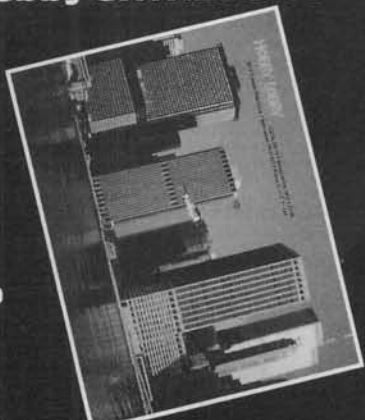
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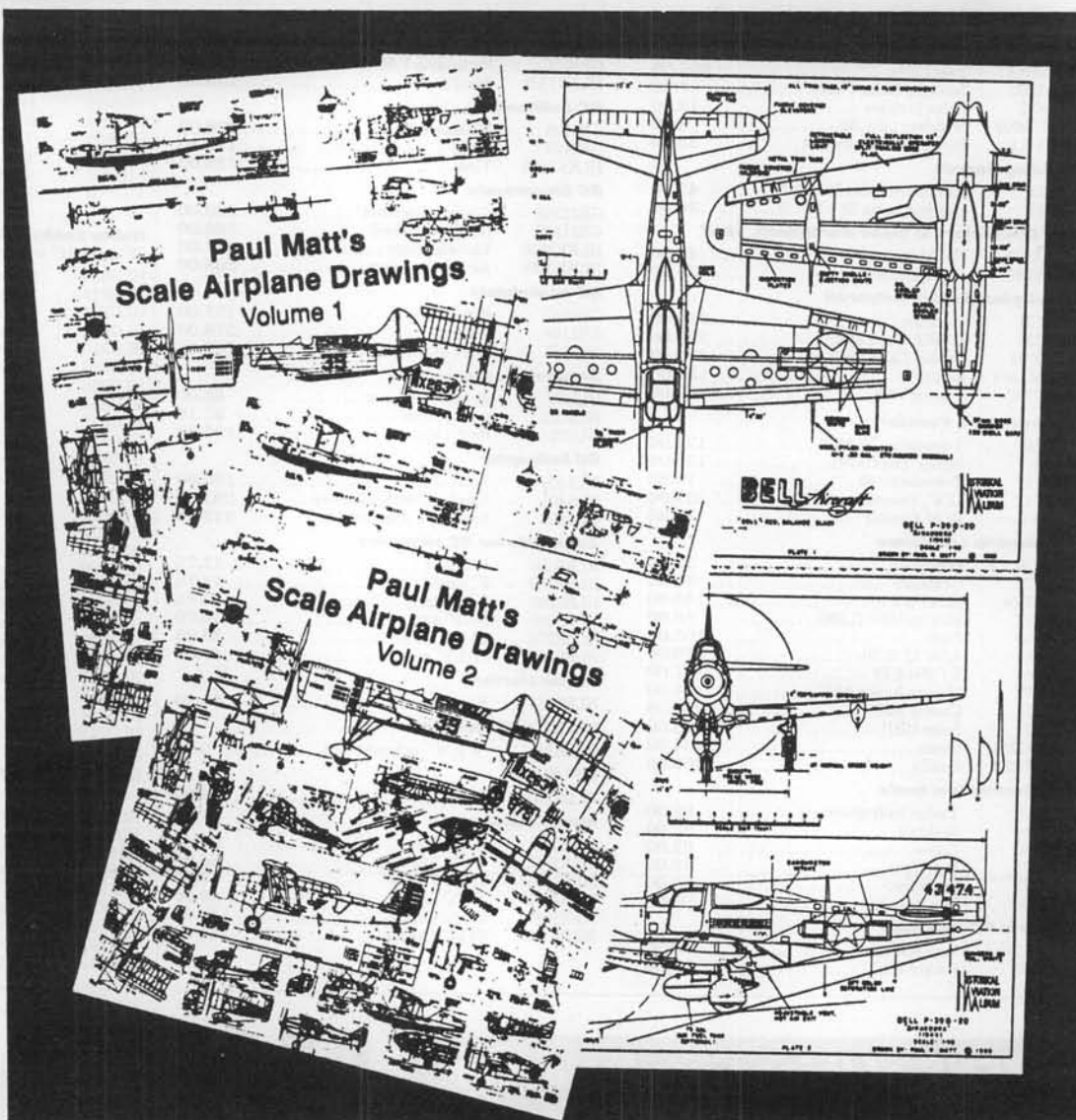
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## MULTI-CHANNEL ELECTRONIC CONTROLS II

**T**here's always a lot going on at a model airplane contest, but for many people, their earliest memories of contest scenes involve the replicas of full-scale aircraft that we refer to as "scale models."

As a Pacific Northwest flier, my most vivid scale memories revolve around the Memorial Day contest known as the Northwest Regionals. On a brilliant Saturday in 1977, the sight of a twin-engine bomber lumbering into the air with master scaleman Orin Humphries at the handle opened my consciousness to the possibilities of scale modeling realism. Slides I took that day show the bomber in flight from an angle that make it impossible to tell the model from the real thing.

And Orin's simple three-line, throttled control system was only the beginning of what's possible in scale model building.

Last month, Fred Cronenwett of Canoga Park, California, showed us some of the additional possibilities opened up by the use of electronic control systems. That article discussed some of the techniques involved in setting up single-channel systems.

These scale model building and flying pioneers have demonstrated that electronic controls make many more scale functions possible without being terribly difficult for the experienced modeler.

This month Fred, with help from fellow scale masters Grant Hiestand and Merle Mohring, completes the picture with a look at multichannel systems.

Here's the final installment of the seminar:

### INTRODUCTION

In the November issue (1991) of *Model Aviation*, the article on control-line scale at the 1991 Nationals brought up an interesting point — that 12 people were using elec-

tronic control systems to operate throttle and other features on the model airplanes.

One point that we found disturbing was that only five of the 12 systems were 100 percent reliable. Now, the article did not expand on what type of systems they were using, but this article will show how to set up and use a multichannel electronic control system that is 100 percent reliable.

### BACKGROUND

The three of us started flying with electronic control systems in early 1990 here in

and others are the most reliable electronic control systems.

### LOCATING AN OLD AM RADIO

This is the only hard part about this whole process, but at some point you will stumble across an old AM radio that is not 1991 ready, and worthless to the guy selling it. Older radios can be located in the classifieds, auctions, etc.

We have converted over the older MACS, Airtronics, Aerosport and a Cirrus RC systems. However, we recommend that you

locate a relatively new radio that has servo reversing and the nicer throttle sticks.

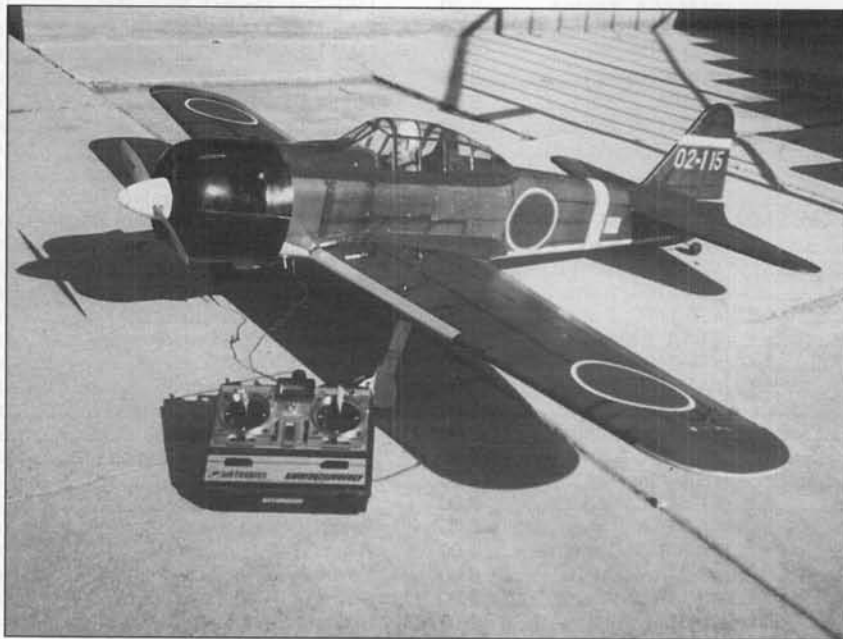
Grant and Fred are using an Airtronics Vanguard six-channel radio that has dual rates and servo reversing. These features will still work after the conversion is complete and come in quite handy for working scale features on model airplanes.

Once you have located a radio to your liking, the next thing to do is to send it to Calvin with a note saying what you want done to it. Specify that you want the RC system converted over for electronic control line use. Call Calvin to obtain a price quote for the conversion process. It usually runs about \$45. Calvin can be reached at 8996 Barco Lane, Jacksonville, FL 32222; (904) 771-0613.

### INSTALLATION OF THE SYSTEM

Calvin will return the radio to you with the RF decks removed, ready to install. The entire flight pack is installed as in a radio-controlled airplane, but the difference is that you plug directly into the receiver to make the system work.

The input to the receiver will be in the form of a Deans charge jack. This can be mounted to the side of the fuselage near the leadouts. Calvin may have installed two charge jacks; the first will be for ground checks of the system, while the second one



Fred Cronenwett, the author of the material on multichannel control systems, doesn't fly this EZ Zero in competition because it's an ARF (converted from radio control), but he does use the multichannel control system (transmitter shown with plane) to operate the throttle and retracting landing gear.

the Los Angeles area.

Fred Cronenwett modified a three-channel radio control system. The RF decks were removed so that the encoder could communicate directly with the decoder through insulated flying lines.

This particular system worked quite well, but took a fair amount of time to assemble and took away from valuable building time. Later, we found out about Calvin Wollitz in Florida. This gentleman will take a radio control system, such as a Futaba or Airtronics (AM band only) and convert it over for control line use. We have found that the converted AM radios from Futaba, Airtronics



will be for the flying lines to plug into.

### OPERATION OF THE SYSTEM

The transmitter has been modified so that two wires are coming out of it; one is the signal and the other is ground. The Deans connector at the end of this wire can be plugged directly into the receiver, or plugged into the handle end of the lines for flight operation (See Fig. 2 in last month's column).

Usually, we start the engine with the transmitter plugged in at the airplane, and then walk out to the handle once the engine is going. The transmitter is either clipped to our belt or hung around our neck, or even put in a transmitter tray. Use whatever works best for you.

We highly recommend this type of system. We have found our converted radios to be 100 percent reliable and a joy to operate. We are willing to help you get started. Give us a call or write if you need help.

For more information about the single-channel and multichannel systems, contact Fred Cronenwett, 7352 Independence #201, Canoga Park, CA 91303. His phone number is (818) 719-0167.

### A MUST-HAVE CATALOG

It's a common story. A young boy or girl falls in love with aviation and control line model airplanes. Other interests, such as raising a family, intervene. Years later, the grownup decides to return to the hobby and discovers that it's hard to find all the materials that make it possible to get going.

That's what happened to John Brodak. But John's not the kind of guy who gives up easily. When he returned to the hobby in 1987, he set to work finding out just what was available for control line enthusiasts.

And he decided to make sure that all CL fliers would be able to find the stuff. The result is the most spectacular catalog of control line equipment to come along in many years. On the inside cover, John tells his own story:

"Like a lot of young boys and girls, I always thought of flying as an adventure. I admired the early pioneers, like Charles Lindbergh and Amelia Earhart. They flew by 'feel,' by knowing their airplane and using their skills. That's the way flying was meant to be, and that's why I started flying control line airplanes nearly 40 years ago.

"In fact, in 1954 I opened a small hobby shop that specialized in planes, control horns, control lines, and the rest of the equipment you need to fly control line

airplanes. Most of my customers were people like me who always wanted to fly. By talking to thousands and thousands of people across the country, I found out over the years what works and what doesn't when it comes to control line aircraft. Over the years I have learned who the best suppliers are, which planes are the most reliable, and what equipment is the most dependable.

"Flying control line airplanes is a great hobby, but like a lot of you I drifted away to other things over the years, including raising a family. In 1987, I finally came back to

that John has gone a long way toward meeting his goal of providing a complete array of CL products. For example, kits are listed from the following manufacturers: Control Line Classics, Custom Models, Aerosmith Model Aviation, Carl Goldberg Models, Top Flite, Sterling, Sig, and Generic Models.

In addition, there is a complete lineup of hardware, finishing materials, tools, adhesives, engines, etc., including some from the smaller cottage industry suppliers who sometimes are hard to track down. And there are several pages of "how-to" control line tips.

The slogan on the front of the catalog is "Flying—The way it was meant to be!" That says it all about control line model aviation. To receive the catalog, send \$3 to Brodak Distributing Co., Inc., 100 Park Ave., Carmichaels, PA 15320.

### FROM RUSSIA WITH DAN

It appears that Dan Rutherford is taking on the role of self-appointed U.S. control line model aviation ambassador to the former Soviet Union. And that's a boon for fliers on both continents. On a recent trip to St. Petersburg, Dan acquired a large quantity of Russian-made engines and other materials.

The lead time involved in putting the magazine out makes it likely that the list of available products will have changed by the time you read this, so I won't list the specific products. However, anyone who is interested in both sport and competitive model aviation products from the Soviet Union may want to write to Dan for a list of what's currently available. Write Dan Rutherford, 4705 237th Place S.E., Bothell, WA 98012.

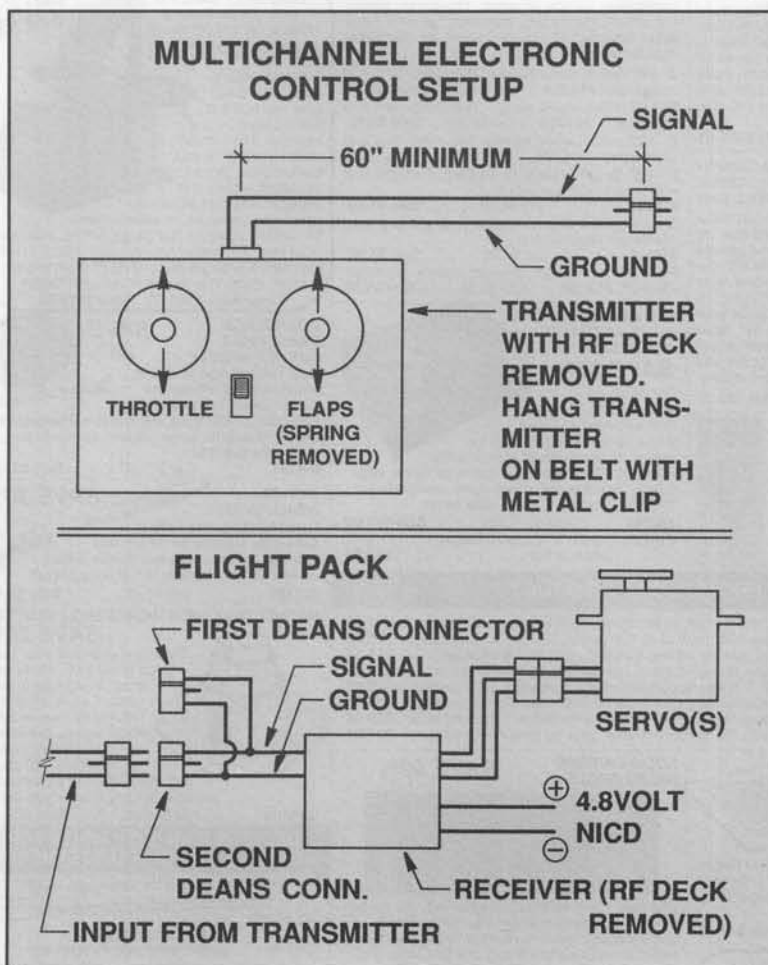
### NEWSLETTER NEWS

The latest issue of *Hi-Low Landings*, the organ of the Navy Carrier Society, has an entirely new look. It's a professional-looking newsletter from front to back, edited by Michael F. Pugh. There are contest reports, technical information, photos, standings and many more items of interest to carrier fliers.

HLL is published six times a year, and is sent to members of the Navy Carrier Society. Dues are \$6 per year. Write: Michael F. Pugh, HCR 51, Box 220, Stephenville, TX 76401.

We've been saying in this column for years that what control line racing really needs is a national special interest organi-

*continued on page 83*



building and flying control line models. That's when I found out just how few U-control outlets are available...and how hard they are to locate! The suppliers of control line airplanes and equipment were out there, but I found myself spending hours and hours, calling from coast to coast, trying to find the parts and equipment I wanted. That's not how I wanted to spend my time, and I figured there had to be a better way.

"That's when I decided to open Brodak's Distributing Co., Inc. Our philosophy is simple: Carry the largest and most complete line of U-control planes and supplies, make everything available at the lowest possible prices, and always ship orders in 24 hours or less!"

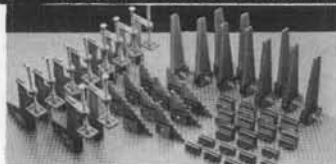
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## 3-JAW CHUCK FOR DREMEL MOTO-TOOLS

Tired of changing collets on your Moto-Tool? Then you'll love our 3-jaw keyless chuck! Works with ALL Dremel and Sears models. Holds drill bits & accessories from 1/64" to 1/8". Use up to 10,000 rpm.

#15264 . . . . . List \$10.95 . . . . . Sale \$8.20



## PERMA-GRIT SANDING TOOLS LAST ALMOST FOREVER

Sandpaper. Sands plywood, fiberglass, epoxy, styrofoam, hardwood, softwood, plastic - just about anything! The money saved on sandpaper pays for them in no time. 9" long.

- A 1/8" radius, wood handle. Two sides, fine and coarse grit. #14524 . . . . . List \$4.95 . . . . . Sale \$4.20
- B 1/4" radius, wood handle. Two sides, fine and coarse grit. #14525 . . . . . List \$4.95 . . . . . Sale \$4.20
- C 3/8" radius, wood handle. Two-sides, fine and coarse grit. #14526 . . . . . List \$5.25 . . . . . Sale \$5.30
- D 1/8" tangent radius (V-shaped). Fine grit one end, coarse grit opposite end. #14527 . . . . . List \$6.95 . . . . . Sale \$5.90
- E 3/4" radius (flat U shape). Fine grit one end, coarse grit opposite end. #14528 . . . . . List \$6.95 . . . . . Sale \$5.90
- F 1 1/2" flat. Fine grit one end, coarse grit opposite end. #14529 . . . . . List \$6.95 . . . . . Sale \$5.90

## WORLD'S SMALLEST, MOST ACCURATE TABLE SAW

### SAVE 33%

For miniature woodworking. Cuts both softwood and hardwood up to 1/4" thick. Ideal for ripping narrow strips or miter cutting. Features 6" x 6" aluminum table, rip fence, miter gauge, blade guard, dust catcher compartment, 2" 80 tooth blade. 1/10 hp, 120v motor.

#50304 . . . . . List \$129.95 . . . . . Sale \$87.00

#15220 Extra fine 107 tooth blade. Cuts burr free. . . . . \$13.95



## CAM ACTION BAR CLAMPS

The fastest, easiest sure-grip modeler's clamps ever made and exclusive with MICRO-MARK. Just slide the moveable jaw along the bar & flip the cam-action lever. Cork lined jaws won't mar or slip. 7" capacity. Set of two. #15125 . . . . . List \$7.95 . . . . . Sale \$5.50



## DREMEL DISC/BELT SANDER with FREE Belts & Discs - A \$16.50 Value SUPER SPECIAL!

A rugged, solidly built tool that can save you hours of tedious hand sanding. Trims model parts precisely to your marked line. Use on all metals, woods and plastics. Has cast aluminum tables and frame, removable platten for sanding curves, miter gauge, 1/5 hp, 3450 rpm quiet induction motor. Also includes 2-80 & 2-120 grit belts & 5-80 grit discs. (FREE! from this ad only). Belts-1" w. discs-5" dia. #60788SP Total Value \$194.50 Sale \$119.95

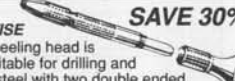


## FIBERGLASS REINFORCED CUT-OFF WHEELS

Steel industry type wheels in miniature sizes. Fiberglass reinforcement resists breakage. 1 1/2" dia. x 1/32" thick. Set includes 2 wheels for steel, 2 wheels for brass, copper, aluminum and 1/8" shank mandrel. #50293 . . . . . List \$10.30 . . . . . Sale \$7.60

## SWIVEL HEAD PIN VISE

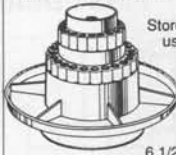
Large freewheeling head is especially suitable for drilling and tapping. All steel with two double ended collets. 0-1/8" capacity, 3 1/2" long overall. #21105 . . . . . List \$6.95 . . . . . Sale \$4.85



## ROTARY TRAY ENDS WORKBENCH CLUTTER

### SAVE 20%

Store and organize your most used small tools. Holds just about everything in less than 1 sq. ft. of space. Great for needle files, model knives, tweezers, scribers, pencils, rulers and more. 10" dia. x 6 1/2" h. Made of high impact plastic with Lazy Susan type base. #14105 . . . . . List \$16.95 . . . . . Sale \$13.50



## DEALERS WANTED! WRITE FOR DETAILS ON YOUR LETTERHEAD

## SAVE 50%

STAINLESS STEEL MINIATURE PUTTY KNIVES Use for mixing, applying, spreading and smoothing epoxy, wood filler, plastic filler, body filler etc. Use on models, miniatures, dioramas, fillet forming, etc. Made of polished stainless steel. Single end: flat, flexible blade, 6 1/8" long. Double end: curved rigid blades, 7 1/2" long. Set of 2. #15132 . . . . . List \$9.90 . . . . . Sale \$4.95



## SAVE 20%

HIGH TECH KNIFE FOR BETTER, MORE COMFORTABLE CONTROL Looks better, feels better, cuts better and makes blade changes easier. Special shape gives you a better grip, keeps the knife from twisting and won't roll off the bench into your lap. Has rotary draw-tight chuck, safety cap and storage at back end for 2 blades. Made of glass filled nylon. #60660 . . . . . List \$4.95 . . . . . Sale \$3.95

## MINIATURE SAW BLADES CUT WOOD, PLASTIC, FIBERGLASS AND SOFT METAL

Hard-to-find blades are precision ground tools of drop forged, tempered high carbon steel. All are .015" thick with 1/8" hole.

- #14133 3/4" dia., 36 teeth List \$9.95 Sale \$7.50
- #14134 3/4" dia., 60 teeth List \$9.95 Sale \$7.50
- #14135 1" dia., 68 teeth List \$10.95 Sale \$8.25
- #14136 1" dia., 34 teeth List \$10.95 Sale \$8.25
- #14137 2" dia., 140 teeth List \$15.95 Sale \$11.95
- #14138 1/8" shank mandrel for above blades \$2.75

Save Even More! Set of all the above #14139 . . . . . List \$60.50 . . . . . Sale \$45.50



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Heavy duty cast iron vise has replaceable self-adhesive basswood jaw liners. Mounts to any thickness workbench. Jaw faces are 6 1/2" w. x 2 1/2" deep. 4" capacity. #60302 . . . . . List \$16.95 . . . . . Sale \$12.70



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One of the finest tools you can buy for making perfect angle cuts in small wood, plastic and metal material. Adjusts in one degree increments with a range of 65 degrees on either side of 90. Made of tough "football helmet" plastic. Includes 52 tpi blade. Cuts up to 5/8" thick x 2" wide x any length. #15215 . . . . . List \$27.95 . . . . . Sale \$19.85



## SAVE 34% DREMEL MINI MOTO-TOOL

The smallest, lightest Moto-Tool ever and it's cordless! Has two speeds (approx. 5,000 & 10,000 rpm-tested slow enough to drill plastic without melting), 1/8" collet, ball bearings and a removable battery pack that charges in a wall mount charger (included). Runs for one hour, no-load on a full charge. Only 6 1/2" long. Weighs just 9 ozs. #60702 List \$49.95 Sale \$32.95 #60703 Extra Battery. Lets you keep one charging while using the other. . . . . \$17.25

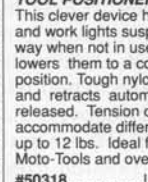


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This clever device holds tools and work lights suspended out of the way when not in use, then quickly lowers them to a comfortable working position. Tough nylon cord extends to 55" and retracts automatically when tool is released. Tension can be adjusted to accommodate different weight objects up to 12 lbs. Ideal for use with Dremel Moto-Tools and overhead work lights.

#50318 . . . . . List \$10.95 . . . . . Sale \$9.85



## SAVE \$52.95

## THE INCREDIBLE MICROLUX MULTI-SAW NEW IMPROVED MODEL WITH 12" THROAT AND DIAL TYPE SPEED CONTROL

It's a power coping saw, scroll saw and jeweler's saw all in one... and it uses ultra-fine jeweler's saw blades for the finest cuts you've ever seen! Cuts everything from soft balsa to thin gauge brass. And it cuts so smooth you won't have to sand or file. Features a cast aluminum alloy yoke, 6 1/4" x 6 1/4" machined aluminum table, blade tension adjustment screw, dust compartment, adjustable blade guide, rip fence and miter gauge. Has a 115 volt, belt drive motor for smooth, quiet operation and a built-in dial type speed control that lets you adjust stroke speed to suit material being cut. Order now and we'll also include 72 jeweler's saw blades FREE (12 ea. of 6 different tooth configurations) #60513 . . . . . Total Value \$162.90 . . . . . Sale \$109.95



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## PROTECTIVE CUTTING PAD HEALS ITSELF AFTER EACH CUT!

Stays smooth after thousands of cuts and blades will last far longer. 3-ply non-glare polyvinyl. Double sealed for twice the life. You've got to try it to believe it. Large 12" x 18" size.

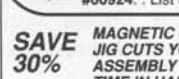
#36134 . . . . . List \$18.95 . . . . . Sale \$14.25



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## SAVE 60%!

MODEL BUILDER'S PRECISION KNIFE SET We made a special purchase of these "made-in-the-USA" sets at a great price and we're passing the savings on to you. Includes light, medium and heavy duty handles and 13 assorted blades in an attractive wood storage case #60924 . . . . . List \$15.00 . . . . . Sale \$5.99



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## MAGNETIC GLUING JIG CUTS YOUR ASSEMBLY TIME IN HALF

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#60304 . . . . . List \$26.95 . . . . . Sale \$18.85 #60305 Eight Extra Magnetic Plates. . . . . Sale \$7.95



## SOLID CARBIDE MICRO DRILLS

## SAVE 59%

Originally made for the electronics industry, these bits will last 30 times longer than other drill bits... and because they all have 1/8" shanks they're a lot easier to handle and will fit in one size Moto-Tool collet. Set of 9 ass't. sizes from #54 to #80. Industrial users pay up to \$4.00 each for these bits, but we bought a manufacturer's overstock at a great price and we're passing the savings on to you.

#60310 . . . . . List \$36.00 . . . . . Sale \$14.75



## SAVE 40%

MINI MACHINIST'S SQUARE Marks a perfect 90° angle and sets up table saws, sanders etc. for accurate, square cuts. Ground and polished carbon steel. 4" blade, 2 1/2" beam. #10118 . . . . . List \$11.95 . . . . . Sale \$7.15

## SAVE 25% RIGHT ANGLE DRIVE FOR DREMEL MOTO-TOOLS

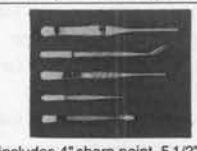
This precision tool is one of the most versatile attachments you can own for the Dremel Moto-Tool. It will drill, sand, cut and grind in places you never could before. Has hardened metal gears and lifetime lubricated ball bearings. Attaches in seconds to Moto-Tool models 275, 285, 395, 595 and FreeWheeler.

#50357 List \$34.95 . . . . . Sale \$26.20



## SAVE 50% ECONOMICAL 5-PIECE TWEEZER SET

All purpose set lets you grasp, position and manipulate the smallest items. Set includes 4" sharp point, 5 1/2" blunt point, 6" bent dental, 4" flat nose, 6 1/2" cross locking. #60365 . . . . . List \$18.95 . . . . . Sale \$9.50





# SUPER SALE

SALE ENDS 15TH OF COVER MONTH!

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## MICRO-SIZE SAW BLADE SET

**SAVE 31%** Same size as a #11 blade, but with teeth! Cuts where no other saw will fit. Includes 6 assorted blades, 24 tpi to 40 tpi plus aluminum handle.  
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## SUPER SPECIAL! JEWELER'S DRILL PRESS with FREE Drill Press Vise - A \$16.95 Value!

**SAVE \$46.95**  
The MicroLux Drill Press is just the right size and has just the right features for the model builder: 3 speed belt drive, ball bearing spindle with 1 1/4" travel, 1/4" 3-jaw chuck, 6" x 9" machined aluminum table, 3/4" solid steel column, depth control wheel, 0-6" chuck-to-table adjustment, heavy duty aluminum housing, dove-tailed sliding gauge for drilling in-line holes, high torque 110V motor. Also includes cast aluminum drill press vise with 1 1/4" capacity. (FREE from this ad only). If you're serious about modeling then this is one tool you shouldn't be without. Try it yourself risk-free for 30 days. A quality tool made in Japan exclusively for Micro-Mark.  
#15111R ..... List \$176.90 ..... Sale \$129.95

## TURN YOUR DREMEL TABLE SAW INTO A PRECISION CUTTING MACHINE

This precision rip fence for the Dremel table saw lets you cut stock to precise tolerances. The sliding face of the fence is calibrated in .005" divisions and the T square design makes it self-aligning and holds it perfectly parallel to the blade. The Accurizer kit also includes a brace that holds the blade spindle to the saw frame, reducing side-to-side play to almost zero. Made in California to aerospace tolerances. Includes instructions and all hardware. Made of steel, brass & aluminum.  
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**SLIDING TABLE FOR  
DREMEL TABLE SAW**  
Get perfect 90° cross cuts. Guides on the bottom slide in the grooves of the saw. The supplied triangles also give you precise 30°, 45° & 60° angle cuts without resetting a miter gauge. For cuts up to 1/2" thick, 10" x 12" table, 1 1/2" h. fence.  
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## SAVE 25% THE CHOPPER

One of the most useful tools for the hobbyist working in wood or plastic strip material. Makes clean, neat, feather-free, accurate cuts easily, inexpensively. Uses readily available single edge razor blades. Perfect mitre cuts with the 30, 45 and 60° guides included. An adjustable stop permits the exact duplication of pieces up to 3 1/2" long. Excellent for model airplanes, model railroad structures, doll house furniture and hundreds of other uses. 7 1/2" x 7 1/2".  
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## SAVE 25% MICRO-DRILL FOR DELICATE HAND DRILLING

Ring slides up and down the spiral brass handle causing the drill bit to turn. Steel chuck holds no. 61 thru 80 drill bits, 4" long.  
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Used by jewelers, modelbuilders, electronic hobbyists. Keeps your hands free for soldering, gluing, positioning, while the work is held firmly at any angle. Nickel plated steel with heavy iron base.  
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These surgical quality probes have hundreds of uses for modelmakers, miniaturists, electronic hobbyists, etc. Use them for positioning, soldering, gluing, adjusting... for any type of micro-manipulation in tiny, hard-to-reach places. Polished and hardened stainless steel with needle sharp points. Set of five, 6" long overall.  
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## SAVE 25% SOLID BRASS BAR CLAMPS

The finest clamps you can own for clamping model RR structures and rolling stock, miniature furniture, ship models, plastic models, small boxes, model airplanes and more. Price is for set of 2.  
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#14257 3 3/4" Capacity. List \$7.95. Sale \$5.95  
#60396 3" Capacity. .... List \$6.95. Sale \$5.25

## SAVE 40% PRECISION PLIER SET

You won't find a better set of pliers anywhere for this price! Made of steel with cushion grip vinyl covered handles and spring return. Set includes needle nose, bent nose, flat nose, end nipper and diagonal cutter. All are approximately 4 1/2" long.  
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## SAVE 25% TUNGSTEN CARBIDE SANDING BANDS

Tired of paper sanding bands that wear out too quickly? This is the answer. Tungsten carbide grains are permanently welded to a steel band for years of use. Won't load up or overheat. Use on wood, ceramic, fiberglass, plastic, 1/2" dia. x 1/2" long. Great for use with Moto-Tools.  
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#14563 Drum for above, 1/8" shank ..... \$2.60

## SAVE 35% TOOLMAKER'S ANGLE PLATE HOLDS YOUR WORK AT A PERFECT 90° ANGLE

Use this hard-to-find tool when-ever you want to hold or join two parts edge-to-edge or edge-to-surface at a 90° angle. Also used to square up table saw or disc sander. Precision cast with machined faces and edges.  
#60713 1" x 1" x 1" ..... List \$8.95 ..... Sale \$5.80  
#20123 2" x 2" x 2" ..... List \$13.95 ..... Sale \$8.95  
#60626 3" x 3" x 3" ..... List \$16.95 ..... Sale \$10.95

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Our industrial quality razor blades are a cut above any you've ever used. They'll hold their finely honed cutting edges far longer than ordinary blades. Made of high carbon steel with aluminum backs and protective card stock wrapping. Box of 100.  
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Only \$1.00 or free with an order from this ad.

