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HELICOPTER REVIEW: ROBBE/SCHLUTER JR. 50 II

JANUARY 1992

MODEL BUILDER

WORLD'S MOST COMPLETE MODEL AIRCRAFT PUBLICATION



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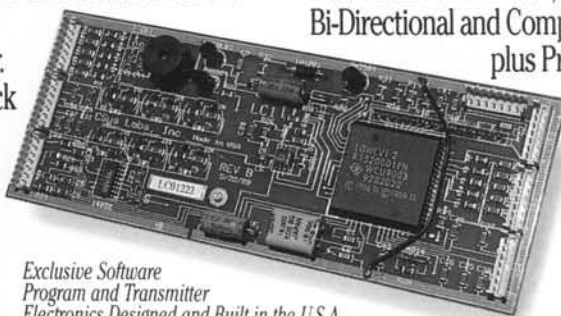
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When Airtronics set out to design the ultimate 6 channel radio we laid down a few ground rules. It had to be the perfect radio, inside and out, and designed in the United States for the American flier.

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Exclusive Software Program and Transmitter Electronics Designed and Built in the U.S.A.

Also included are Electronic Servo Centering, Adjustable Travel Volume, and Servo Reversing on all channels, as well as Dual Rates for Elevator, Aileron, and Rudder. Mixing includes Bi-Directional and Compensation Mixers for any two channels, plus Pre-Set Mixers for Aileron/Rudder, Elevator/Flap, Flap/Elevator, Flap-erons, Elevons, and V-Tail. Two Roll Programs, Aileron Differential, Crow Mixing Capability for Sailplanes, and Two Aileron Servo Capability allows the Infinity 600A to be tailored to many different types of models.

The Infinity 600A features a Plug-In RF Module, Plug-In Transmitter NiCd Battery Pack, Trainer System, and Proportional Auxiliary Channel as well as our famous Dual Conversion Receiver for the ultimate in performance and precise control.

So don't settle for anything less. Airtronics has built the perfect radio with you in mind. The Infinity 600A.

No corners. Just the cutting edge.

 **AIRTRONICS** INC

11 Autry, Irvine, CA 92718 (714) 830-8769

AIR SUPERIORITY BY TOP FLITE



SPECIFICATIONS

Wingspan: 62" Weight: 7-9.5 lbs.
 Wing Area: 700 sq. in. Length: 48.5"
 Requires: .60-.80 2-Cycle or .91-1.20 4-Cycle Engine and 4-7 Channel Radio.
 F4U Corsair pictured is covered with MonoKote®. Kit includes the decals shown.

The new Gold Edition F4U Corsair.



Corsairs crushed the enemy from Guadalcanal to Korea. To its Marine and Navy pilots, the gull wing warrior was a trusted friend...as it is to modelers choosing the Classic Scale F4U Corsair from Top Flite.



Interlocking parts and a "self-aligning" fuselage simplify assembly and increase durability.

With Top Flite's new "Gold Edition" kit manufacturing, you can build a sport scale model of the F4U Corsair that looks as powerful as this—and performs maneuvers with fighting spirit.

The kit's computer-designed accuracy, high-quality materials and interlocking parts make the Corsair's complexities easy for hobbyists with average assembly skills. No guesswork is needed.

A detailed, photo-illustrated instruction manual leads you step by step



The Corsair's wings are highlighted by realistic vacuum-formed ABS air scoops (oil coolers).

through the distinctive design—with complete, specific plans for installing optional flaps and retracts.

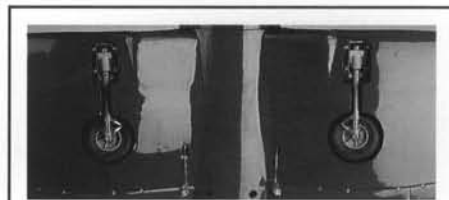
Reducing the parts count by over 100 pieces from their previous kit, Top Flite has made the Gold Edition Corsair simpler to build. And the scale looks are more accurate than ever.



Ribbed tail surfaces appear realistically fabric-covered. Concealed linkages add to the authentic looks.

Vacuum-formed wing air scoops and an injection-molded ABS cowl add the kind of detail you'll be eager to show off at the field.

Ask your hobby dealer for the Gold Edition F4U Corsair, from the new Top Flite. For more information, write for free product packet No. 358.



Top Flite's F4U Corsair includes a detailed manual—which even explains every step of installing optional retracts and flaps.

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MODEL BUILDER

WORLD'S MOST COMPLETE MODEL AIRCRAFT PUBLICATION

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ON THE COVER

The "Rare Bear," and pilot Lyle Shelton, on their way to a fourth consecutive Gold Trophy at the 1991 Reno National Championship Air Races, September 15, 1991. Top: The Flying "W", see page 15. Bottom: The "Samurai," a Mong biplane, owned and flown by Takehisa "Ken" Ueno, and co-sponsored by Circus Circus Enterprises, also won Gold, in the Biplane category at Reno. Logo decals on the aircraft reflect the sponsor's close connection to the model hobby industry. See page 44.

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BILL NORTHROP'S WORKBENCH



Since the January 1988 issue, it has become "standard procedure" for *Model Builder* to present a feature photo/story on the National Championship Air Races, staged for the past 28 years in Reno, Nevada. Felix Vivas has been our reporter for every race. This writer was fortunate enough to attend the 1989 races, and armed with proper press credentials, was able to watch and photograph a lot of the aircraft from a "front row seat" at three different turn pylons. It's an experience never to be forgotten, as the diminutive Formula 1's and Biplanes, the snarling T-6's, and the gut-thumping Unlimiteds bear down

What made the Reno report all the more interesting was the fact that some time ago, we announced that an effort was being made to produce a radio controlled version of unlimited air racing. Back then, we commented that if the effort was well organized, such a proposed event would have the potential of becoming a major happening in the RC aircraft hobby, and one that would also capture the attention and support of the non-modeling public, on a level with FAI World Championship competitions

3, 4, 5, and 6, 1991, was a roaring success. When the word gets around from those who attended and/or participated, plus

Unlimiteds bear down on you practically at eye level and flash by not more than a stone's throw from the pylons.

the very positive reports this publication (for sure) and others (undoubtedly) will provide, the future of this event as a major



Spectators encircle the top three winners in the Gold, Silver, and Bronze finalist trophy races, on display at the awards ceremonies for the First Annual R/C Unlimited Air Races, held at Madera Municipal Airport, Madera, California, October 3, 4, 5, and 6, 1991. Total purse was \$25,000, with the Gold winner taking home \$4,500.00! A stellar event with a tremendous future. More in text, and full reports coming in the February issue.

on you practically at eye level and flash by not more than a stone's throw from the pylons.

Sticking with standard procedure, we again bring you our report on the 1991 Reno Air Races, as written and photographed by Felix Vivas. It not easy to sort through over a hundred better-than-average slides in order to select the best ones for publication. We wish we could show all of them to you.

and the famed Tournament of Champions, as sponsored by Circus Circus Enterprises under the board chairmanship of Bill Bennett.

Well folks, we're here to tell you that the organizers, spearheaded by Tom Easterday and Cliff Adams, really "done right," and the First Annual R/C Unlimited Air Racing Championships, held at the Municipal Airport in Madera, California on October

attraction that will draw thousands of spectators, modelers, and members of the model hobby industry, is to be totally assured!

Anticipating the success of this project, we decided to attend this inaugural race and bring back a report. As it turned out, two additional *Model Builder* contributing editors had the same notion about the potential of this event, and made the trip

DEAR JAKE

Advice for the Propworn

BY JAKE

DEAR JAKE:

Do you remember Uncle Fester from the Addams Family? Well I saw a guy who looked just like Uncle Fester at the Nats. He was wearing a Caterpillar hat and taking notes at the RC Scale site. He also had a copy of *Model Builder* sticking out of his back pocket. He had sort of a blank look and appeared to be sub-intelligent. Was that you?

Reese in Hershey, PA

Dear Reese:

No, I'm pretty sure it wasn't me. I look more like Lurch, and I don't own a Caterpillar hat. I do have a nifty Rainbow Trout hat, though. It even flaps its fins when I pull on the string that comes down behind my ear.

Jake

DEAR JAKE:

Who do you like in the Super Bowl this year?

Fan in Freeport, RI

Dear Fan:

I think the Dodgers have a good shot.

Jake

DEAR JAKE:

The Super Bowl is for the football championship, not baseball! Geez, what a moron!

Fan Again

Dear Fan Again:

Sorry. I prefer to spend my weekends at the flying field, so I don't follow sports very much. If you're talking football, I guess I'll have to pick Notre Dame.

Jake

DEAR JAKE:

I was talking about professional football, the kind played by professional athletes.

Fan One More Time

Dear Fan One More Time:

So was I.

Jake

DEAR JAKE:

I keep hearing about a secret additive that would make our model airplane engines run on water. If this is true, why isn't it on the market? Is it because it's too expensive or because the fuel manufacturers are suppressing it to save their business hides? My guess would be the latter.

Tired of Fuel Prices in TN
Dear Tired:

There is such an additive, and remarkably, it's dirt cheap. It's called MC-29, and it's inexpensive because it's a waste product from the manufacture of maraschino cherries. When added to water, it produces a combustible red fluid that burns very nicely in internal combustion engines.

There are a couple of problems, though. First, the red water doesn't mix with oil, so it won't work very well in our 2-cycle engines. Second, the combustion by-products in the exhaust from this stuff happen to dissolve balsa wood, Monokote, and fiberglass. Finally, and probably most discouraging, the maraschino cherry industry executives hoard the stuff and run it in their Cadillacs.

Jake

DEAR JAKE:

Did Hans Wortmann, famous designer of many airfoils, know Frederick Gottingen, equally famous designer of many other airfoils?

Art in West Allis, WI

Dear Art:

No, but their wives played canasta every Wednesday at Shirley Whitcomb house.

Jake

DEAR JAKE:

My brother and I are identical twins. In fact, we are so close that we have one of those empathic relationships. Do you know what I mean? If I have a cold, he sneezes. If he sits on a tack, I say ouch. If I eat the beans, he gets the gas.

The amazing thing, though, is that this empathic relationship

continued on page 86

to Madera to check it out! Consequently, you'll read articles and see photos taken by "Big Birds" editor Bruce Edwards, from Tacoma, Washington, and "Strictly Scale" editor Al Tuttle, from Port Orange, Florida, in addition to some photo coverage by this writer. And because we're not about to steal any thunder from these two capable gentlemen, we'll only say at this time, "Tune in next month!"

THUMBER OR PINCHER?

A modeler from Rocky Ford, Colorado, has opened a can of worms! Charles Jacob asks the following question on RC flying:



"Is it better to use your thumbs on both sticks, or to pinch the sticks between thumb and fingers? Silly question? Maybe. But since I have ho habits formed yet, I thought I'd survey the experts and see if there is a consensus. At our field, most pinch the sticks, yet the great preponderance of literature refers to thumbs on the sticks.' Pictures of the contest fliers in the RC magazines don't show this detail.

"From reading everything published during the past 12 or 14 months, I thought I had decided that 'thumbs on the sticks' was the way to go, but then came the full-page ad from Byron Originals, showing Dennis Crooks pinching both sticks! Could it be that the literature says one thing while the champions do the other?"

"Anyhow, I'm writing to a couple dozen of the leading lights in RC flying to see how they fly, and which method they think is best. I've enclosed an SASE and would appreciate your input.

"1. Do you fly with your thumbs, or do you pinch the sticks?"

"2. Which way do you think is easier to learn, thumbs or pinching?"

"3. If you were just starting out now, knowing what you know, would you train yourself to use thumbs only, or would you pinch the sticks?"

No, it's not a silly question, but Charles' inquiry does bring to the forefront a subject that is probably thought about by many RCers, but not often brought up in conversation. What is often discussed, is the choice between Mode I and Mode II operation, and we feel that this choice may also enter into the matter of how the sticks are moved.

Having flown RC from the early 1950's, this writer has used pushbuttons to operate single, compound, and cascaded escapements; buttons or a stick for pulse rudder-only; stick for Galloping Ghost and inductive kick; toggle switches for reed systems; single-stick with knob for analog and digital proportional; and two-stick (Mode I and Mode II... even Mode III!) for modern digital proportional flying. I can only say that the new RCer of today is quite fortunate in that he or she must only decide on the two-stick or single-stick mode and the method of moving said stick(s)!

Much as I hate to admit it, and I'm too far gone to change, Mode I for two-stick operation is undoubtedly the most precise, and offers the least possibility of pri-

continued on page 86

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over the counter

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SIG'S 10% NITRO EQUIVALENT FUEL

It has long been said that necessity is the mother of invention, and supporting evidence is still coming in. Most everyone who runs



glow engines is aware that there has been a drastic cut-back in the availability of nitromethane within the past year. To the small percentage of serious modelers who are in the habit of running high-performance engines that thrive on a large dose of nitro mix in their fuels, it has been a more serious situation than to the average modeler. However, even the average fun-fly modeler likes to use a fuel with at least 10 percent of the nitro kicker in its formula.

Sig Manufacturing Co., Inc., 401-7 South Front Street, in the home of "revenge," Montezuma, Iowa 50171, phone (515) 623-5154, Fax -3922, went back to its chemistry set and came up with a nitromethane-free alternative fuel that is claimed to have exactly the same power output, operating temperatures, needle valve range, and other performance characteristics as regular Sig Champion 10% nitromethane-based fuel. The new fuel is called Sig Signature R/C Fuel.