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RIFFLER FILE SET**  
Riffler files do work impossible with regular files. Fine cut for precision work in wood, metal and plastic. Made of alloy steel, double ended for twice the life. Approx. 7" long. #33111A  
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Cutting a straight line with an X-Acto knife is easy and safe with our knob held S.S. straight edges. 3/32" thick x 2" wide x 6" or 12" long. Just the right sizes for hobby and graphic arts work.  
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Includes 100 of the world's favorite blade design at less than 13 cents each! Honed to razor sharpness.  
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## SAVE 37%

Includes: Badger Model 200, all metal, single action, internal mix air brush for the smoothest finish. Adjustable spray pattern from 1/16" to 1 1/2" wide. .... List \$68.00

Oil-less single piston compressor with pressure relief safety valve. Produces .33cfm @ 20 psi when airbrush is in use. Max. pressure, 59 psi. 1/12 hp, 115v. 6 ft. cord and convenient on-off switch ..... List \$132.95  
#60460 AIRBRUSH / COMPRESSOR COMBO ..... Total List \$200.95 ..... Sale \$150.75  
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## SPECIAL AIRBRUSH - COMPRESSOR COMBO OFFER

## SAVE 25%

**Air-Brush Set**

**DRILL PRESS ATTACHMENT.**  
Converts the new Moto-Tool model to a precision Drill Press! Dremel #212.  
#50288 ..... List \$55.50 ..... \$37.95

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## DREMEL MOTO-TOOL The Tool That Does It All!

The most versatile hobby tool you can own is improved! Dremel's newest Moto-Tool features a 3-jaw chuck, 30% more power than older models and a slimmer, easy-grip shape. This is Dremel's top-of-the-line kit for professional results and longer life. Has a 5,000-30,000 rpm variable speed ball bearing motor with built-in slide type speed control, deluxe molded case and 20 accessories for grinding, routing, sanding, carving, drilling, cutting and more. 115v AC motor. Dremel #5950  
Order our #60698 List \$115.50 ..... Sale \$69.95

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Converts all Moto-Tools to a precision shaper! Dremel #231.  
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Our No.	Dremel No.	Description (Order by Our Item Number)	LIST	SALE
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60491	1671	16", 2-Speed Scroll Saw	278.00	179.95
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60901	8500	FreeWheel Heavy Duty Cordless Moto-Tool	104.50	65.95
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## HOW GROUND EFFECT SAVED A LIFE

**A**fter we talked about ground effect here in the November '91 issue, I received the following letter from reader Ed Toner of Howell, New Jersey, who writes:

Dear Francis:

I read with interest your dissertation on Ground Effect, and as I did so, I recalled an incident I witnessed many years ago. It was in 1956, and I was a Lt.jg Naval Aviator in a fighter squadron (VF-152), part of Air Group 15, which had just deployed aboard the USS WASP (CVA-18).

I was flying the F2H-3 Banshee, which required a catapult launch, but with us was VA-155, flying AD-5 Skyraiders, a propeller attack plane that, under most circumstances, could take off from a deck run.

A friend of mine, Lt.jg Jim Dagdidjian, AKA "The Crazy Armenian," an AD driver, had a fortunate encounter with ground effect one night. It was dusk, and I was in the fantail on the port side, watching the first launch. The WASP was wound up tight to her full 32 knots, as the launch was the ADs on their night qualifications.

Jim was the lead plane, and therefore had the least deck run for takeoff. (That's the seniority system in action.) The WASP had an angled deck for landing, but of course the full length deck run was required for takeoff. The launch officer signaled "Take Off," Jim saluted, and released the brakes. At this precise second, the Quartermaster on the bridge did his job of lighting the ship for night running, as it was exactly sundown. For some reason, the the centerline lights on the flight deck did not illuminate, but the lights on the angled deck, used for landing, did.

Add the torque of that huge corn cob radial engine, a small swerve to the left, and Jim was lined up with the lights on the angled deck and proceeded to take off, much to the horror of all who witnessed this.

He left the deck with much less than required flying speed, and rapidly slid down toward the sea, 75 feet below. We all figured he was done for. Jim bent the throttle around the stop, flew needle-ball-air speed

in ground effect, flying inches above the sea, with his prop tips whipping up water, at 12 knots below stall speed.

He stayed in ground effect until he was almost out of sight, with the rescue helicopter chasing him, and the Destroyer plane guard at flank speed, frantically chasing the both of them. Then, ever so slowly, the AD rose majestically and flew!

After his uneventful return to the ship a

in the fathers of aviation, I assume many of you are too. Let me summarize the achievements of one of the more colorful aviation pioneers.

Like the Wright Brothers, Curtiss had a bicycle shop and later built bicycles, but in Hammondsport, New York, instead of Dayton, Ohio. Throughout his life he loved speed and progress. He was a bicycle racer until about 1901, when he made himself a gasoline engine and mounted it on a bicycle. After that he developed, built and sold motorcycles, and raced them.

In 1903 he became the American motorcycle champion, with a world record speed of 56-2/5 seconds for a mile. In January 1907 he established another world speed record, of 136.3 mph, this time for all types of vehicles. His vehicle was a seven-foot-long motorcycle of his own design with a V-8 engine, also of his own design.

That engine wasn't originally intended for motorcycles, however. His company was building them for dirigibles and airplane experimenters. Curtiss became interested in aviation himself about that time.

Glenn wasn't as much of a scientist or engineer as the Wright Brothers were, but he was an innovative, energetic experimenter, and an excellent practical designer. He was popular, outgoing, and open with his ideas, while the Wrights were more secretive and private.

In 1905 Alexander Graham Bell had ordered a Curtiss engine for his aerial experiments. In 1907 Curtiss joined the Aerial Experiment Association, which included Bell and Lt. Thomas Selfridge. Selfridge was later to become the first fatality in a powered airplane (a Wright machine).

The Association worked on Bell's huge box kite experiments, which were doomed to failure, but they also designed and built more conventional aeroplanes, which fared much better. The first, the "Red Wing," crashed because it lacked means for lateral control. Bell suggested movable wing tips, which later evolved into ailerons. This started a long battle with the Wright Brothers, who held a patent on lateral control by wing warping which was broad enough to

continued on page 84



Author Francis Reynolds starting a "gas model" in 1940.

few hours later, he was given a hero's welcome, and a new "G" suit and skivvies.

—Ed Toner, 52 Newbury Rd., Howell, NJ 07731, (908) 363-0845.

What can I say, Ed, except Thanks, and have you ever considered becoming a writer?

### GLENN CURTISS

I read a fascinating article on Curtiss in the Spring/Summer 1991 issue of *American Heritage of Invention & Technology* magazine. Having always been interested



Sure, fun is why you attend fun flies. But if you'd also like to win, try these two new engines from SuperTigre.



G-51

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Santa Clara County Model Aircraft Skypark, with membership totaling almost 400, has joined the Sport Flyers Association. Founded six years ago by Brian Nelson and 25 charter members, the SCCMAS flying site is located on a 42 acre park area leased from the county. Charter members invested \$30,000 of their own money for a 519 ft. paved runway, a 185 ft. safety zone with paved taxiways, and shaded pit areas. SCCMAS repaid this investment within two years and now has a concession stand and clubhouse facilities. Scheduled for '92: R/C helipads and R/C car track areas.



**People You Know . . .**

**JOHN WORTH.**



Elder statesman of model aviation and retired executive director of the AMA (1961-1991), John is now both an SFA member and director.

**DOUG PRATT.**



Modeling expert on everything from peanut scale to engines, author of McGraw Hill Guide Books, and 10 year AMA veteran, Doug is now applying his talents as an SFA Vice President.

**BRIAN NELSON.**



A model builder since grade school, full scale pilot at age 14, and Navy P-3 pilot, Brian is also founder of Santa Clara County Model Aircraft Skypark, the largest flying club in the U.S., and an SFA member.

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800-745-3597 or 214-522-3301, Fax 214-522-0868

o. I will advise of all safety rules established at any field where I fly and any state or local regulations governing model flying. I will always obtain prior permission from property owners before flying. I will not fly any models in a careless, reckless or dangerous manner.

7. I will not use hazardous fuels nor fuels containing tetranitromethane or hydrazine.  
8. I will not use any explosives in conjunction with model flying whether on the model, in the air, or on the ground.  
9. Rockets will be flown in accordance with the Safety Code(s) of the National Association of Rocketry. A fire extinguisher must be present when using pyrotechnic smoke candles. Authorization may be secured from the SFA for special events.

9. I will not power my models with turbojet engines.

0. I will not fly my model higher than 400 feet unless it is flown in uncontrolled airspace, or unless it is a sport

1. I will not fly model aircraft within three miles of any airport unless I have received permission from the FAA or I

I will not fly under an IFR clearance without a flight plan unless I have received permission from the FAA or I am flying at an authorized radio control flight field.

2. I will always perform a ground check of my model before flight.

3. I will use only those radio control frequencies currently allowed by the Federal Communication Commission.

4. I will extinguish any fuses on my Free Filoht model upon completion of function

5. I will only launch Free Flight models at least 100 feet downwind of spectators, cars, or anyone not directly involved in the activity.

6. involved with the flight.  
I understand that SEA Insurance does not cover anything related to the flight of a commercial aircraft.

7. I will retrieve any lost model with great caution, considering all circumstances thoroughly before proceeding

and will never attempt to recover a model from a power line.

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SAFETY CODE COMPLIANCE AND WAIVER STATEMENT

I will comply with the 1992 SFA Safety Code and my Flying Site Safety Code for all model aircraft operations and the NAR Safety Code(s) for all sport rocket operations including any changes or additions which may occur during my membership period. I understand that my failure to comply with the codes will result in loss of liability coverage for any damages or claim. I understand that written notice must be provided immediately upon the occurrence of any incident of bodily injury and/or property damage. I also understand that no claim will be accepted sixty (60) days after the expiration of my policy. I hold harmless the Sport Flyers Association, Incorporated trade membership organization for any personal injury, property damage or wrongful death which may occur.

**UJ. MUST BE SIGNED BELOW FOR ACCEPTANCE.**

X

Applicant or Parent/Guardian of Applicant under sixteen years of age

# University of Florida Flies High

STRICTLY SCALE BY AL TUTTLE

## Modelers Create DC-3 in School Colors

Photos this month are of the magnificent DC-3 built from Nick Zirolì plans by Ray Helpling, Tom Rice and Hal Jones. Span is 140 inches, and the power is two OPS 30s (1.8 cu. in. each). Controls include ailerons, elevator, rudder, throttle, flaps, retracts, and landing/nav lights. Quite a building project, to say the least! More info in text.



The 24th annual Tangerine Internats was staged during a week-long gala event, highlighted of course by the big football game at the Tangerine Bowl. Scale flying events, sponsored by the Remote Control Association of Central Florida, were held on Saturday and Sunday, December 28-29, with the new 1992 rules being used, and there didn't appear to be any problems—other than lack of communication. The majority of the entrants had not received the '92 rulebook and were going by hearsay. Once the rules were explained to these individuals everything went along smoothly.

Entries in both Sport Scale and AMA Fun Scale were divided about equally. The Fun Scale event

turned out to be very popular, with several of the FAI pattern fliers competing. I believe one plane was flown by two or three different individuals and they were having a ball. Watch for more pattern fliers to get into this event.

There were a couple of really outstanding entries. One plane was a giant DC-3 in the University of Florida school colors. The DC-3 was built by three modelers from Gainesville: Ray Helpling (pilot), Tom Rice and Hal Jones, members of the Gainesville Flying Gators. Ray was the spokesperson and this is what he said about the model:

"The plane weighs 42 pounds. Engines are OPS 30s (30cc). Flying props are Zinger 18x10s. Zirolì





plans were used because all of Nick's planes fly very well. We started right in on construction as soon as we received the plans.

"Meanwhile, we went to the Atlanta show and met

a fellow who maintained the Douglas archives in San Diego, California. He mailed us a set of factory drawings which were a big help, as we found a few discrepancies on the Zirolì plans, and used the factory drawings to modify the plans. Luckily, we were not too far along on the model, so we were able to correct the mistakes quite readily. Because of these discrepancies, we strongly suggest that you get a good set of three-views before starting construction.

Nick's plans also showed balsa covered ailerons. There is no DC-3 that we know of that didn't have fabric covered ailerons. We made fabric ailerons and put 29 ribs in them,

*continued on page 76*

The art of  
modifying stock  
models to suit  
your own  
personal tastes,  
including  
converting RC  
models to CL!

# ARF Bashing

ARFS BY ART STEINBERG

Not all ARF enthusiasts are content to fly their airplanes in stock form, a trait which seems to be prevalent among many RC build-

ers on ever since aeromodeling began, because many of us like to place our own personal stamp on the models we fly, even if they

which appear to be original designs, but closer investigation reveals that they began their lives as ordinary



This sleek Reno-type RC racer is a model of the "Sumpthin' Else." It is a highly modified ARF kit, the "Dago Red," from EZ Sports Aviation.

ers and pilots. Modifying existing kits is a practice which has been going

were built from a kit. For this reason we see a lot of models at the flying field

kits familiar to us all.

One such example was brought to my

attention last October by Mike Arnold, treasurer of the Scale Warbird Racing Association. We ran into each other at the First Annual Unlimited RC Air Racing

build one from the ground up.

It was decided to transform the Dago Red into the "Sumpthin' Else" Reno racer which made its appearance in 1979. First, the



The TR-260+, a quarter-scale ARF from J&K Products. Entirely pre-built and covered, this particular model is powered by the new Magnum II engine, also sold by J&K—details in text.

Championships held at the Municipal Airport at Madera, California. Mike was promoting a scale warbird race which was scheduled to be held at Mesa, Arizona later that month. He had with him a beautiful ARF which he was raffling off for the S.W.R.A. What was really remarkable was that the ARF was a warbird which originally came out of the box as a stock EZ "Dago Red." Mike said that these do well in competition, because the pilots can spend time modifying a ready-built plane into a Reno type racer, rather than taking the time to

wing was modified by being clipped short and fitted with Hoerner tips. Next, the horizontal stabilizer was shortened to scale size. The landing gear struts were replaced with scale Robart assemblies, and a scale prop was added for static judging. Next, the airplane was completely refinished, first by applying a coat of Hobbypoxy primer, then Hobbypoxy paint.

S.W.R.A. rules determine the allowable size engine to be installed in each Reno type racer, dictated by a formula which takes into ac-



count the airplane's wing area. All engines must be of front intake type; the Sumpthin' Else that Mike was raffling off was equipped with a K&B Sport .61. The rules allow unlimited modifications to an engine as long as the displacement is not altered in any way.

• • •

As long as we're on the subject of modifying ARFs, I've been getting some interesting information from Fred Cronenwett of Canoga Park, California. Fred is a control line flier who enjoys converting RC type ARFs to control line, and

ARFs for control line use. The conversion is quite simple and is not permanent if built properly.

The EZ Zeros that Grant Heistand and I fly in formation are identical in many ways. The placement of the bellcrank (for the elevator) is one of the special features of our airplanes. The center bolt of the bellcrank has been placed one-inch behind the CG, slightly above the wing, and inside the fuselage. The pushrod going back to the elevator is a normal fiberglass pushrod that could be used for RC or CL. The

guides at the wing tips. It is critical to maintain approximately three degrees of line rake to keep the line tension during flight. The position of the

the flying field. There should be about three ounces of lead put in the right wing tip for trim purposes. The wing tip on my Zero was carefully removed by

some offset to the right for flight trim for CL use. However, if someone wanted to convert this airplane back to RC, the rudder would have to be made opera-



Fred Cronenwett's EZ Sports Aviation Zero, an RC ARF model which has been converted to control line use. Of special note is that the model is equipped with throttle, flaps and retractable landing gear, all controlled by a multichannel electronic system—see John Thompson's "Control Line" column in this issue and also last month for more details.

leadout guide at the wing tip will determine this line rake, and should be made

using a sharp razor blade, the weight epoxied in place, and the wing tip put back

tional. When the airplane is built, the rudder should be made adjustable so that a servo could be installed for RC use.

The ailerons on the Zeros have been used for flaps; a servo was set up to push both of the strip ailerons down to act a flaps for landing. We have found that the strip ailerons (when both of them are deployed in the down position) are quite effective and slow the model down.

I have taken my EZ Zero to three CL scale contests as a demonstration model, and never intended to



Four scale control line models. The center ones are ARFs, the Corsair is from a Sterling kit, and the B-17 is from a Royal kit. All feature on-board electronic controls.

he writes:

Enclosed are some photographs of the conversion of

leadouts exit the fuselage above the wing, and pass through a pair of leadout

adjustable. With an adjustable line guide, the line rake can be easily changed at

in position.

The rudders on both of our Zeros have been permanently set with

enter it in the competition. I entered my Corsair that I built from the Sterling kit in sport scale, and used the Zero as a "scare" factor. Most of the people at the CL contests asked me why I was not entering the Zero in sport scale. Some people even thought I



Grant Heistand's ARF Zero ready for a flight. These ARFs need less power for control line than for RC.

had painted the model, and did not know it was an ARF. We are learning that large CL sport scale model airplanes are few and far between. Merle Mohring, Grant Heistand and I keep building bigger and bigger models for use with CL sport scale, the point being that CL models generally are quite small and use .25 or .40 size motors. The larger airplanes fly much better than the smaller airplanes, and properly trimmed (line rake), the larger models will not pull your arm off.

Speaking of sizes of motors, we have found that CL airplanes do not require the brute force horsepower that most RC pilots tend to use. The box for the Zero says that it needs a .60 or larger two-stroke or a .90 four-stroke. My Zero does just great with an O.S. .48 Surpass in the nose, and weighs in at 6.5 lbs. We highly recommend that for the Zero size of ARF, you use a .45 four-stroke or a .45-.50 two-stroke. The .60 two-stroke engines have too much power for CL use. Keep in mind that when flying CL you cannot fly straight up forever, and CL models fly at about 1/2 to 1/3 the speed of an RC model due to the flying lines.

In conclusion, we are very pleased with the Zeros and the other airplanes of this type that we fly. To give credit where credit is due, a gentleman by the name of Harold "Scotty" Scott originally converted the EZ PT-19 over to CL use three or more years ago. Two years ago, Merle, Grant and I purchased everything he had that had

anything to do with model airplanes. I received the PT-19 and we were very impressed. It was Grant's idea to then build a pair of Zeros for demonstration purposes. As Grant put it, "The PT-19 doesn't have retracts, but the Zeros had retracts and all of the other toys that made life interesting." So in the summer of 1990, Grant and I assembled these two Zeros. Merle then followed with the Hobbico P-40 to fill out the demonstration team. The airplanes are a joy to fly, and we highly recommend them to anyone looking for something different.

—Fred Cronenwett, 7352 Independence #201, Canoga Park, CA 91303, Telephone (818) 719-0167

Many thanks to Fred for letting us in on this fascinating aspect of modifying ARFs for control line use. Fred will be happy to provide more information to anyone interested enough to write or call him, but he does need an SASE if you need a written reply.

Those of us who like to assemble and fly ARFs are becoming more and more spoiled every day. It seems the manufacturers are going out of their way to exploit this section of the radio control market, and the selection of almost-ready-to-fly airplanes available to modelers is growing by leaps and bounds. But there is one type of ARF which has been noticeably scarce in RC circles, those in the giant scale category.

J&K Products of Torrance, California, has broken through this heretofore unexplored area by bringing to market a remarkable new offering, their giant scale TR-260+. This Laser type airplane is completely hand-built in Thailand, and uses only the conventional materials used in a standard kit-built model, namely balsa and plywood. All the components are factory covered with Goldberger Ultracote, and a number of color schemes are available. The kit includes some parts made from ABS plastic, such as the cowl, hatch cover, and wheel pants. For those who are sticklers for perfection, these parts are also available in fiberglass as an additional cost option. Also, J&K offers a full selection of replacement parts for the TR-260+.

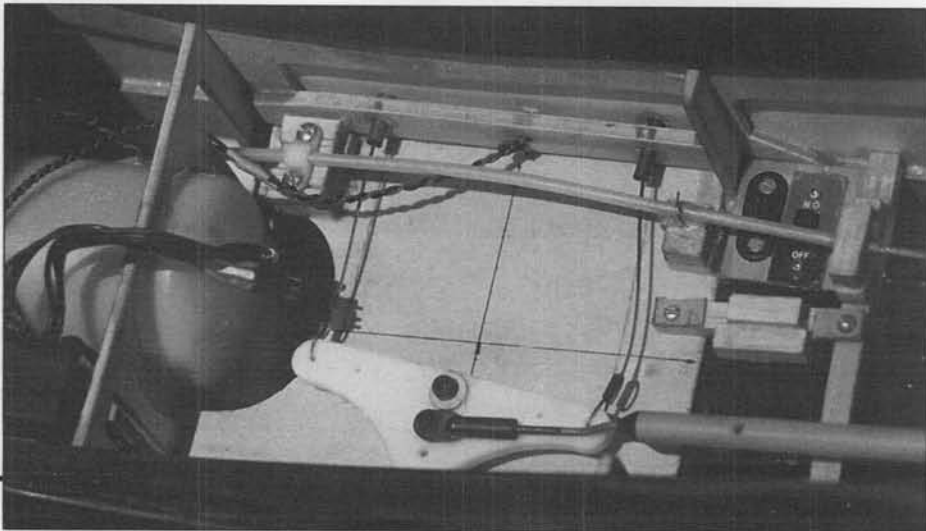
The model has a wingspan of 92 inches, fuselage length of 65 inches, and has a ready-to-fly weight of 16 to 19 pounds. Recommended power is from two to four cubic inches. The TR-260+ in its pre-built form sells for \$595, but for those who would rather do it themselves, J&K offers the TR-260 (without the plus sign in the name) in standard kit form for \$249.

While I didn't personally fly the TR-260+ myself, I did observe a number of demonstration flights, and was highly impressed with its rock steady flying performance. All maneuvers were easily done in a smooth manner, and the model's slow flight characteristics were truly outstanding. Landings were accomplished with the airplane coming in very slowly, displaying no tip stalling tendencies, finally touching down to a feather-light landing. Ground handling was unusually responsive. The demonstration was flown with an engine which is also offered for sale by J&K, the Magnum II, a 2.5 cu. in. powerplant.

The Magnum II is purported to fly up to a 25 pound airplane with ease. It has reed valve induction and produces four horsepower at 8000 rpm on regular gasoline. The one-piece forged steel crank supports a full-bearing connecting rod. The suggested propeller sizes range from an 18x10 to a 22x8. The engine comes complete and ready to run with a muffler and an aluminum mount, with a choice of a six-bolt hub or a one-bolt hub. Amazingly, this engine sells for only \$149.95! The TR-260+ is offered as a special combo with the Magnum II engine for \$695. The engine is also available together with the standard TR-260 kit for only \$349. For further information contact J&K Products, 2304 W. Redondo Beach Blvd., Torrance, CA 90504, or phone them at (213) 327-3862.

And on that note we'll close our thoughts for this month, but keep those questions and comments coming to me, Art Steinberg, 2267 Alta Vista Dr., Vista, CA 92084 (include an SASE for a personal reply). For a quicker response, phone me at (619) 726-6636 or FAX me at (619) 726-6907. Meanwhile, keep those ARFs flying! **MB**

Close-up of the bellcrank installation in the control line EZ Zero. Switch on the right is for the on-board electronic control system.



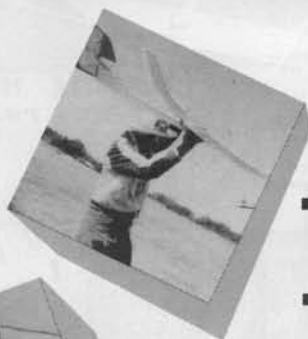


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## PROWLING THE AISLES AT THE IMS SHOW

**F**erretting out exciting new "stuff" for product-hungry soaring consumers in a crowded trade show is a task that is time consuming, sometimes frustrating, and loads of work. Jammed aisles and stuffed booths are not exactly the ideal environment for collecting data and shooting unobstructed, decent photographs.

When we visited the 15th annual International Modelers Show in Pasadena, California, during January, we came away with lots more news than anticipated. We were pleasantly surprised. One would think that the economic R-word would have shrunk the size of the show and the quality of the exhibits. We didn't find it to be so! There seemed to be more going on in soaring this time than in previous years, although most of the activity was at the more swiftly reactive, direct marketing, cottage industry level.

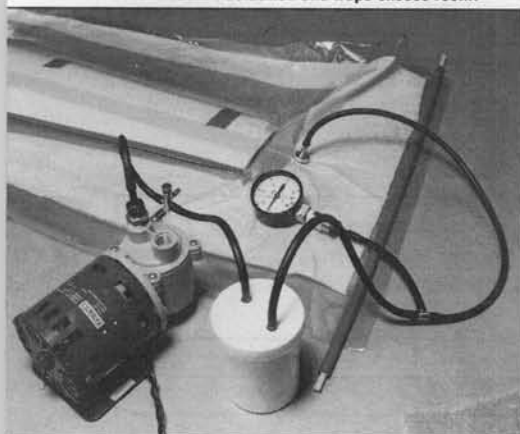
Without further ado ... presented in A-to-Z fashion, here's the new "stuff" that we unearthed at this year's IMS!

**AERIAL MODEL AIRCRAFT PRODUCTS**  
1641 South Ellsmere Ave.  
Los Angeles, CA 90019  
(213) 965-9504

Bob Ratzlaff is the proprietor of this newly formed company—a company which will have moved to its new HQ up in the gold country of California by the time this issue comes out. However, don't worry, mail will be forwarded from the old address above.

In the Aerial Model Aircraft Products (AMAP) booth we discovered loads of new items. By the time you read this, Bob's new Flair series of sailplanes and motorgliders

George Sparr of Aerospace Composites has been refining and improving his E-Z-VAC II design. The system is seen here with the new vacuum reservoir that reduces vacuum fluctuation and traps excess resin.



Bob Ratzlaff (left) of Aerial Model Aircraft Products, and Thomas Pils of TPP Products, new in the hobby business but have many new models and custom model making services available.

will be available. At the show, only a fiberglass fuselage was ready.

The Flair models are based on two epoxy-glass fuselage designs (with a third on the way). Flair I has a mid-fin mounted stabilizer and removable canopy. Flair II is a T-tail design that can be built as an electric motorglider and/or unpowered sailplane. As a motorglider, the fuselage has a removable canopy. Remove the motor, spinner, prop and canopy, and you can cover up the entire nose area in front of the wing with a removable nose cone or sheath. What you are left with is a very clean, seamless front end with no hint of its past as an electric model. Great idea!

Flair wings can be custom designed by the purchaser. Bob will custom cut the blue foam Flair wings to your specs and presheet them via vacuum bag in any one of five ways: balsa, obechi, 1/64th plywood, fiberglass, or carbon fiber. Bob will do some finish work (i.e. totally ready to fly) but recommends you call to receive a bid. Bob welcomes all custom orders.

In our photo, Bob Ratzlaff is the fellow with the beard and moustache. The other gent in the photo is Bob's friend, Thomas Pils, of TPP Products. This second business is unrelated to AMAP. It is a German model import, mail order company based at 1911 Euclid Street #6, Santa Monica, California 90404, phone (310) 396-1759.

TPP sells sailplane/motorglider kits from

the Blue Airlines company in Germany. Visible in the photo are two models from this manufacturer: the Blue Action (2.5-meter span) in sailplane form, and the Blue Filou (2-meter span) in 10-cell motorglider form. A third model, the Blue Curry (not shown, but 2-meter span) features a slick T-tail and HQ 1.5/8 airfoil. All models are of the obechi-over-foam wing and fiberglass fuselage variety. Call for details.

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George Sparr had a very busy time at the IMS answering questions and giving demonstrations on vacuum bagging techniques. New in his booth was an improved version of the E-Z VAC II system (see photo). The white can



Tim Renaud of Airtronics Specialty Division showed his new Whisper two-meter competition sailplane. Most folks had it figured for the 95-inch Whisper, which it resembles.

with the two vacuum lines attached helps smooth out the pulses created by the pump, making the vacuum gauge easier to read. It also prevents any excess epoxy from getting into the pump.

Also new in the ACP booth was 12-inch wide, four-ounce unidirectional S-glass for V-bag wing skinning. For a ding resistant, strong wing that is relatively low in cost, rather than run uni-carbon skins (expen-





This new company, American R/C, had a booth manned by its principles: (from left) Tom Barras, Mike Dwyer, and Tom Rish. The American RC Microlight Series is just getting underway with the first release of the 37-inch span "Shooting Star" in both kit and ARF forms.

sive!), George recommends an outer layer of 1.4-ounce cloth, an inner layer of the new 12-inch uni-S-glass and any one-inch carbon fiber strips necessary for spar strength. Finally, a thin, 1/4 or 3/8-inch strip of pre-preg C/F at the trailing edge keeps it



Ron Parcels of Minimax Enterprise took the time and effort of dismantling part of his booth to show us the Minimax 700 two-meter sailplane. Super quality wood cutting, flat bottom wing, and robust construction are just three features.

straight and tough.

#### AIRTRONICS SPECIALTY DIVISION 11 Autry Irvine, CA 92718

New in the Airtronics Specialty Division booth was the Whisper, a two-meter competition sailplane. When I saw it in the booth, I asked the boss, Tim Renaud, if it

Charlie Richardson (left) and Paul Naton manned the new C.R. Aircraft Models booth. This new company had two new slope aerobatic models to present: the pivot wing Turbo S and Turbo ST (good for thermals too), and the more conventional aileron wing Excel.



was the Whisper 95 (which has appeared in MB before). He smiled and said, "No, it's the two-meter Whisper. But, a lot of people are saying it looks like the 95-inch Whisper." Five wing panels, a high aspect ratio wing, and a skinny fuselage give it a bigger appearance.

Interested in finding out more about this all-wood 2-meter competitor with the Legend design for an ancestor? Ask to be placed on the mailing list and you'll receive all the particulars in the ASD "Soaring Exchange." Issue number 2 of the first volume is now available, and it's free!

#### AMERICAN R/C 16181 Ganges Lane #3 Huntington Beach, CA 92647 (714) 841-4282

New on the scene as a company are Tom Barras, Mike Dwyer, and Tom Rish who go by the name of American RC. The American R/C Microlight Series is just getting underway with the first release of the "Shooting Star," a 37-inch span, 29-inch long, RC slope, RC hand launch or FF sailplane. Quick and easy to assemble from

the initial print-wood kit or later die-cut kits (call for availability), the Shooting Star ends up weighing only seven ounces! Airtronics micro gear was used in the prototypes. With 147 square inches of wing area, this places the wing loading at ... whaddaya know ... seven ounces! Price is about twenty bucks. An almost ready-to-fly version is also available for

a C-note.