Case lots of the new fuel formula have been sent to expert modelers, noted engine experts, magazine writers, and hobby dealers. Without exception, tests by these individuals and groups have confirmed there is no difference between Signature R/C fuel and top quality 10% nitro fuel. All types of two-stroke engines (it's not for four-strokes) including ABC,

ABN, AAC, lapped piston, ringed piston, ball-bearing, single-loop bypass, Schneurle, etc., are said to run great with this fuel. Give it a try. It retails for \$11.95 per gallon, \$4.95 per quart, and \$3.25 by the pint. Remember, it's for two-stroke glow engines only.

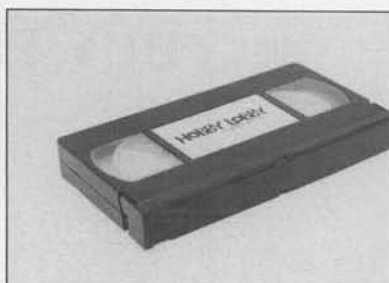
PLANETARY-GEAR STARTER, DRILL/GRINDER, VIDEO

The best way to start our continuing list of new items in the latest Hobby Lobby Intl. catalog (No. 18) is with a starter. Right? Just another electric starter. Right? . . . Wrong! The Kavan Planetary Gear Engine Starter is only 1-3/4 inches in diameter and 6-3/4 inches long. Obviously, the 5:1 planetary reduction gear gives the starter tremendous torque from its small diameter motor (you know, planets orbit around the Sun, not along side of it!). The unit weighs only 1-1/2



pounds, and will start two-cycle engines ranging from .20 to .61, and four-cycle engines in the .20 to .90 size range. Price is \$25.90.

The Como Drill is a tool made specifically for model building. The drill unit is only six inches long and weighs less than six ounces. The lightweight cord from the tool to the transformer won't drag across delicate parts and damage them, and the heavier six-foot cord from the transformer to your wall outlet lets you work much further from the



outlet. The Como Drill comes as a complete outfit, with a 110-volt transformer and speed control, tool collets, grinders, cutters, cut-off wheels, and many other items, in a fitted case. The tool will accept cutters and grinders from other tools, such as the Dremel.

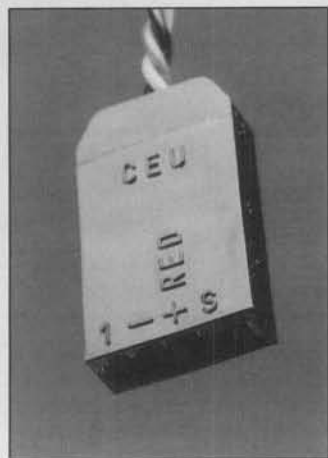
When you buy models sight unseen through mail order sources, it can be disconcerting not to be able to really get an idea about an item for which you're putting out a lot of money. Hobby Lobby helps you by offering 15 to 20-minute VHS video tapes showing its various kit models in action. The tapes cost only \$9.00, including handling and shipping. They're yours to keep, or you can return them for a credit of \$6.00 each. Video 1 includes the Uhu, Elektro Junior, and Pink. Video 2 shows the Sunfly, Race Rat, and High Speed. Video 3 includes the Freshman and Graduate. Video 4 is on race boats; the Key West, Systems, and Cobra. And Video 5 includes the Senior, 40 and 66 Telemasters. In addition to flight scenes, you'll also see close-ups of the kit, as Jim Martin pulls off the lid and picks out the parts.

More info on all of the above is available by contacting Hobby Lobby at 5614 Franklin Pike Circle, Brentwood, TN 37027, phone (615) 373-1444, and when you do, be sure to tell 'em we sent ya!

"CEU" UNIVERSAL RADIO CONNECTOR

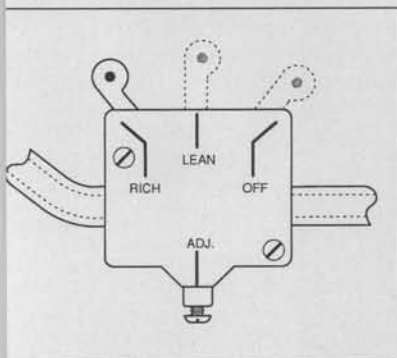
Custom Electronics, P.O. Box 1332, Alta Loma, CA 91701, phone (714) 980-4244, introduces the "CEU" Universal Radio Connector. It's a four-pin, three-wire FEMALE radio connector that will mate with Airtronics, Futaba "J," JR, Hitec, or the new World Engines servos and battery packs. In addition, it is the only one of these types to which you can solder the wire leads. The connectors are sold assembled with eight inches of wire attached for

\$3.00 each, or unassembled so the modeler can attach his or her own wires for \$2.50 each. The connectors are distributed to all major hobby shops through Ace R/C, Inc., Higginsville, MO, phone (816) 584-7121, or may be obtained direct from Custom Electronics.



REMOTE FUEL CONTROL VALVE

How many times have you taken off your airplane with the carburetor needle set just right, only to have the prop unload in the air or the carb



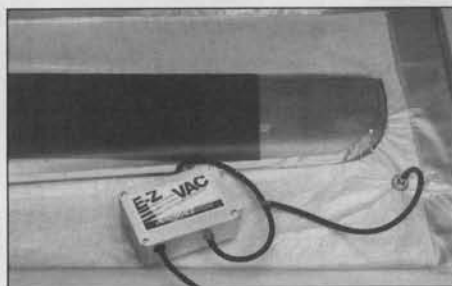
pick up some dirt from the fuel and turn your perfect adjustment into burbley rich or burn-m-up lean? If it's a competition flight, you've had it, and if it's a fun flight, the fun is over because you have to land, taxi back (maybe), and reset the needle (particularly if it's lean!) before resuming the flight. If you haven't experienced that problem, you're either a glider guider, an electric eccentric, or an armchair R/Cer... it happens to everyone else!

Fourmost Products, 4040 24th Ave., Forest Grove, OR 97116, phone (503) 357-2732, says it has this problem licked. It's called the Fourmost Remote Fuel Control Valve, and like it says, it permits

you to have complete control of your needle valve setting during flight, as well as on the ground, while keeping your hands away from the prop, or other moving parts of the engine. It also provides a shutoff function, ensuring safe engine operation. Note: *It can only be used with glow fuel.* The price is \$14.95, a fraction of the cost of that prized engine you can now shut off when it goes lean in the air!

EZ-VAC VACUUM BAGGING SYSTEM

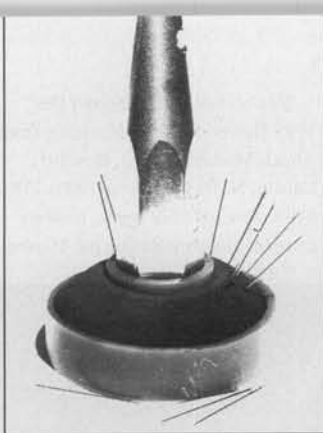
If you have experienced, or are considering the idea of applying composite covering materials on



your models, you understand the need for a dependable vacuum bagging system. Aerospace Composite Products, P.O. Box 16821, Irvine, CA 92714, phone (714) 250-1107, Fax -0307, has introduced a complete EZ-VAC Bagging System. Included is the almost silent EZ-VAC pump (which pulls six inches Hg vacuum and is rated for continuous duty), nine feet of 18-inch wide two-mil nylon bagging film, two Quick-Lock vacuum bag seals, a connector/valve fitting, neoprene tubing and Tee connector, and nine feet of 15-inch wide breather felt... ie, everything you'll need to start vacuum bagging composite parts... all for \$75.00. The system is available from hobby dealers, or direct from ACP. Send a buck for a complete catalog of composite materials and supplies.

ALGLO PIN TOOL

Ever since the father and son team of Bob and Bill Hunter first introduced "Hot Stuff" to the model building (and repair) hobby, cyanoacrylate glues have drastically revolutionized construction and repair methods on all types of models, whether airplane, boat, or car, also trains, figures, etc. Ironically, as much as it has changed building methods, especially related



to time consumed in "waiting for the glue to dry," the old fashioned pin has survived. The pins that hold parts together may not stay in place as long as before, but the need for

proper alignment and positioning of parts before the quick-setting adhesive "kicks off" is still prevalent. Experienced modelers long ago learned that "haste can still make waste," and positioning and holding parts in place with pins before

applying glue, especially when using the almost instant CA types that don't give you time for minor adjustment of fit, is of primary importance! Therefore, we have no apprehension about introducing a new tool that has been designed for the express purpose of using pins in model construction.

The Alglo Pin Tool is a nickel-plated brass device that serves three purposes in the use of pins for model building. It easily drives them into hardwood building boards, its special slotted end pulls pins out, and it magnetically picks up and/or retrieves pins from tight spots! Ya want one? Send \$9.95 plus \$1.50 for postage to: Alglo, P.O. Box 9805, Fountain Valley, CA 92708. The manufacturer is also interested in dealer and distributor inquiries.

CLOCK, COASTERS, STORAGE RACK



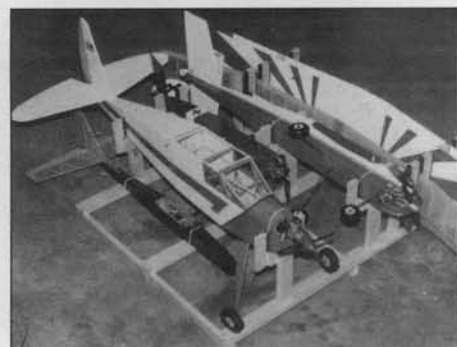
The popular aviation clock, made to look like the altimeter instrument on an aircraft instrument panel, is now available from Jennings Products, P.O. Box 1121, Hendersonville, TN 37077, phone (615) 824-0475, Fax -5150. The battery powered clock measures 6-1/2 inches square and is priced at \$24.95 plus \$2.50 for shipping and handling.

Taking the aviation instrument theme a little farther, Jennings also offers a set of four coasters; one each of an altimeter, horizon and airspeed indicators, and a directional gyro.



The set sells for \$14.95, plus \$2.50 for S&H.

Getting back to strictly model stuff, Jennings has developed a model aircraft carrier/storage rack. Totally adjustable to accommodate various aircraft designs, it can hold as many as four different aircraft. As



a carrier, it prevents your models from shifting around during transport to and from the field, and as a storage rack, it can be hung up on the wall, models and all. Construction is of basswood and half-inch plywood, and all model support parts are padded. This item is \$49.95 plus \$5.00 for UPS shipping (UPS needs a street address for shipping).

Ladies, with Christmas just a short time away, something here may solve your gift problem. Give 'em a call and see if they can meet Santa's deadline! *continued*

TWO-METER SAILPLANE

Jarel Aircraft Design & Engineering (JADE), 12136 Braddock Drive, Culver City, CA



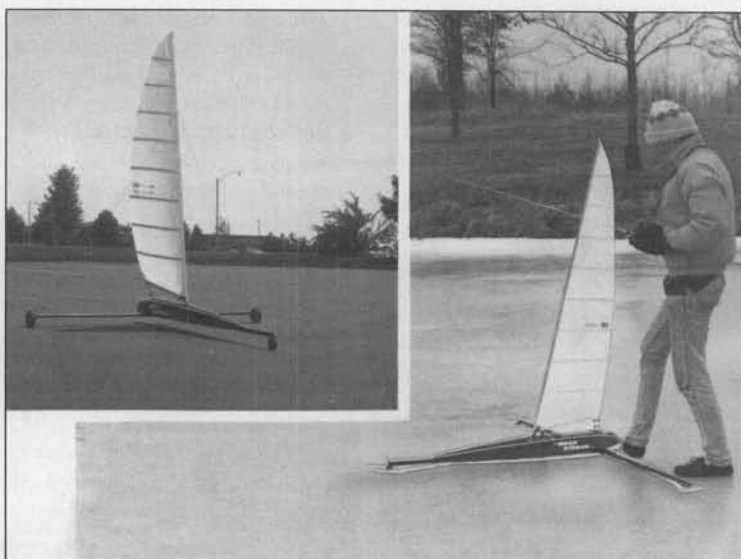
90230, phone (213) 390-1348, has introduced the "Impulse," a two-meter sailplane designed for winch, hi-start, thermal, slope, and electric flight. It features pre-shaped hardwood leading edges, machine-cut foam cores, "CrashGuard" thermoplastic fuselage, canopy and wing tips, a complete hardware package, and instructions that include over 70 photos and illustrations. The retail price is \$79.95. Contact Richard Jarel for more information.

HIROBO SST-EAGLE HELICOPTER



- You should call and order the
- 1991 Hirobo Helicopter catalog from
- Altech Marketing, P.O. Box 391,
- Edison, NJ 08818, phone (908) 248-
- 8738. Among other items, it offers
- complete information on the Hirobo

- SST-Eagle .60-size helicopter kit.
- The SST Eagle can be flown with
- either side or rear exhaust .60 cu. in.
- engines. The SSR-II rotor head is
- standard, as is the 97-tooth main
- gear and autorotation clutch.
- Different gear ratios are available to
- match your engine's rpm and torque
- characteristics. The six-piece metal
- frame allows easy maintenance and
- provides room for a 16-ounce fuel
- tank for longer flight time. The
- canopy is made of a lightweight
- fiberglass shell with a smoked
- windscreen. The SST-Eagle uses
- belt drive for low friction and
- smooth operation. The tail rotor



pitch lever mechanism has been redesigned for more linear control. All of the new features have been designed so they may be incorporated into earlier versions of the Eagle. Contact Gabe Mastriano for more information, and tell him we sent you.