For those with RC HLG in mind, but who don't have the arm for the grenade toss anymore, every Shooting Star kit comes with its own "crossbow" type launcher consisting of a launch rail, a handle grip, and a rubber band.

As of this writing, future kits will include an electric version (the "Rising Star"), an aileron version (the "Nova"), and ARFs of each. These electrics are super safe to operate, run for 30 seconds, don't require a speed controller, charge in 30 seconds, charge from a dry cell battery (no charger), and are based on the VL Products power unit which has parts readily available. (The micro sized Wanderer you see in the photo was only an electric power test bed, not a working proto of the Rising Star.) Great ideas, all!

#### C.R. AIRCRAFT MODELS 205 Camille Way Vista, CA 92083 (619) 630-8775

Here is a new company which special-

izes in high performance sailplanes. Charlie Richardson, president of C.R. Aircraft Models, has three new sailplanes to offer the slope and thermal set. All feature light wing loadings, low drag Selig airfoils, advanced slope designs, foam wing cores, machine cut balsa and ply parts, some hardware, full-size plans, and instructions. All will accept standard or micro size radio components. And all look like tons of fun!

The Turbo S is a 52-inch span, wingeron (pivot wing) design with 270 square inches of wing area and the Selig 3016 airfoil. It is designed for all-out aerobatic slope flying. Two or three RC channels are required.

The Turbo ST is a larger, multi-purpose version of the Turbo S. It features a 60-inch



Lindy Bailey of Dynalite Models displays Mark Smith's latest creation, the Skeeter RC HLG. It's a 55-1/4 inch span all-wood chucker that will be equally at home on an athletic field as on a slope.

span wing with a higher lift Selig 3021 airfoil. Increased wing area (315 squares) combined with a 15 to 20-ounce all-up weight gives the Turbo ST thermal capability along with respectable slope aerobatics.

The Excel is a more conventional aileron/elevator design. It features a span of 50 inches, an area of 260 square inches, a Selig 3016 airfoil, and a 15 to 20-ounce flying weight. "The Excel's predictable flying characteristics are perfect for the beginning aileron pilot, and in the hands of an experienced pilot, Excel can outfly anything in its class," says the brochure.



Future Flight's Joan Koontz and Rol Klingberg demonstrate the 1,100 square inches of the new Klingberg Wing KW 100. Billed as a super high performance competition sailplane, the KW 100 has some very trick features.

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### COMPOSITE STRUCTURES TECHNOLOGY

P.O. Box 4615  
Lancaster, CA 93539  
Phone/FAX (805) 723-3783

Matt Gewain introduced a new technique for giving a vacuum bagged wing some jazzy color: saturate a colorful fabric (such as a thin, colorful, cotton flannel) with epoxy, and make it the outer layer next to the mylar. Laminate everything else as you would normally to make your wing. When it's done, you have a pretty neat looking wing. Yes, it gains some weight, but if that doesn't matter in your design, so what?

### DYNAFLITE

P.O. Box 1011  
San Marcos, CA 92069  
(619) 744-9605

New from Dynafite and the drafting pencil of Mark Smith comes the Skeeter RC HLG. Featuring die-cut balsa and ply parts, some hardware, full-size plans, instructions, etc., this Class A chucker is going to sell for an incredible \$19.95! It will also be offered as a combo with a Dynafite Up-Start for an equally reasonable (but undetermined) price.

The Skeeter features the Selig 3021 airfoil—a good choice for thermal flying—a smaller than normal stab area but a longer than normal tail moment to make up for it. The wingspan is 55-1/4 inches, the area is 336 squares, and the flying weight is a competitive 12-1/2 ounces.

### FUTURE FLIGHT

1256 Prescott Ave.  
Sunnyvale, CA 94089  
Phone/FAX (408) 735-8260

Rol Klingberg's new Klingberg KW 100 flying wing has been out only a few months as this is being written. You probably haven't yet had the opportunity to see one fly (I sure haven't). However, if what Rol claims is true about its easy handling and higher performance, this wing will become the sleeper of 1992!

Computer optimized airfoils, foam core wings, "Autoyaw" rudders and computer optimized wing planform are just a few of the features of the KW 100. The most unique feature of all for my money is the in-flight adjustable center of gravity, which allows upwind penetration without drag-inducing down elevator!

With 1,100 square inches of fully balsa sheeted wing area, this is a large bird! And with no fuselage or tail, a very clean bird that builds very quickly, too. The Wing 100 has a suggested retail of \$219.95.

### HIGH SKY

3929 Kansas St. #9  
San Diego, CA 92104

Five new features have been added to the Thermal Navigator, an airborne thermal sensor for sailplanes. This unit plugs into an unused channel on the receiver, and in line between the receiver and the rudder servo. When the glider encounters lift, the rudder kicks in (adjustable, equal to a trim-tab



Brian Laird of Slope Scale visits with friends inside his booth while showing his new B-17 Flying Fortress slope glider to interested parties.

input), causing the plane to turn. The unused channel enables/disables the Thermal Navigator when desired.

New features allow for left or right turn when in lift and alternately right or left turn in sink as well. The stronger the lift or sink, the more the rudder moves. For high altitude flight, an optional on-board transmitter is available which sends the climb-sink rate to a receiver on earth. You can select climb-only indication, climb-and-sink indication, or none at all. You can also override the thermal induced turn with your sticks. There is even a sound output for audio indication!

It weighs only one ounce, and is about the size of a normal receiver. For \$49.95 the Thermal Navigator is the least expensive thermal sensor going.



Dennis and Rob Ross, along with their father, Ron, have resurrected the classic Hobbie Hawk in its original form, but with greater quality and accuracy. Their company is Ross Models, Inc.

### MINIMAX ENTERPRISE

P.O. Box 2374  
Chelan, WA 98816  
(509) 683-1288 for info  
(800) 328-1288 for orders only

You've seen the ads in MB, now let me show you the model and the man behind the model! Ron Parcells, who has been a machinist by trade since 1958, is the main man at Minimax. He hand cuts and sands all parts in his kits, and you can be assured they are excellently made and fit perfectly. The Minimax 700 kit includes full hardware, an extensive 32-page building in-



struction manual (with 174 pictures to help you visualize what you are about to do), and rolled plans that are easy to read and follow.

Three models are available: the Minimax 700 two-meter (shown), the Minimax 700X two-meter with its cleaner, bolt-on wing, and the Minimax 1000X three-meter. At \$46.00, \$51.00, and \$68.00 factory direct, they are quite a bargain!

#### ROSS MODELS, INC.

708 Dermody Way  
Sparks, NV 89431  
(702) 358-7677

The Hobie Hawk flies again! In its original glory, with its (still) unique elliptical wings and stylish fuselage! And the quality



Mike Pratt is right proud of his new design, the Samurai, to be kitted by Sig. Pivot wings and V-tail make it unique.

is, by Hobie Alter's own admission, better than the original!

Ross Models is a family business. Ron Ross and sons, Dennis and Rob, have combined their efforts to faithfully reproduce and even improve the Hobie Hawk with a combination of the original tooling and better machining.

For those unfamiliar with the specs, they are: 98-inch span; 590 sq. in. wing area; 30 oz. weight (less RC); 9.2 oz. wing loading with 8 oz. RC gear; and 42-inch overall length. The price is higher than most at \$350.00 (direct only), but then so is the

Roger Chastain of Tekoa holds two new products worthy of note: the Thermal Generator power unit for his Feather Cut foam core cutter, and the Tri-T Laminate which is used for template making.



performance and the classic style!

#### SIG MANUFACTURING CO.

401 So. Front St.  
Montezuma, IA 50171  
(515) 623-5154

One of the bigger players showing a new product at the IMS was Sig. The new Samurai pivot wing, V-tail sailplane will be available soon after you read this article. Bigger brother to the successful Ninja slope glider, the Samurai should also prove to be a hit. Contact Mike Pratt at Sig for details.

#### SLOPE SCALE

12935 Lasselle St.  
Moreno Valley, CA 92388  
(714) 924-8409

Brian Laird had an all new power scale slope kit plane in the Slope Scale booth this year: a B-17 Flying Fortress! The model is shown in the photo minus engine nacelles, which can be added for scale realism if desired (Brian's IMS static display competition model had them). With a span of 54 inches, a slightly thinned Eppler 374 airfoil and a flying weight of 46 ounces, this is one B-17 that's going to really move! And if seeing a B-17 do a quick roll or fly through the (scale) sound barrier kinda turns you on, this model is the only cure.

If interested in buying a Fortress for defending your local slope, send Brian \$119.95 plus four bucks shipping—and state tax if in California.

#### TEKOA: THE CENTER OF DESIGN

3219 Canyon Lake Drive  
Hollywood, CA 90068  
Phone/FAX (213) 469-5584

Last but by far not the least is the Tekoa booth. Lots of new stuff to see here. There is the Feather Cut hot-wire foam core cutter, the Thermal Generator power unit, and the newest and best template making material I've ever seen.

The Feather Cut machine is one of the simplest, highest quality, easiest to use, most complete foam cutters I've ever seen. The cores it cuts are flawless and simple to create. Cutting bows come in 28, 40, and 52 inch lengths. And the Thermal Generator that heats the cutting wire is likewise simple to use and heavy duty enough to last for many years.

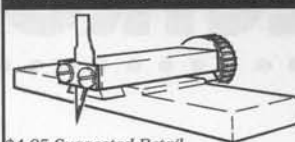
The Tri-T laminate which is used for template making is incredible stuff. It cuts easily, sands to useable smoothness with just 320 grit sandpaper, won't burn a groove if the cutting wire is left in one place too long, cuts smooth cores time after time, and lasts longer than anything else.

If you have any need of further info, call Tekoa and ask for Roger Chastain. It will be a phone call well spent.

#### TIME TO FLY

We're way past the allotted space already, so we are going to sign off for now. Any questions to direct my way, I welcome phone calls (letters are too time consuming) at (714) 245-1702. My mailing address is 3610 Amberwood Ct., Lake Elsinore, CA 92530. **MB**

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# ELECTRONICS CORNER

BY ELOY MAREZ

## The Straight Scoop on Parallel Capacitors

Following last month's discussion about resistors in parallel, it seems appropriate to talk a bit about capacitors in parallel. Actually, it is something of a coincidence, as the mail has just brought a letter from a reader who is building a variable speed control for AC powered tools, which I wrote about back in February 1982. The circuit calls for a .22 Mfd capacitor, a value no longer available from Radio Shack, and he asked what other Radio Shack cap he could use for a replacement.

Actually, the capacitor is more than slightly mysterious to the electronics beginner. It is

millionth of a Farad, and in picofarads (pF) which is one-millionth of a microfarad! That's right, one-millionth of a millionth of a Farad. It is probably best to just forget the micro-math and use the stated values. Fortunately, capacitor manufacturers seem to realize that some confusion does exist and most caps have the value printed on them in numbers with the proper suffix. The only point to remember is that often, the letter "R" is used to designate a period, i.e., 1R5 uF translates to 1.5 uF.

A capacitor is basically two pieces of conductive material with a space between them.

Two metal pie plates in close proximity facing each other often constitute a capacitor. The capacitance is determined by 1) the area of the plates, and 2) the space between them. In practice the capacitors we use are made up of two pieces of metallic foil rolled up with an insulator between them. Again, the area of the foil and the thickness of the insulation determines the total capacitance.

The insulation is critical for another reason—the type of material and its thickness determines how much voltage it will insulate against, which becomes the stated working voltage of that particular capacitor. If not given in a circuit, one should always use a capacitor rated at higher than the highest voltage that it will be subjected to in that particular use.

We don't see them much in RC or support equipment, but

there are capacitors made of multiple metal plates with nothing in between but air. One of the banks of plates is fixed, the other can be rotated so as to increase or decrease the amount of plates facing each other to vary the capacitance.

In use, capacitors have two primary uses, that of passing AC or DC pulses, and blocking DC. There are numerous types, each recommended for specific uses, but two basic groups exist: 1) non-polarized, which means they can be connected in any manner, and 2) polarized, often referred to as "electrolytics" which are marked positive (+) and negative (-) and which must be connected in the circuit so that the voltage is applied in that manner. That's it in a rather reduced nutshell, now let's see what tricks we can play with them similar to what we did with resistors.

First, in series—one after another. When two or more capacitors are connected in series, the effect is that of increasing the spacing between the plates, or that of increasing the thickness of the insulation. Therefore the capacitance is always decreased and is always less than that of the smallest individual value. The basic formula is:

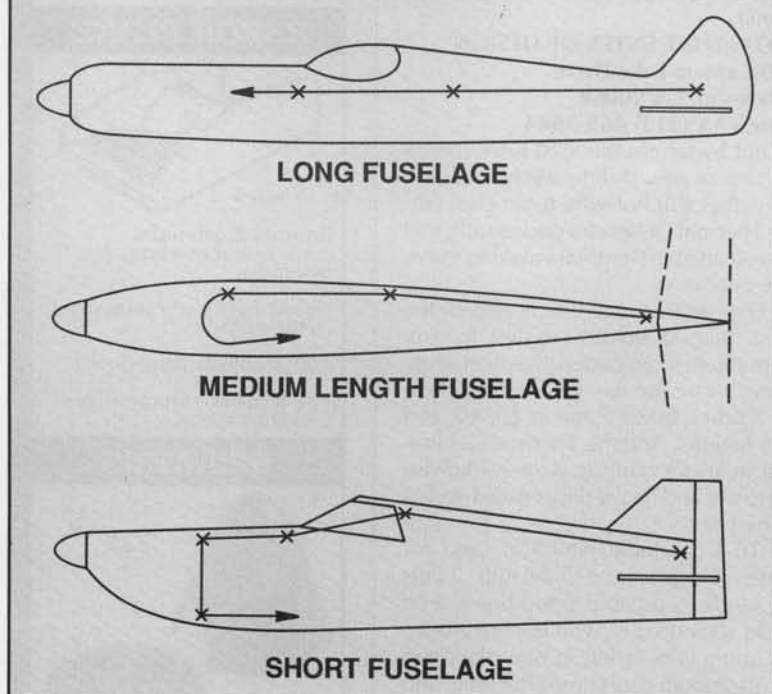
$$C \text{ (TOTAL)} = \frac{1}{\frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3}}$$

However, since for all practical purposes, we are seldom going to run into a long string of capacitors connected one after another, we can generally use a simpler formula that applies only to two of them; it happens to be the same formula that we use to find the total resistance of two resistors connected in parallel:

$$C \text{ (total)} = \frac{C_1 \times C_2}{C_1 + C_2}$$

For example, two 10 uF capacitors connected in series become 5 uF. Working that out, we have 10 X 10 (100), divided by 10 + 10 (20), equals 5—and

### THREE TYPICAL ANTENNA INSTALLATIONS



Antenna installation routes as recommended for airplanes with different fuselage lengths by the maker of the "Shove It" antenna system. One should use care in keeping those folded antennas away from other RC components; best results will generally be obtained with a short length of antenna trailing externally at the tail.

often referred to by what it does, or by its type of insulation, rather than for what it is. The value by which we measure capacitance, the Farad, is not a practical one, hence we always have to use confusing sub-multiples, of which there are a number, each with its own often vague designator. Most commonly, capacitor values are stated in microfarads (uF) which is one-



I didn't even have to get out my calculator for that one!

Now for capacitors in parallel. The effect is that of adding the plate areas, while keeping the same spacing or insulation thickness. Therefore the capacitances add, the formula being simply:

$$C \text{ (total)} = C_1 + C_2 + \dots \text{ etc.}$$

For example, our two 10 uF capacitors connected in parallel are the equivalent of a single 20 uF unit; one 10 uF and a 5 uF compute to a 15 uF.

The voltage rating of capacitors in parallel remains the same, as will the voltage applied in any given circuit. However, when connected in series, the voltage divides inversely proportional to the capacitance. For example, our 5 and 10 uF units above, connected in series across a 10 volt source, would see 6.66 and 3.33 volts respectively. With the advent of low voltage solid state electronics, the considerations are far less important than they were in the days of high voltage tube type equipment. Simply use components rated at or higher than the supply voltage, and you can't go wrong; they are all small and inexpensive.

## RECEIVER ANTENNAS—PUT 'EM INSIDE

Internal receiver antennas is not a new subject, having been covered in length in these pages as late as August of last year. Outside antennas are as outdated and unnecessary as those ugly, greasy, wing-holding rubber bands.

There is late information on the subject; allow me to introduce you to a device called "Shove It"—as in "Take this job and..."

Shove It is actually a single pin connector, simple yet effective, which allows you to build the antenna permanently into the fuselage structure of your model while at the same time being able to remove the receiver if needed. The secret is the connector, which in the case of the Shove It is a pair of

well-made, heavy, gold-plated male and female connectors which should provide an excellent mechanical and electrical contact. It comes complete with 36 inches of antenna wire, two male and one female connector and shrink tubing insulation. That gives you enough bits and pieces to have two airplanes with internal antennas using the male connectors on them, and a female connector equipped receiver which can be easily changed from one model to the other.

Quite comprehensive instructions are included with what is a relatively simple product—but they are worth reading and heeding. To the latter, I would add that you should never start the day's activities without a (transmitter) antenna-down range check. It becomes doubly important if you install this type of system and periodically move the receiver from one model to another.

Shove It is priced at \$2.79, plus 50 cents for postage, directly from: Lauren Associates, 630 Montview Pl., River Vale, NJ 07675; (201) 664-0803. There are discounts and 12-unit display cards for dealers.

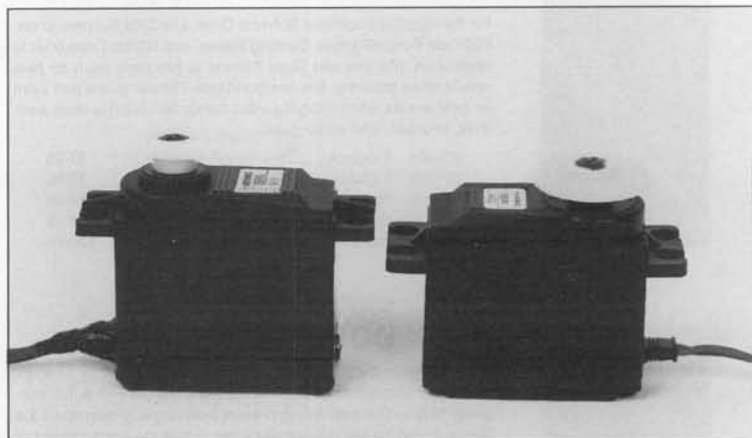
## FET SERVOS

FET servos, or FET boosted servos as they are also referred to, made their appearance sometime in late '90 or '91. They have not made much of an impact in the model airplane world; it appears that they are intended more for RC car use, where the rule seems to be that money translates directly to speed. Those who tried them immediately developed electronic speed control problems—not actually, but in RC cars, all malfunctions from gears to glitches are automatically blamed on the speed control. The fact is that the FET servos consume huge amounts of current, and when one is introduced into a car's system that had been running a given amount of time per battery charge, it will significantly reduce that time.

So what is an FET servo? Well, let's talk general servos for a moment. Basically, the servo can be thought of as having two major parts, the amplifier, which translates the command inputs at the transmitter, through the receiver, to turn on properly polarized voltage to the motor; and the motor itself, which then transforms electrical energy into mechanical energy—torque in this case. The power output of the servo is directly related to the power output of the motor, the gear train being designed to convert and control it to the desired torque-to-speed ratio. With the same motor, you can have a

small motors, including some extremely high quality and expensive instrument grade motors. Seldom does one see efficiency figures higher than 50%—my best guess for those used in the average "standard" servo being 30 to 40%, coreless motors running probably 40 to 50%.

Now, again, regardless of its efficiency rating, the only way to increase the torque output of a motor is to make it run faster. How can we do that? Well, one way is to lessen the load, but that is not a practical solution for a servo. The other way is to increase the voltage, which we can do to some degree, such as



The Airtronics 94151 FET-booster servo (left), a real powerhouse shown here in size comparison to a standard 94102. The 151 uses some relatively new techniques—see text for discussion and explanation.

fast servo at a given torque rating, or a slower servo at higher torque, but there is no gear train magic that will gain you both at once.

Though never discussed down at our level, there are efficiency figures which should be considered in the design and application of a servo. The electrical energy consumed by the motor, like everything else electrical, is calculated in watts; i.e., volts times amps. The motor's torque output can be measured mechanically; the ratio of one to the other giving us an efficiency rating for that particular motor. I don't have any exact figures for any of the motors used in the common RC servos, but I do have some published by the makers of other

by using a five-cell battery. But major motor, and ultimately servo, power increases require different motors.

We are now back to that motor power rating, in watts, which we discussed earlier. Remember that the current in any circuit is determined by the voltage divided by the resistance. With voltages in the same ranges we have been working with, the only other way to increase the wattage is to increase the current—in other words, we have to decrease the motor resistance. That is the first major difference in an FET servo; an extremely low resistance motor that will draw a lot of current, converting it into a lot of torque! In this case, we

*continued on page 80*

# SIG MODEL AIRPLANE DOPE

## "The Traditional Aircraft Finish"

### SUPERCOAT



4 Ounce Color ..	\$2.59
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16 Ounce Spray .	\$7.95

### HIGH-GLOSS BUTYRATE DOPE

AVAILABLE IN 30 BRILLIANT HIGH-GLOSS COLORS — COMPLETELY FUEL PROOF

Cellulose acetate butyrate dope is a paint that was developed many years ago for use on full-scale airplanes. It is a light weight, fast drying, lacquer-related formulation. Ever since its first introduction, butyrate dope has been a favorite with model airplane builders due to its many unique properties.

Butyrate dope is excellent for finishing any type of wooden model airplane, especially when used in conjunction with an uncoated cloth or paper covering like Sig Koverall, Silk, Silkspan, or Plyspan Tissue. It has the ability to shrink these coverings drum tight and provide a fuel proof finish. Butyrate dope is very flexible, making it the very best paint to use on a model that has open areas in its structure where the covering is unsupported. It will not crack or split from vibration or flexing.

### DOPE THINNER

For thinning Sig Supercoat Butyrate Dope, Lite-Coat Butyrate Dope, Flat-Coat Butyrate Dope, Sanding Sealer, and Nitrate Dope prior to application. Mix one part Dope Thinner to two parts paint for best results when brushing. Mix one part Dope Thinner to one part paint for best results when spraying. Also handy for cleaning dope from tools, brushes, and spray guns.

SD-025 4 Ounce .....	\$1.95
SD-066 8 Ounce .....	\$3.65
SD-106 Pint .....	\$4.65
SD-146 Quart .....	\$7.15
SD-162 Gallon .....	\$20.95

### SANDING SEALER

#### BUTYRATE DOPE PRIMER

Creates an ultra-smooth base for a prize winning butyrate dope finish. Quickly fills wood grain and covering materials.

Sanding Sealer is basically our Lite-Coat low-shrink butyrate dope with special light weight, easy-to-sand fillers added that make it the perfect surface primer for a dope finish. Two coats of Sanding Sealer, put on after your initial two coats of clear dope, then sanded thoroughly when dry, will provide an ultra-smooth base for the color dope. Sanding Sealer is completely compatible with all other Sig butyrate dope products.

SL-001 4 Ounce .....	\$2.59
SL-003 8 Ounce .....	\$3.79
SL-004 Pint .....	\$5.99



### DOPE RETARDER

Typically, when butyrate dope is used in a high humidity environment it will sometimes "blush" (meaning it will dry with a dull non-glossy finish). The best way to prevent blushing is to slow down the rate of drying by using Dope Retarder to thin the paint instead of regular Dope Thinner. Retarder can be used as a 1:1 substitute for regular Dope Thinner when a slower rate of drying is needed to prevent blushing.

DR-001 4 Ounce Jar .....	\$1.99
DR-003 8 Ounce Jar .....	\$3.69
DR-004 Pint Can .....	\$4.89
DR-005 Quart Can .....	\$7.69
DR-006 Gallon .....	\$21.99

### FLAT-COAT

#### NON-GLOSSY CLEAR BUTYRATE DOPE

Flat-Coat is a non-glossy version of Lite-Coat low-shrink dope. It's recommended as a final top coat on models that need a realistically dull, military type finish. Simply paint your model as usual with standard high-gloss Supercoat color dope, then spray Flat-Coat over all the color areas that should be non-glossy. Ideal for painting, WWII models, anti-glare panels, wheel wells, scale pilots, instrument panels, scale props, etc. Our tests show that Flat-Coat produces a more realistic dull finish at less cost than buying separate flat colors. Flat-Coat is completely compatible with all other Sig butyrate dope products.

FC-001 4 Ounce Jar .....	\$2.19
FC-002 Pint Can .....	\$5.49



### LITE-COAT

#### LOW-SHRINK CLEAR BUTYRATE DOPE

Because of the high shrinkage of regular Supercoat clear butyrate dope, it can sometimes warp a thin or lightly built balsa model. To help eliminate this problem, Lite-Coat low-shrink clear butyrate dope was developed as a substitute in some applications. Lite-Coat has the exact same handling characteristics and high gloss of Supercoat clear, but with a lot less shrinkage. In fact, they are completely compatible and intermixable.

LC-001 4 Ounce Jar .....	\$2.19
LC-003 8 Ounce Can .....	\$3.79
LC-004 Pint Can .....	\$5.49
LC-005 Quart Can .....	\$9.39
LC-006 Gallon Can .....	\$28.99



### NITRATE

#### CLEAR DOPE

Nitrate Dope is sometimes preferred for the initial coats of a painted finish, instead of regular Supercoat clear or Lite-Coat clear dope, because of its superior adhesion to typical model structure materials. Acts as a sealer for the bare wood and makes a well bonded base for most commonly used model paints. Nitrate Dope is clear, fast drying, and high gloss. Nitrate Dope IS NOT FUEL PROOF! It should be used only for initial surface preparation and covering attachment, and then topcoated with a fuel proof paint such as Sig Butyrate Dope, epoxy, or enamel model paints.

ND-001 Pint Can .....	\$5.99
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# BIG BIRDS

BY BRUCE EDWARDS

## CONTEST DIRECTORS MAKE MISTAKES TOO!

In the past, good and bad officiating by Contest Directors has been discussed by most columnists who regularly attend contests or fly-ins. Most CDs are good people who do a job that nobody else wants to do. When I attended the Unlimited RC Race at Madera in October '91, the officiating was excellent.

At Madera I met an old friend who is a

He got a little red in the face as he told me why he did not have his beautiful Big Bird to fly anymore.

It seems that when my friend attended a local fly-in near his home, his model was shot down by radio interference. The interference was caused when the Contest Director took it upon himself to allow another flier to use old radio equipment that was not

ried out, so that everyone is protected equally. A CD has absolutely no authority to change AMA's narrow band frequency policy for any reason. To do so is the same as telling a pilot that he may fly over the pit area or buzz the spectators whenever he wants.

All of us who heard this story felt very bad about our friend losing his plane. He would



(Left) Karl Hibbs uses a Webra Bully to do very good aerobatics with his Byron Pitts Special. Weighs in at 16 pounds. (Right) Dick Hanson sent this photo of the gentlemen who are sponsoring "Aerodrome '92." They are, left to right: Gene Swartz, head mechanic for the Guntersville Fighter Replica Museum; Frank Ryder, C.E.O. and owner of the Museum; and Jay Cerolla, head of the Model Department. Guntersville Airport, Guntersville, Alabama, is the site of this giant gathering of WWI aircraft, to be held over Labor Day weekend.



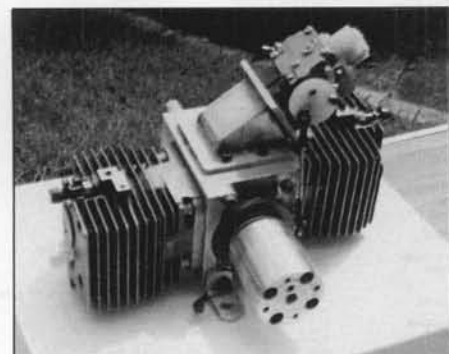
very good Big Bird pilot. He was running around helping various crews make their heats in any way he could. I commented that he should have entered his own plane.

He got a little red in the face as he told me why he did not have his beautiful Big Bird to fly anymore. It seems that when my friend attended a local fly-in near his home, his model was shot down by radio interference. The interference was caused when the Contest Director took it upon himself to allow another flier to use old radio equipment that was not

The last time I made a comment on officiating it was to reinforce the idea that the CD is there to see that AMA's policies are car-

ried out, so that everyone is protected equally. A CD has absolutely no authority to change AMA's narrow band frequency policy for any reason. To do so is the same as telling a pilot that he may fly over the pit area or buzz the spectators whenever he wants.

All of us who heard this story felt very bad about our friend losing his plane. He would



If author Bruce Edwards were to race at the next RC Unlimited Race at Madera, California, this Aerrow 100 would be his choice of powerplants.



Walt Wyrick loves the way his Balsa U.S.A. "Der Jager" flies. S.T. 3000 is the powerplant of Walt's choice.



flyer should state exactly what is and is not allowed at their event. It should also state any frequencies that are not to be used.

Most clubs that sponsor flying events hope to see the event grow, and the events do grow if they are well managed. People are not going to visit your fly-in if they keep having bad experiences there.

The AMA's frequency plan seems to be working well as long as both the transmitter and receiver are narrow-banded. As time



Steve Milos loaned his E-Z Lazer 300 to Vince Dunlap (left) and Jerry Holcomb, so they could attend the Keizer Big Bird fly-in. The aircraft weighs 16 pounds and is powered by a Saito 300 single carburetor engine. They did not bend it, Steve!

showing me some photographs of some very nice giant scale planes, one of which was a C-119

Flying Boxcar, yet no magazine has ever received any pictures of the plane to my knowledge. These are really special projects and it is too bad that some Big Bird builders are too shy to send in photos their latest

ins I have attended. I am not a photographer by trade, however, there are some things anyone can do to take good photographs. Number one on the list is to read your camera instructions until you completely understand them, just like you would do with a new radio set.

Take a few practice shots to learn how to center your subject in your viewfinder. There is usually a small colored outline that will show the outer edge of your photo. Take a few extra seconds to center your subject, left and right, up and down. Most people get the subject in the bottom half of the photo with a lot of empty space on top.

The most difficult place I have had to take photos was at the Unlimited RC Race at Madera. The pits were packed close together and the crews were busy preparing their aircraft. It was not uncommon to have to try half a dozen times to get an interview and pictures.

My photos are all taken with a Ricoh



(Left) Darrell Cheshire sends greetings to all his friends in the Boeing Hawks RC Club. Darrell is retired from Boeing, now lives in Oregon, and flies his Diablo on a regular basis. (Right) Paul Snyder says his Ace 4-120 Biplane really performs with the O.S. BGX-1 3500 supplying the horses. Radio is a Futaba PCM.



goes by and everyone gets their equipment up to date, most problems should disappear, as long as too many frequencies are not given away to pagers and other users.

If you have an older style biplane and do not take the trouble to go through some sort of trammeling you will probably have a plane that flies poorly.

### CONTRIBUTIONS WANTED

I have not received many pictures lately but I am hoping that you readers will be sending some photos of your Big Bird winter projects as they are completed. Please let me hear what is happening in your area.

This past summer, while I was visiting the Keizer, Oregon, fly-in, a gentleman was

Ronnie Kemp, owner of Sky Rider Models, shows off his new P-39 Aircobra. It's 1/5-scale, with an 82-inch wingspan. It weighs 22 pounds and has an S.T. 3000 for power.

project to share with us.

Quite a few of you have said that you enjoy the photos in the Big Bird column. So far, most of the pictures are from various fly-

auto-focus 35mm camera. The only problem I have is remembering to set the shutter speed to the correct ASA number of the film. Even then the photos come out quite



well. The only problem I have with my camera is the fact that it is difficult to take close-ups of small parts, so perhaps Santa will be kind to me one of these years and furnish a camera to do the job. So don't be shy, send in some shots of your planes, you may inspire someone else to try a new project.

### THE FUN FLY "ROAD RUNNER"

Michael McNally called me to ask if I knew where to purchase a Road Runner kit. Michael also wanted to know if I thought the Road Runner would be a good starter plane to enter the Big Birds arena with.

Michael has indeed chosen well. The Road Runner is available from Fun Fly, Box 1686, Lander, WY 82520; telephone (307) 332-7630. It is a very high quality kit. Few kits are as well designed or have such high quality wood in them. The plane is adaptable to many engines from a .90 four-stroke to a 2.70 Saito Twin.

strained models. Duke appreciated the timely safety reminders he reads in "Big Birds" and hopes we will continue to remind everyone to check their models carefully.

### NEW BIG BIRD KIT

Last fall, Ronnie Kemp, owner of Sky Rider Models, flew his new P-39 Aircobra at the Keizer Big Bird fly-in. Ronnie's Aircobra flew very well and seemed quite agile on the controls. Often an RC model of a WWII Big Bird will fly better than the original full-sized aircraft, due to better airfoils and power/weight ratios.

Ronnie's P-39 is powered by a Super Tigre 3000 and uses homemade mains and Robart nose retractable landing gears. The plane weighs 22 pounds and slows for landing nicely with 43 degrees of flap.

The Sky-Rider Models kit of the P-39 features an excellent fiberglass fuselage and foam core balsa covered wings. The kit

with these reliable powerplants. The price of the kit will be \$1295.

### BILL FAILOR

Many Northwest Big Bird pilots were saddened by the passing of our good friend Bill Failor. Bill was a retired Boeing employee whose modeling exploits go back to the 1930s when he was a member of the Seattle Guide-Liners.

Bill's last Big Bird was a quarter-scale Sopwith Triplane that graced the pages of the December 1991 "Big Birds" column. The plane is expected to be on permanent display in Boeing's Museum of Flight, a fitting tribute to a real gentleman.

### REQUIRED READING

Big Birds Book of the Month is *Hurricane* from Squadron/Signal Publications, Inc., 1115 Crowley Drive, Carrollton, TX 75011-5010. This book has paintings, pictures and facts about the Hawker Hurricane and cov-



(Left) Dan Weigandt flies his Laser 200 with great precision. His plane is powered by an O.S. Gemini 300 twin, weighs 17-1/2 pounds and has a 98-inch wingspan. (Right) Charley Townsend attends a lot of fly-ins and always has a good time flying his Balsa U.S.A. Fly Baby. It is powered by a Quadra 35.



The Road Runner is also a good trainer because it may be set up as a docile flying platform and is big enough to be easily visible to the student pilot.

### BIG BIRD SAFETY

Duke Evans, from Douglasville, Pennsylvania, wrote to say that his club, The Tri-County Wing-Snappers, takes great care to inspect all the planes that attend the club's three Giant Scale fly-ins that they sponsor each year.

Last year they found a quarter-scale Cub and a one-fifth scale P-51 with reversed ailerons. On other planes they found a dead battery pack, loose hinges and loose control horns and clevises with no keepers. The best equipment is only as good as its installation.

Duke said they are strongly encouraging the fliers in their area to make or buy good Big Bird restraints, because they have had some nasty accidents from improperly re-

sells for \$425. You may order the P-39 kit from Sky Rider Models, 11919 Canyon Road East, Puyallup, WA 98373; telephone (206) 535-0116.

In the near future Sky Rider Models will be offering a kit of the OV-10 Bronco. It will weigh 33-36 lbs., and when disassembled it will fit in a 2x6x4-ft. box. When assembled, the OV-10 will have an eight-foot wingspan and 98-inch length. Those of you fortunate enough to have a van could remove the wing tips and roll it in the back door.

The OV-10 has a fiberglass fuselage and booms. The wing is foam and balsa and the plane is designed for use with two S.T. 3000 engines. It should be an able performer

Dick Glad hardly ever makes a thud when he flies his Big Birds—instead he flies his own design "Thud," which strongly resembles a Swizzle Stick with a thyroid problem.

ers all marks. Without the Hurricane, the Spitfire would not have turned the tide in the Battle of Britain.

So long and enjoy your Big Birds! See you next month, when we cover the Big Birds at the Northwest Model Expo! Bruce Edwards, 8304 53rd St. Ct. West, Tacoma, WA 98467; telephone (206) 564-4416. **MB**





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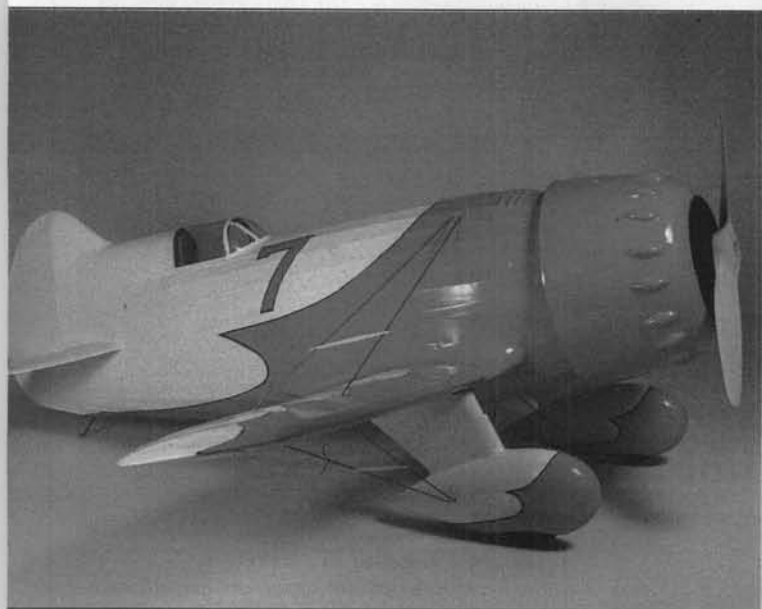
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# GEE BEE R-1/R-2 HYBRID

BY R. J. THEISS



(Above) The author's pretty little CO<sub>2</sub> racer has been a completely successful modeling project, whereas the full-size R-1/R-2 Hybrid, like all of the 1930's Gee Bee Super Sportsters, was fraught with misfortune; pilot Roy Minor ran it into a ditch while testing for the 1934 National Air Races, and Cecil Allen lost his life and demolished the aircraft when he crashed just after takeoff in the 1935 Bendix Race. (Right) Two models on lot—one slender, one not! Ms. Hope Trivette displays the author's latest project.



As with most builders of miniature aircraft, I found myself wanting to knock the socks off the rest of the gang with a really unique project—you know, one of those strange designs that is sure to invite the comment, "It ain't never gonna fly, no how!"

Although the Gee Bee Super Sportster is certainly no stranger to the serious modeler, it does (due to reputation and appearance) qualify as a doubtful flier.

To top it all off, it was my intention that a CO<sub>2</sub> motor would be doing the honors up front—yet another reason for most to have their doubts about my racer's ability to perform.

Though you might question my innermost thoughts during the period of design and construction, I must confess to having had thoughts of nothing but success. My confidence was based on research into both the real craft and models of the blimp-like speedsters. Much to my interest were recent engineering studies that have shown the Gee Bee R-1, R-2 and R-1/R-2 racers to have been among the most efficiently designed craft (for their large radial engines) ever built. Research has also established pilot error as the major cause of every accident related to the Super Sportsters.

Before going any farther, let me define my use of the term "free flight" as applied to this model. It was my desire and intent that my racer perform just as realistically as possible. No jump takeoff with a spiral to an altitude from which a powerless glide of duration might be expected.

The real R-1/R-2 required power throughout its flights and it seemed reasonable to expect the same from my scaled-down job. The idea of taking off from a hard surface, flying at only inches above the pavement for about fifty yards and then landing on the same hard surface, may not be normal—but it is scale.

In contemplating the design of the model, I came to recognize three areas of major concern. First off, I was faced with a heap of frontal area. This is

probably the main reason why most modelers have stayed clear of the Super Sportsters. The second major challenge was torque. When Jimmy Doolittle flew the R-1 to victory at Cleveland in 1932, he had it; and with the powerful little CO<sub>2</sub> swinging a 7x6 wood prop, I would have it, too. Which brings up the last and certainly not the least challenge—bulk and weight with not much wing area to support it.

Sounds almost insurmountable, doesn't it? And still I was sure that I could build and fly the craft with success. My plan was as follows: With torque generated about the axis of the engine drive shaft at the front of the plane, it seemed logical to generate any dampening effort around the same axis, also at the front of the plane.

By keeping the trailing edge of the balsa cowl thin, along with having a nose cone between the CO<sub>2</sub> motor and firewall, I not only relieved frontal pressures, but also induced a smoother flow of air around the fuselage than was possible with the real craft. As the drawings and photos show, unlike the huge radial engine on the real craft, my tiny single-cylinder motor gives little resistance to the flow of air around the nose cone and over the leading portion of the fuselage.

I used the same flow of air to cope with my second major problem: torque. Notice that four fins are mounted to the nose cone portion of the fuselage running almost the full length of the cowl to which they are attached. I felt that it would be of an advantage to mount these units as shown rather than having two on the vertical plane and two on the horizontal. Quite possibly, the 45-degree mounting system could provide some needed lift in this area. Notice also that I added fins of thin acetate window material to the trailing edges of these mounting units. These fins are bent in a common direction, utilizing the prop wash as a resistant force to the generated torque.



The remaining problem of weight would have to be controlled by the design of my little fatty. I had determined that the maximum weight should not exceed 3-1/2 ounces. I used only the lightest balsa, including the wheels, which I turned with my Dremel tool.

As was most obvious, the tail feathers would have to increase in size. Dashed lines indicate this added area of a slip-on boot made of acetate window material. (These finally replaced the basic trim tabs added during tests.)

## FUSELAGE

In preparation for construction, cut out and shape all of the formers and ribs from 1/16-inch balsa sheet. Mark the stringer positions on the edges of the formers with a soft pencil (the pencil marks will not interfere with the glue joints and never bleed through the finish as ink often does). On fuselage formers F-3-B and F-4-B, I have shown areas to be cut out so as to accommodate the installation of the wing root ribs. The material to be removed is best cut partway through and then left in place during the construction of the fuselage.

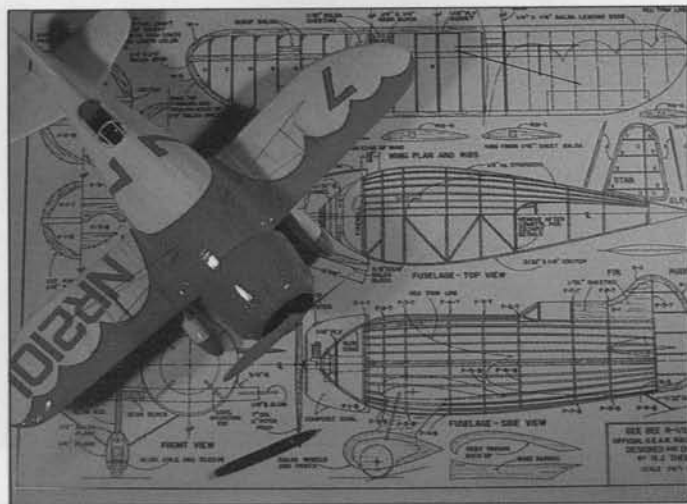
The marked positions of the stringers on formers #1, #8 and #9 should be maintained; however, the markings on the rest of the formers should serve as indicators only. A light variance from these marks may be necessary so that the stringers have a natural flow from fore to aft.

Setting these units aside, build the horizontal crutch. With the crutch pinned over the drawing and on a flat board surface, glue former F-9-T into position. Work your way forward, adding each top half former to the crutch. The first stringer to be glued in place is the very top center one, which runs from former F-6-T forward. This stringer establishes the top profile line of the fuselage.

Starting from the rearmost former F-9-T, install two stringers at a time on exact opposite sides. By cutting the stringers about five inches too long, you can provide yourself with a good leverage for their bending over the last two forwardmost formers, producing a rather abrupt curve. This is the procedure to use for the entire top half of the fuselage.

With all of the stringers in position, add the fin unit and sheeting between formers F-7-T and F-8-T.

After removing the top half of the fuselage from the plans, cut the stringer tails flush with former #1. Repeat the tail-to-front procedure used on the top half of the fuselage and you will be rewarded with a recognizable shape that is unmistakably Gee Bee. Glue the rudder outline pieces together over the



drawing, then glue the unit onto the fuselage, adding the 1/16-inch square balsawood braces to either side.

## WING AND TAIL

In designing this unit, I employed a single large, lightweight spar. Notice that the wing is built in four separate sections. The two center sections will be passed through the fuselage to join at the center line where they will establish the angle of dihedral. The outer two panels are joined with a guide pin and may be removed for travel, storage or for a desired change in the angle of incidence.

To begin construction, mark the rib spacings on the spars with a soft pencil. The gluing of the ribs at these positions follows, making sure that the trailing edges of each rib are in perfect alignment. Next comes the fastening of the leading edges, followed by the wing tips and trailing edges. These are best pregglued over the plans so that they will hold their shape while being added to the spars and ribs.

I wrapped up the remaining framework by building the stabilizer/elevator units. Pre-

shaping the leading and trailing edges along with the tips of these units pays off with a super clean structure.

## LANDING GEAR

Each of the Gee Bee's gears and pants are one smoothly faired unit. After shaping all the parts separately, using the drawing outlines as template guides, glue and pin the units together as shown. The aluminum pins add much needed

at the fuselage.

I used two different methods of construction for the cowls—lay-up and plank. The plank method is a rather standard approach and requires lots of shaping and sanding. Actually, the lay-up method has been around for some time, too. It's done by turning a form from a block of wood chucked into a drill press. This is encased in a thick coat of fiberglass resin. Over the resin goes a thick polished coat of candle wax, then a coat of mat medium (a water-based art material). The actual cowl is made of two clear doped layers of the thickest silkspan you can get. Next comes a thick core layer of clear dope loaded with balsa dust, then two more layers of clear dope with silkspan, and two final coats of hand brushed red dope. The hand carved blisters should be added before the final two coats of red.

## MOTOR MOUNT

I've shown the motor mount plug in three-views on the drawings. This hardwood piece fits into a slot that conforms to the wedged shape of the shank. Cut the forward tip of the cone along the line indicated on the drawings. This portion of the nose cone can be removed when pulling the motor, tank, and charger units. It is held in position by wood dowel pins as shown on the drawings. Having cut this unit free, slip the mount plug into its receiver slot and drill a hole from side to side through both units. The fixing and slotting for the charger completes this phase of work.

## COVERING

Holding manageable-sized sheets of Japanese tissue over two segments of stringers on the fuselage at a time, trace the outside stringer edges by drawing the side of a newly sharpened pencil along their lengths. Cut out the sections along the penciled lines and label them with a soft pencil. Do the same for the top and bottom panels of both outer wing sections, the horizontal stabilizer, the elevator, and for either side of the rudder. Now you have all of the covering material, patterned, shaped, and labeled, for the entire craft. Using a 1/2-inch flat brush, lay thinned white glue

*continued on page 61*

strength to the gears and very little weight.

## WING/FUSELAGE FUSION

I designed the wing sections to join at the centerline of the fuselage so that the shock loads from the stiff wheels and gears can be transmitted throughout the wing and entire fuselage, rather than through a relatively small portion of the wing root section only. Using an X-acto knife, complete the slitting of the lower section of formers F-3-B and F-4-B, remove these sections, slide both wing panels in place, square them up with the fuselage and glue the angled butt ribs together along with every location where the wing and fuselage framing meet.

## COWLING

Feeling energetic, I actually built two cowls for the Gee Bee. The first was based on the R-2 model, which in real life had the smallest engine used in the R series. This cowl, though having a bit tighter fit at the fuselage, presented the least frontal area of any Gee Bee Super Sportster. The R-1/R-2 Hybrid's cowl had a larger gap



# Gee Bee Z

## TEST-FLIGHT

In 1931, five Granville brothers, Zantford ("Granny"), Tom, Robert, Mark and Ed, and aeronautical engineer Robert L. Hall, designed and built their first "Teardrop Streamlining Concept" race plane. Powered by the 985 cubic inch Pratt and Whitney Wasp Jr. nine-cylinder radial engine, its stubby, powerful appearance appeared radical to many. It was called the Gee Bee "Z"—and won first place in the 1931 Cleveland National Air Races with an average speed around the pylons of 236.239 mph, flown by Lowell Bayles, who later lost his life when the Z was overstressed to destruction from the installation of the big P&W Wasp of 1340 cu. in., in an attempt on the World's Landplane Speed Record.

In 1932, Granville Bros. Aircraft, Inc., employed aeronautical engineer Howell ("Pete") W. Miller and refined their streamlining concept further by running wind-tunnel tests on a scale model of their new proposed 1932 racers. Miller performed extensive structural stress-analysis on the new "R" series racers to avoid the in-flight structural failure of the previous year's Model Z.

Two R models were built: the R-1, powered by the big Wasp (about 770 hp) for closed course racing, and the R-2, powered by the Wasp Jr. (450 hp per Bob Granville). The R-2 had a more streamlined cowl and larger fuel tanks for the cross country Bendix Race. The R-1 won the 1932 National Air Race's

BY VERN CLEMENTS • PHOTOS BY MAUREEN CLEMENTS





With all checks completed and the ship signed off by the FAA, there's nothing left to do now but roll her out and see how she's gonna fly.



And fly she does! Pilot Delmar Benjamin did a terrific job of handling the Gee Bee on its maiden flight, which included rolls, inverted flight and a fast pass right on the deck.

The first flight is over, and Delmar Benjamin is one happy test pilot. The aircraft is plenty sensitive on the controls, but certainly doesn't live up to the original's reputation of being a vicious aircraft.



Thompson Trophy pylon event at 252.686 mph, with Jimmy Doolittle piloting it; a record that was not broken until 1936. Doolittle also set a 1932 World Speed Record in the R-1, going 294.38 mph over the straightaway course.

Lee Gehlbach flew the Gee Bee R-2 from Springfield, Massachusetts, to Burbank, California, where the Bendix Transcontinental Race started. The race finished in Cleveland. With oil leak problems, the R-2 came in a disappointing fourth in the Bendix Race at 210 mph, with winner Jim Haizlip averaging 245. With its mechanical problems hopefully solved, the R-2 was then flown in the Cleveland Thompson Trophy Race at 222 mph and 247 mph in the Shell Speed Dashes (5th place in each). Expert race pilot, Lee Gehlbach, flew a much tighter course around the pylons than did skilled first place winner Jimmy Doolittle with the more powerful R-1.

Replica Gee Bee Sportsters have since been built and flown, with the latest being a gorgeous Model "E" by Jim Jenkins. Bill Turner built and flew a replica 1931 Z racer several years ago. Due to many published bad stories about the fast, all-out racing models, the 1932 R racers have been shunned by replica builders.

Now, we have aerobatic pilot and aircraft builder Steve Wolf (of "Samson" fame) and aerobatic pilot Delmar Benjamin, who have built a beautifully replicated 1932 Gee Bee R-2 racer! Delmar plans to fly the airshow circuits in the new Gee Bee R-2, demonstrating this ultimate expression of brute power for all to see!

Thanks to an invite from enthusiastic, smiling Steve and Liz Wolf, and quiet, precise Delmar Benjamin, my wife Maureen and I arrived at Wolf Aircraft, located at Hobby Field, in Cresswell, Oregon, 1-1/2 days before the R-2 test flights. Fairings were all over the floor, and the group of skilled aircraft workers were working intently. After seeing that beautiful Gee Bee, Maureen was almost as excited as I was, and still is. When a wife feels that way, you well know the impact of this event!

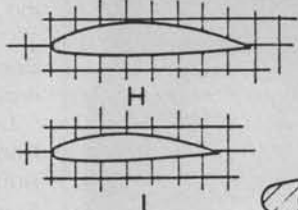
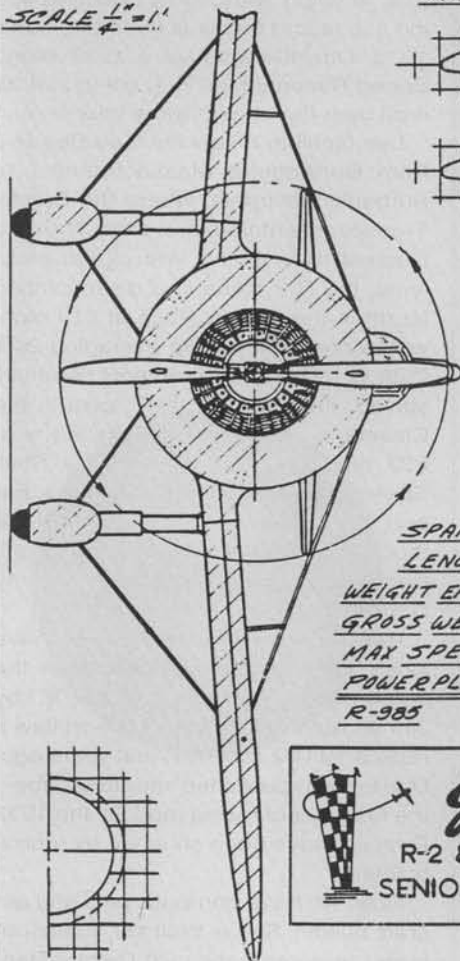
On Monday, December 23, 1991, over 59 years after the original Gee Bee Model R stunned the world, a seemingly very calm Delmar Benjamin taxied the epitome of brute racing power and beauty to the end of the runway, while we spectators watched in awe with cameras ready. The thunderous roar and acceleration was overwhelming; beautiful takeoff, moving fast to altitude, circling outside the field's perimeter, but always within our view during his "feeling it out"

SCALE  $\frac{1}{4}" = 1'$

MODIFIED M-16 AIRFOIL

COLOR SCHEME:  
RED & WHITE WITH  
BLACK NUMERALS  
SAME AS R-1

VIEW SHOWING NUMBER  
ING.



SPAN - 25'  
LENGTH - 17'9"

WEIGHT EMPTY - 1796 LBS  
GROSS WEIGHT - 3883 LBS  
MAX SPEED - 225 MPH  
POWER PLANT - 550 HP PW Wasp Jr.  
R-985 SPAR LOCATIONS

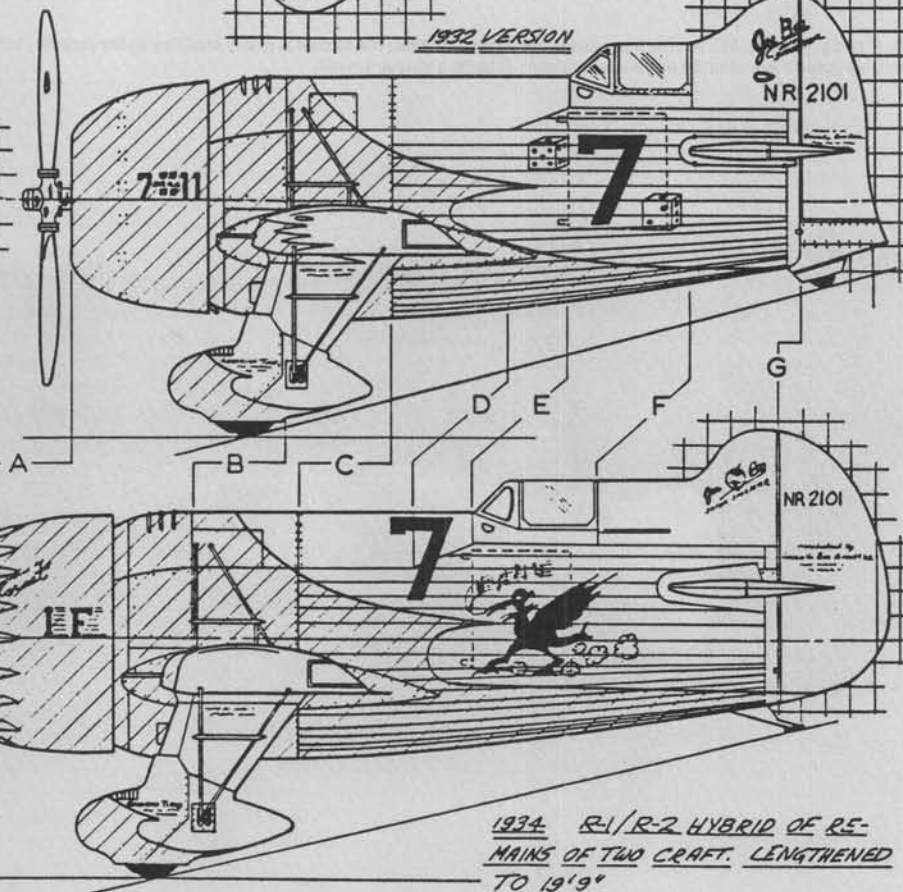
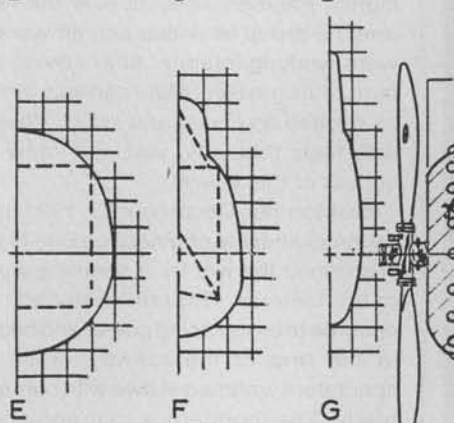
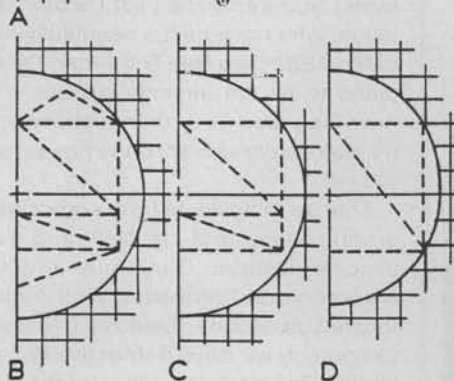


HASKELITE  
COVERING

$\frac{1}{8}"$  SQUARES

1933  
VERSION-  
ALSO R-1

1932 VERSION



1934 R-1/R-2 HYBRID OF RE-  
MAINS OF TWO CRAFT. LENGTHENED  
TO 19'9"



flight procedures. Stall speed 100 mph, recovery straight ahead. A roll each way, inverted flight, side-slips, and a high speed pass above the runway. Then, a landing approach—I expected him to do that several times before landing, but no, Delmar made a nice landing, just like that! And used only 1300 feet of the 3100-foot runway in the process!

Delmar taxied the Gee Bee to the pumps, shut it down, and slid out of the right side door, with us circled around him. He said, "That's an airplane! I didn't stay up long because I forgot my earplugs. I'm going up again," which he did after a brief aircraft check and adding more fuel.

On his second flight, Delmar flew the Gee Bee inverted a longer spell, while the Bonanza chase plane's crew was trying to keep up, filming him. He then flew knife-edge, rolls, hesitation rolls, loops, and a beautiful Cuban-eight before making a low, fast pass over the runway at 270 mph on 30 inches manifold pressure (40 inches available), followed by another good wheels landing, very straight down the runway. In landings, the main gear wheels touch down at 120 mph; never landing in the near-stalled three-point attitude as in the old days, per Delmar. Speed insures control, a well-known fact in flying.

Howell Miller, chief engineer for the Gee Bee R-1 and R-2 in 1932, was called by Steve during the second flight. Miller was delighted to hear the R-2 fly by in a low pass over the runway! It had been planned to buy Miller an airline ticket to come see the tests, but health problems prevented him from flying.

Miller has read too many published "Killer Gee Bee" stories. In 1932 he knew that only a couple of pilots were possibly qualified to fly the fast Model R Gee Bees, with their heavy wing loading figures for that day. Later, those figures were, and are now, acceptable. The Granville/Miller design was ahead of its time. As Steve Wolf says, "The wing loading is comparable to flying a P-51, without flaps."

In 1932, there were no training aircraft to prepare pilots to fly airplanes that were capable of almost doubling the speed of the military aircraft of the world. Relative to the



Inside the Wolf Aircraft hangar, the atmosphere is intense as final preparations are made for the initial test flight. The Gee Bee is seen here up on scales for the weight and balance check.

Gee Bees' power, high speed, and wing loading in 1932, accidents were often due to pilot error.

In my past, I spent six years of research (thanks to Premo Galletti's help!) and drafting board work, drawing Gee Bee model plans, with scale accuracy being my main goal. Models built from my plans fly with an 18% CG position, be they FF, CL or RC. Granger Williams built and very successfully flew RC, both the 1/6-scale Z and R-1 from my plans (including scale airfoils), not modified from exact scale as done by others. Thus, the Gee Bee racer's aerodynamics were explored. The main problem with Gee Bee models is keeping the flying weight low.

Noted designer Curtiss Pitts has used and studied the M-6 airfoil intensively, and told Steve that an 18% CG is correct. They are striving for that position on the replica R-2. Test flights were made at 21-1/2% CG and Delmar said, "You just *think* elevator and rudder control, they are so effective and sensitive." The 1932 Gee Bee R-2's calculation was 22-24% CG; even more sensitive than Delmar's! The still experimental Wasp Jr. engine of 1932 weighed 92 pounds less than the same, since-upgraded engine in the new R-2, further inducing a probable tail-heavy condition. If tail heavy, any airplane design is unstable and difficult to fly!

Slight washout is built into the replica R-2 wings for improved lateral control management. Washout has been incorporated in many/most later aircraft designs, adding handling and extensive safety benefits. It is well known that this is also applicable in model aircraft flight.

Modern Cleveland disc brakes are used, providing precise landing roll-out directional control; a great improvement over units available in 1932.

This beautifully replicated Gee Bee R-2 represents wiser studied decisions and construction skills by Steve and Liz Wolf, Delmar

Our author, Vern Clements, a long-time Gee Bee fanatic and advertiser in *MB* classifieds never anticipated that his six years of Gee Bee research and scale drawings would be a major contribution to the building of a 12"-1" scale R-2 replica.

Benjamin, and their most adept helpers, Duane Trappen and Jim McAllister. My drawings only provided them sought-after accurate scale outlines, full-scale cross-sections, geometric systems plottings, other details, and full paint/decor layout.

At the time of this writing, Delmar has made eight flights in the Gee Bee and has not pushed it for a top speed reading. Upper landing strut/wing root fairings are yet to be formed from aluminum (no fiberglass was used); installation of these fairings is expected to increase speed by about 10 mph. Fine-tuning to today's known trim and bal-



Can you think of any homebuilt aircraft that will attract even one-tenth the interest that the Wolf/Benjamin replica Gee Bee R-2 will at future air shows?

ance specifications is continuing. Using a 99-inch prop, the rate of climb indicator needle pegs on 4000 feet per minute! Expect to see powerful, high speed air show performances...by a beautiful Gee Bee that surpasses our long lingering dreams!

Yes, non-believers were at the recent R-2 test site, too. A local area TV reporter came to interview Steve, who was pressed for time doing final preparation work, so I handled it. During the interview, a fellow kept leaning forward and saying, "Tell him of the accidents." I blanked him out. The thoughtless are rarely wordless.

On December 23, 1991, many bad Gee Bee myths were dispelled. Being in its presence and seeing Delmar's skilled, thundering test flights in his potent red-and-white Gee Bee R-2 Super Sportster... was awesome! **MB**



# ELECTRIC POWER

BY MITCH POLING

## WHAT OUR READERS ARE UP TO

**B**en Mathews sent photos of the Gulf States Electric Fly-In, held last October near New Orleans, Louisiana. The meet is family outing style with picnicking and their famous Cajun Cook-out. Tom Ohlsson, a fellow club member, was the chef and produced a traditional Cajun Jambalaya and Shrimp Etouffee. Boyd O'Brian made his world famous Commander's Palace Bread Pudding, which used every pan in Ben's house. Now Ben's

Lowell uses ten cells and an 05 motor in his Traveler. Ben did not say, but I think Lowell is using an Astro cobalt 05 with a gear drive. A gear drive lets you do some neat tricks—such as “overdriving” a motor with more than the standard number of cells. This can yield much power with not much penalty in weight. You do have to pay attention when you do this, or you can overheat the motor and battery pack. If you keep the same size prop, the current goes

Kirk Massey's Larry Jolly 205 (an F3E design); and Lowell Howe won Class A Sailplane with his Astro Mini Challenger. Everybody got a prize; forty hobby sponsors contributed goodies, including three radio systems from Futaba, Hitec, and Airtronics!