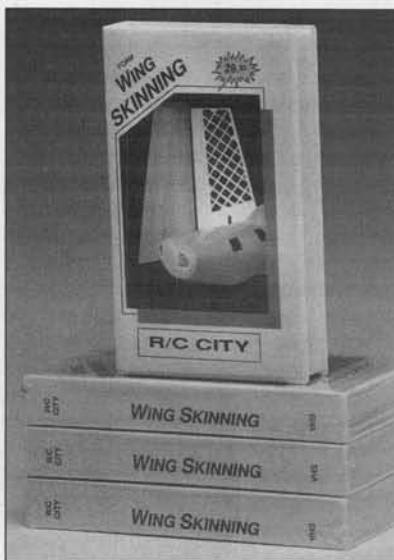
MEANSTREAK RC ICEBOAT / LAND SAILER

If you want to depart from the norm of radio controlled model operation, try an RC iceboat or land sailer. The Reid Company, 304 West Hill St., Champaign, IL 61820, phone (217) 352-0584, Fax -0337, offers the "MeanStreak," designed for top performance in winds of five to 15 mph. The MeanStreak is a scale model of the famous "Skeeter" iceboats, which are the world's fastest. It features a streamlined ABS plastic body, and a high-aspect, fully battened sail. The selling price is \$350. For more information on plans

and/or kits, contact the company for direct availability.

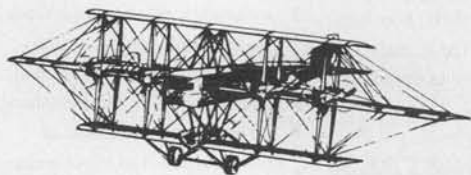
FOAM WING SKINNING: THE VIDEO

R/C City recently released its new video entitled, "Foam Wing



Skimming." The videotape, which is approximately 45 minutes in length, presents the complete story on foam core wing skinning. In easy-to-follow steps, you can learn the basics and fine points of covering foam wings. From choosing the right balsa wood for the job, to the final shaping, watching the video is like having an instructor right at your side.

For a complete catalog of its products, send \$1.00 to R/C City, 96 Railroad Ave., #F, Suisun, CA 94585; or call for information at (707) 428-3119; FAX (707) 421-2336. **MB**



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GR4268	ASW 22 BE "Vario"	414.00
GR4269	Chili	279.00
	SALE! \$229.00	
GR4270	Elektro Junior A-R-F	179.00
GR4271	Cherry A-R-F	238.00
GR4272	Cherry II	258.00
GR4274	Solar-UHU	128.00
GR427420	Solar Cells, 20	278.00
GR427421	Solar Cell, 1	14.75

GR4275	SB-13 Flying Wing	299.00
HLAN1324	Sinus	296.00
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HLAN1329	Aerofly	138.00

Telemasters, Funster

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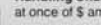
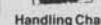
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ELECTRIC POWER

BY MITCH POLING

INTEREST GROWS IN LARGE ELECTRICS

Sen Almojuela, the editor of the Puget Sound Electric Model Fliers newsletter, sent me photos and an account of the 1991 Boeing Hawks Electric Fly-In last June. Here is Ben's report:

"There were 41 pilots and 80 planes, the largest attendance ever for this event. Nearly a third of the planes were larger than 05 sized including three cobalt 60 models. The interest in larger electrics is growing!

"Saturday was cool, with showers in the

afternoon, but Sunday was sunny with temperatures in the 70s, with only light winds. The three cobalt 60 planes included Bob Benjamin's Daydream biplane, a conversion of a four-stroke model; Bill Preston's 1940 Goldberg Sailplane, and Ben Almojuela's 'Showmonster'. Bob flew the Daydream very well. The Sailplane has a six-square-foot wing and twenty-eight 900 mAH cells, resulting in a very light wing loading and a very fast climb rate. Ben's

Showmonster is a double-size version of Ken Willard's 1970 1/2A design, the Showmaster. Both Bob's and Ben's planes qualify as 'Big Birds,' and have been flying at local Big Bird meets to convince folks that not all electrics are small.

"Dan Gregory, a Boeing engineer who works at the Kent Space Center, brought out three unusual airplanes. Dan's 'Wing' looks like a flying 'W' (front view) and is powered by an Astro cobalt 25 with gear-

ing and a Graupner 12x7.5 prop. The motor is mounted as a pusher. The four landing gears are mounted in the bottom knees of the 'W'. It has 1920 sq. in. wing area, 7 lbs. flying weight, and flew very well. It won the Most Impressive award on Saturday. Dan also brought another flying wing, much like a Klingberg. Dan likes flying wings; he refers to horizontal and vertical tails as 'experimental stability devices!' Dan also brought the largest plane ever seen at the Fly-In. His

Dan also brought the largest plane ever seen at the Fly-In. His "Flying Test Bed" has a 15-foot span, 2,025 square inches...

'Flying Test Bed' has a 15-foot span, 2,025 square inches, and flies on an Astro cobalt 15 with belt reduction. It weighs 4.5 to 7.5 lbs., depending on what battery pack is used. It majestically sailed around the sky Saturday, and won the Longest Flight award.

"There were 15 scale planes at the Fly-In. The most unique was Tom Davis' P-38 made from a Comet rubber power kit. Two Kyosho DCM20BB motors with custom made 5.875:1 reduction drives powered the model. Tom is a master of small, light models; the P-38 weighed only 12.5 ounces! The wing area is 144 sq. in., for a loading of only 12.5 ounces per square foot. The flight appearance was very realistic; it did not appear to be flying 'too fast'. This plane won awards for Best Multi-Motor and Most Impressive.

"Dave Pentland won the Best Scale award with a deHaviland Beaver on Saturday. It is powered by a geared Astro cobalt 15, weighs 64 ounces, and flies very realistically. Lee Urbaniak won Best Scale on Sunday with his PT-26. It is scratch-built, powered by an Astro cobalt geared 40 on 20 or 21 cells, and weighs seven pounds. Lee also had a House of Balsa P-51 powered by an Astro-geared cobalt 05, which flew well. Lee won an award for Most Aerobatic with his Ace All-Star biplane powered by a geared Astro cobalt 035 on six cells!" (This is especially impressive as most gas power All Star planes use a .15 gas engine! The geared Astro 035 cobalt obviously opens up a whole new



(Above left) Roland Peterson answers some questions about his own-design "Pure Wing," produced by his Model/Tronics Company. Power is a special Model/Tronics 05 motor and gearbox turning a Sonictronics 10x6 folding. Span is 42 inches, wing area is 250 sq. in., total weight is 42 ounces. More in text. (Left) Tom Davis, master of small electric models, shows off his P-38 and his half-size Klingberg flying wing. The P-38 is built up from a Comet rubber kit. The Klingberg wing has a span of 39 inches, wing area of 167 sq. in., and weighs 10.4 ounces. Power comes from an AYK Magnum AP with custom 5.22 reduction.

range of possibilities for electrics.-mp)

"Rick Fischer won the Best Multi-Motor award with his Astro Partenavia powered by two Astro cobalt 05s. Mike Kometz won Most Aerobatic on Sunday with his Ace 4-20, flying with an Astro 15 cobalt. Bill Kubiak won Farthest Travel, coming from Minnetonka, Minnesota. This is the second time he has come to the Fly-In! Nine fliers came from Canada.

"Roland and Larry Peterson are kitting electric planes; their company is called Model/Tronics. They demonstrated two of their kit planes. The Psycho Max is a 36-inch span straight flying wing with a pusher motor. It looks like a license plate! The Pure Wing is a 42-inch swept flying wing with a geared pusher and motor. The performance of these models with their Model/Tronics geared motors and six or seven cells has to be seen to be believed. In one demo, Roland and Larry flew their models up to 500 feet in a few seconds, then dove straight down in formation before breaking level just ten feet from the ground!" (Model/Tronics advertises that the Psycho Max is an electric combat machine with "unlimited vertical"! For info on the aircraft and prices, send a dollar to Model/Tronics, 3824 24th Ave. West, Seattle, WA 98199.-mp)

"Ron Standley demonstrated his design, the LLP-300, which looks like a Quickie 500 racer. Powered by 14 1200 mAH cells and an Astro cobalt 25, it flew much like the overpowered sport 40 gas planes that a lot of us flew before quitting noise forever. The plane only weighs four pounds and has 485 sq. in. of wing area. Ron plans are being published in this month's Model Builder.

"The prizes and trophies this year were given away each day for Most Impressive, Best Multi-Motor, and Most Aerobatic. Special large plaques depicting a B-17 or B-29 were awarded for Best Scale in honor of the Boeing Company's 75th anniversary this year. All the pilots got a prize; everyone got a number and had 15 seconds to choose from the pile on the table. Special thanks go to the following for merchandise or certificate prizes: HiLine Ltd., Peck-Polymers, Carl Goldberg Models, Ace R/C, Astro Flight, Satellite City, Sig, Futaba, Great Planes, SR Batteries, Coverite, Hobby Lobby, Tower

(Right) Three Cobalt 60-powered models visited the Fly-In this year. Clockwise from left: Ben Almojuela's Showmonster, Bill Preston's old timer Goldberg Sailplane, and Bob Benjamin's Daydream biplane. Just proves that all electric airplanes aren't small, as the Showmonster and Daydream are legal "Big Birds." (Below right) Dan Gregory made up for not being able to attend the Fly-In the past two years, by bringing a van full of airplanes: two flying wings, both over 8-1/2 foot span, and a large airplane Dan calls the "Test Bed," which has a 15-foot span.

Hobbies, B² Streamlines, Gordon Millikan, and Ben Almojuela. Everyone went home with something! Thanks also to the Boeing Hawks for the use of their field for two days.

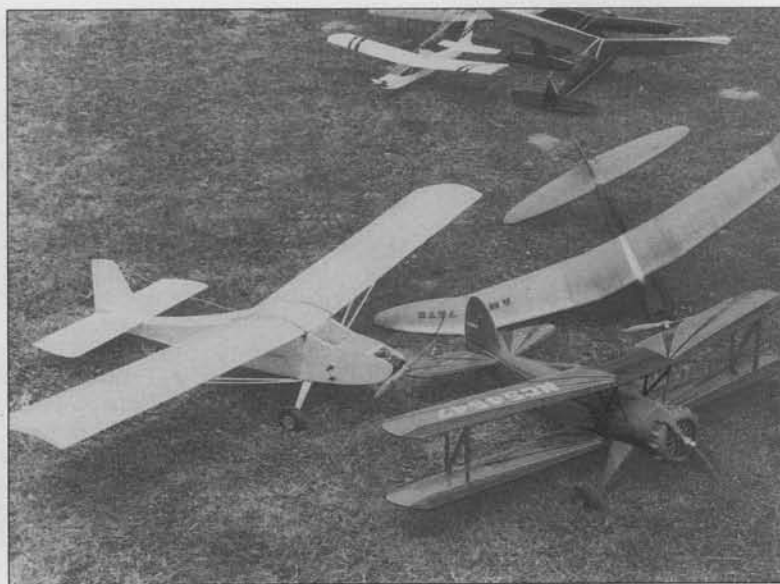
"Next year will be the Tenth Annual Fly-In; mark your calendars for the weekend of June 27-28, 1992!"

A CATALOG WORTH READING

Charlie Sylvia, who runs C.S. Flight Systems, sent me the new 1991 C.S. catalog. I reviewed the 1990 catalog a few months ago in this column, and this new catalog is as good or better. This is the only catalog I know of that is devoted exclusively to electric flight. The new catalog has 108 pages. It is the most complete listing that I have ever seen of electric flight equipment. I use it as a reference when I want to check on what is on the market!

The information articles and manufacturers sheets that are included are very good. I personally found Keith

Dan Gregory's "Wing" looks like a flying "W" and is powered by a geared cobalt 25. With its 1920 square inch wing area and 7-pound flying weight, it flies very well. The "Wing" won the Most Impressive award.



Shaw's article on testing NiCds, Roland Boucher's article on how to design scale models for electric power, and Bob Boucher's article on high rate speed controls invaluable. There are many more features, including a contest schedule and "what you can build for electric." The model featured in this catalog is the Modeltech CAP 21, with an Astro 60! The flying ability required is listed as "advanced"!

I recommend this catalog to you, both for saving money and for the knowledge it contains. Write C.S. Flight Systems, 31 Perry St., Middleboro, MA 02346. The catalog is \$5 USA or \$6 foreign, or you can get just the information section for \$2.50 USA or \$3.00 foreign. A catalog update is available for those with older catalogs, for \$1.50 USA or \$2.00 foreign.

A few months ago I discussed the internal resistance of NiCd packs, and asked if anyone had a method for determining this reliably. It turns out that ANSI, the American National Standards Institute, has an excellent method, which is used as the standard



The Solar-Uhu from Graupner. See text for details.

worldwide. Charlie Sylvia recently sent me the ANSI booklet that covers this and capacity measuring. The testing standard is as follows. The cells are given five cycles of charging and discharging. The charge is at .1C, the discharging at 1C (rated capacity of the cell). The cell is then fully charged at .1C, and then discharged at 10.0C for two minutes. It is then switched to 1.0C discharge. The voltage is read just before switching, and then read again when it reaches its maximum value after switching (at 1.0C current). The internal resistance is calculated from the change in voltage divided by the change in current (i.e., voltage and current values at 10.0C compared to 1.0C). C is the

rating of the cell in AH, so a 1200 mAh cell is 1.2 Ah, and a 10.0C current would be 12 amperes.

This method looks much better to me than the method I have been using, which depended on measuring voltages while they were still changing. I think this will be the method I use in the future. The booklet also included very precise specifications for determining the capacity of NiCd cells, and this will be a topic for a future column. Thank you, Charlie, for your help.

SOLAR ASSISTED PLANE

Jim Martin provided information about new products from Graupner that are available from Hobby Lobby. The Solar Uhu is a very cute solar assisted plane. It uses 20 solar cells in the wing to charge the six-cell NiCd pack that is on board. This charge can be on all the time, before, during, and after flight, at a rate of up to one ampere. The 20 cells only weigh 4 ounces. I have seen this plane on display at Nuremberg, and it is very attractive. The price with the cells is \$390. The cells are available separately from Hobby Lobby. They are polycrystalline cells, measure 2x4x.02 inches, weigh .2 of an ounce each, and will deliver a maximum of .5 volts at 1.2 amperes in direct sunlight at 77 degrees F when charging an empty NiCd pack. The energy available is 100 milliwatts/sq. cm. The cells are \$14.75 each. This is worth it. I have found that it is very easy to get cells that do not work well at "surplus" sales and prices. You know you will get proper performance with the Graupner cells.

The SB-13 Flying Wing is a semi-scale model of the plane made by Akaflied Braunschweig in Germany. It's too bad that it got named with initials, it is much too pretty for that. I saw it at Nuremberg, and it looks like it is "flight eager." It is \$299 at Hobby Lobby. Last, but not least, Hobby



The SB-13 Flying Wing is new from Graupner. More in text.

Lobby's new #18 catalog is available free in the USA. This has a motor chart along with many electric items. Send a letter to Hobby Lobby, 5614 Franklin Pike Circle, Brentwood, TN 37027, or call (615) 373-1444. Tell them MB sent you!

Last, but not least, I'll recommend a couple of books for those who are just getting started in RC airplanes. Jim Waterman wrote two booklets, *Ease of Flying Ratings of RC Trainers*, and *Learning to Fly RC With or Without an Instructor*. The *Flying Ratings* book is invaluable; there are so many planes rated as "trainers" that I feel are too fast or unstable for beginners. This book will help a lot. It is also a good book if you are interested in flying larger electrics (15 size and up) and want to pick a plane that will succeed. The book is not specifically aimed at electric fliers, but the information is good for all. The book is \$4. The *Learning to Fly* book gives you the best chance to teach yourself that I have ever seen. I learned to fly by myself several years ago; Jim's book would have saved me a lot of time and money, but it wasn't available back then! It also is \$4. Order from Jim Waterman, 3818 Deerfield Dr., San Antonio, TX 78218. Tell Jim I sent you!

My own book, *Building and Flying Electric Powered Model Aircraft* is now in its third edition. I rewrote several sections to bring it up to date. This book has started thousands in electrics. It gives very practical information on charging, NiCds, motors, and airplanes. When you finish the book, you will have a very solid start on understanding electrics. The book is available from C.S. Flight Systems; order number CSS-B2, for \$7.95, or in your local hobby store. Enjoy!

Write me at 7100 CSW/MC, Box 734 PSC 2, APO NY 09220-5300 with USA 29-cent postage; or Normannenweg 20, D-6200 Wiesbaden-Biebrich, Germany, with international postage. **MB**



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

1991 USA FAI Team Trials

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

1991 USA Nationals

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

Int- 1st-Robert Akers-X-Cell .60

2nd-Eulace Mallory-X-Cell .60

3rd-Kent Officer-X-Cell

1991 Kyosho .30 Challenge

FAI- 1st-Wayne Mann-X-Cell .30

Int- 1st-Kent Officer-X-Cell .30

Novice-2nd-Jim Robertson-X-Cell .30

4th-Mark Gheblian-X-Cell .30

Scale- 1st-Ted Schoonard-X-Cell Hughes

1991 Michigan Champs

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

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

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

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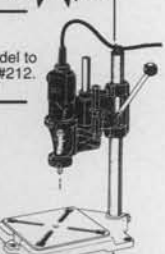
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ELECTRONICS CORNER

BY ELOY MAREZ

No-No on Silicone Rubber

Happy 1992! It is another year, can you believe it? How time does pass when you are flying! Anyway, I hope it is a good one for you. For us!

First up this year is Raymond Lefrancois, of Stafford, Virginia, who asks a question about something I should have warned about a long time ago: RTV silicone rubber! Ray writes:

"I wanted to ask a question. I'm getting ready to finish a Leisure Lanzo Bomber and I'm not sure how I want to install a Jomar SC-4 speed control. I read somewhere about using those thick silicone adhesives on the back of the PC board to stick the unit to the fuselage.

"The more I thought about it, the less comfortable I was putting something that hard, some sort of solvent, on any electrical device. What do you think?"

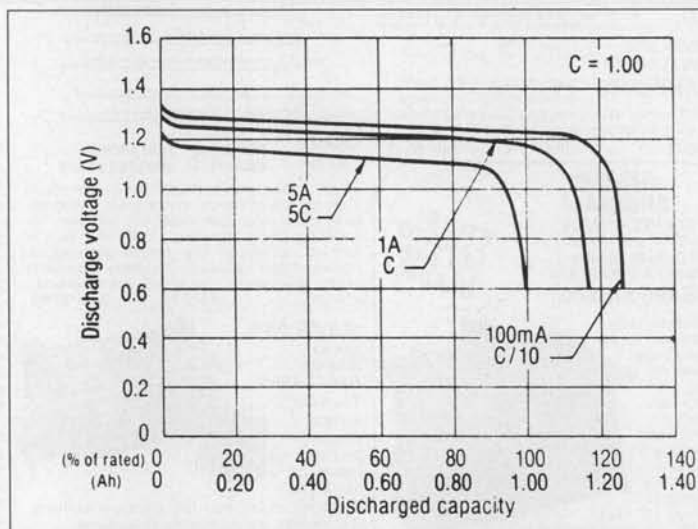
What I think is that Ray has done the correct and smart thing—if the slightest doubt

...another very important point: How much do you charge if you have a reduced flying session, or cancel out altogether?

exists, ask someone. In the case of silicone rubber on PC boards, it is a definite no-no for TWO reasons.

First, the hobby shop/automotive store silicone that is commonly found in the workshop is extremely corrosive to most unprotected metals, such as the copper and lead PC boards. There is an electronic grade of RTV, somewhat more costly and available only through electronic suppliers. There is a difference, an easily discernible one. The former type of RTV, the non-acceptable one, has a strong smell of vinegar before it sets, and some remains after it does set. The electronic kind does not have this smell, and is safe to use except for reason No. 2, which is:

The danged stuff sticks too



Typical discharge curve for a 1000 mAh capacity NiCd cell under various load conditions. Notice the generally lower voltage as the load increases, and the sharp drop-off as the end of charge approaches. For RC applications, the critical low voltage is usually considered to be 1.10V.

well. Well, in some cases that is a desirable feature, but not on the PC board of equipment that may someday need repairs. There are probably exceptions, but every electronic equipment company that I know of will not even attempt to service RTV covered units, and returns them untouched. Unless you intend to throw it away if it ever quits working, don't cover it with RTV.

DVM'S AND LOAD RESISTORS

This is the subject of our No. 2 letter writer this month, Jim Lynch, a chopper flier from Tucson, Arizona, who writes:

"I would like to thank you for answering some of my questions regarding NiCd's in the past. Flying a couple of high-current-drawing (five servos and gyro) choppers here in Tucson's 90+ temperatures all summer keeps me mindful that I need to continue to keep a close eye on things like remaining NiCd capacity after five 15-minute flights. After five flights, I have

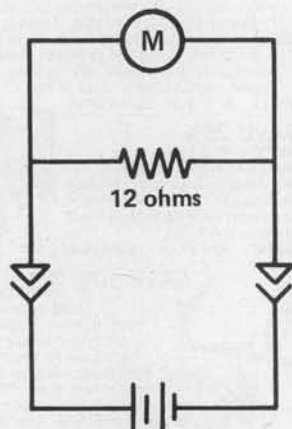
Circuit as used by Jim Lynch to measure NiCd battery voltage under load. Resistor value results in 400 mA drain. Calculating the resistor value for the recommended C/2 load is done by dividing the voltage by the desired current. The wattage of the resistor is calculated by multiplying the voltage times the current.

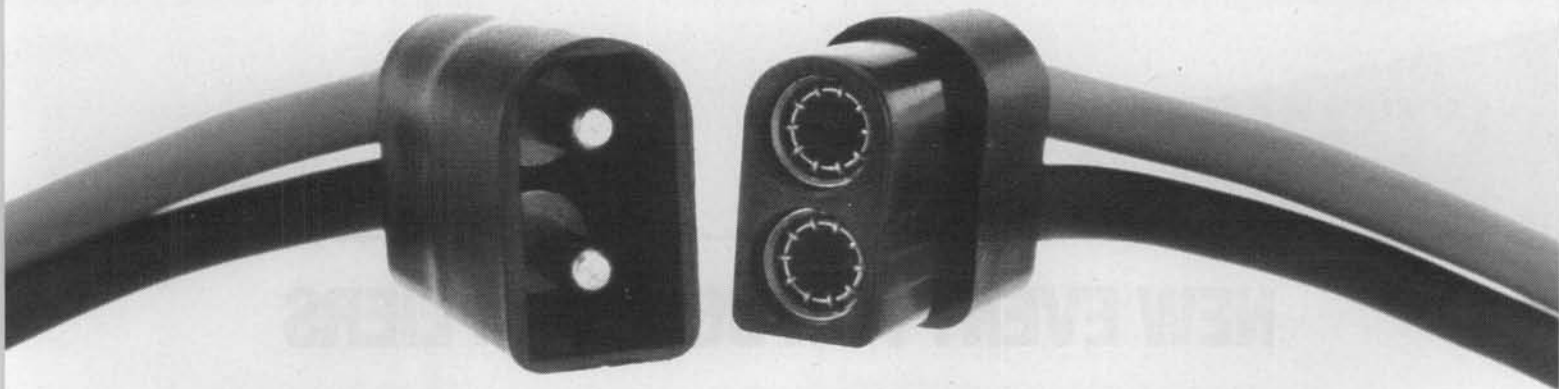
gotten into the habit of checking the receiver pack (transmitter doesn't seem to be a problem) with a DVM, which reads in hundredths of a volt. I have been placing a 12 ohm resistor across the meter leads which results in a load of about 400 mA for both my 1000 mAh and 1200 mAh packs. Doing this has resulted in the following questions:

"1) Is this a suitable load for both 1000 and 1200 mAh packs? I notice that varying the resistor value changes the meter readings.

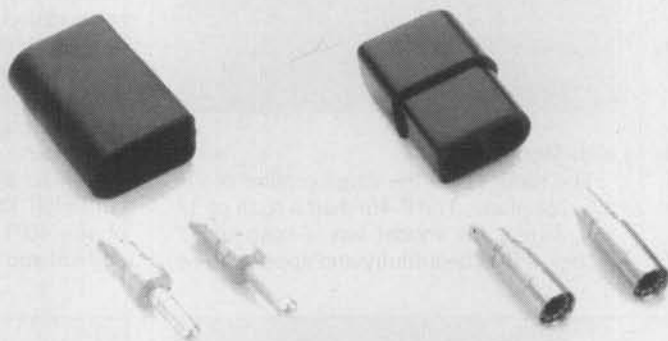
"2) Using this test scheme after five 15-minute flights I measure about 4.70 volts on my 1000 mAh equipped chopper,

continued on page 26





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NEW EVENT FOR COMBAT FLIERS

A new AMA event for 1992 that hasn't received much, if any, publicity is 1/12-scale combat. The rules have been finalized, and AMA's Bob Underwood told me in September that the 1992 rulebook was in the process of being finalized. From what I gather, the planes are to be 1/12-scale with a 5% deviation from outline allowed. Those fighters that had in-line engines will utilize a .15 RC throttle equipped engine. Those fighters that utilized radial engines are allowed a .21 throttle equipped engine. I believe that any brand engine can be used. Planes will tow a thirty-foot streamer.

Tom Stryker's 1/12-scale P-40F was designed for this event. The model is powered with an O.S. .15 RC engine, has a 225 mAH battery pack, three RCD Apollo miniature servos (ailerons, elevator, throttle) and a six-channel Airtronics receiver. Weight is just

under two pounds. It is hand launched, as landing gear is not utilized. The fuselage is balsa, wing is foam core sheeted with 1/16-inch balsa, and the whole plane is covered

I feel that this event will be very popular, because of the many types of planes that can be modeled.

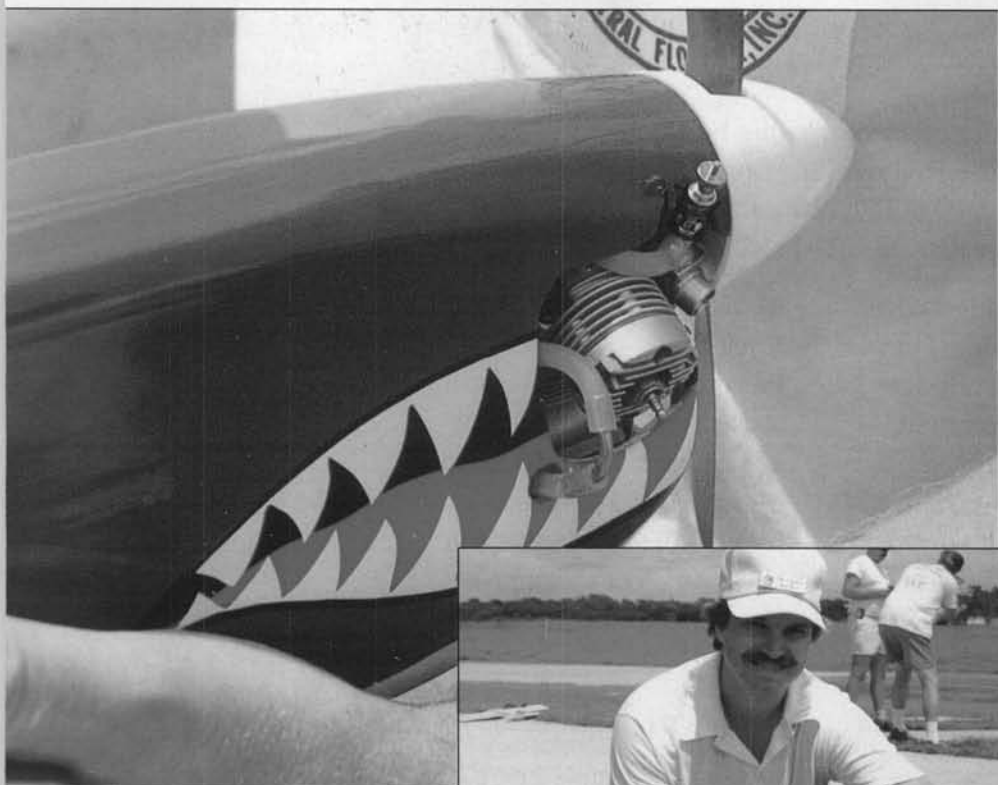
with Monokote.