• • •

Bob Taylor sent a photo of his Goldberg Sailplane, a kit from Hobby Horn, 15173 Moran St. B, P.O. Box 2212, Westminster, CA 92684. Bob says the Sailplane outflies



Seen at last year's Gulf States Electric Fly-In, held near New Orleans, is Jerry Smartt, of Warsaw, Missouri, preparing his Astro Viking for the final round of Class A Oldie, ended up placing second overall. Jerry flew the same ship to first place in O.T. Electric at the 1991 Nats.

cook is mad at him! I digress, we were talking about flying!

There were some unique planes at the meet. Jerry Smartt brought his beautiful Brooklyn Dodger with a fake gas engine in front. Jerry won the championship in electric Old Timer at the 1991 AMA Nationals, by the way. Glenn Weber brought a canard with swept forward wings and a V tail. Glenn calls it “Willit” for “will it fly?”—which it does very well.

Mike Finnin had a beautiful original design canard that was very easy to fly. Lowell Howe flew his Thermic Traveler in the “Longest Flight of the Day” event. The Traveler is a sailplane with the classic “Wolf” wing shape. By the way, I will refer to the plane as the Traveler, as I got a letter from Frank Zaic several years back requesting that the “Thermic” part of the name not be used. Frank invented the word “Thermic” and he had not given permission for it to be used for this particular design. Be that as it may, the Traveler is a very good design, and a kit for it is available Midway Model Company, P.O. Box 9, Midway City, CA 92655.



“Most Outstanding Participant” award at the Gulf States meet went to Glenn Weber, whose Fly Baby is about to be given the heave-ho by Jim Prim. All Gulf States photos were sent in by Ben Mathews.

up dramatically—not so good. My rule of thumb is to drop either the pitch or diameter of the prop by one-inch for each cell added. The geared Astro cobalt 05 can turn an 11x7 with seven cells under normal operation, so with ten cells, an 8x7 or any combination of pitch and diameter adding up to 15 would be a good place to start (such as 9x6, 10x5, etc). Neat way to get extra power! It paid off for Lowell, as the plane reportedly could go out of sight in 15 seconds, and the one-minute motor run allowed him four climbs. Most planes could only get one or two climbs with a one-minute run.

Kirk Massey brought a rare oldie, an “Ollie” from 1951 *Air Trails* plans. Ben says that this plane had probably the fastest climb rate at the meet (he did not say what motor or batteries), and Kirk won Class A Oldie with it, as well as the “3 for 10” event (three launches plus spot landing, 10-minute precision flight time).

Some of the standings were: Most Aerobatic, Kirk Massey's original design Dual Phase twin (no details were given); Scale, Glenn Weber's Spitfire with an Astro ferrite 25 with belt drive; Longest Flight of the Day,



Lowell Howe, of Kerrville, Texas, explains some of the features of his Class A winning Mini Challenger to President George Bush.

his Playboy even at 104 ounces and a wing loading of 17 ounces per square foot. The plane has very few straight lines, so it took a lot of work to build. This paid off in good looks as well as good flying. It uses an Astro geared 40 turning a 12x7-1/2 Rev-Up prop for three to four minutes of power on 21 1000-mAH Sanyo SCR cells. The throttle is the Astro 205, which Bob says is excellent. Sermos connectors are used throughout. A two-inch wheel is preferred if there is any wind; A larger wheel lets the plane tip more easily. The covering is clear Micafilm from Coverite, which was tedious to apply, but is pretty and fairly hole-proof, plus lightweight. Twenty minute flights are routine with low lift present.

Bob did have some trouble with motor noise and tried Bob Kopski's three capacitor setup. This helped a lot. Bob competed in the 1991 Astro Champs, but found that the climb was slower than the other unlimited old timers. He noticed that the brushes were shedding brush dust very heavily; the dust was all over the inside of the plane.

He took the motor back to Astro for repairs. Bob Boucher, of Astro Flight, took a look at the motor and diagnosed a shorted



armature. Boucher explained that a shorted armature makes the brushes fight each other on which direction to turn the motor, and this causes the very rapid brush wear and dust. After the repair, the Sailplane really jumps off the ground, and the climb is great. So, take note, folks. If a motor is shedding brush dust, lacks power, and wears out the brushes fast, send it in for armature repair.

Burl Anderson sent photos of his Seagull in action—it's powered by six sub-C's and an Astro 05 cobalt. Burl remembered my articles back in 1974/75 on rewinding windshield wiper motors, and the Jr. Electra Fli, which I published in the now-defunct *Radio Control Sportsman*. He is interested in rewinding motors that come from cordless appliances. My book, *Building and Flying Electric Model Airplanes*, does show how to do rewinding, and HiLine has some small motors that are sold specifically for rewinding. I have not rewound motors for many years, because they have become available in many options and the prices



Seagull, a Mitch Poling design built by Burl Anderson, makes a pretty picture as it accelerates for takeoff.

45244, phone (513) 474-0985, offers an electronic on-off switch for \$39, which features a BEC and prop brake.

Ed Erfurth sent photos of his scale Beardmore Inflexible. It flies on three Astro 05 cobalt motors. The motors and batteries are connected in series. Unfortunately, I misplaced the statistics—my estimate is that the plane is about 10-foot span, with a nine-pound flying weight. Ed discovered that he had inadvertently been flying it with the center motor running in reverse! Even



Here's 3-1/2 months of work, all ready for its maiden flight. Bob Taylor did a super building job on his O.T. Goldberg Sailplane, built from a Hobby Horn kit! Bob says it's a real floater even at over twice the original free flight model's weight.

ceiling height is a very real problem. Servos should weigh .6 ounces or less.

The plane can fly on either direct drive or gear drive. The advantage of direct drive is simplicity. Tony Naccarato has proven with his Farman that direct drive flies very well (see my book for this). Gear drive makes it easier to maintain constant speed flight, and produces high thrust. It is difficult to find or build a suitable gearbox, and main-



Ed Erfurth obviously prefers unusual subjects for electric scale! Clockwise from top: Curtiss B-2 Condor, Loening M-8, Boeing B-9, and Beardmore "Inflexible" before painting.

have been pretty low. I recommend that if you rewind motors, follow the directions in my book carefully, and use Sta-Brite silver solder. The ordinary 60/40 solder used for radio and wiring work tends to heat up and spin off the commutator connection points.

Burl would also like to know if there are inexpensive speed controls available. There are speed controls available for under \$50, and I hear that they perform quite satisfactorily. There are many under that price for offroad racing, and they should be fine for planes, though I believe all of them at that price are low-rate. Low-rate throttles are much less efficient than high-rate at anything other than full on or off. This means hotter motors and batteries.

Flightec, 21 Juniper Way, Hamilton, NJ 08619, phone (609) 584-9409, offers three throttles for under \$50. These offer very good performance. Benson Hobby Products, 7119 N. Chimney Rock Place, Tucson, AZ 85718, phone (602) 299-2631, has several throttles priced under \$50. Some of the Benson throttles are super small, about half an ounce, and are quite suitable for schoolyard type models. Jomar Products, 8606 Susan View Lane, Cincinnati, OH



Front end details of Kirk Massey's Class A Oldie winning "Ollie," built from old *Air Trails* plans. Note single retracting wheel.

so, it flew quite well!

The original Inflexible had a wingspan of 155 feet, and was all metal, built to the design concepts of Dr. Rohrbach. It was built and flown in England in 1928-29, and was a giant for its time. The wheels were 7-1/2 feet tall! Ed likes old time multimotor aircraft; he also flies a Boeing B-9 built to 3/4-inch scale from Cleveland plans. It flies on two Leisure 05 motors on direct drive, in series with twelve 800 mAH batteries. Span is 58 inches, area 529 sq. in., and weight is 64 ounces. The covering is silkspan and dope. Motors are on-off. It looks good to me!

Bob Nevin wrote with questions about getting started in indoor electric RC. He has a copy of the March 1983 AMA magazine detailed my indoor scale RC Sopwith Tabloid, which was 1/6-scale. My comments to Bob were that there have been some improvements, though not all that much as far as indoor RC is concerned. For indoor scale, try the HiLine 50-watt motors, either direct drive or geared. Use the Jomar or Benson high-rate mini throttles. A throttle is very valuable in indoor flying, since the



Lillian Erfurth lends size comparison to hubby Ed's finished Beardmore "Inflexible." Ship is little more than a powered glider; should be a great flier.

tain it. My feeling is that the best approach is to pick a Peanut scale plane that flies well and scale it up, including the structure, to the size you want. I think the Waterman Racer would be ideal for direct drive. It could be built at three square feet and make a very nice indoor RC at about 20 ounces or so, using four cells.

Remember, if you have an electric meet date that you would like to have in this column, send it in now! My U.S. 29-cent postage address is: Mitch Poling, 7100 CSW/MC, Box 734, PSC 18, APO AE 09220. For overseas postage, use Normannenweg 20, D-6200 Wiesbaden-Biebrich, Germany.

Some readers have asked what all those numbers and initials stand for in the APO address, so here goes: 7100 Combat Support Wing/Medical Corps, Postal Service Co. 18 Army Post Office, Army Europe. This address is slightly different from the address I was using; the PSC is now 18, and APO NY has changed to APO AE. An APO address is wonderful, since it is like having a U.S. post office here in Europe. I get to use it since my wife is a physician in the Air Force! **MB**

## Chopper Chatter

BY JAMES WANG, WITH MARTYN MCKINNEY

**T**his month's column is devoted to electric helicopter technology. It covers selecting the electric motor, battery pack, and pinion gear to maximize performance and duration. The research was done by Martyn McKinney of Toronto, Canada. As readers may recall, in my *Kalt Whisper* review (July and August 1990 issues of *Model Builder*) I asked if anyone had experimented with changing the timing on electric motors for RC helicopters. Martyn wrote back to me and was very

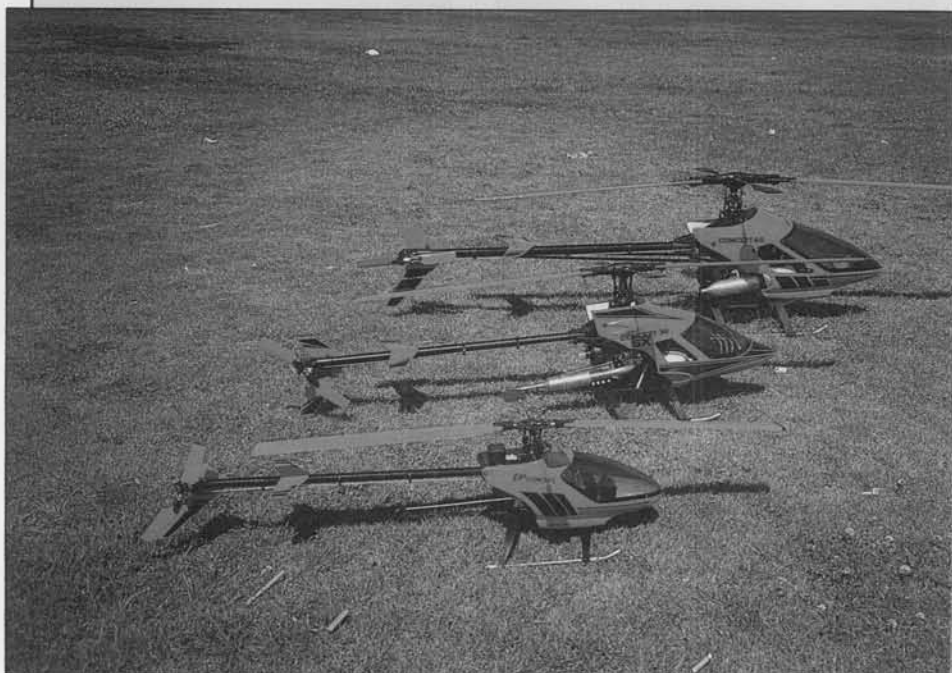
on RC helicopters during the weekend; how much better can life be? Like I said before, if you include an SASE with your questions or letter, I will respond to you usually within one week. My new address is: 7365 Main Street, Suite 106, Stratford, CT 06497. Or you may call me at (203) 929-6952 between 8 and 11 p.m. East Coast time during weekdays, and all day on the weekends. Of course, if the weather is good, I will probably be outside flying as long as there is daylight.

Now let's read about Martyn McKinney's experiments with the *Kalt Whisper*:

In the July 1991 issue of *Model Builder*, "Chopper Chatter" columnist James Wang asked if any readers were able to achieve more performance out of their *Kalt Whisper* helicopters.

During the past six months I have done extensive experimentation, both theoretical and practical, on the *Whisper* and have come up with some changes which I felt *MB* readers might want to try.

The first change I wanted to make to the *Whisper* was to use the standard and readily available seven-cell battery pack instead of the eight-cell pack that the *Whisper* required. The *Whisper* would fly on a freshly charged seven-cell pack, but the performance would soon degrade as the battery discharged. The first solution I tried was to change the pinion gear from the stock 17 teeth to 20 teeth to compensate for the lower voltage. There was no improvement in performance. This indicated to me that the 540 motor that comes with the *Whisper* has too much armature resistance (too many turns



This fabulous trio of Kyosho helicopters belongs to Fred Sage of Southern California. They are the electric EP Concept, Concept 30 SX, and Concept 60. The blades, tail boom, and canopy are painted using automotive paint. The 60 uses the new Super Tigre 60H motor.

generous in providing his experimental and theoretical results on his *Kalt Whisper*. All the research and technical information in this month's column are provided by Martyn. He also wrote a program for personal computer that can predict electric helicopter performance. You can contact Martyn to get more detailed information on his program. His address is 808 Millwood Road, Toronto, Ontario, Canada M4G 1W2.

Next month we will present still another technical treatise by Martyn, this one dealing with calculating the hover flight time of an electric helicopter, and how that flight time is affected by the choice of motor, battery pack, gear ratio, etc.

Many of you may know that I have recently moved to Connecticut. I am presently working for the Sikorsky Helicopter Company. So far, things have been pretty good. Working on full-size helicopter rotor dynamics and designs during the week, and

**FIGURE 1—HOVERING TIME WITH VARIOUS BATTERY PACKS**

Battery Pack	Time (watt-hours)	Battery Capacity
7-cell 900 mAh Sanyo SCR pack	3.5 minutes	7.58
7-cell 1200 mAh Sanyo SCR pack	4.25 minutes	10.08
7-cell 1400 mAh Sanyo SCR pack	4.75 minutes	11.76
7-cell 1700 mAh Sanyo SCE pack	5.25 minutes	14.28

or not enough rpm per volt) to achieve the rpm necessary to allow the *Whisper* to fly on seven cells. As time went on, the performance of the stock 540 seemed to degrade. I feel that excessive overheating (I have seriously abused mine) might cause the magnets to degrade.





Marty Kuhn hovers Fred Sage's EP Concept inverted. Fred replaced the stock motor with a Trinity Joel Johnson High Performance motor. Eight 1700 mAh "pushed" cells are used. The "pushed" cells allow higher discharging current, hence more power. Our columnist says he has seen Marty do a triple axial roll with this EP Concept. He tried to stretch it to four, but ran out of room. On one charge, he flew for four minutes and fifteen seconds.

I then changed the motor to a 14 turn Kyosho LeMans motor. There are many other brands available that would be suitable. By changing the pinion gear from the stock 17 teeth to 12 or 13 teeth, I was able to achieve the rpm range necessary to fly on seven cells. The performance is outstanding, with hovering flight times listed in Figure 1. Flight times in windy conditions or level flight are even longer.

I have timed a stock Whisper indoors with a 9.6 volt, 1100 mAh battery pack at 4.25 minutes. The battery capacity in this case is 10.56 watt-hours.

It is important to pick a pinion gear that will give a rotor rpm high enough that hovering is achieved without too much main blade pitch. If the rotor RPM is too low and therefore pitch is high, there will not be enough tail rotor thrust available to compensate for the main rotor torque. Using the stock Whisper blades, I found 12 to 13 teeth pinions were best with a 14 turn motor.

Although the helicopter will fly well on a wide range of pinion gears, another factor that must be considered is that the gear be chosen so that the rotor rpm will be high enough to achieve hover even as the battery wears down.

This is less of a problem with the SCR cells, which have a flat discharge curve, but is particularly noticeable with the SCE cells. Choose your pinion with enough teeth so that the main rotor rpm is high enough to allow flight even as the battery wears down. Figure 2 is a chart listing the suggested pinions to use with various motors, depending on the number of turns on the armature, battery packs (seven or eight cells), and whether Whisper or EP Concept blades are being used.

The Kyosho EP Concept comes with foam blades which are a slightly smaller diameter (35-3/4 vs. 37-3/4 inches) and signifi-

cantly lighter weight than the wood blades that come with the Kalt Whisper. When I first tried them on the Whisper the helicopter would barely fly. When I looked at the theory, I discovered that the thrust is proportional to the diameter to the third power. That meant that a small decrease in diameter would result in a significant decrease in thrust, which would have to be compensated for by increased rpm.

To achieve the proper rpm, I increased the pinion gear to 14 teeth when using EP Concept blades. This resulted in another advantage. It effectively altered the relationship between the tail rotor and main rotor thrust vs. rpm ratios, thus giving me far more tail rotor authority. I am now flying my Whisper using this setup:

- Kalt EP Concept blades (use a metal washer top and bottom).
- 14-turn Kyosho car motor.
- 14-tooth pinion.
- Seven-cell Sanyo 1400 mAh SCR battery pack.
- Flying weight 44.5 oz.

The performance is outstanding, and if you need even more power you may get it at the expense of shorter flight times by increasing the size of the pinion gear. The only practical way to improve performance with the stock 540 is to raise the battery voltage by using more than eight cells.

I own two Kalt Whisperm and two Kyosho EP Concepts. The second Whisper I have is set up as a fixed pitch helicopter. If aerobatics and autorotations aren't your thing, I highly recommend it. I feel it would make an excellent trainer and flies very well on even the simplest four-channel radio.



Cary Woolard of Hobby Dynamics holding the new Agusta A-109 epoxy-glass fuselage for their Kalt Whisper electric helicopter. Columnist James Wang saw this model fly at the 1991 Schluter Cup. Kalt also has a lightweight fiberglass Huey Cobra fuselage for the Whisper. The price for each is about \$160.

FIGURE 2—MOTOR PINION GEARS

MOTOR TURNS	APPROXIMATE RPM/VOLT	PINION TEETH (EP Concept blades, 8-cell battery)	PINION TEETH (EP Concept blades, 7-cell battery)	PINION TEETH (Whisper blades, 8-cell battery)	PINION TEETH (Whisper blades, 7-cell battery)
19	3250	18	NA	17 (stock)	18
18	3425	17(stock)	19	16	17
17	3625	15	18	14	16
16	3850	14	17	13	14
15	4100	13	15	12	13
14	4400	12	14	NA	12
13	4750	NA	13	NA	NA
12	5125	NA	12	NA	NA

The above table is approximate; actual gear choice would depend on the particular motor you choose. In general, the smaller the pinion gear, the longer the flight times. A compromise must be made between flight time and flight characteristics. The Sanyo SCR cells, which display relatively flat discharge characteristics, allow the use of a smaller pinion. The Sanyo SCE cells require a larger pinion to maintain rotor rpm throughout the flight.

For the fixed-pitch Whisper, I am using the same setup as above, with the exception of a 15-tooth pinion gear on the motor. The electronic speed controller is adjusted to give maximum throttle when the stick is at its maximum position. This is unlike the setup on the collective pitch version, where I have adjusted

the speed controller to give maximum rpm at hover. Flight times are comparable and perhaps even a bit longer than the collective pitch data given above.

In his article, James commented on the fragility of the Whisper. Although it is fragile, there are a number of things a new flier can do to improve its durability. After repeatedly breaking the stock landing gear struts, I used the plastic struts from a Concept 30 with the original Whisper aluminum gear. Although slightly heavier than the stock struts, the helicopter is able to come down extremely hard with no damage either to the struts, frame or side frames.

I feel that the wire braces used to support the tail boom do very little and I don't use them. Instead I have wrapped the main frame at the tail boom support with fiberglass tape and cyanoacrylate glue. Although not pretty, it significantly improves the strength in this area and also demonstrates a convenient way to repair the main frame should it get broken.

One other modification I have made is to get rid of the nylon battery straps. Because I change flight packs frequently, the catches on the straps would come loose. After almost losing a pack in the air I replaced them with a single elastic band wrapped around the struts, which allowed easy replacement of the battery. There is another advantage to this setup. In the event of a hard landing, the elastic band provides some resiliency and allows the battery pack to "keep going" with less damage to the helicopter.

In the *Model Builder* article, James also asked about motor timing. Although the voltage driving the motor is DC, the voltage seen by the armature of a DC motor is a square wave, the frequency of which depends on the number of poles and the armature rpm. Because the armature has some inductance, the



Columnist James Wang flies his Kalt Whisper inside the living room. He's quite happy. But just wait till he gets a glitch and chops off that Ming vase, or takes a chunk out of the wall!

current in the armature is not exactly in phase with the voltage across the armature but lags it by a few degrees. If the brushes are not offset with respect to the pole pieces, this means that the current isn't at a maximum when the armature is directly under the pole pieces. As the armature voltage goes through its zero point and switches from positive to negative, the armature current is still flowing and arcing will occur, which indicates that the motor is not operating at its optimum efficiency. This arcing can also damage the commutator and brushes.

The timing may be adjusted by monitoring the current and voltage on an oscilloscope or visually looking at the arcing on the brushes when the motor is under its working load, and adjusting the timing until the arcing disappears. More power may be obtained from the motor at a particular voltage by altering the timing even more, but at less efficiency.

RC flying has been my hobby for many years and I have been flying electric almost exclusively for the last seven years. I have owned my Whisper for six months, and I can say that it has given me the most enjoyment of any RC "toy" that I have flown. Its outstanding performance and lack of noise has meant that I can now fly almost anywhere, anytime, and there's nothing more fun than practicing a few nose-in hovers after a hard day's work. **MB**

FIGURE 3 - KALT WHISPER PARAMETERS

## STOCK WHISPER

ARM. TURNS	PINION	ROTOR DIAM. IN	ROTOR CHORD IN	PITCH DEG.	N cells	CELL SIZE	CELL mOhm @1200	RPM/VOLT	BATT. VOLTS	LOADED VOLTS	UNLOAD RPM
19	17	37.75	1.75	5	8	1100	4	3246	9.6	8.96	31158
TR DIAM IN.	TR CHORD IN.	TR/MR RATIO	TR BOOM IN.	TR RPM	MR TORQ. FT.-LB.	TR THRUST OZ.	TR PITCH DEG.	TR POWER WATTS	MR LIFT COEFF.	MR DRAG COEFF.	L/D RATIO
7.25	0.75	5	23	5276	0.41	3.43	10	2.2	0.5	0.02	25
Rarm	MAIN GEAR	RATIO	Eg VOLTS	WEIGHT OZ.	ROTOR RPM	POWER IN	POWER OUT	EFF. %	CURRENT AMPS	TIME MIN.	THRUST OZ.
0.07	340	20.0	7.16	43.64	1055	179	130	73	20.0	3.30	44

## MODIFIED WHISPER (14 TURN MOTOR, EP CONCEPT BLADES)

ARM. TURNS	PINION	ROTOR DIAM. IN	ROTOR CHORD IN	PITCH DEG.	N cells	CELL SIZE	CELL mOhm @1200	RPM/VOLT	BATT. VOLTS	LOADED VOLTS	UNLOAD RPM
14	14	35.75	1.75	5	7	1400	4	4405	8.4	7.87	37000
TR DIAM IN.	TR CHORD IN.	TR/MR RATIO	TR BOOM IN.	TR RPM	MR TORQ. FT.-LB.	TR THRUST OZ.	TR PITCH DEG.	TR POWER WATTS	MR LIFT COEFF.	MR DRAG COEFF.	L/D RATIO
7.25	0.75	5	23	5603	0.35	2.95	8	1.8	0.5	0.02	25
Rarm	MAIN GEAR	RATIO	Eg VOLTS	WEIGHT OZ.	ROTOR RPM	POWER IN	POWER OUT	EFF. %	CURRENT AMPS	TIME MIN.	THRUST OZ.
0.04	340	24.3	6.70	45.05	1121	149	117	79	9.0	4.42	42



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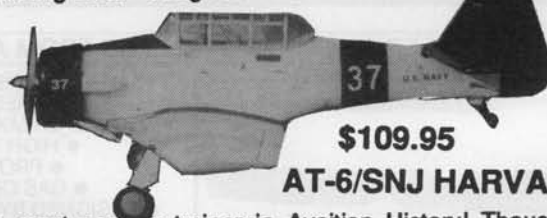
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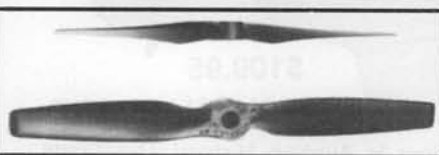
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## counter continued from page 12

features include plug-in wing and stab halves, two-piece cowl (no need to remove the spinner and prop to get to the engine), and removable canopy for access to the radio. Kits are supplied complete with a two-hour videotape of building instructions, plans, jig built wings, all necessary wood, shaped foam parts, epoxyglass wheel pants and two-piece cowl, canopy, all hardware, wheels, tailwheel assembly, and pre-shaped landing gear. Sounds as though Bob has put together an extremely complete and well-thought-out kit!

Bob advises that the Extra 300 kit is also

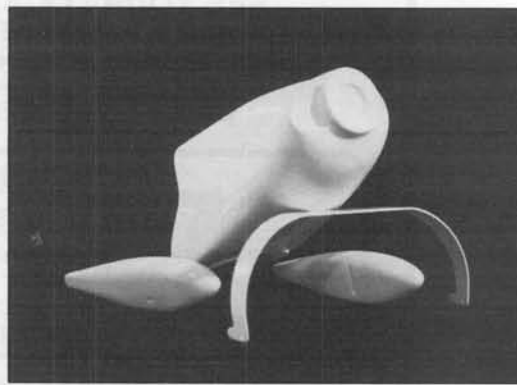


offered in an even bigger 30% (96-inch span) version. Kit pricing and availability details can be had by contacting Bob Godfrey at Precision Aviation Designs, 1822 6th Ave. W., Bradenton, FL 34205; (813) 747-7006.

### AFTERMARKET KIT PARTS

Builders of the immensely popular Extra 300 and Ultimate 10-300 kits from Carl Goldberg might want to consider fitting their models with the aftermarket parts (bent aluminum landing gear, epoxyglass cowl and wheel pants) offered by Fiberglass Specialties, 38624 Mt. Kisco Dr., Sterling Heights, MI 48310; (313) 978-2512. The glass parts are done with a special white epoxy and are one-piece construction—strong but light.

The parts shown in the photo are for the Extra 300; a similar set is available for the Ultimate. Components are offered separately or all three together for a special package price. Contact Fiberglass Specialties for prices and ordering info. **MB**





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# FREE FLIGHT

BY BOB STALICK

## On My Desk...

Several months ago, I published a little piece by Grant Carson entitled, "In My Workshop." Grant did a nice job explaining how he has organized his shop to build free flights. It seemed strangely familiar to me, as it highlighted some of the practices and difficulties that I face regularly in my workshop. For magazine columnists and newsletter editors, I thought it would be appropriate to take a paragraph or two apropos our special dilemmas. I call this piece, "On My Desk."

On my desk I have a computer and a printer, upon which I write my column each month. To the left of the computer are two sloppy stacks of mail. The closest stack has stuff in it that

free flight. These have captions clearly stated on the back. The other stack has pictures that are fuzzy, far away, cluttered and/or without captions.

On my desk, between my computer and my printer I have a stack of letters. Most of them are nagging at me, awaiting my answers. As time permits, I will get to them. None of them contain a self-addressed stamped envelope (SASE), because those that did have already been answered. Some ask for information that I have, but would take several hours of research to find—these remain to be answered as well.

On my desk, or to be precise, near my desk on two filing cabinets, I have stacks of newsletters that have at least one article or plan that is of interest to me. If I get enough time to build, I will not be able to find the article or plan that is in the stack of newsletters, since no logical organization exists in this stack.

On my desk, or to be precise, near my desk are two large cabinets with doors on them. Inside is my precious collection of *Model Builder*, *Zaic Yearbook*, *Aeromodeller*, *NFFS Digest*, *SAM Speaks* and other publications of interest. Here is where my research takes place when those letters come in asking obscure questions, or when I am looking for the latest stumper for the Mystery Model.

Now, all of this sounds very organized. Let me tell you that on my desk nothing looks organized to anyone except me. Generally, only my wife, Barbara, ever sees it—and that is a blessing. So, if you are a newsletter editor or magazine columnist, I expect that you are well-organized and know where everything is. If so, your desk is not at all like my desk.

### MAY MYSTERY MODEL

As those of you who regularly read this column know, I usually do not feature Mystery



Wes Funk originally built this Stalick-designed FAI model for F1J competition, now flies it in Class A with a hot Cox Tee Dee .09.



All photos this month were submitted by Lyman Armstrong, taken at the NCFCC's Waegell Field in Sacramento, California last year. Pictured here is Paul Kellas with his stock Astro Star, a Terry Thorkildsen design powered by a K&B 3.5. This is Paul's second A-Star—both good ships.

appears to be useable column material. The stack in the far left corner has material that might be useable under certain conditions—say, if the closer stack gets used up.

On my desk, I have a bunch of letters and photographs just between the two abovementioned mail stacks and the computer. Some pictures were sent to me and some I took myself. Some are possible magazine material, most are not. Those that are, feature closeups of a modeler and his

Models that originally appeared prior to WWII. However, I sometimes find one from before that time that just begs to be included. This month's feature is just such a design. It is from a pre-war issue of a non-modeling magazine and was forwarded to me by John Crosetto. This rubber-powered model features a diamond fuselage and a wingspan of 30 inches. The designer was a fellow named Lewis Hazelton. The wing mounts to the fuselage using wire cabane struts. The ship has a kind of gimmicky name, and all you have to do is guess what it is. Drop your best guess into an envelope along with your name and address and forward it to *Model Builder*. If you have the correct name of this model and if your name is drawn from the proverbial "hat," you will win yourself a free subscription to *Model Builder*. Now, how can you beat that kind of a deal. Give it a try. Do it now. Be a winner. Your odds are much better than at the local lottery.

### FEBRUARY MYSTERY MODEL WINNER

James B. Sullivan, of Marsten Mills, Massachusetts, was one of five readers who correctly identified the "Hoopla" Class A/B pylon ship from the January 1948 issue of *M.A.N.*. We also received one vote apiece



for the Cleveland Playboy and Harold Coovert's "Pippin," which do bear some resemblance—sort of.

So who gets credit for designing the Hoopla? The original article carries the byline of John L. MacKenzie, who also drew the plans. The actual designer, however, was a fellow named Eldred Hoopengartner—which should leave no question as to where the "Hoopla" name came from!

## MAY THREE-VIEW: F1B NO. 22

by Tony Mathews/Doug Rowsell

The three-view and following article were taken from *Scatter*, newsletter of the Southern California Aero Team, edited by Bill Bogart.

"This model is a direct descendant of the F1B model that Doug and I designed in the airport at Los Angeles in 1984 on a napkin! Originally conceived as a windy weather 'Borden-Weapon,' it has since evolved into our main all-around airplane. The layout is by now well-proven and can be used as a basis for experimental development.