The model is to the exact outline of the full-size plane. The P-40F had a span of 37 feet, hence the model has a span of 37 inches. It flies beautifully and appears to be

very stable. The model will be kitted. Tom tells me the P-40 is the first in a series of these 1/12-scale fighters. Tom is a very prolific designer and designed the .15 powered "Wild Thing" combat model that has proved so popular with the RCACF club in Central Florida. Tom has also designed and kitted other planes. His kits are top quality and are priced right.

I feel that this event will be very popular, because of the many types of planes that can be modeled. The price will be reasonable, because of the small size, and they are easy to scale down as one foot equals one inch. If you are interested, pay your 1992 AMA dues and get your hands on the 1992 rulebook.

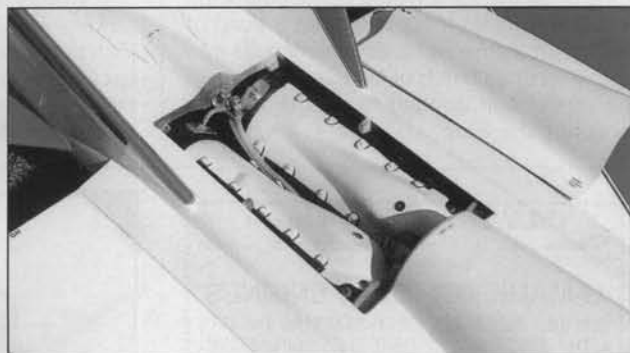
Contact Bob's Hobby Center, 7333 Lake Underhill Road, Orlando FL 32822; telephone (407) 277-1248, and these good folks will tell you how to get in touch with Tom.



(Above) Closeup of the O.S. .15 engine installation in the 1/12-scale P-40F. (Right) Tom Stryker with his 1/12-scale P40-F, for new AMA scale combat event. (Far right) Hand launching the 1/12-scale P-40F is a wee bit steep, but it has plenty of power for climb-out.



(Above) Steve Corney's Byron F/A-18 Hornet, with twin Hurricane fans. (Right) Steve Corney: "Now let me see, that darned piston must be in there somewhere." (Far right) Close-up of the neat installation of Hurricane fan units in Corney's Hornet.



They handle his kits. Bob Fulwider is the owner and proprietor and in my opinion has one of the best stocked hobby shops in Central Florida. The atmosphere is friendly and the clerks are all modelers who know what they are talking about. Even though I live 55 miles away, I always stop by when in the area. We Central Florida modelers are lucky to have such a shop in our area.

When at Byron's Expo 91 last month, I spotted an interesting installation in a Byron 1/8-scale F/A-18 Hornet. This model is quite large, with a wingspan of 57 inches and a fuselage length of 84 inches. The model was originally designed to fly with a single .90-size engine and flies extremely well with this setup. This particular model was built and flown by Steve Corney and utilizes two of his Hurricane fan units. The fans are 5-1/8 inches in diameter and powered with .91 engines. Both units fit inside the fuselage perfectly.

The engines are O.S. .91s with Nelson pistons, sleeves, and RPM rods. Steve has forty-five flights on them and stated that they were looking good. Steve says the plane flies

very well and that Byron did one heck of a job on the kit design. The plane has been clocked at 150 mph in straight and level flight; no diving through the traps. It weighs about 18-1/2 pounds and flies as fast as the so-called sport jobs. There is lots of power and the vertical performance is awesome. It

When at Byron's Expo 91 last month, I spotted an interesting installation in a Byron 1/8-scale F/A-18 Hornet.

is strictly a prototype, is a stripped-down version and does not have scale gear and condiments.

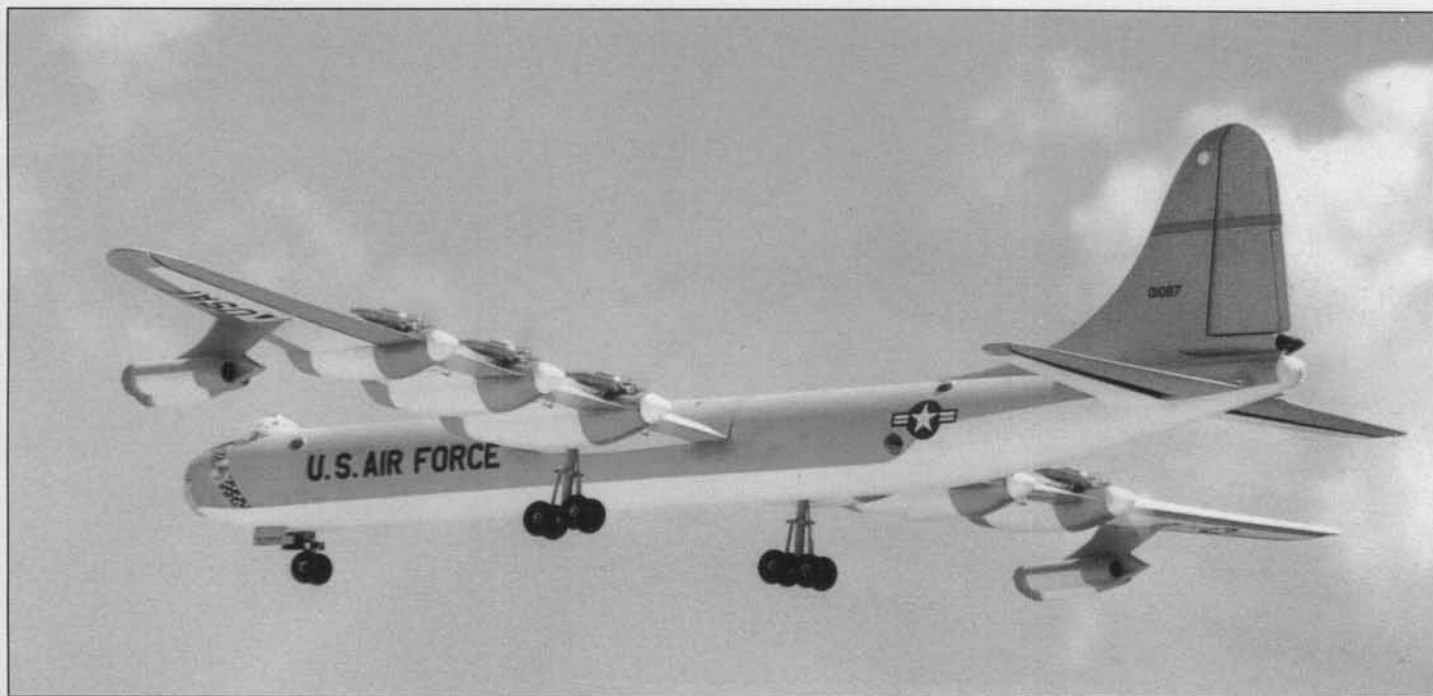
Steve says he just wanted to see how the twin fans would work. He is very happy with the results and performance. Further conversation with Steve revealed that the wings were flexing slightly. This, he believed, was

caused by the fuselage flexing at the wing root area, as he had compromised the fuselage's structural integrity by putting a large hatch topside. He felt that a couple of fuselage cross braces would take care of the flexing situation. The wings themselves were not flexing, as he had added an additional aluminum spar during wing construction. I only got to see it fly once and it was impressive. I didn't get Steve's address, but I believe he lives in Southern California.

LEAD PRODUCTS

I received a couple of interesting items from Jake Larson, who resides in Treasure Island, Florida. Now both of these items are composed of a deadly substance called LEAD. So you may or may not be interested. Rocks and sharp sticks are deadly objects also, when used in a certain manner. All kidding aside, if you do purchase these items, please keep them away from small children and be careful not to ingest the powdered lead.

The first one is powdered lead, which can be mixed with an adhesive such as epoxy to add weight to your model where necessary.



This 75-pound B-36 was seen at Expo '91. It has six K&B .61s. Flown by Richard Hinz, of Lakeland, Minnesota.

One good use for it would be for balancing wings during their construction. Instead of gluing on lead weights or driving nails into the wing tip, a batch of lead and epoxy can be mixed and applied to the tip prior to covering the wing.

The other item is self-stick lead tape. The sample was 3/4-inch wide and .007 of an inch thick. According to Jake, the adhesive backing is very tenacious and it really sticks. However, the adhesive is not fuel-proof. It looks to be ideal for use on rubber-powered

models as balance weight. I'm sure there are many uses for it.

These products can be obtained from Longhorn Golf Co., 7000 Harwin Drive, Houston, TX 77036; telephone (713) 952-1550; FAX (713) 952-5829. The lead tape, Cat. #SLTP, 10 yards x 1/2-inch, is \$5.45/package. The lead tape, Cat. #SLTP01, 45 inches x 3/4-inch, is \$1.75/package. Powdered lead, Cat. #MPL1, is \$2.00/pound. Thanks for the sample, Jake. Incidentally, Jake is a retired USAF Captain and has been modeling for fifty years.

GLASSING A MODEL

I have received several queries on how to 'glass a model.' There are many methods. Some are complicated, while others are extremely simple, and they all work. Since I am basically lazy, I adhere to the KISS principle: "Keep It Simple Stupid." Before I describe the method that I use, however, here are a few pointers. First, use a good quality glass cloth. If using a light cloth, I recommend Dan Parson's 6 oz. cloth. Byron Originals' 1-3/4 oz. cloth is also excellent. PIC has a superior glass cloth that comes in various weights. I have used all of these cloths and have found them to be top drawer.


The choice of epoxy resin is up to you. I have not tried the new Hobby Pox or Zap resins yet, but I am sure they work well. I use and like the PIC Coating Pox. This is a 5:1 mix epoxy that has 100% solids, no wax, and a very low odor level. It stays flexible after curing and sands easily. Do not mix up more than two to three ounces at a time, because the pot life is only five minutes. However, once spread out, the pot life extends to approximately sixteen minutes, depending on temperature and humidity.

If using cloth lighter than three ounces, thin the epoxy 50% by volume, using iso-

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propyl alcohol. Drugstore alcohol can be used. Thinning 70% by volume is okay, but 90% by volume results in a faster cure time. If using heavier cloth, thinning is not necessary.

The following method applies to both foam and balsa. Surfaces to be covered should be smooth, and all dust, etc., removed. Cut the cloth to size, allowing approximately two inches overlap on all sides. With bottom surface up, put the cloth in place and smooth it out. If you wish, you can hold the cloth in place with masking tape. Mix up a batch of epoxy, thin it if required, and pour the epoxy along the center of the longitudinal axis. Using a squeegee and starting at the center, work the epoxy towards the edges until the entire surface is covered and the cloth weave is filled. Be certain that there are no wrinkles or bubbles present in the cloth. Using the squeegee, remove the excess epoxy. You will find that approximately 1/3 to 1/2 of the epoxy is returned to the container. Inspect the surface carefully to be sure the weave has been filled. If necessary, a second coat can be applied.

To scavenge, apply a second coat within 90-120 minutes over the first coating layer. Squeegee as before. Both coats will be accelerated in curing and be tack-free in approximately 90 minutes, and fully cured in 4-6 hours. PIC Coating Poxly can be burnished to remove fingerprints, marks, trapped

air bubbles, etc., before it is fully cured. These minor imperfections can be literally erased.

To burnish the surface, cover your finger or the squeegee edge with a layer of polyethylene plastic film, and rub or smooth over the epoxy surface to burnish away any im-

...with many different contests and fly-ins scheduled. The big one here in this area is the Tangerine bash...

perfections. Burnishing is best performed just as the coating layer is becoming "tack-free" . . . normally about 90 minutes after application. As the layer cures, less burnishing is possible. After the coating cures, remove excess cloth at the edges with a sanding block and cover the other surface. Upon completion, surfaces can be sanded smooth, being careful to not cut through the cloth. Using your favorite primer, spray a coat onto the surfaces and allow to cure. After curing, fill any pinholes, flaws, etc., and spray a coat of primer over the filler. Allow to cure. After curing, sand off the primer, again being careful to not cut through the cloth. What

you have done is filled in all low spots, etc., with the primer. Spray on a very light coat of primer and again fill any flaws as before. Coat the filler with primer, allow to cure and lightly sand the entire surface. You are now ready to add the color coats.

Flying season is upon us here in Florida, with many different contests and fly-ins scheduled. The big one here in this area is the Tangerine bash which is to be held Thursday Dec. 26 through Wednesday Jan. 1. I will have a full report on the scale activities. Unfortunately, scale attendance has been down in the past. Hopefully it will be better this year. It is hard to believe, but this is the event's 25th anniversary. Sadly, the man who founded the host club (Radio Control Association of Central Florida) and one of the originators of this event, Walt Schoonard, is no longer with us, as he passed away recently. He is truly missed.

I received a set of plans for a .25 size Beech Staggerwing from my ol' Maui flying buddy, Al Wheeler. The plans and instructions are A-1, and I believe it is or will be a construction article here in *Model Builder*. Al stated in the note that maybe I had a young friend who would like to build one. Heck yes, Al. I have a young friend and it is I. You don't think that these plans are going to get out of my possession, do you? I need a .25-size plane for AMA fun scale and this is going to be it! You know how I love round engines and biplanes. Thanks, Al. **MB**

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so my next question is, how low can I go? 4.65, 4.60, 4.55V?

"3) What constitutes an 'overnight' charge? So many people, including columnists, say to just charge 'overnight.' Is overnight 8 hours, 12 hours, 16 hours? I've been told that C-10 means 1/10 the battery capacity charged for 16 hours. Is this overnight?"

"4) If because of bad weather conditions at a flying session I just take one flight or even no flights, should I charge for 16 hours before the next flying session? The following day? Or next week?"

"Thanks an awful lot, you are doing one great job of giving me more reliable air time."

First off, I have to say that I agree 100% with Jim's thoughts about battery management, especially where it applies to more advanced heavy current consuming models—helicopters, scale, pattern, etc. I know there is no such thing as an expendable airplane, but somehow, I don't feel quite as bad seeing an Ugly crash as I do a real model that I know cost a large slice of the owner's life to build.

Taking Jim's queries one a time, I have never felt comfortable with the DVM method of predicting remaining flight time . . . and notice that I say *predicting*, instead of calculating. Mainly, there are two unknowns

that have a decided effect on this procedure: the discharge curve of the battery pack in use, and the average current consumption on the particular model in question. Without these two factors, any formula is incomplete, and invalid.

I much prefer the battery discharge method, using an instrument such as the Ace R/C Digipace, or Digipace II. Using such a unit, it is necessary only to measure the capacity of the freshly charged battery, recharge and fly a carefully measured amount. Then, without further discharging, measure the remaining battery capacity. It is then arithmetically possible to calculate the average and total flying time safely available to you . . . for **that** airplane, with **that** battery, with **you** flying. Anytime one of those factors changes, the calculated results change. It is a good idea to periodically test with the loaded DVM during any extended flying session, as a further test that a cell has not dropped out on you, but the available time should only be calculated from the usage data obtained with the discharger.

I also don't like the voltage reading method for other reasons. There are many NiCd types and brands, and they are definitely not all created equal. That is, the discharge curves vary widely, doing so with different loads as Jim has confirmed by using different value resistors. Just how much battery life is left before the critically low voltage is reached depends on this discharge curve, which in

most cases is another great unknown. Such information is generally available for Sanyo and other major brands, but there are a lot of other cells for which such information is not easily available. Have you ever heard of Saft, Yuasa, Tadiran, Varta, or Alexander? They are just **some** of the other NiCd makers, and **you** may be using one of them!

To make things worse, the published discharge curve is not forever; it changes as the battery ages. If you feel the need, it can be easily calculated for any given pack with the battery discharger and DVM. Simply take periodic voltage readings as the battery discharges, reducing the time interval as the end approaches, and make your own chart.

I have included a chart that depicts the typical operation of a NiCd cell under certain discharge conditions. As you can see, there are so many considerations that you can almost scare yourself into not taking off at all. To be more specific about the critical voltage Jim asks about, you will notice that at about 1.15 volts per cell, things are definitely and rapidly approaching the end; therefore 4.60 seems like a logical place to quit, but again I would use that only as a backup for the discharger calculations.

Backing up a bit, the load parameters I have used for years are C/2 (half capacity) for 30 seconds. The time is necessary to let the current stabilize, however, keep in mind that it is also adding to the battery discharge. You will have less in the battery after you

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have tested it, than before you started!

Now for charging times! Jim has a right to be confused. There has been more misinformation about NiCds and NiCd charging than probably any other modeling subject, though by now the electronic speed control is a close second in the RC car field. Let's try to clear up some of the confusion.

In the recent November issue, in an article on the Ace R/C AT-2000 Charger, I talked about this subject at length, and I don't see the need to repeat it here so soon. To summarize, based on information from the real authorities (in this case, the battery manufacturers), the overnight rate, sometimes referred to as the standard charge rate, is C/10 for 16 to 20 hours. The C/10 is simple and definite; it is 50 mA for the common 500 mA pack, though in this case let's use Jim's example of a larger 1000 mA pack. In that case, C/10 works out to 100 mA. As for the time, as soon as we fire up the calculator, we run into some inconsistencies, as it would appear that

at the specified times, we are putting in 1600 mA at 16 hours or 2000 mA at 20.

However, using the normal constant voltage charger supplied with your RC system, this is not so, as the charge rate reduces steadily with time (see the referred-to article!). Another variable is that NiCds, more so the ones now available than those of earlier years, are more forgiving of some overcharging than they used to be. Personally, I have found that using the system charger as rated, calculating and charging for 120% of the capacity taken out tops off the battery perfectly with little chance of overcharging.

Using a constant current charger, that is, one whose rate does not decrease with time, such as the Ace AT-2000, I drop that time down to 110%. The key is that "capacity taken out" phrase above, but that can be easily calculated if you have also done the exercise described earlier on how to determine just how much your particular machine uses for any given time.

Now last, but certainly not least, Jim raises another very important point: How much do you charge if you have a reduced flying session, or cancel out all together? Well, about this time, you are going to think I have some financial interest in Ace R/C, because we are back to the Digipace! Well, the only concession I do have in Higginsville, Missouri, is an open account, but it is just like my American Express card; the end of the month brings one of those envelopes with windows that bills are mailed in, with the bottom line saying: The day of reckoning has now arrived!

In any event, if you know the actual measured capacity of the battery in use, the rate of consumption, how long you flew, and the charge rate, it is a simple matter to calculate the time required to revitalize it.

However, there is yet another possibility to contend with (this whole matter of NiCds is not exactly simple, now is it?): Self-discharge, the tendency of all NiCd batteries to lose energy while sitting idle. The factors involved are, first, the original quality of the cells, and obviously, the NiCd cells for your expensive models are not a good place to try to economize! Secondly, the actual condition of the cells; they being affected both by their age and the abuse, primarily the overcharging, to which they have been subjected. Also, the storage temperature has a bearing; self-discharge increases drastically when cell temperature increases. Fortunately, self-discharge is easily detected if present to any degree. Right . . . it takes only

another application of the discharger.

The process involves first the charge/discharge/measure procedure as previously explained. Then, following your normal charging practice, do so again, let the battery sit for two weeks, and with-

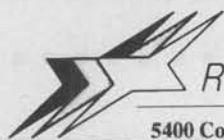
out peaking or recharging it, measure the capacity again. A battery in good condition, at room temperature (72° F), should exhibit a self-discharge of between 10 and 20 percent, anything over that being an indication of poor cell quality and possibly that the end is near. Obviously, with data such as this on hand, it is simple to determine the charge necessary under the conditions Jim describes.

I agree that what at first seems like such a simple subject can get so complex, but this is only the surface of the subject. There are volumes and volumes to be had on the subject, full of all kinds of chemical diagnoses, graphs and formulas. The bottom line, of course, is just how much your model is worth to you, and how much of a gambler you are.

On that subject, for Jim and his fellow rotary-wing flier pals, I have another suggestion: Separate those large capacity packs into two different batteries, one for the gyro, and another for the rest of the electronics. The gyro current is usually published with its specs; armed with the information you have now learned how to obtain, you will know just how much of your average consumption is taken by the gyro and how much is going to the rest of the equipment. Then pick the capacity of each pack accordingly, leaning towards providing more life to the radio. The theory is that should the gyro develop any malfunctions, such as a shorted motor, it can drain your battery quite rapidly. If you are flying on one battery, even auto-rotation won't save you, just cover your head, and as the old advice goes, repeat after me: Our Father, etc.

Next month? Who knows . . . but just in case it's worthwhile, you wouldn't want to miss it, would you? **MB**

The bottom line, of course, is just how much your model is worth to you, and how much of a gambler you are.



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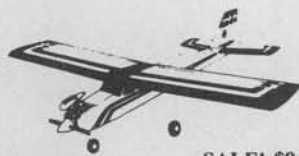
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Preparing for a New Season

The first issue of the new year leaves this writer with some difficult choices. Is it time to wrap up the activities of the old year, or to forecast the upcoming flying season? January is like that. For most of us who live in parts of the country where the seasons dictate the kind of models that we can fly, winter is as much a time to reminisce about the past as it is to talk about what we are going to do about future flying exploits.

So, what should you do, other than build new models, during the winter months? Let me share a few things that you can do before the excitement of the upcoming outdoor flying season gets you excited again.

MODEL PREPARATION

This is the time to take out all of the models that you flew last year and expect to fly again next year. Do the following:

Check out the fuselage. Are the D.T. lines frayed? If so, replace them. Remove the fuel lines and clean up the fuselage with 409 or W i n d e x . Check the engine mount for any cracks or loose screws. Remove the engine and timer. Repair any holes. Re-fuelproof, if needed. Make sure the tabs and trim tabs are firmly glued in place. If you use a VIT

system, check all lines, arms, and springs to see that they work as when they were new. If not, repair or replace them.

If the model is rubber powered, check the prop shaft for any bends or weakened solder joints. Check the propeller for any cracks or dings. Repair as needed. Check the folding



mechanism and the bearings. Same goes for the prop stop. Is it loose? If so, tighten it up. On any model, check the rubber band hooks to see that they are still glued firmly in place.

Check out the wings. Bend or twist the wings to see if any spars or glue joints are broken

or weak. Repair them now. Replace torn tissue or silk. Patch any holes that need it. Use a model cleaner to get all of the field crud off the surfaces. Re-fuelproof if needed. Check the alignment keys so that they are firmly glued in place. Check also for unwanted warps, and



"Lucky Chucky" Gode has returned to the northwest model scene after a two-year absence. The model is a Spacer 800 powered by a K&B .35 Greenhead. The model put in about a dozen aerobatic flights and creative landings—all without significant damage, thereby earning Chuck his new nickname.



(Above) George Oldershaw showed up at the Silents Please and Old Timer Championships with this Hank Cole "Smoothie" rubber model. Nice construction job and some very nice flights. (Left) Mike Stessor wanted to know how Greg Davis always got his picture in *Model Builder*. He was told to pose pretty with a model. Here is Mike launching his 1947 Zeek, winner of 1/2A Nostalgia at the Annual Northwest Free Flight Championships. The model is powered by a Cox reed valve .049.

use a hot plate or steam to remove them.

Check out the stabilizer. Repair any tissue or silk rips. Clean the covering with a model cleaner. Replace covering as needed. Check for unwanted warps and remove them. Check the stab keys to see that they are firmly glued in place.

ENGINES AND TIMERS

Before you reassemble your newly checked-out model, clean the engine completely. I use dope thinner and a toothbrush on the outside of the engine. If the engine did not bite the dust during the contest season, the inside should be just fine. I customarily put a few drops of Rislone or Marvel Mystery Oil into the exhaust ports and the venturi and then turn the engine over several times to allow this lubricant to cover most of the moving parts. If the engine was dirtied on the inside during the season, you should have cleaned it up by now to reduce further damage. If not,

do it as soon as possible. Oil all moving parts during reassembly.

After mounting the engine on the model, wrap it with a soft cotton cloth. On my smaller engines, I use the little cloth shoeshine mitts that some motels provide with your overnight stays. This keeps the moisture and dust out, and it keeps the lubricant in.

Regarding timers, it is a good idea to clean them thoroughly. Use an ultrasonic cleaner if you have one. If not, use a small plastic container—an empty 35mm film canister works well here, filled with dope thinner. Take the backplate off the timer and drop it in the container. Shake it vigorously, and using a small soft toothbrush, clean the faceplate or any other stubborn areas. Allow to dry thoroughly. Lightly oil the bearings. When assembling, be certain to tighten all screws and nuts. Re-install in the model.

FIELD EQUIPMENT

This is one area that might be overlooked if you are in a hurry.

Charge the battery. Check all leads to see that the connections are secure; repair as needed. Clean the flight box from the inside out. Discard old plugs, broken props, and any other flotsam. Refill the fuel cans.

Check the tools. Usually the needle-nose pliers are shot;



(Left) The Willamette Modelers Club sponsors a Women and Kids Hand Launch Glider Contest in conjunction with its annual Silents Please and Old Timers Championships. This year, 12 women were entered, and Jaynette Ponnay (left) and Maggie Oldershaw tied for first place. Jaynette won the event in a fly-off. (Below) Jaynette Ponnay shows off her winning form during the fly-off flight in Women's Hand Launch Glider.



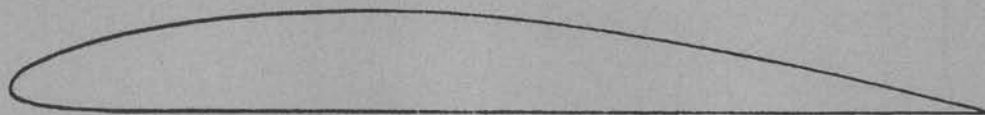
buy a new pair. Clean and check the screwdrivers and engine wrenches; replace as needed. Check out your props. Throw out the nicked and dinged ones, and buy new replacements. Fill up your glowplug boxes or caddies. Replace the batteries in the tachometer, the thermal thermometer and the stopwatch. Replace all the used bladder tanks and fuel lines. Check to see how much D.T. fuse you have. Time to order more?

Check out the fuel syringes to see that they are still working fine. Lube the rubber parts of the syringes with castor oil. Throw out all of the glues and other adhesives that you have, unless they were unused. Make a note of what you need and plan to buy these items prior to the next flying session. Check to see that you have clay or other weights as needed. Check your rubber band supply. Do you have the sizes and amount you will need?