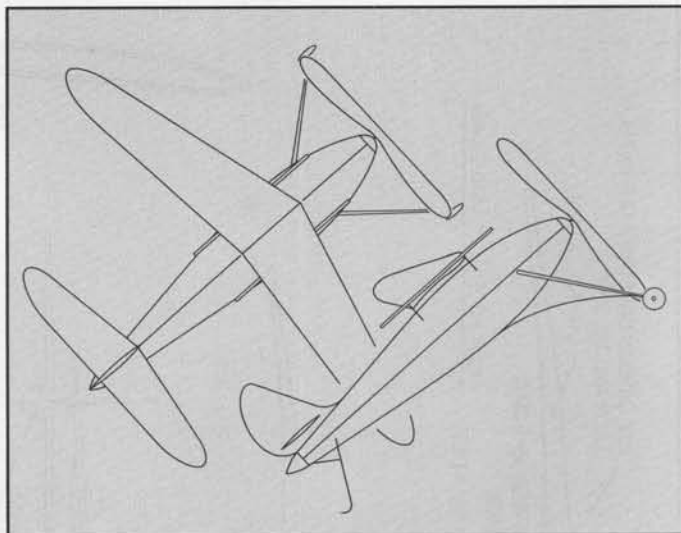
"This version, No. 22, was intended as an experiment in high-tech construction techniques. We wanted to gain experience using aluminum foil-skinned balsa wings as per F1C practice on a Wakefield. It became apparent that a D-Box type structure was the most ef-

ficient way to use this new technology. We felt that this technique would result in a lighter, stiffer, and more warp-resistant structure. We also believed that this new structure could be exploited to use higher-than-normal aspect ratios, or thinner-than-usual airfoil sections.

"This model uses a proven layout, but with a very thin (under 4%) low cambered airfoil. We originally intended to use an aluminum wing only with a conventional fuselage/tail. However, we decided to go bananas and make an all-metal Wakefield, with a metal wing, metal stab and fin—with D-boxes, metal motor tube and a metal skinned tailboom. In retrospect, the all-metal approach went a bit too far...!

"But, we sure raised a few eyebrows! We did gain valuable experience using this tricky technology though. Newer versions use built-up fins and all-carbon fuselages. This results in a better compromise of strength, durability, and stiffness. The plane is trimmed as per Jean Wantzenriether's PGI setup with the low aspect ratio stab, thrustline through the CG, and negative incidence on the wing.

"The right-left trim produces a safe pattern without auto-rudder. Yes, this high-tech machine is 'auto-nothing!' We will be bringing details on how to make metal wings in future issues. So



MYSTERY MODEL

stay tuned! Incidentally, don't assume that the low cambered airfoil of the No. 22 means that it has a poor glide. In fact the glide is the most remarkable feature of this plane! I have some ideas why..."

## UPDATE—VIC JAY'S FAI MODEL

In November, I requested information on behalf of Frank Parmenter, who was searching for the airfoils for Vic Jay's 1956 FAI Power model. Well, call off the search. Frank was able to contact Vic directly in Great Britain and has received all of the necessary information to submit this model to the NFFS Nostalgia committee for approval.

And approval is on the way. Jay's model as well as a number of others are being debated currently and will be listed in the near future. As you prepare to construct a new Nostalgia class model for this summer's competition, you may wish to look to this additional list, which I hope will be in next month's "Free Flight" column. If you are interested in Jay's model, you can get a full-sized plan (about 418 square inches in the wing) for \$6.00 postpaid, directly from Frank Parmenter. Frank also has a B-C size at 706 square inches that he will sell you for \$8.00. Contact Frank at 4106 Sequoia Trail East, Georgetown, TX 78628.

## 1992 NATIONAL FREE FLIGHT SOCIETY SYMPOSIUM

Tony Italiano, president of the National Free Flight Soci-

ety, announces that the 1992 *Symposium* will be edited by Paul Masterman of Great Britain. A call for papers is now announced. Please consider reducing your research effort into writing for this report. If you have an article in mind, please state your intentions along with a general outline of content and send it to Hardy Brodersen, P.O. Box 1104, Birmingham, MI 48012. Hardy will collect the articles for transmission to Paul.

The NFFS is also accepting nominations for the "Free Flight Hall of Fame"—send nominations to Anthony J. Italiano, 1655 Revere Dr., Brookfield, WI 53045; and for "Ten Models of the Year"—send nominations to Bruce Kimball, 10051 24th Ave. SW, Seattle, WA 98146. The deadline for submissions is short, so make your nominations immediately.

## CO<sub>2</sub> POWER SUPPLIES

I just recently heard from Daniel Baird, who operates a small CO<sub>2</sub> supply service out of his home. Dan provides some nifty items, including different kinds of filling valves, reproduction tanks, radial engine mountings and other stuff. He also has some adjustable pitch propellers, folding props and extra O-rings for Brown and Telco engines in the works, which should be available shortly.

If you are interested in CO<sub>2</sub> free flight and don't know where to get some of the special equipment needed, contact Daniel Baird, 3529 Koon Lane,

"Maverick" by Doug Galbreath flies in F1J competition with one of those new Shuriken screamers—note special prop.



.003" CARBON CAPSTRIPS T&B, OVERLAP  
D-BOX AND T.E. 5/32"  
1/16" Balsa Ribs  
.003" CARBON WEB, 45° FOR 6"  
3/32" Balsa WEB  
ROOT PROFILE 4% MOD. GO499  
CARBON SPARS, .007"x3/32" (.003"x1/16" AT TIP)  
1/32" Balsa SHT.  
1/16" Balsa Ribs  
CARBON L.E.

ALUM. ON TIP IS .0009" THK.

TIP PROFILE

DIHEDRAL BREAK PROFILE

FIN SECTION 7%  
SYMMETRICAL

RUBBER: 14 STRANDS FAI (TAN)  
390-420 TURNS  
PROP RUN 39-45 SEC.

MODEL IS TRIMMED TO  
FLY RIGHT/LEFT

1/4" WASHOUT BOTH TIPS

7/8  
3-3/4  
4-1/2  
3-3/16  
14  
16  
1/16" WASHOUT LEFT PANEL ONLY  
4-3/4  
10  
1-1/2" DIA.  
5 MIL MYLAR COVERING  
ON ALL FLYING SURFACES

ALUM. COUPLING

MACHINED ALUM. PYLON

CG @ 65%

CARBON TAIL BOOM

CARBON MOTOR TUBE

22-1/2"

PISECHIO FRONT END

MODIFIED  
DORING PROP

3° RIGHT THRUST

4.5° DOWN THRUST

# F1B NO. 22

DESIGNED BY TONY MATHEWS AND DOUG ROWSELL





Three test flights were all that Dick Myers had on his plastic covered stock Satellite before entering and placing second in F1J at the 1991 Sierra Cup. Uses a Tee Dee .051 with bladder tank.

Knoxville, TN 37931. Send a large SASE for a free catalog.

## THERMAL OBSERVATIONS

Moe Whittemore is the editor of the *CIA Informer*, the newsletter of the Central Indiana Aeromodelers. He writes:

"Many of you probably use a digital thermometer as your primary or secondary method of spotting the departure of a thermal. I'd like to pass along some of my observations gleaned at a recent contest while using a Radio Shack unit. A question I've pondered is how much temperature rise is enough to get the job done with a model of a specified wing loading? The model I was flying that day was a small unlimited rubbership (150 square inches) that was capable of not more than 2-1/2 to 3 minutes in indifferent air, and no more than two minutes in bad air.

"The day of the contest, the sky was overcast, and the temperature hovered around 75 degrees, with breezes light and variable. If I can remember right, the three two-minute rounds were easily made. The temperature rise at launch for the three flights averaged approximately .3 degrees above the lowest steady reading. For the three-minute round a temperature of .3 to .4 degrees was waited on and resulted in a thermal sufficient to shove the model up to an altitude that took one minute to fall upon DT from the max.

"For the four-minute round, a temperature rise of .4 to .6

degrees was used. The thermal was even stronger than the previous one, yielding an altitude at DT such that 1:45 was required for the fall.

"I wasn't so lucky for the five-minute round. A dead calm set in. I held a wound motor for nearly 25 minutes, waiting on the air.

Temperatures changed only .1 to .2 degrees over this interval, with virtually no wind activity to mark a thermal departure! Finally a temperature rise of .2 to .4 degrees occurred, accompanied by a small bit of wind action. By this time I'd gotten pretty impatient and let the model go, hoping it was smart enough to find something I couldn't. All it found was the one just sensed, and it milked that small thermal for all it could, but was down in just over three minutes.

"A bit later, a .4 to .6 degree temperature rise was plenty to let my hand launch glider max and a .3 to .4 rise was enough to keep it alive for a 105 second flight.

"I guess the point I am trying to make is, between the overcast sky and the light and variable winds that day, I couldn't have picked the air that I did by using only my streamer. I would have missed many opportunities if I relied solely on the streamer pole. With both crutches, you can tell a lot about what's happening with the air; the streamer telling 'what,' and

the thermometer 'how much.'"

Interesting stuff, Moe. I have wondered the same thing. I have had good luck using my Starline Thermometer, but now, I will pay attention to the amount of rise it shows prior to the launch.

## FAI FREE FLIGHT AMERICA'S CUP—1991 WINNERS

Al Hotard, who is the official contact person for the America's Cup Competition, sent along the following information about the 1991 Cup:

"The best FAI Free Flight fliers in 1991 in the USA and Canada are the three winners of the America's Cup Competition. They are: Jim Bradley in F1A Nordic, Dan Tracy in F1B Wakefield, and Norm Poti in F1C Power. They won as a result of having the highest scores in a series of contests across our two countries during all of 1991; one 'hot-weekend' flying performance will not do the trick! Our congratulations to Jim, Dan and Norm for this achievement.

A total of 45 fliers scored points in Nordic, 52 in Wakefield, and 37 in Power. Nineteen contests were flown.

If you want to know what it takes to seriously try for the America's Cup, get out a map of the USA and Canada and track Bob Gutai's travelog from his Allentown, Pennsylvania home to the eight contests he scored in from coast to coast. He also flew in the Sierra Cup. Who will make that kind of commitment to win in 1992?

The three beautiful A.C. trophies for 1991 were awarded at the second 1992 contest, which

is the MaxMen 14 round International at Taft in February. For further information, contact Al Hotard, 1012 Damato Drive, Covina, CA 91724. Phone: (818) 966-4788.

## PICTURES FROM RUBBER POWERED MODELS

Recently, I received a nice letter from John Lovse, of Mt. Clemens, Michigan. John shared his experiments of fastening a camera to a rubber powered model and using it to take pictures:

"I am retired and like to design and build rubber powered airplanes. This idea might not be new, but I will pass it on just the same. I put a small camera in a model and rigged it so that when the rubber motor runs out, it would take a picture. I designed a 36-inch model all out of 1/16-inch sheet balsa. It weighs 7-1/2 oz. with the camera. I don't use a landing gear because I fly in a grassy area, so it isn't needed.

"The model flies great and the camera device works every time. The only problem is that the small camera I have doesn't take very good pictures, but I am working on that. The camera lens is set on the right side and with the plane flying in a 175-foot circle, it will always take your picture. Maybe some of your readers can improve on this idea."

For further information and details, contact John Lovse, 38129 Moravian, Mt. Clemens, MI 48043.

## THAT'S IT DEPARTMENT

Well gang, that's it for another month. As usual, I am willing to receive and publish pictures and articles that you send. Credits are given for published pictures. You may become famous, but you will not get rich, as no pay comes with the publication.

I hope you are already in gear for the 1992 season. It's time to go out and fly. Hope to see you there. In the meantime, catch a thermal for me. **MB**

The 36-inch all-balsa rubber model built by John Lovse for taking in-flight photographs. See column for details.







along the outside edges of the stringers just prior to placing the tissue over the framework. When the entire fuselage and rudder have been covered and have dried to a firm tautness, two brushed coats of thinned clear dope will affix the tissue into its final shape.

Both top and bottom of the wing and horizontal tail units should be covered before brushing on the clear dope. When the dope has dried enough so as not to be tacky, pin these units to a flat board to resist warpage. I have had tremendous luck with doping both the top and bottom of the wings and tail surfaces before pinning them to the board. Both sides dry evenly with this method.

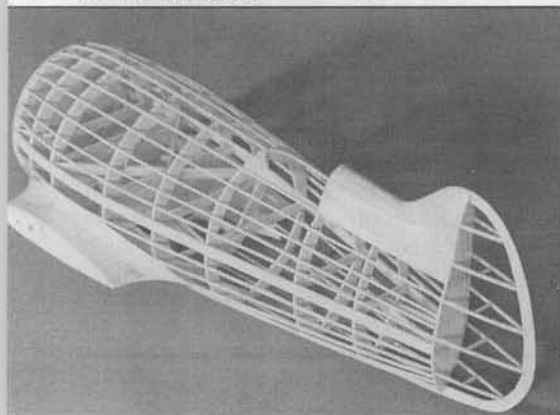
## FINISHING

Lightly sand all surfaces with the finest grade of wet-and-dry paper you can find and spray the entire ship snow white. When dry, trace the shape of the red trim from the lines provided on the drawings and cut the patterns from medium weight stationery. Using a very soft pencil, trace the patterns onto the wings, fuselage and so on. Narrow masking tape provides the edge for the trim color coats. Any little frays that remain after the tape has been removed can be cleaned up with a single-edge razor blade. The shape of the fuselage trim coat pattern on my model took lots of cutting and refitting. I really can't provide a short cut for this process.

## MOUNTING THE MOTOR COWL

I've shown the template for the mounting fins on the draw-

The completed basic fuselage structure. Not as complex as it appears—just a crutch with formers and stringers top and bottom. Japanese tissue covering adds tremendous rigidity to the finished framework.



ings. Final fitting will require a bit of shaving and sanding so as to ensure perfect alignment. The adjustable torque fins are glued into position just prior to the final mounting of the cowl itself. Set them at 30 degree pitch for starters. I used the short stick pins (about 3/8-inch long) to hold the cowl onto the mounts. One pin for each fin should be ample.

## TEST FLYING

The right choice of people for the test of my prototype Gee Bee was something to consider. A guy could put a real kink in his reputation at a time like that. Of course, my son Shawn would have to be with me. In fact, he would be flying so that Dad might chase the thing should it be necessary.

My first test procedure was a taxi run with only five seconds of power. The roll was slightly to the left, as I expected, and was about 50 feet in length. I added three seconds to the power run for each of the next three tests. Now, with a reasonably powerful run of about 14 or 15 seconds, the indication was still a tendency to roll to the left. I added a sizeable clear tab to the rudder and held the timing to 15 seconds for test number five. (Incidentally, I have a log book for the recording of all tests and flights. It helps a great deal when test flights are a number of days, weeks, or months apart.)

Test five called for a still larger trim tab, this one 3/4 of an inch by two inches in length. Of course, I realized that some of the rudder trim might have to be removed when the full power of the initial engine run was utilized. Most CO<sub>2</sub> powerplants burst with energy for the first few seconds of the run.

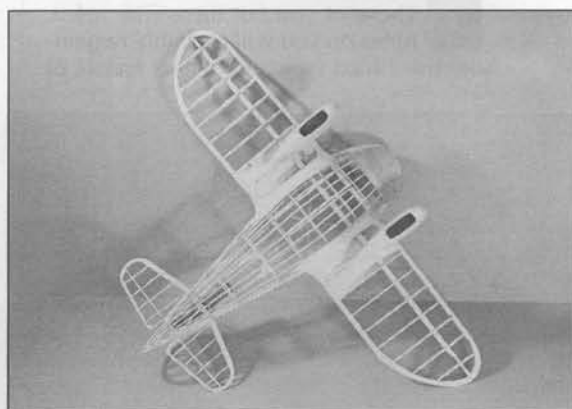
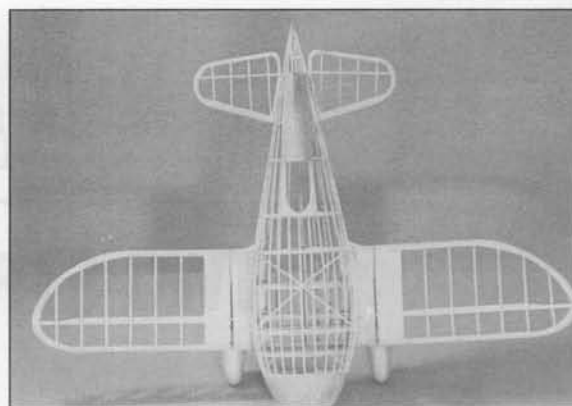
It seemed that it was time to readjust the torque fins for any additional help with my left turn problem. They were now set at 45 degrees.

Run number six was a doozy. The power timing was near enough to lift the tail within a few feet from the start and hold the craft at the edge of flight for about a

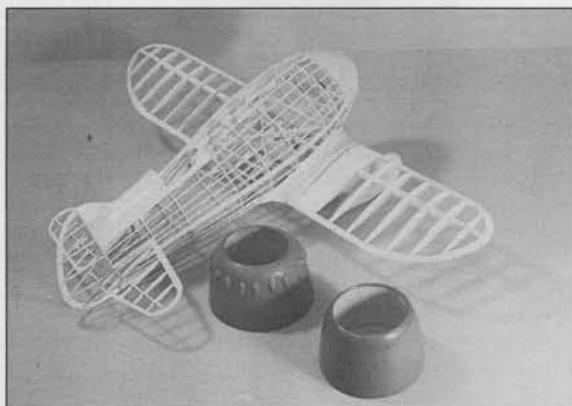
200 foot distance. I now added two good-sized trim tabs to the elevators with a slight up position.

Having gained some confidence, I decided to go for broke. Run number seven was with the normal starting procedure, and I am sure was just as thrilling as the first time. Russell Boardman poured the power to the real Gee Bee R-1 back in 1932. The final run of the day was a series of intermittent high-speed ground rolls and brief flights of five or six inches altitude, covering lengths of about 15 to 20 feet. Each time the ship was lifted by what I suspected was a slight gust of wind, the left wing would dip slowly until the left wheel tapped the concrete lightly. This skipping occurred about five times during the run of over 275 feet. The "flight" path still had a slight arc to the left. A bit of a pain—however, by the end of the first test day, I figured that still having the plane in one hunk put me well ahead in the game.

So, if you are wondering how my bright red-and-white project turned out, consider the fact that you are reading this, and that the author is not given to self-humiliation. In fact, I think I'll show up at the next F.A.C. Nats and raise a few eyebrows. **MB**



Top and bottom views of the completed basic structure. Keep it light for best performance.



Cowl on the left is the correct scale shape and was made by laying-up doped silkspan over a wooden form; process is fully described in text. The other cowl is the more streamlined R-2 unit used for flying and is made of balsa planks.



Front end of the fuselage is removable. Clear plastic vanes at the trailing edges of the cowl supports are the author's attempt to counter the torque from the CO<sub>2</sub> motor—explained in text.

# RC AEROBATICS

BY RICK ALLISON

## TWO-STROKE VS. FOUR-STROKE

**E**very couple of years in patternland, there seems to arise a Great Debate. Those of you out there with a few miles on you will probably remember the Tuned Pipe and Retract Hassle of

of engine that you would bring home to mother, or encourage your daughter to marry—that sort of thing.

Four-strokes, in contrast, are scary, muscular, accident prone brutes that drip me-

like Del Monte creams corn. What happened?

First of all, the Edge happened. Those of us who compete always search for the Edge, and most of the time, we either find it

or we believe we do. Back when model aircraft four-strokes were infant mechanisms, the rules of the pattern event were written to allow twice as many cubic inches for four-strokes as for two-strokes. This was done to produce a power parity, as the two-strokes of the time were, inch for inch, about twice as powerful.

Nothing stays the same for long. Drag racers say that there is no substitute for cubic inches. Engineers love a challenge, and salesmen love the words "new" and "improved." Engine manufacturers are in competition also, and they are every bit as fond of the Edge as we are.

Meanwhile, the rules of the game changed, and the

high speed, horizontal pattern of the past gave way to today's constant speed, vertically oriented pattern. More torque was required to turn larger and more efficient propellers at a slower speed.

The pure power advantage has now unquestionably swung over to the four-strokes. The big debate (we started off talking about a debate, remember?) is about whether or not a raw power advantage is the most important component in a total competition package of engine, airframe, and radio. Coincidentally, that is the subject this month.

Judging from my mail and telephone, a good many of us are now convinced that the only way to stay competitively afloat in



(Far left) "Runaround" built by Brett Forsberg from a Dick Hanson kit, came out super light at only 7-3/4 pounds. Uses a YS 1.20 four-stroke. At about 870 squares, it's rather small for a 1.20 size model, and it's also very fast! (Above) Another Dick Hanson kit, an Ultimate biplane built by Matt Cole. Weighs about 10 lbs. with an O.S. 1.20FS up front. (Left) RC City's Jim Graham displays a finished Conquest 120, one of his company's kits. Jim is about 5' 10" tall—this is one BIG airplane.

the early '70s. More recently, we have had the Turnaround Vs. Cruise Missile Crisis and the Battle of the Noise Rule. Since most pattern pilots are human, and humans have a long history of disagreeing with each other, this is pretty normal. I say "most," because some of the top FAI pilots are actually cybernetic organisms, like the Terminator. This is why we can't beat them.

Right now, the big deal is two-stroke vs. four-stroke power. Four-strokes are the New Wave, the Coming Thing, Tres Chic, and Very In. Two-strokes are, well, two-strokes. They are small, reliable, quiet, solid, relatively simple, and (lately) durable—sort of like a small town bank president. The kind

chanical steroids and weigh enough to anchor the middle of your average major college Defensive Line. They are the kind of mechanism that would wear a tattoo and ride a Harley, if they weren't engaged in the business of hauling your pattern airplane around.

There is considerable irony here, because for many years, these images were reversed. Four-strokes were unassuming, awkward, ungainly powerplants that pulled floating trainer types around, wheezing and percolating away in a quietly anemic fashion. Hairy chested two-strokes lived in the fast lane, sucking on their tuned pipes and swilling their nitro, and using up bearings



the present environment is to junk the old two-stroke bird and go for the new and improved heavy iron.

Is this really the only way to go? Or is the current rage for 1.20s just another one of the lock step fads that sweep across the pattern landscape with regularity?

From the seat behind my word processor, the answer looks a lot like yes, no, and maybe.

There is a neologic acronym that expresses the whole matter very well. The word is TANSTAAFL, and it means "There Ain't No Such Thing As A Free Lunch."

Consider the weight of the components of the average .61 two-stroke powered, 800 sq. in. pattern plane. The finished empty airframe, if it is well constructed and of the usual materials (glass fuselage, foam wing and stab, light balsa, with a plastic film and paint finish) will weigh from 3.5 to 4.5 lbs., with the median being about 4 lbs. The radio airborne package contributes about 1.25 lbs. The retracts, exhaust system, tank, plumbing, nuts, bolts, engine mount, clevises, spinner, prop, and other assorted hardware bits are about 1.5 lbs., and the engine is 1.25 lbs., for a total of 7.5 to 8.5 lbs., with the average being around 8.

Now consider that a four-stroke 1.20 engine weighs almost exactly a pound more than the .61. Consider also that the weight of all the other airborne components will actually increase (larger tank, longer retract legs, larger spinner and prop, heavier nuts and bolts, longer pushrods or cables, bigger engine mount, etc.) with a 1.20 powered airplane.

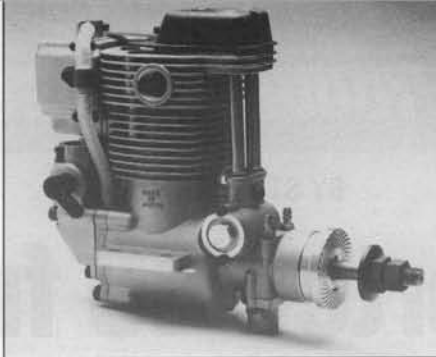
To take advantage of the extra power and lift the increased weight, the airframe must be larger—about 10% larger at a minimum. This means that we are looking at an airplane which is about 6-8 inches longer, with a wing area of 900+ sq. in. and proportional increases in fin and stab area, etc. Since we now have a lot more surface area, saving weight on the finish looks to be difficult.

The word is out on the flightlines of America that the 1.20s must weigh 8.5 to 9.5 lbs. at the above size to really get the job done.

If the engine now weighs 2.25 lbs., the radio stays the same at 1.25 lbs., and the hardware bits marginally increase to 1.75 lbs., we have 3.25 to 4.25 lbs left in the weight budget to construct (and finish!) an airframe that we have agreed must be about 10% larger than the .61 sized airframes we built last year.

In other words, the 1.20 airframes need to weigh less, by about a quarter of a pound, than the old .61 airframes. Not proportionally less, but *actually* less. To accomplish this magical feat, a lot of things have to happen.

The fuselages must be made lighter; lighter cloth, less resin, and more composite stiffeners like Kevlar and carbon fiber. Less structure and lighter materials must be used inside the fuselage. Fewer fasteners. Less adhesive. The lightest possible balsa for



Two of the most popular engines for modern pattern competition just happen to be made by the same manufacturer—YS Futaba. At the top is the big YS 120AC supercharged four-stroke, on the bottom the YS 61AR two-stroke that was featured in last month's "Over the Counter" column. Pattern results from the 1991 Nats seem to indicate that the use of two- and four-strokes is about equally split, with no clear dominance by either.

sheeting. Smaller and lighter retract mounts, and the minimum possible wing structure for the calculated flight loads. "Convenience" items like removable and adjustable stabs must be made lighter or eliminated.

A 1.20 vibrates a good bit more than a .61. Combine that fact with a larger, more lightly built and therefore inherently less rigid airplane, and the inescapable conclusion is that the 1.20 airframes are not going to last as long or take as much abuse as the .61s did. The consensus out there among the designers I've talked to is maybe half as long, and maybe less. One went so far as to suggest that the airframe life of one of these ultralight 1.20s might be as low as 80(!) flights.

The newest and most powerful four-stroke 1.20 four-stroke engines, complete with exhaust system, run a couple hundred bucks more than the comparable new and improved two-stroke .61s. The 1.20 kits are about 50 bucks more expensive than the .61 sizes, and they cost about 50 bucks more to build and finish.

The big engines have twice as many bearings, three times as many moving parts, and a reliability record (based on previous models) only about half as good as the .61s. The engines operate in a more highly stressed mode, and when failures do occur, they can be catastrophic.

Fuel for these monsters leans toward the high side on nitro content, with 20% being

the norm, and some users going as high as 40-50%.

So the cost of all that lovely horsepower is only about 300 bucks more up front. To make up for this, the fuel (including increased consumption) costs nearly twice as much, and the airplane only lasts about half as long. At least you won't get stuck with flying last year's unfashionable and frumpy toad. No, sir, you are going to really need that new Whizcruiser 1.20 which is all the rage, because last year's out-of-style Super Slasher 1.20 (with 100 flights on it) now looks like a bad rebuild of Humpty Dumpty.

Does the above mean that the 1.20s are just a fad? Not really. The brute power is there, and power is almighty seductive. As long as the power is there, competitors will find a way to use it, and a mere trifle like ridiculous expense won't be a barrier.

Those at the top of the dog pile who have access to the best support and the best materials, and who possess or are willing to pay for the building skill needed to use those materials properly, will very likely enjoy a small but real edge in performance. That edge won't be large enough to overcome lack of practice or any sort of bad flying, but it will exist. To that end, they will give up a good amount of durability and a small amount of reliability. TANSTAAFL, again.

The point is this. The four-stroke 1.20 is not a universal cure for low scores, and the new two-stroke .61s are pretty powerful themselves. The .61s are simpler, more dependable and user friendly, quieter, smoother, and less expensive. The .61 airframes last longer, and are less expensive to build. They will stand up to many more practice flights, and practice remains the key to winning.

And as far as advantages go, you must remember that we have been talking about 8.5 to 9.5 lb 1.20 machines. That weight is a difficult target to hit for a 900+ sq. in. airplane, even by the best builders among us. 10 to 11 lb airplanes are (and are going to be) the more common result, and while those airplanes won't be as fragile, they will also have no performance advantage over a light, well set up .61, especially in vertical penetration.

Of course, there are other, "non-power" reasons to build a 1.20. They are larger, and easier to see. Some people just like a bigger airplane, and some people like the sound. Some people buy covering material in 25 ft. rolls.

The future is the "maybe" part of the deal. For absolute power parity to be restored between the two-strokes and the four-strokes, the displacement numbers in the rules have to change, and there has been talk of doing just that. Perhaps that will be necessary, just to keep pattern from becoming a one or two engine event. I don't believe it's necessary at the moment, because all the extra power of the 1.20 still comes with so many built-in disadvantages.

*continued on page 83*

BY STU RICHMOND

## Sportee 40 from Hobby Dynamics

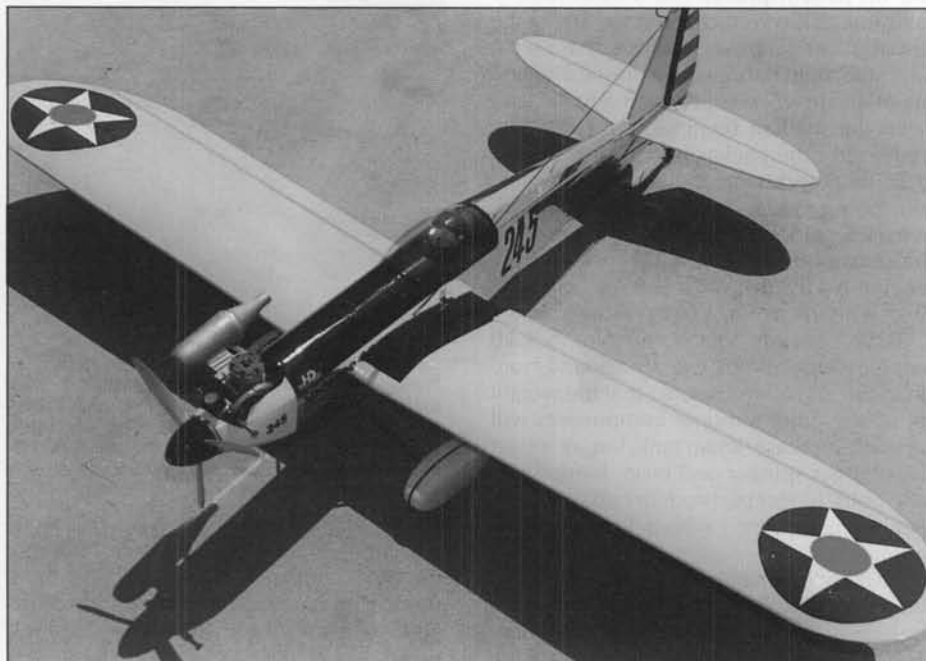
**M**y favorite old airplane is the Ryan ST (ST stands for sport-trainer) that was built from 1934 to 1941. There's a restored Ryan ST flying on the Florida airshow circuit. It's lovely in bright yellow and highly polished chrome-like aluminum. The five cylinder radial sounds beautiful and it has those big, round pre-war Army Air Corps military insignia out near the wing tips.

When I said "yes" to building the Sportee 40 for a review, I recognized the letters "S" and "T" in its name. Also, the outlines of my favorite Ryan showed all over the model. I knew in advance that the Sportee 40 was going to look like the Ryan ST of yesteryear.