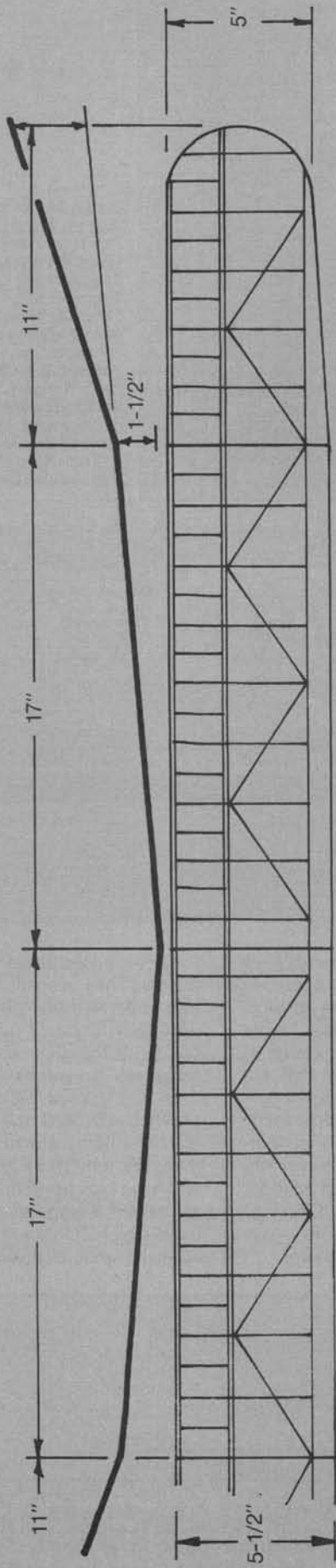
JANUARY MYSTERY MODEL



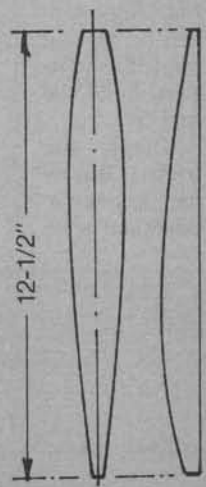
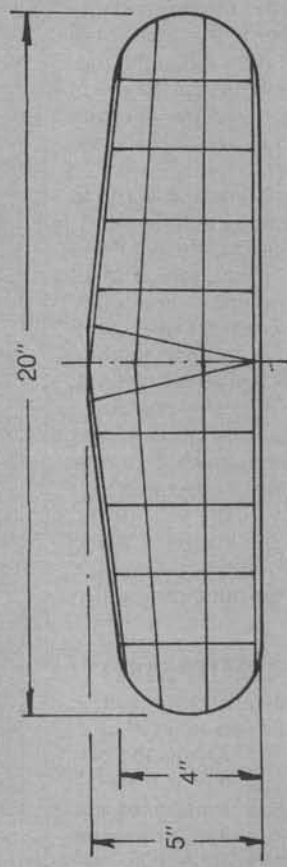
DARNED GOOD AIRFOIL — HATSHECK



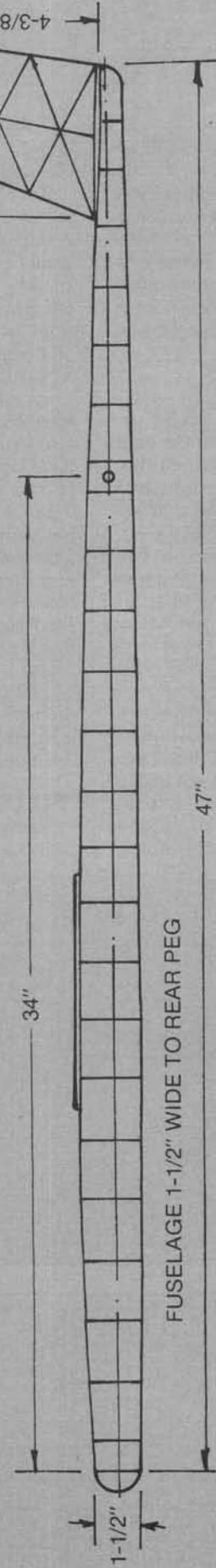
STA	0.00	1.25	2.50	5.00	7.50	10.0	15.0	20.0	25.0	30.0	40.0	50.0	60.0	70.0	80.0	90.0	95.0	100.
UPR	2.40	4.00	4.80	6.00	6.70	7.30	8.30	9.00	9.50	9.80	10.0	9.50	8.30	6.70	4.80	2.60	1.30	0.00
LWR	2.40	1.10	0.70	0.30	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00



FULL-SIZE RIB SECTION



PROP 26" D x 26" P



FUSELAGE 1-1/2" WIDE TO REAR PEG

FUSELAGE	38 GM
WING	41
TAIL	10-1/2
PROP	29-1/2
MOTOR	90
	<hr/>
	209 GM

- 1st 1991 NATS MULVIHILL WINNER, LAWRENCEVILLE, IL
- 1st 1990 MIDWESTERN STATES CHAMPS, BONG, WI
- 1st 1990 IMAC ANNUAL, BONG, WI
- 1st 1989 USOC, LAWRENCEVILLE, IL

HMV-5 MULVIHILL
by Ed Konetes

If not, buy them now and refill your containers. Thermal streamers? Are they pretty much shot? Buy some new ones.

Replace all of the cotton rags you carry with you. Get clean ones and toss out all of those oil-soaked smelly things.

For rubber fliers, check the rubber lube. Fill the container. Check the rubber motors and toss out those that aren't going to be used. Check out the winder. Clean it up with a toothbrush and some cleaner and lubricate as needed. Check out the winding stooge. Is it still holding together? If not, do what is needed to make it safe to use. Clean it up while you are at it.

For towline glider fliers, check the tow reel. Take it apart, clean and lubricate if appropriate. Check the line, the flag and all of the swivels and replace as needed.

Some of you may not have all of this equipment to worry about. Some may have much more. Whatever your situation, it is imperative that you take care of your stuff now. If you do, you will not get to the first meet of the 1992 season and wonder why certain things just simply are not working, are broken or worn out. Remember, it may have been that way when you put it away at the end of the 1991 season, and you just didn't bother to do anything about it. Make your 1992 season a good one by preparing for it now, even before you start building that new super-high-zoot free flight winner.

JANUARY MYSTERY MODEL

Over the years, I have built a number of "original" models. Several of them have been based upon the wing and stabilizer of this classic free flight. In fact, if you look at some of the pictures of the earlier FAI Power fliers on U.S. teams, you will see this wing and stab in use on them as well. The model was first available as a kit in 1949, and to the best of my knowledge was never a magazine feature. The designer was one of the big names in free flight model design, from early indoor to antiques and old timers through the Nostalgia and early modern free flight periods.

The sketch should give anyone who has been in this hobby for a few years the final clue needed to win this month's Mystery Model contest. Just write the name of the model on a postcard or letter, include your name and address, and send directly to *Model Builder*, c/o Bill Northrop. If your name with the correct answer is drawn from the proverbial hat, you win a free subscription to *Model Builder*. Heckuva deal, right!

JANUARY THREE-VIEW: HMV-5 MULVIHILL

It's unusual for me to feature two rubber-powered models in a row, but this three-view was too nice to pass up. It was the Mulvihill Winner at the 1991 Lawrenceville Nationals, with ten consecutive maximum flights and a grand total of 48 minutes of flying time. It has also compiled a nice list of

wins in the Midwest, winning a first at the 1990 Midwestern States Contest, a first at the 1990 IMAC Annual, and a first at the 1989 USOC at Lawrenceville.

It is a classic and "proper" lightweight model with built-up fuselage, wing and stab. The wing has just under the maximum area for this class of model. With an aspect ratio of over 11, the wing has that long, skinny appearance that is more often seen on Wakefields than on Mulvihills. A couple of unusual features that are worth noting are that the fin is mounted directly on the stabilizer, and the stab has a thin symmetrical airfoil. Wing, fin and stab structures are very light with laminated strip outlines and tips,

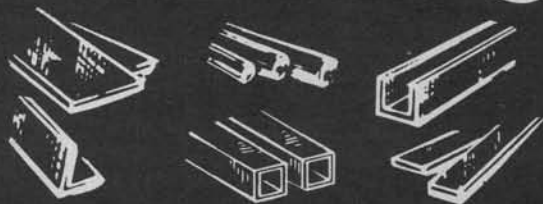
and small cross-section leading and trailing edges. No mention is made of whether or not the model uses carbon fibre reinforcement, but the opportunities to do so are apparent.

DARNED GOOD AIRFOIL: HATSCHKEK

Here is the airfoil that Bob Hatschek has used on some of his earlier FAI Power (F1C) models. I present this one for several reasons: it is a good section for current AMA wing sections, as it has some Phillips entry, and is 10% thick at the high point, which is

continued on page 84

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ALUMINUM TUBE (12")			RECTANGULAR BRASS TUBE (12")			SHEET METAL (4 x 10")		
STOCK NO.	SIZE	PRICE EACH	STOCK NO.	SIZE	PRICE EACH	STOCK NO.	SIZE	PRICE EACH
100	1/16	.25	262	3/32 x 3/16	1.30	250	.005 Brass	1.00
101	3/32	.30	264	1/8 x 1/4	1.40	251	.010 Brass	1.40
102	1/8	.30	266	5/32 x 5/16	1.60	252	.015 Brass	1.90
103	5/32	.35	268	3/16 x 3/8	1.85	253	.032 Brass	3.50
104	3/16	.40				254	.008 Tin	.90
105	7/32	.45				255	.016 Alum.	1.00
106	1/4	.50				256	.032 Alum.	1.40
107	9/32	.55				257	.064 Alum.	2.20
						258	Asst Brass	2.40
						259	.025 Copper	3.00
ROUND BRASS TUBE (12")			BRASS STRIPS (12")			BRASS ANGLE (12")		
125	1/16	.35	230	.016 x 1/4	.25	171	1/8 x 1/8	.55
126	3/32	.40	231	.016 x 1/2	.35	172	5/32 x 5/32	.65
127	1/8	.40	232	.016 x 1	.50	173	3/16 x 3/16	.55
128	5/32	.50	233	.016 x 3/4	.45	174	7/32 x 7/32	.60
129	3/16	.55	234	.016 x 2	.95	175	1/4 x 1/4	.65
130	7/32	.60	235	.025 x 1/4	.30			
131	1/4	.65	236	.025 x 1/2	.50			
132	9/32	.70	237	.025 x 1	.90			
133	5/16	.80	238	.025 x 3/4	.65			
134	11/32	.90	239	.025 x 2	1.70			
135	3/8	1.00	240	.032 x 1/4	.35			
136	13/32	1.10	241	.032 x 1/2	.55			
137	7/16	1.20	242	.032 x 1	.95			
138	15/32	1.30	243	.032 x 3/4	.75			
139	1/2	1.40	244	.032 x 2	1.90			
140	17/32	1.50	245	.064 x 1/4	.70			
141	9/16	1.60	246	.064 x 1/2	1.15			
142	19/32	1.75	247	.064 x 3/4	1.40			
143	5/8	1.85	248	.064 x 1	1.90			
144	21/32	1.95	249	.064 x 2	3.40			
COPPER TUBE (12")			SQUARE BRASS TUBE (12")			BRASS CHANNEL (12")		
117	1/16	.25	149	1/8 Square	.65	181	1/8	.70
118	3/32	.30	150	3/32 Square	.80	182	5/32	.80
119	5/32	.40	151	1/8 Square	.90	183	3/16	.65
120	1/8	.35	152	5/32 Square	1.00	184	7/32	.70
			153	3/16 Square	1.10	185	1/4	.75
			154	7/32 Square	1.20			
			155	1/4 Square	1.40			
SOFT BRASS FUEL TUBING (12")			BRASS STREAMLINE TUBE (12")			SOLID BRASS ROD (12")		
121	1/8	.50	122	Small	.90	159	.020	.10
						160	1/32	.12
						161	3/64	.15
						162	1/16	.20
						163	3/32	.25
						164	1/8	.40
						165	5/32	.60
						166	3/16	.80
						167	.114	.40
						168	.081	.40
						169	.072	.25

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SPECTRA SUPER FABRIC

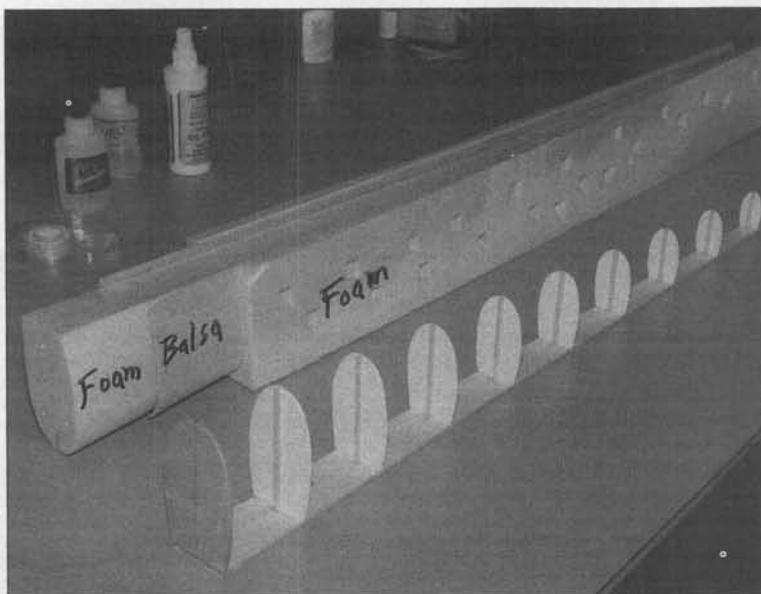
We once thought that fiberglass was the space age material for laminates, then carbon fiber and Kevlar (duPont aramid) came along. The latest is a special oriented polyethylene fiber called Spectra. I just bought a couple of square yards of it. Amazing stuff!

Spectra, a trade name of Allied Chemical, I suspect, is far lighter than any of the previously-mentioned materials. Graphite weighs twice as much, and glass two-and-a-half times as much. That alone should get the attention of a model builder. But we need high strength in addition to low weight. Spectra has it. It is practically as strong and almost as stiff as graphite; 1.6 times stronger and twice as stiff as Kevlar; and twice as strong and five times as stiff as fiberglass!