Hobby Dynamics Distributors supplies hobby shops from coast to coast, and they're also the importers of JR radios, Kalt helicopters, Webra engines, and many other major quality hobby shop items. They're into RC kit manufacturing, too. I've built their Gobe 40 intermediate trainer (bunches of fun), which is a box-like high-winger with an airfoil that displaces lots of volume but also

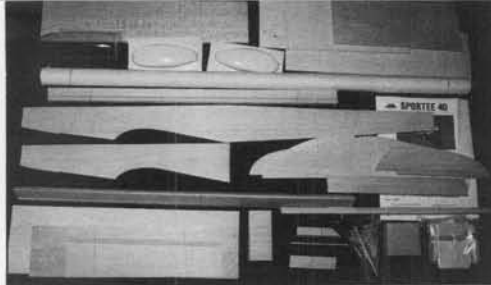


builds flat on your bench. The Sportee 40 uses the identical airfoil and its wing also builds fast and easy. I assumed the model (due to the wing design) would have the same or similar aerobatic tendencies. With more power from the newest version of the Webra Speed .40 engine, a bit less wing area than the Gobe (500 versus 682 square inches), a sleeker fuselage streamlined into a two-inch spinner, wheel pants and a closed cockpit, and weighing at least half a pound lighter, I figured the Sportee 40

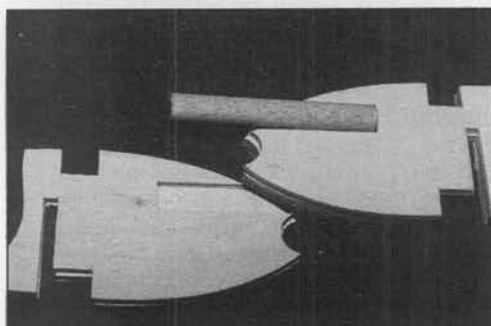


(Top) Sure looks like a Ryan ST sport trainer from overhead! (Above) Big black letters show up in flight—helps with visual sight orientation. Covering and trim were all done with MonoKote. (Left) The Sportee 40 is a high performance sport/trainer model. With less power it would be more docile. The model has never surprised the author; it's nicely predictable, even at slow, nose-high approaches. It's a beautiful flying model capable of flying as good as you can fly it!





(Above) Complete kit contents. Construction is mostly balsa and spruce, with a bit of Lite-ply thrown in for good measure. (Left) Fuselage starts to take shape. Thin Hot Stuff, thick Insta-Cure+ and Powermaster X-L-R-8 kicker were used. (Below) A Webra Speed .40 ABC powers the author's review model. This is probably the maximum power you'd want put in this kind of ship.



(Second from bottom) Front of the fuselage is formed by gluing balsa blocks in place, then carefully carving them to shape. (Bottom) Front wing dowel is sandwiched between die-cut Lite-ply center section ribs.

would do all the RC flying the Gobee does with more speed and a sleeker appearance. I was right!

The real Ryan STs were extremely aerobatic. Loops, rolls, spins, inverted flight and such were routine. My Ryan-like Sportee 40 does all this and more, and I love it! I think you'd enjoy building and flying a Sportee 40, too. It lends itself to all sorts of scale-like decorating. A pair of scissors used on the formed canopy would easily give you a sporty single-place open cockpit. Or the Sportee 40 could easily be decorated like the P-26 pursuit ships in red/white/blue. Move the cockpit far back like the famous Gee Bee pylon racers and make believe you're Jimmy Doolittle at the stick! It would be easy to alter the fuselage for two open cockpits and it wouldn't take much to add functional landing flaps, but as my Sportee 40 was specifically built for this kit review, no construction changes were made. This review model is strictly "per plans."

I find reading kit reviews often makes me want to spit up. Because the kit (and sometimes more) is given free to the builder, he thinks he must write phony superlatives and use flowery adjectives as payment, rather than tell it like it is. Let me tell you about the Sportee 40 kit as sold to your local hobby shop by Hobby Dynamics Distributors.

This kit had some wood that I felt was too soft (fuselage doublers and the fin) and some wood that was too hard and heavy (wing ribs). The single stringer in front of the cockpit was an inch too short, but the five stringers behind the cockpit were each about four inches too long, which allowed plenty of wood to splice onto that single short piece—no big deal!

My honest feeling—I'm telling you straight—is that these minor things are far offset by building a kit in which the parts punch out easily and readily (some really just *fell* out), where the plans and building directions and photos are all straightforward and easy to follow, where the engineering design results in a super strong model without extensive use of sheet after sheet of Lite-ply (I despise that stuff structurally), and by building a kit that flies as good as it looks!

Kit reviewers almost never tell you how much time is involved in box-to-air hours. My Sportee 40 time log was as follows:

Fuselage construction through K&B resin fuel-proofing and spray painting the nose section and cockpit (at least half the time was spent shaping the fuselage to streamline into the spinner): 7-3/4 hours.

- Wing construction and tail feathers: 6-1/4 hours.
- Wheel pants and landing gear with painting: 2-1/2 hours.
- Wing-to-fuselage fit: 1/2 hour.
- Pilot-headrest-instrument panel: 1 hour.
- Covering the fuselage and installing canopy: 3-3/4 hours.
- Covering the wing frame: 2-1/2 hours.
- Making four insignias from red/white/

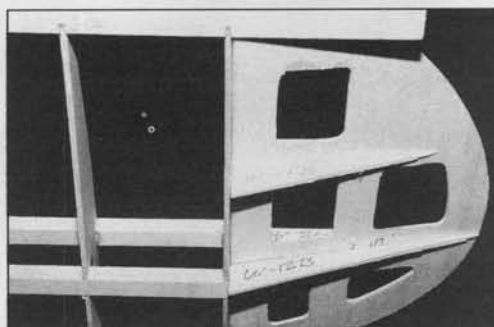
blue MonoKote for the wing: 1-1/2 hours.

- Covering the ailerons and tail: 2-1/2 hours.
- Hinging/installing all control surfaces: 1 hour.
- Miscellaneous time (installing the tailwheel, mounting the wheel pants,

*continued on page 83*



(Left) Wing has a hardwood dowel leading edge and a pair of 3/8-inch square hardwood spars—strong! (Below) Wing tips assemble from die-cut Lite-ply parts. (Second from bottom) Trial fit of the tail feathers. Simple sheet balsa construction lets you get them ready for covering in short order.



Small black plate is CA'd inside the painted wheel pant and is carefully lined up so that its surface is perpendicular to the wheel axle. Sig wheel pant mounts were used in place of those shown on the plan.

# HANNAN'S HANGAR

BY BILL HANNAN

**"There's  
a better  
way to do  
it, find it."**

Our lead-in line is by Thomas Edison, who spent his lifetime carrying out that idea. Our thanks to Chuck MacCrindle, of San Pedro, California for pointing out how appropriate the concept is to our favorite hobby.

## **TWICE AS MUCH FUN?**

Our photo gallery this month is (with one exception) devoted to twin-propeller models. Certainly twins require more effort to construct and more skill to fly than a single, however the results can be especially satis-

Although it might appear that being able to operate from a common supply tank would guarantee equal thrust output and simultaneous stopping, such is seldom the case, and some experimentation likely will be required for successful results.

Electric systems are another logical solution to multi-prop models, as has been convincingly demonstrated by Don Srull's dramatic free flight Dornier X with its twelve propellers.

So if you are looking for a fresh challenge and a sure-fire

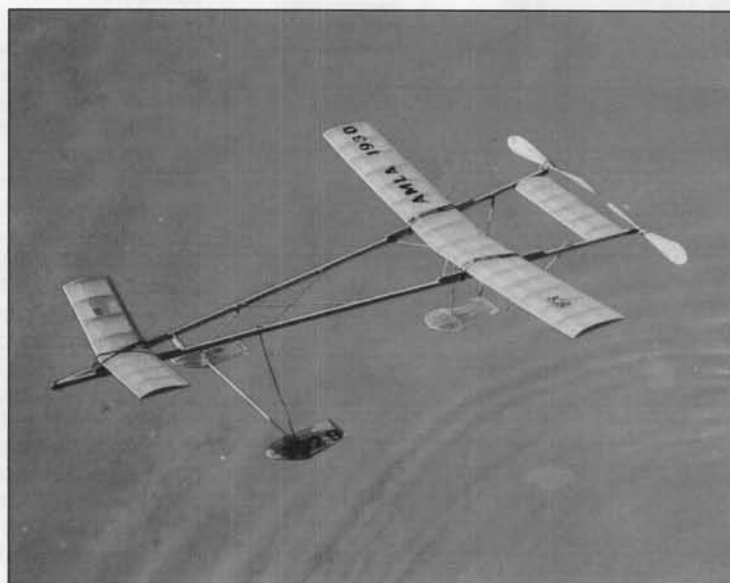
suggests the idea might be usefully employed by others giving demonstrations to youth groups.

## **SPEAKING OF YOUNGSTERS**

Larry and Dottie Conover, former producers of the fondly-remembered *Sig Air-Modeler* magazine, have organized a program to promote model building among young people. Entitled "Project Grandpa: Mentor," the object is to persuade older modelers to share skills and enthusiasm with the new generation—often their grandchildren.



(Above) Beautiful 25-inch span rubber-powered deHavilland Dragon Rapide was constructed by Paul Boyanowski, of Allen Park, Michigan. (Above right) This is how model twins started...1900's technology in this rise-off-water twin pusher by Vic Cunyngnam, of Exeter, California.



fying. Scale model builders looking for a change of pace will discover that multi-engine subjects open an entire new spectrum of subject possibilities, many with ideal proportions.

Power options are many, each offering pros and cons, of course. Rubber is by far the simplest, cheapest and quietest, however the choices of scale designs may be limited to those which can accommodate fairly large propellers. By contrast, glow engines can turn near-scale diameter props quite efficiently, thus expanding the scope of suitable subjects. CO<sub>2</sub> and compressed-air powerplants also offer quiet operation and eliminate starting problems.

attention-getter, why not try a twin?

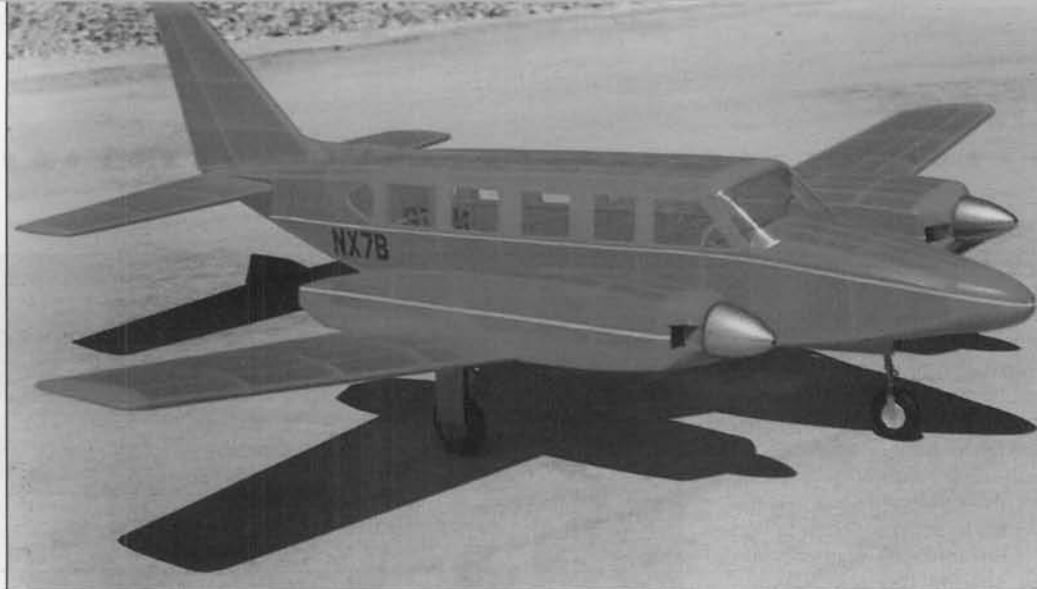
## **SURPRISE!**

Gil Caughlin, of Tacoma, Washington, was asked to give an indoor model demonstration to first-grade school students. Following a successful flying session, Gil wanted to emphasize the importance of lightweight materials in the model's performance. So he held three small squares of the ultra-thin mylar covering material above the childrens' heads, expecting them to descend slowly. Imagine their surprise (including Gil's) when the heat from the kids' bodies caused the mylar pieces to rise to the gymnasium ceiling! Gil

A great deal of thought and experience has been invested in the program, with the ambitious goal of providing solutions to many of today's social problems. The Conovers feel that the children have been led astray by "the Pied Pipers of instant gratification," not knowing there are better ways to spend their time. Stressing the fact that model building is an effective, enjoyable method of instilling patience, craftsmanship skills and good sportsmanship, the program outlines creative outlets for the boundless energy inherent in most young people.

If you have even the slightest interest in sharing your appreciation of model building with





This 27-inch span rubber-powered Piper Navajo is the handiwork of Dick Howard, of Lake Havasu City, Arizona.

today's generation, two dollars will bring a complete package of information and teaching guidelines. Included are an 11x15-inch construction plan for a rubber-powered beginner's model (and details for an easily-made motor hum device for it), books, materials and kits source list, and a thorough discussion of Project Grandpa: Mentor. Send to P.O. Box 628, Longmont, CO 80502.

## MODELING'S INNER GAME

Nope, we don't mean indoor flying, but the inner thoughts that motivate model builders. Stan Fink, editor of the *Domeduster* newsletter (which is an indoor publication, however) suggests that many of us should take a closer look at our internal reasoning. Pointing out that books about success in tennis, golf, skiing and music have shown the way, Stan explains that too many people act mainly upon their whims, rather than careful goal-setting when commencing model projects: "Some folks mistakenly assume that everyone flying model airplanes has the same goal—namely, to be the world champ. This couldn't be farther from the truth. This is a *hobby* to the majority (italics ours, wch) of fliers. We are in it as an antidote to the world of work and worry. We are here for the camaraderie, the challenge, and to keep from being swallowed up by boring boob-tube non-entities. Very few have the time, talent, desire and money to excel.

"If I were to reach goals by comparing myself to others who have more talent, time, desire

and money, I would end up with nothing but frustration and would probably quit the hobby altogether. Each of us must set our own goals (not too low, not too high) in order to get the most out of this hobby."

If you appreciate that sort of philosophy, augmented by indoor model plans and building hints, consider subscribing to *Domeduster*, at \$12 for six issues from: Stan Fink, 1810 Pine St., Philadelphia, PA 19103.

Another newsletter helping to spread the Flying Aces Club concept of scale modeling, is *Tail Spin*, edited by Mike Nassise, 22 Greenfield St., So. Easton, MA 02375. Yearly rates are a mere \$5, and the publication includes three-views, cartoons and contest information. The January/February 1992 edition featured a fold-out construction plan for a 16-inch span Alliance Argo stick-and-tissue biplane by master modeler Dave Stott. Fun!

Another source of good scale modeling documentation is Bob Banka, who operates Scale Model Reserach. Bob's recently-published 1992 catalog lists more than 3,300 photo-

graphically examined subjects, and claims over 25,000 three-view drawings. This massive variety of offerings is quickly



accessible, enabling Bob to offer rapid service by first class mail. For your copy of this 79 page catalog, send \$4 to Scale Model Research, 2334 Ticonderoga Way, Costa Mesa, CA 92626.

And for you CO<sub>2</sub> model fliers, a new range of accessories is offered by Daniel Baird. These

Doug McHard, of England, synchronizes the thrust of his twin compressed-air engined "Pchelka" with the aid of this base-mounted pivot. Simple!

Lane, Knoxville, TN 37931.

When contacting any of the above mentioned people, kindly mention *Model Builder*. Thank you!

## GONE WEST

Two more notables passed away during December, according to Ed Whitten. Leo A. Weiss, an accomplished model builder during the 1930s, industrialist, consultant and columnist died at age 73 in Alexandria, Virginia. One of Leo's exceptionally attractive Texaco event gas models was featured

If two are good, three must be better! Another of Dick Howard's productions is this Fokker F.20 rubber-driven trimotor based upon Dave Stott plans.



# HANNAN'S HANGAR

in both the 1937 *Frank Zaic Yearbook* and *Model Airplane News*.

During the same month, famed author/pilot Ernest K. Gann, age 81, also passed away. Among his best remembered books were *Island in the Sky*, *The High and the Mighty*, and *Fate Is the Hunter*, all of which were made into motion pictures. A former Army Air Corps and American Airlines pilot, Gann was also an accomplished painter. Our condolences to the families and friends of both of these fine gentlemen.

## RC ORNITHOPTER

Although successful free flight ornithopter models date back to at least the 1800s and engine-powered models have appeared as recently as the 1960s, engine-powered, radio controlled examples have been rare indeed. Paul MacCready's

electric powered pterodactyl of the 1980s seems to have been the most recent, until the team of James DeLaurier and Jeremy Harris demonstrated their ten-pound, ten-foot span example during December of 1991. Although its duration amounted to only 2-1/2 minutes, a more highly-developed version is expected to perform much better.

Our thanks to George Benson for sharing this report based upon a clipping from the *San Francisco Chronicle*.

## SIGN-OFF TIME

Our farewell thought is from the pen of aviator/author Antoine de Saint-Exupery (1900-44), shared with us by Dennis Weatherly: "In anything at all, perfection is finally attained not when there is no longer anything to add, but when there is no longer anything to take away." **MB**



(Above) Beautiful electric-powered PBY Catalina by Ian Pallister, of England, takes off with the aid of the dolly shown. Tonda Alfery photo. (Left) An easy-to-adjust approach to a twin is the pusher-puller common-thrustline configuration, such as will be employed on this Peanut Cessna Airmaster, by Charlie Glassie, of Tacoma, Washington.



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# WORLD CHAMPS NEWS



Wayne Mann

Curtis Youngblood

**X-CELL HELIS DOMINATE  
WORLD CHAMPS  
TROPHIES!**

## THE RESULTS SPEAK FOR THEMSELVES...

USA Team—1st Place  
Wayne Mann—2nd Place  
Curtis Youngblood—3rd Place

M.A. / U.S.A. Congratulates  
the USA Team  
for their outstanding results.

### 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 Schoodnard—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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#3680 Rotosports Kevlar Blades  
#3694 M.A./USA N.H.P Tail Blades  
#0561 M.A./USA Pro-Paddles  
#0802 M.S./USA Torque Tube Drive  
#0552 M.A./USA Constant Drive

Available soon...

Curtis' H.P.F. FAI fuselage (not shown)



### Wayne's Choice of Winning Equipment:

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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%  
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#3817 M.A./USA JMW Expert Gyro  
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# PLUG SPARKS

BY JOHN POND

## An Obscure Old Timer

For a change, we are going to lead off the column with one of the little-known designs approved for O.T. competition by the SAM Executive Committee: The "Bliipo."

A casual look at the Bliipo reveals it is rather a slick looking design for Class A/B. The wingspan of 42 inches rather limits much more power than an Ohlsson .23 for Class B.

We had hoped to run a photo of the model, but a frantic search of several hours failed to turn up

Bliipo plan is available directly from me at P.O. Box 90310, San Jose, CA 95109-3310. Ordering number is 39G3, cost is \$5.75 plus \$1.15 for postage and handling (California residents add 47 cents tax). All plans go out on the same day the orders are received.

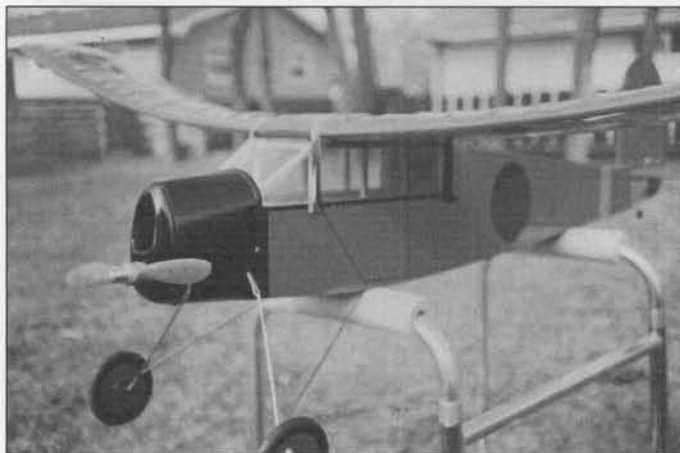
Returning to the Bliipo, this model was the brainchild of C.B. (Charlie) Barron, who was a member of the San Antonio Gas Model Association, in conjunction with Fred Lehmborg. First

closer than that!

Those were wonderful days in the old SAGMA (San Antonio Gas Model Association) club, where many good friendships were developed. To this date, every so often Charlie Barron calls up Fred Lehmborg for a long distance bull session. Simply great!

### NOSTALGIA CORNER

This month, we are not using any photos from the Dick Everett



(Above top) Photo No. 1. Simple red and white color scheme lends a bit of attractiveness (?) to this Red Ripper, built by Athol Hutchinson of Australia. Uses P.A.W. .29 diesel. Photo by Bruce Abell. (Above) Photo No. 2. Terrific looking 1937 Dick Schumacher "Holman" design built by Max Hansen, of South Dakota. Combination of elliptical dihedral and swept-back wing planform make for an interesting construction project! (Above right) Photo No. 3. John Tatone seen at California's Waegell Field in 1956 with a Torpedo .35 powered Class C "Frisco Kid." June Dyer photo.

a single one. These were submitted to SAM along with the drawing to have the model design recognized and classified as an Old Timer, but we have no idea where they are now.

At this point, it might be apropos to put in a plug for my Old Time Plan Service. All the drawings of old models being presented in this column are drawn from reductions of the full-size drawings. The full-size



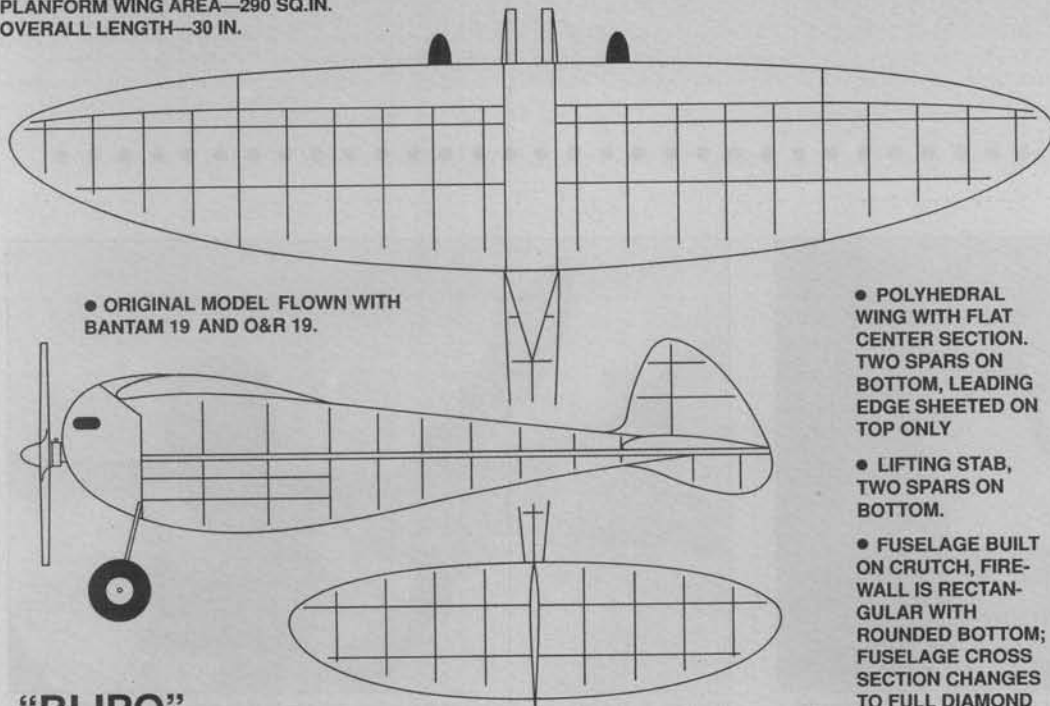
conceived in October and November of 1939, the model was first flown in January or February of 1940. Designed for the Ohlsson .19, it was later powered by a Bantam .19. For those desiring specifications, the wing span is 42 in., wing area is 283 sq. in., and the fuselage length is 29.25 in. Required weight at that time was 15.76 ounces (required wing loading was 8 oz./sq. ft.) Can't design them any

collection (which featured primarily Southern California activity), but instead, we are presenting Photo No. 3, taken by June Dyer, who was the mainstay of NCCFC competition, running contests for almost ten years with very little help.

In addition, June would take photos of the action and outstanding models and modelers. Seen in the picture is John Tatone with his Frisco Vulture



SPAN—43 IN.  
PLANFORM WING AREA—290 SQ. IN.  
OVERALL LENGTH—30 IN.



## “BLIPO”

CO-DESIGNED IN 1939 BY CHARLIE BARRON AND FRED LEHMBERG

## MODEL OF THE MONTH

## Chemical Compatibility of Common Finishing Materials

**Example: Vinyl spackle is compatible OVER poly resin (find vinyl spackle in the "over"-section and read down to poly resin. Compatibility is the intersection of the two).**

**Example: Vinyl spackle is not compatible when put UNDER poly resin (find vinyl spackle in the "under" section and read across to poly resin).**

**Polyurethane  
Acrylic Enamel  
Epoxy Enamel  
Alkyd Enamel  
Acrylic Laquer  
Butyrate Dope  
Nitrate Dope  
Aero Gloss Dope  
Dupont 305  
Poly Resin  
Vinyl Spackle**

**OVER**

**UNDER**

**Vinyl Spackle  
Poly Resin  
Dupont 305  
Aero Gloss Dope  
Nitrate Dope  
Butyrate Dope  
Acrylic Laquer  
Alkyd Enamel  
Epoxy Enamel  
Acrylic Enamel  
Polyurethane**

[illegible]

A "C" in a column indicates that the combination is COMPATIBLE.  
An "N" indicates that the combination is NOT COMPATIBLE.

## PHOTOS FROM AUSTRALIA

Bruce Abell, who writes the glider column "On Silent Wings" for the Australian magazine, *Airborne*, has been busy attending various SAM meets in New South Wales.

Seen in Photo No. 1 is a Red Ripper built by Athol Hutchinson. Dick Bringgold of Phoenix, Arizona, has labeled this design as having "the lock on UGLY." The reason for showing the pic is just to show what an attractive red and white color scheme can do to improve the looks of a design.

As can be seen, this model is powered by a P.A.W. (Progress Aero Works) .29 diesel. Australian modelers use diesels in considerable numbers as the cost of glow fuel is quite prohibitive. At last count, a gallon of nitromethane (if you could

(same name as the famed club to which he belonged).

The shot was taken at the NCFFC's Waegell field in 1956.



Photo No. 4. Dick Korda in 1940 with his latest rubber design, called the "Dethermalizer." Plans are available from *Model Builder* (Plan No. 786-O.T., \$9.50). Photo by Joe Elgin.

If one were to attend an NCCFFC meet at Waegell in late May or June, 1992, I would defy anyone to notice any difference in the terrain and vegetation. The NCCFFC has been extremely fortunate in having such an excellent facility. It has been the site of several International Championships.

get it) was selling in Australia in the neighborhood of 25 to 40 dollars!

**DICK  
SCHUMACHER**

This columnist has been touting the various Dick Schumacher designs built and flown by "Schooie" prior to

# PLUG SPARKS



Photo No. 5. Jerry Persh is enthusiastic about his Cox Tee Dee .049 and .020 powered Comet Mercury models.



Photo No. 6. Bob White (today a world-class F1B competitor) in 1939 with an Ohlsson Gold Seal powered Comet Clipper.



Photo No. 7. Nothing changes! Bob White, again, with his Ohlsson .33 powered Comet Clipper in 1991. Photo by Mik Mikkelsen.

World War II. At that time, he was always a threat to win with the numerous model designs he produced.

The earliest notice of

Schumacher appeared in Phil Zecchetella's column in the October 1937 *Flying Aces*, page 45. Seen is Schumacher's early design "Hoiman" at the '37



Photo No. 8. The late Larry Nigh seen at the Jean, Nevada SAM Champs last year with a Brat powered Shulman Skyrocket. Harold Johnson photo.



Photo No. 9. High class work and finish are very evident on Howard Osegueda's Super Cyke powered Record Hound. Howard, an excellent competitor and Director of MECA Region II, passed away recently—more in text.

Nats, with Dick taking a snooze under the wing. Unfortunately, Dick flew too late in the day and only registered 18-20 minutes in the late afternoon. This is not to detract from the performance of the model. Photo No. 2, a "Hoiman" recently built by Max Hansen of Huron, South Dakota, reveals what clean lines the model has with a good cowl affixed.

Dick Schumacher was not too well known until he got into RC following WWII. Many of his designs such as "Liberty Belle," "Hoiman III," etc. were kitted and published in magazines. What most modelers are unaware of is that Dick was a prolific designer and builder, turning out such models as the "Miss Fire" (a kit job for Ted Morrison's Model Shop);

"Josephine" (a Class C model for Charlie Pottol of Madewell); "Thunderbird" (a glider design for Offenbach's Hobby Distributors); "Pixy" (from the 1934-39 Zaic Yearbook); "Ethy" (Zaic 1938 Yearbook), and numerous others that don't readily come to mind.

Don't worry men, we have got all of them available!

## 50 YEARS AGO, I WAS...

Ever since we published the classic photo of Dick Korda receiving the 1939 Wakefield Trophy, we have been receiving supplemental photos and information.

We are indebted to Joe Elgin, who took Photo No. 4 back in 1940. Seen is Dick Korda with one of his models being devel-



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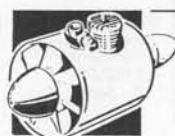
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RK-740 \$109.50  
THRUST 7.0 LB



RK-720 \$99.50  
THRUST 3.5 LB

oped as a follow-on to his famous Wakefield design. Seen is what this writer identifies as the Korda "Dethermalizer," a larger version of the famous Wakefield design.

The spectacular 1939 winning flight was like a catalyst, arousing the interest of all modelers and in particular, the hobby kit manufacturers. These included Megow, Burd, Cleveland, and Berkeley. Also to be noted was the interest of many magazines, not necessarily model aviation oriented, such as *Open Road for Boys*.

To Korda's credit, he was more than equal to the task as he produced numerous rubber power designs (competition type) and several very successful gas powered models (Champion, Powerhouse, etc.). Small wonder the name Korda is practically a household word in the aviation hangar of modeling.

## THE FINAL DOPE

After last month's writing on dopes, it remained for David Flick, editor for the RUF Model Airplane Club, to come up with a compatibility chart for common finishing materials.

This chart was supplied through the courtesy of Bob Beecroft, San Diego Orbiters newsletter editor, and supplies the answers long sought by modelers who love to finish their models in various coatings.

## CAAMA NEWS

The SAM club located in the Washington, D.C. area was extremely active in the latter part of 1991, staging at least three meets. Jerry Persh writes to say that they had a real fun contest, the scoring being rather innovative; divide flight time by engine run with a max of 10 (i.e., 100 seconds divided by 10 second engine run gives 10). This applied to the power portion of the meet.

The best part, says Jerry, was the trophies: six- to seven-inch replicas of famous O.T. models mounted on the trophies. Jerry sez he got a replica of the GUFF, really neat!

Photo No. 5 shows Jerry Persh enthusiastically displaying his entries, a full-size Comet Mercury (Pond plan) with Cox TD .049 and a scaled-down Mercury (Beneke plan) using a Cox .020 for power. Fun airplanes, Jerry calls them.

Pic was taken at the Bill Saunder farm near Cuckoo, Virginia, 500 acres for flying. Fantastic field for easterners!

## THEN AND NOW

It is always a great surprise to receive old photos of famous modelers who are more known for their modern activities. Such is the case in Photo No. 6, submitted by Mik Mikkelsen, which shows the famous F1B Wakefield winner, Bob White, back in 1939.

The model is naturally a Comet Clipper (everyone built one of those!) powered by the popular Ohlsson Gold Seal engine. Hard to tell where the photo was taken but it's a safe bet that it is now completely covered with houses, shopping malls, etc.

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Now comes Photo No. 7, again showing Bob with a Comet Clipper in 1991. Times change but models don't. This Clipper (to show the difference in post-war engines) has ample power with an ignition Ohlsson .33.

Worth mentioning is that this good flying model was lost at the 1991 Jean SAM Champs. Worst of all, it was equipped with one of those expensive retrieval systems. When they go over the hills, not much chance of getting a radio signal!

## OBIT NOTICES

Last year seemed to be a particularly tough one on the ranks of the old timers. For the first obit, we are indebted to Harold Johnson, who reports that Larry Nigh of Cedar Rapids, Iowa died on December 8. Photo No. 8 is presented showing Larry at the 1991 Jean, Nevada SAM Champs. The model is a Leon Shulman "Skyrocket" powered by a Brat 14. It was typical of Larry's selection of models, building only those that pleased him. For this reason, he was never the greatest competitor, but no one could say he had more fun than Larry when meeting and flying with the fellows.

A recent letter from Otto Curth, of Northbrook, Illinois, contained the discouraging news that Frank Nekimken (nee Phillip Frank Nekimken) passed away on November 3, 1991. Frank was the major spark plug in making Chicago the leaders in model aviation back in the early days. There was never too much for Frank to do, as he taught model building in the numerous Chicago Park District fieldhouses, was responsible for the formation of the Chicago Aeronuts, and secured their meeting place at Gage Park. Frank is fondly remembered for his activities in obtaining contest sponsorship for indoor and outdoor events. His activities included the organizing and being Contest Director of the 1940 and 1941 Nationals at Chicago. These were great meets as attested to by the records set and designs that appeared.

Just as we were completing this column, this writer was shocked by the news of the sudden death of Howard Osegueda, well-known O.T. modeler and Region 2 MECA Director. Howard was extremely interested in SAM competition, winning numerous West Coast contests. In his quest to supply readily available ignition engines, Howard acquired the Vivell project, producing quite a few Super Vivell .35 engines. At the time of his death, he was planning to produce the small Vivell .09 diesel. Howard was also responsible for founding the SAM 00 chapter in addition to his activities with SAM 21. We will all miss his friendly genial manner!

To wrap things up, we present Photo No. 9 showing Howard at the peak of his O.T. modeling career, displaying a Super Cyclone powered Henry Struck Record Hound at the SAM 21 meeting held monthly at the Pond Plan Shop. **MB**

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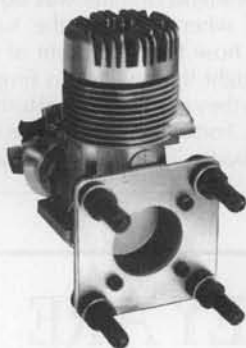
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just like the full-size aircraft. In fact, they had unequal spacing of the ribs, so we scaled out these spacings to be correct. The nice thing about Ziroli plans is that the parts fit!

"We didn't put rivets on. We didn't even consider it after going down to the municipal airport at Orlando where they had a DC-3. In order to duplicate the rivets on this thing, the scale rivet positioning would be approximately 1/16-inch apart and would have been an impossible task. So we did not put on the rivets or panel lines. The paint scheme is a direct replica of the University of Florida plane.

"Hal used to take pictures for the U of F football team, so he has a lot of time riding in it. Because of this, there was no question as to what the color scheme was to be. The plane is all balsa and ply. It is covered with 3/4-oz. fiberglass cloth and painted with epoxy paint. We went to the Hill Supply Company, as they had mixed the original paint for the U of F DC-3. They still had the paint numbers and mixed our paints to these numbers. They even gave a paper certifying that they were the paint numbers used on the original plane.

"Radio is a Futaba seven-channel PCM, using all channels. For the lights, we only had one channel left and I wanted landing lights and navigation lights. We had to make a switch that would give us either nav lights or landing lights or both. It took a bit of figuring, but we were able to fabricate a switch that would perform these functions just using one channel. The retracts are Robart and to date have performed flawlessly. We use a two liter air bottle at 120 pounds pressure.

"We took two-liter soda bottles out to the University and a friend of ours, a professor in aerospace engineering, tested the strength of these bottles. None of them burst below 290 pounds, so the 120 pounds of pressure we use is well below the safety factor. All control surfaces are moved via cables and all control arms are internal. We also use a dual battery system."

As you can see in our accompanying photos, these fellows put a tremendous amount of effort into this plane. There are even curtains in the windows and the cockpit is detailed. The plane does fly very well.

Notice what Ray said about three-views. A good set of three-views is a must if you are going to build a truly scale model. Unfortunately, a good many three-views are not very accurate. If you can, obtain actual photos of your subject that have good three-view shots. When taking photos of a subject, I take both side views, front view, rear view and an overhead view. The overhead or top view is sometimes difficult to do, but well worth the effort. Also, there are generally several different sources of three-views of the same subject. Get a set from as many sources as possible and then compare them; you will be surprised as to the variations.

Note also that the group is using a two-liter soda bottle as an air supply for the retracts. If you do use one of these bottles, wrap it with fiberglass stranded shipping or strapping tape. These bottles can and do burst on occasion. I have had two bottles burst. One of these burst at eighty pounds during filling. A friend of mine was doing the filling and when it burst, the hand holding the air hose took the brunt of the shock. We thought that two of his fingers were broken, as they swelled up and turned black and blue. Fortunately they were not broken, only badly bruised. The plane

sustained considerable internal damage.

The other failure occurred shortly after I had filled a bottle to 100 psi. I was getting ready to start the engine when the bottle burst. The canopy and dummy pilot were launched at least twenty feet into the air. The plastic bottle cap came out through the rear of the plane at about Mach two and broke the horizontal stab spar as well as the rudder post. The bottom hatches were blown off and there were stress cracks throughout the fuselage. Wrapping the bottles with fiberglass tape will slow the velocity of the explosion and prevent the bottle cap from becoming a deadly missile. The two failures occurred on the same airplane, a Byron Corsair. This is a large and rugged airplane. Can you imagine the damage to a smaller model? The one- and two-liter pop bottles are all tested at 200 psi at the place where they are manufactured, for the reason that carbonated beverages bouncing around in the sun on the back of a delivery truck can generate some kind of pressure.

When you do use one of these bottles, carefully check the bottle for any scratches. If you find even one scratch, do not use it! It could burst. When installing the bottle, glue two strips of 1/2-inch thick foam rubber (not urethane foam) to the bottle and then glue the strips to the airframe. This will shock mount the bottle. Be certain that the bottle cannot rub against anything. As I stated earlier, bursting of these bottles is rare. Just handle them with care.

Another really outstanding model at the Tangerine Internats was a Piper Aztec that scored a perfect 100 points static. This was a magnificent machine. The presentation was outstanding as well as the workmanship and colors. I did not get a picture of it prior to its first flight in the first round, as I was one of the static scale judges. I did get a couple of in-flight pics, which did not turn out too well as the plane's color was the same color gray as the overcast sky. The plane appeared to fly very well. Unfortunately, it was slightly damaged during landing. The owner of the model was so upset that he immediately dismantled the aircraft and went home in a tizzy! Perhaps the model will show up on the contest circuit later on. If it does, I will try and get some photos.

The 1/12-scale WWII Combat rules are in the new 1992 rulebook, so all of you who are interested in this event should take a look at them. They seem a little cumbersome, but you must realize it is a first cut and things will sort themselves out. There is a lot of interest. Greg Rose, of Orion, Michigan, is one of the movers and shakers of this event. In talking with Greg, I suggested that he come up with a list of plans and kits that are available and are legal for this event. Progressive Miniature Aviation in Orlando, Florida, is producing kits. They have a P-40, Zero, P-51 and FW-190. These are excellent kits and are priced right. For more info, call (407) 277-1248. **MB**



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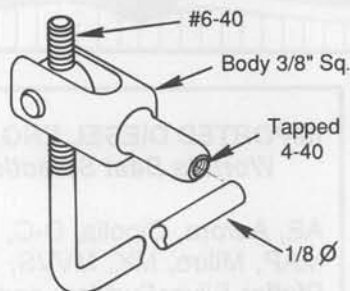
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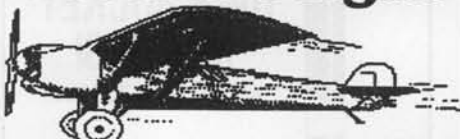


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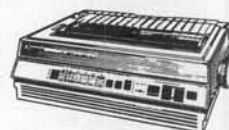
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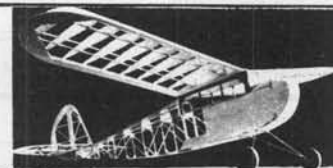
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## CORNER continued from page 35

are talking of about half an amp for an unloaded servo, the average being only about 150 mils.

The FET, which is actually short for MOS-FET, comes in now. The normal servo amplifier, not being able to handle the extreme current, has to be "boosted." That is, it is equipped with an additional stage, consisting of larger FET transistors that are capable of carrying the extra current with very little internal losses. Larger, that is, than the transistors we normally see in the output stages of servo amplifiers, though not as large as those commonly seen in electronic speed controls.

One FET servo with which I have personal experience, is the Airtronics 94151, a relatively small but very powerful servo. It measures only 1.54x1.48 x.79 inches and weighs 1.87 ounces, yet is capable of producing 75 oz./in. of torque at a transit time of .08 second. Others in the family are the 94152, same size, at 103 oz./in., and the 94161, about 1/4-inch higher, at an astounding 135 oz./in. of torque. The 151 and 152 are rated at 6.0 volts, the 161 at the more normal 4.8.

Now, what happens when you put these guys to work? Well, as in all servos, the current drain increases, ultimately determined by just how much work they can and have to do. The free running and stalled currents are good indicators of this. The standard non-FET servo, when cycled rapidly back and forth without any load, will pull an average of 100 to 150 mils. Stalled, it will punch the meter at between 400 and 500 mils. The FET 151, free running, draws 400 to 450 milliamps, and fully stalled, at which it is hard to hold with the fingers, the current draw goes to 1.2 amperes. A lot of power, both consumed and delivered. But, you have to have one to get the other.

So what's the application? Well, obviously, anywhere that requires a lot of muscle to get the job done. These servos also include ball bearings and metal gears in the critical spots, so they should take a lot of punishment. Being small, they are a definite advantage over those that produce comparable torques with decided size and weight increases. In addition to flight control duties, they seem to be just the ticket for many scale functions on those big airplanes, from lowering the flaps to opening the canopies. Due to the current drain, one should be sure that one needs that kind of mechanical power before using them, and it sure would be a good idea to use separate receiver and servo batteries. Just don't make the mistake of believing that other non-FET servos are giving you high power without also using increased amounts of amperage—Ohms Law applies to all of us and all motors and servos.

Eloy Marez, 2626 W. Northwood, Santa Ana, CA 92704. **MB**

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To the AMA Executive Council, Staff and Members:

In 1990, the insurance and membership programs which now comprise the Sport Flyers Association were offered to the AMA. As AMA members, we created these programs to save flying sites which were threatened with closure due to inadequate coverage and a growing public perception that aeromodeling poses a greater risk than benefit. We believed these programs would free AMA self insurance reserves, remove underwriting risks, and lower membership fees. We offered to fund merchandising and manufacturers' programs to increase consumer sales and awareness and to reverse negative public perception. We wanted to work with the AMA to build model aviation, not compete against it. Because we still do, this offer stands to this day.

Unfortunately, then as now, the AMA's response has been hostile and defensive. Instead of receiving appreciation for programs created to resolve a growing threat, we have been the target of personal attacks and slander. While being labeled an "enemy" by the AMA, we have been issuing special coverage to keep some of the largest sites open for use by both SFA and AMA members. While SFA offers coverage to allow clubs to open their membership and still be insured, the AMA continues to force all members of chartered clubs to join AMA—consequently restricting access of those who can participate. We assume that such attempts to lock out our members and discredit Sport Flyers are based on misinformation and fear instead of the AMA's intent to restrain trade.

Keep in mind that this is a *hobby*, and modelers are in it to have *fun*, not to argue about the pros and cons of insurance. Put aside the fiery rhetoric, and consider what could be accomplished by positively working together. Instead of spending money to increase coverage for the AMA, why not save money and increase coverage for your members and clubs through the added limits SFA can provide. Instead of funding defensive advertising, help us promote aeromodeling to the public and those programs which benefit industry manufacturers and retailers.

This is an open call to join us in building the entire industry. Instead of fearing the loss of current membership, realize that opening model flying to all consumers will generate multiples of new members and industry growth. Eliminate those barriers to clubs and flying sites that make both restrictive and limit the numbers who can participate in this hobby. Realize that forcing members to join just because their club is AMA chartered is a lousy way to grow membership or sell the virtues of model aviation. Lift "modelers only" restrictions, open membership, and show claims data to illustrate the low risk/high reward ratio of model aviation, and in so doing allow clubs to access both public and private sources of funding that have benefitted golf, baseball, and other sporting activities. Separate and publicize categories of claims data to protect manufacturer's interests and lower product liability costs. Consider the benefits of jointly lobbying the FCC and other regulatory bodies and the advantages of industry funding offered by SFA's Hobby Industry Political Action Committee (HIPAC).

We welcome your response.

Sincerely,

Al Zlogar  
SPORT FLYERS ASSOCIATION



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## Products continued from page 65

mounting the engine, taping the aileron gap, etc.): 3 hours.

- Total time of building: 32-1/4 hours, which included telephone calls, sandwich snacks, beer breaks, toilet trips, etc., as well as pleasurable workshop solitude. Radio installation time was additional.

I liked the die-cutting of the Lite-ply. The design of the wing's Lite-ply center ribs to align and accept the wing hold-down dowel is absolutely superb and worked perfectly. The balsa wood was well pre-sanded and required only a few swipes on the die-cut edges with one of those new Powermaster Super Sanders before assembly. I liked the good hints the instruction book gives on tools to use—good hints on where to use what glues. The kit was built with less than an ounce of Satellite City thin Hot Stuff, less than an ounce of Bob Smith's Insta-Cure+ gap filling CA, and most of a two-ounce bottle of Powermaster X-L-R-8 CA accelerator/kicker. The yellow paint is from Pactra's Formula-U spray can. The three-

blade prop is Graupner's 9x7. I used 2-1/2 inch Sullivan Sky-Lite wheels and a Sullivan RST-8 fuel tank (with the small dimension vertical to minimize fuel pressure head variation). Covering took 36 lineal inches of chrome MonoKote (it shrinks very little; you should put it on so tight it doesn't need shrinking!) and 72 lineal inches of yellow MonoKote (shrinks beautifully!).

The RC system used is JR's Computer Max 6—sure makes the airborne installation easy compared to my older sets. The set allows you to adjust throttle linkage and control throws in minute increments—just a few pushes of the buttons do these tricks. After the first test flights, the rudder travel was punched up to 150% and wowie! What fun!

The Sportee 40's fun is in the flying. It easily does loops that track inside and outside beautifully, flat upright spins (it won't spin flat inverted), 4-, 8-, 12- and 16-point axial rolls, extended knife-edge (requires a bit of down elevator, which indicates my model is noseheavy; battery pack will get moved back a bit).

The Sportee 40 does graceful side slips to landing. I suspected it might Lomcevak...or tumble...and it does! The Lomcevak is done

by flying the first half of a big inside loop; as you get to the top slam in full left aileron with full left rudder and full down elevator while at full throttle and low inertia at the top of the loop. The tail will tumble right on over the nose once—and sometimes twice. The small diameter leading edge contributes well to the sudden stall required before the tumble starts. You might have to practice this one a bit to get the tail-over-nose tumble timed just right!

If you cut back the control throws a bit you'll have a glass-smooth pattern trainer. It could be a real contender in local contests in the novice-sportsman and standard classes. Model appearance influences most judges a bit (it shouldn't) and the Sportee 40 just looks beautiful in flight. The Webra Speed .40 is near the top of the .40 size power range—you can certainly use less power and have as much Sportee 40 fun. Even a good .25 to .35 will do well (you may want to put the battery pack under the fuel tank for balance with a lighter engine).

Ask your local hobby dealer to let you look inside the Sportee 40 kit. If you decide to buy, build and fly it you'll have bunches of fun. Mine's a blast! **MB**

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## CONTROL LINE continued from page 17

zation and a newsletter. For about 12 years, racing has been the only "disorganized" CL event.

Well, there's a start at least: a newsletter called the *TR Inquirer*, published by the Southern California Association of Team Racing.

The masthead makes this statement: "SCATR is primarily FAI F2C Team Race oriented. However, the *TR Inquirer* will be of interest to all who are geared toward competition control-line racing requiring a mechanic (pitman)/pilot team. All other racing activities will be included as the information is provided by you or as the editor has the opportunity to acquire it."

Like all good newsletters, the *Inquirer* features technical tips, contest information, debate about rules and safety issues, product source listings, plans, and a contest calendar. The editor is the editor of the Knights of the Round Circle's *Direct Connection*, and manufacturer of fine control line tanks, Kenn Smith.

To subscribe, send \$6 (\$10 outside U.S.A. or Canada) to Kenn Smith, 521 Jansen Ave., San Dimas, CA 91773.

### THIS JUST IN

Here's news of an important AMA fast combat contest—a big-money meet in the Midwest. It's the first Duke Fox Memorial Great Plains Combatfest. It's a triple-elimination contest, with \$1,000 for first place and additional prizes from Fox Manufacturing Co., Bear Model Products, Model Engine Specialties and others.

The dates are August 15-16, and the location is Kishwaukee College in DeKalb, Illinois. For information, contact the Chicagoland Combat Coalition, 377 N. Park, Glen Ellyn, IL 60137.

And, in September, another big meet for old-time and nostalgia stunt. It's the Eastern States Vintage Stunt Championship, Sept. 19-20, at Winston Salem Hobby Park, Winston Salem, North Carolina.

On Saturday the events are Old-Time Stunt and Old-Time Stunt Phase II (Garden State Circle Burners Rules). On Sunday the feature is Nostalgia Stunt.

There will be plaques through fifth place in each event, a Spirit of '52 Award, a Spirit of '64 Award, and a Forty Point Award (Nostalgia Concours).

Proceeds will benefit the David Taffinder lung transplant fund. For information, write contest director Tom Dixon, 3390 Woodrun Trail, Marietta, GA 30062.

### ELECTRIFYING IDEA

Phil Plumbo of St. Paul, Minnesota, raises a question that might be of considerable interest to quite a few CL fliers. Phil asks for a "how-to" on control line electric flying.

"My eight-year-old prefers the quieter electric engine, and I do, too," Phil writes.

Electric flying is one of the mysteries of control line aviation that needs much more exploration. Readers, how about sharing some of your expertise on this matter? Send us some information and photos.

The address is: John Thompson, 1145 Birch Ave., Cottage Grove, OR 97424. As always, technical information, club news, contest reports and news of upcoming events, questions, photos and other control line modeling news is always welcome. **MB**

## RC AEROBATICS continued from page 63

But, engineers are engineers, and technology always changes.

The technology can change in lots of ways. There is room for improvement yet in the .61 two-stroke. The four-stroke 1.20s can be made lighter and less bulky. The existing .90 sized four-strokes can be improved along the lines of their larger brothers, bored out to 1.0, and used to power the existing .61 sized airplanes. Space age lubricants already exist (very expensive!) that can provide large performance gains. Better and lighter vibration isolation engine mounting systems may be developed. Some enterprising botanist may develop 2-4 lb./cu. ft. density balsa that grows to maturity in three weeks and has the strength of aircraft spruce. Some chemist may be developing a lightweight miracle paint or covering even as I write.

If it does come down to a change in the displacement rules sometime in the future, that opens a whole new can of stuff. Can you imagine a .90 sized, long stroke, reed induction, rear exhaust two-stroke pattern motor that weighs less than 1.5 lbs. and turns a 15x13 prop like a toothpick? Martha, pass me my T-square. I think I feel a new design coming on...

And so it goes; the more it changes, the more it doesn't stay the same. One thing is for sure, however. All of the present physics textbooks are going to have to be a long way out of date before TANSTAAFL ceases to apply to the Art of Pattern Plane Design.

Rick Allison, 15618 N.E. 56th Way, Redmond, WA 98052. **MB**



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## DESIGN & TECHNICAL cont. from page 20

include ailerons, in the opinion of the courts.

These AEA aeroplanes were canards, like the Wrights were designing, but I read elsewhere that one of the early Curtiss machines had both front and rear stabilizers. The front one was damaged, so Curtiss took it off and found the plane flew fine without it. (I suspect he had to make some cg adjustments.) That ended his canard era. Curtiss himself was long gone when the canard Curtiss Ascender was built.

The first aeroplane designed primarily by Curtiss was the "June Bug." In 1908 he flew it nearly two kilometers to win a Scientific American trophy. The Aerial Experiment Association broke up about that time. In 1909 the all-Curtiss airplane, the "Gold Bug," flew 27.4 miles, to win the trophy again. At Reims, France, Glenn also won the Gordon Bennett trophy race, barely beating Louis Bleriot.

Curtiss was one of the first to try to take an airplane off the water. His early attempts failed due to poor pontoon design. Henri Fabre was airborne from the water first, in France in 1910, with his "Hydravion."

Curtiss did it at San Diego the next year, and likely was the inventor of the suction-breaking step for floats and planing hulls. While the Wrights tried to sell the airplane to the Army, Curtiss courted the Navy, with his seaplane ideas.

In World War One we had the Curtiss JN-4 "Jenny" with its OX-5 engine. After that we had some potent Curtiss Schneider Cup seaplane racers and many famous Curtiss fighters. Not bad for a kid who liked to race bicycles.

Long after the Wrights and Curtiss had left their respective companies, the long and bitter court argument over rights to the



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# MARC SHOW

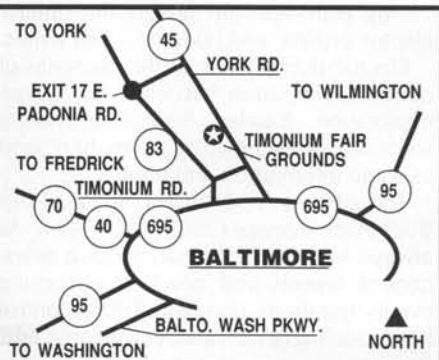
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aileron became moot when the two companies joined to become Curtiss Wright.

## USING SERVO TAPE

I don't attach servos with double-sided tape very often, but sometimes it is the easiest way, especially for throttle, aileron, and flap servos. I have seen too many failures of pressure sensitive adhesives in general to trust servo tape alone, however. Even the servo's own weight might peel it off in time. Therefore, when I use servo tape I also wire the servo to the mounting surface. I put a loop of wire through the closest mounting hole on each end of the servo and through holes in the mounting surface, bending it over and securing it with CA on the far side. Run the wire through the usual servo grommets, so the grommets plus the sponge-rubber servo tape will still provide some isolation from engine vibration.

## NON-PLUGGING CA DISPENSER

I have found the following product useful. It does much to solve an old problem: constipation of the CA bottle after it has been used for awhile.

The cause of the problem is contamination. Most foreign materials will cause cyanoacrylate to set up (polymerize) on and in the nozzle; for example, humidity in the air, moisture on materials, finger dirt, balsa dust, CA accelerator (freon), and baking soda. To minimize nozzle plugging we must keep all such things away from the nozzle. Keep the cap on when not in use. Tap the bottle on the table after use to clear the CA from the tip. And don't touch the tip of the bottle to the work or anything else. But in spite of trying to live with those rules, my CA bottles eventually plug up, unless I'm using them constantly.

Some of the CA distributors offer to solve the problem for us by selling us extra tips. I have a collection of these tips, but seldom use them because it is faster to stick a pin into the end of the nozzle to clear the plug. That, of course, only makes matters worse for the future, because the pin carries contamination into the bottle, which makes it plug up all the faster.

Oh, yes, the new product. Art Gross sells "Drop-ets," which consists of a little molded flexible polyethylene capsule with a long tube extending from one end. To use it, one squeezes the capsule, sticks the tube into an open bottle of CA, and sucks CA into the capsule, which becomes a convenient device for applying the CA to joints. Art's literature with the Drop-et gives some good advice on how to avoid plugging of the

tube. For one thing, if the tip plugs you can simply cut the plugged part off, and since the tube is four and a half inches long, you can do this many times. In addition, the tube on the Drop-et can be stretched out to a small diameter, so very small drops of CA can be dispensed, and one can get it into tight places.

Art Gross Enterprises is at 12516 Maplewood Ave., Edmonds, WA 98020. Art's number is (206) 743-9332, phone or FAX.

## NOSTALGIA DEPARTMENT

Sometime in 1937 I was flying my first gas model at Graham Field in Bellingham, Washington. This was an active airport, for those days, in that it had a resident OX-5 powered Waco biplane and a resident Velie Monocoupe. Also, maybe once a year, a visiting airplane would come in. There was no control tower, of course, and we kids didn't get permission from anyone to fly there, we just flew.

So, one day I was flying my Reginald Denny-designed gas model, powered by a Baby Cyclone (my first engine was a GHQ, which ran but never flew). Our standard refueling was three eyedroppers full of gasoline, as I recall, to keep the models from flying into the adjacent residential districts. If there were any timers this early, we didn't have them.

My model landed nicely in the middle of the field, and I started trotting out to

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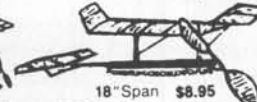
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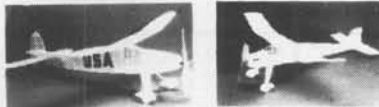


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get it. My flying buddies yelled after me, "Watch it Francis, the Monocoupe is coming in." I walked back to the edge, leaving my model on the field. Taildraggers aren't noted for low forward vision when they are on the ground. Would you believe the pilot and his passenger never saw my model and taxied right over it? (Thanks, I knew you would.) I picked up the engine and half of the wing and went home. The plane I designed around that half wing was my first engine-powered original design.

Mr. Graham, owner of the Waco, leased the field from Lind Gravel Company. As Lind progressively ate into the field at one end, to strip mine the gravel under it, the field got shorter and shorter. By the time I was taking flying lessons in 1940, Graham Field was so short that we really had to slip a plane to get in there without overshooting. We were training in Taylorcrafts at the new Bellingham Airport (under Lloyd Lampman, owner of the Monocoupe), but our gasoline was still back at what was left of Graham Field.

Bellingham Airport was no picnic to fly from then either. The grading crews were still working on it. I was practicing alone one day and tried to get a bulldozer operator to spin the prop for me. I couldn't get him near the thing, so I spun it myself, then climbed aboard.

## PARTING WORDS

Most people "know" that women have one more rib than men. Some say the reason for this scientific "fact" is that one of Adam's ribs was used to make Eve. The real scientific fact is that men and women have the same number of ribs, twelve pair each. We shouldn't believe everything we hear or read. Usually we can believe what we see, if we are absolutely sure that we saw it correctly. Don't let optical illusions become optical conclusions.

"Whenever possible scientists experiment. They do not trust what is intuitively obvious. Science is far from perfect. It's just the most successful method known, by far, to understand the world. The discipline of science is hard; scientists, being human, don't always follow the methods of science themselves.

Like other people, they don't especially enjoy having their favorite ideas challenged. But they recognize it is the cost of getting to the truth. And the truth—rather than the confirmation of their preconceptions—is what they're after."—Dr. Carl Sagan. **MB**

## DEAR JAKE continued from page 7

tionally Torqued airplane gets too much Dyne to Improve It and not enough Benign Neglect. Whereas the Kinematically Ugly airplane gets so much Benign Neglect, it can't help but last forever.

A neutral aircraft may receive no Benign Neglect. This can foster attention-getting behavior in the model. The attention may come in the form of Dyne to Improve It energy. This in itself is dangerous, but enough Dyne to Improve It attention could actually bump the neutral aircraft into the Emotionally Torqued category and guarantee its demise. On the other hand, too much Benign Neglect of a neutral airplane could eventually degrade its appearance to the point where it finally became Kinematically Ugly, thereby assuring its immortality.

These forces are real. I know from experience that if I pamper and baby a ship, it's a goner. (Too Much Dyne to Improve It!) But let some doggy airplane rattle around in the trunk between flying sessions, and it'll still work when an archaeologist digs it up in 2292. (Benign Neglect at work!)

Thanks for your insight, Jake. I hope my own observations have shed a little light, too.

Theorist in Asbury Park, NJ

Dear Theorist:

Thank you for your supportive letter and your very remarkable, yet indisputable, theories on the forces at work in our universe.

Very few readers have shared your positive opinion on the validity of the Emotional Torque and Kinematic Ugliness ideas. In fact, many have suggested that another force was at work in the formulation of these theories. That force, they claim, was the Critical Density of the author.

Jake **MB**

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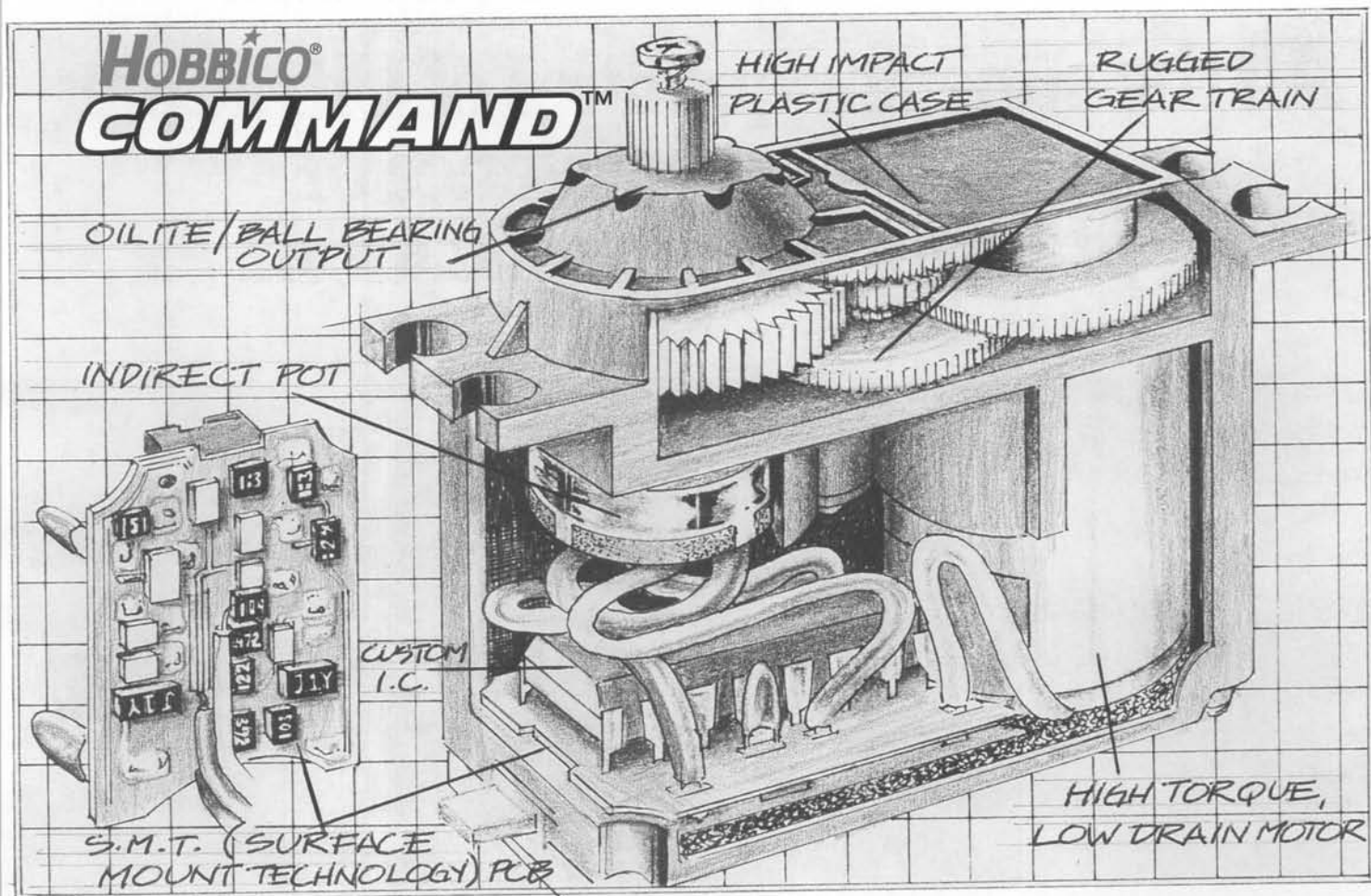
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