And it is not brittle. It has 20 times the impact strength of any other material. Until recently, its chief use was in armor and bulletproof vests. It is so darn tough that it can't be cut with ordinary scissors, and is even hard to cut with a razor blade. Special tools are available, and it can be cut with a hot wire, the same as we cut foam.

Originally it could not be used in lami-

Want some? It is available to the modeling fraternity from Weston Aerodesign Co. Inc., 944 Placid Court, Arnold, MD 21012. Phone (301) 757-5199 or 974-0968. The Spectra stock they have at present is 2 oz./sq. ft. white woven cloth 48 inches wide (Frank Weston's literature says 50 inches, but mine measures 48), which has had the bonding treatment. This fabric measures .005 to .007 of an inch thick, depending on how hard I squeeze the mike. It is \$35.00, plus shipping, per lineal yard. I haven't had time to experiment with mine much yet, but I will keep you posted.



Wire-cut Artcor bulkheads (or ribs) are reinforced with balsa (see text). Foam jig in background was used to hold ammonia-soaked balsa fuselage skin in shape while drying.

MODEL WING STRUCTURES

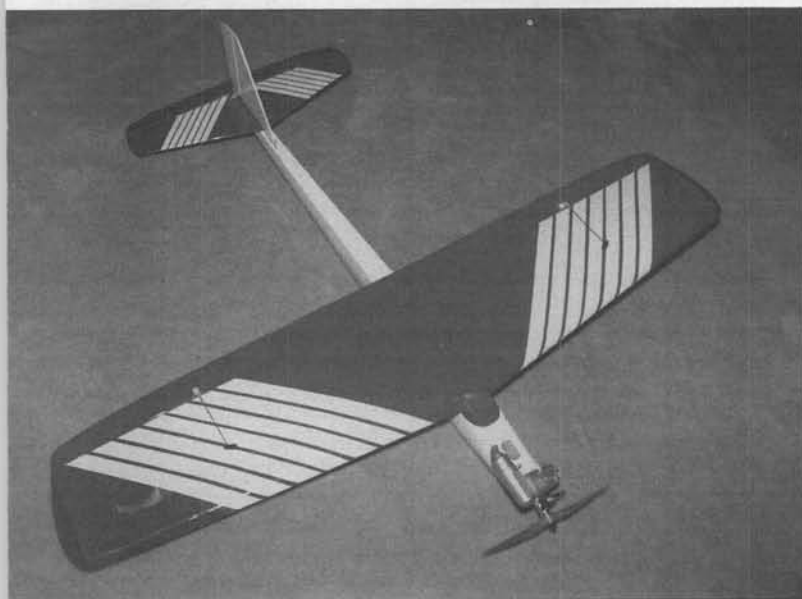
Last month we talked about wing spars and leading edge or "D" section sheeting, and also about tapered spars, tapered wings, and foam-core wings. Let's finish up on wing structures by covering the other structural parts of the wing. (No, Archie, not the wing covering, but covering the wing design, as in talking about it.)

First let's get down to basics and examine the functions that the leading edge should perform, before we try to design it. It needs to tie the fronts of the ribs together, provide the desired leading edge radius, and provide a front attachment for the sheeting, if any,

and/or the wing covering. It needs to have a little tensile strength to resist drag loads, and some compression strength to resist crashes (If we use slip-off wing mounts these requirements are reduced and the wing can be made lighter). The leading edge must also provide enough bending strength in the fore-and-aft direction, to resist the tension of the covering, and to resist normal handling and minor abuse from banging into things.

The leading edge does *not* need to provide much bending strength in the vertical direction, nor does it need to provide wing torsional rigidity. These functions, as we saw last month, can be much more effectively provided by a proper full-depth spar and "D" section sheeting. To provide for those flight loads, even in part, in the leading edge design, would be to make the leading edge and the wing unnecessarily heavy.

I have built wing and empennage leading edges in a number of different ways over the years, including using round birch dowels, fiberglass arrowshafts, and hard aluminum alloy tubes for leading edges. Looking back, I now see that some of these were over-designed (read, "too heavy"). I keep trying to find better modeling materials than balsa. Once in a while we do find better materials for certain model applications (other woods, epoxy/fiberglass, carbon fiber, Spectra, foam, polycarbonate, etc.), but it is surprising how



Author's latest .40-powered sport aerobatic model weighs just 3.15 pounds (50 oz.).

nates because it was so slick that resins wouldn't bond to it. Now there is a cold plasma surface treatment which gives Spectra intended for composites good bonding characteristics.

often I try a new material for something, and then go back to balsa. Balsa is still, or is again, my choice for wing and empennage leading edges, but what shape should we make it? Figure 1 shows several possibilities.

The first example, with the L.E. glued flat against ribs cut vertically, is perhaps the most common. It is also rather poor. It is deep vertically, but we decided we didn't need vertical bending strength in the L.E. Its shallow width gives us poor lateral bending strength, which we do need.

In the second example, a rectangular balsa leading edge is mounted flat in a rectangular slot in the ribs. We now have good lateral bending strength, but the slots are harder to make, and there is very little area to attach the "D" sheeting to. Without leading edge sheeting, this shallow L.E. would allow the wing covering to pull down between ribs and distort the airfoil excessively.

The third sketch shows the front of the ribs notched on the diagonal and a square balsa leading edge glued in. Not bad. It has good depth for lateral bending strength and better leading edge area for sheeting or covering. I may have originated the last example, or may have seen it somewhere else. Here the leading edge consists of two balsa strips glued onto cut ends of the ribs and glued together at right angles to each other. This one has more area for sheeting attachment and support, or to maintain airfoil contour in the covering, than any of the others. It also has the greatest depth in lateral bending, and therefore has a better strength-to-weight ratio. It is a little more work, but is easier to make than it might appear.

TRAILING EDGES

As before, we do not want to design the T.E. for vertical bending strength or torsion. Again we need some lateral bending strength to resist covering tension, and we need to provide a stable structure for aileron hinge and possibly flap hinge mounting. While the L.E. needs compression strength to resist

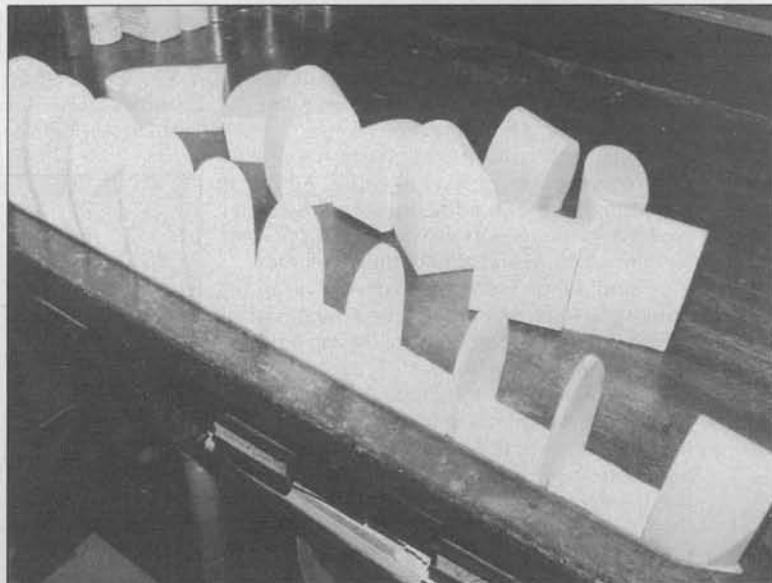
crash damage, the T.E. needs tensile strength for the same reason.

Picture the loads on the wing in a nose-down crash or bad landing. The fuselage stops suddenly, but the wing tries to continue on forward due to its inertia. This loads the whole wing like a deep beam, with the leading edge acting as a spar cap in compression, the trailing edge acting as a spar cap in tension, and the covering or sheeting acting as a shear web. Have you ever seen a crashed model with the wing covering torn diagonally? It failed in shear during impact.

I said earlier that the wing can be built lighter if we use a slip-off wing mount. This is true because if the wing slips free in a crash, these tension, compression and shear loads are greatly reduced. The fuselage can also be built lighter with a slip-off wing mount, because the kinetic energy of the wing is not added to that of the rest of the model in crunching the forward fuselage. The slip-off mount also eliminates twisting forces between the fuselage and the wing, which tear up the wing center section and the center of the fuselage.

Pardon my enthusiasm, but slip-off wing mounts are great. Maybe most modelers feel that extensive damage in crashes is inevitable, so they make no attempt to design against it. I do design with crashes in mind, and the damage my models suffer in crashes is small.

My airplanes are much lighter than average. Just talk? Hardly. My latest crash-damage-resistant, hot-dog-aerobatic model (see photo) has 640 square inches, carries a .40, and weighs just 3.15 pounds plus fuel. That is a wing loading of 11.4 oz./sq. ft., a WCL of 5.36 oz./cu. ft., and a DL of 7.87 lb./cu. in. Needless to say, it consumes sky wholesale. My mail tells me more of you are using slip-off wing mounts every month, but it takes time to get an innovation of this type



Fuselage bulkheads wire cut in place from blue foam.

into common use.

Back to trailing edges. My favorite is a simple balsa trailing edge of triangular cross section. The sheeting of the trailing edge, for an inch or so forward of the T.E., looks nice, but I have personally never used it. It takes longer to build, adds weight, and seems unnecessary.

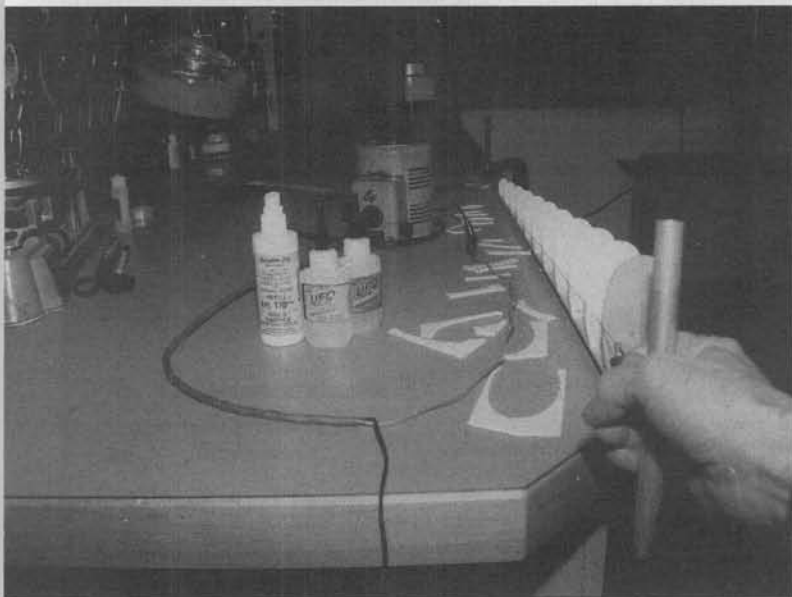
I pointed out the need for the trailing edge to carry tension loads. In that regard, take a look at Figure 2. In a wing inset ailerons, if the trailing edge stops at the inner ends of the ailerons, and continues again in front of the ailerons to the wing tips, we have a problem. This doesn't provide a through load path for tension loads or compression loads in the trailing edge, and doesn't even provide a stable wing structure at the inner ends of the ailerons.

In a crash, such a wing would be very apt to fail at the aileron roots, because the two ribs there would be placed in bending and the covering would be placed in tension and shear, trying to transmit the tension load across the trailing edge discontinuity. In my opinion, the most weight-effective fix to the problem is to continue the outboard trailing edges in to the center of the wing and join them together, as shown by the dotted lines in Figure 2. This requires putting holes in the inboard ribs.

WING RIBS

Ribs act as fore and aft beams in the wing structure, so an optimum rib design should look like an "I" beam in cross section, with a thin shear web or shear truss, and cap strips top and bottom to carry the tension and compression loads. Big airplane ribs look this way, but model ribs seldom get that complex. Wing ribs don't need lateral bending strength if the covering is bonded to the ribs, since shear stresses in the covering will keep the ribs from buckling sideways.

Plain sheet balsa ribs are pretty good, and easy to make. Adding rib cap strips can improve the strength-to-weight ratio, there-



Wire-cutting plastic foamboard bulkheads in place.

fore permitting lighter ribs, but only if we then use thinner sheet stock for the basic rib. If the rib is already strong enough, adding cap strips to the same thickness sheet adds only weight and building time.

Adding lightening holes to sheet balsa ribs to reduce weight is a lost cause. A hole is nothing, right? So add enough holes and we have nothing. Seriously, I tried it once, weighing before and after cutting the holes. The amount of weight saved was disappointingly little; but worse, the strength of the final rib was terrible, because the balsa wants to split at the holes.

Plywood ribs can be lightened with holes, because plywood doesn't split, but it is so much heavier than balsa that I never use plywood ribs except for a special one or two that have to carry a concentrated load. Even then, I don't use lightening holes. If a proposed plywood rib looks stronger than it needs to be, I use thinner plywood, or use lite-ply. I do use lightening holes in some fuselage structural bulkheads. I have more to say about bulkheads, but will refrain for now, because we are talking about ribs.

WIRE-CUT RIBS

Cutting out balsa ribs (where a kit maker hasn't done it for us) is a slow and not particularly stimulating job. I'm constantly looking for easier ways to do things. If we choose the right rib material, a long electrically-heated wire can cut all the ribs to shape, in place in the wing, in one swift operation, and do it just as fast on a taper wing as on a rectangular wing.

We cut foam wing cores with a hot wire. A core might be looked at as one super-wide rib extending from the root to the tip. If we glue oversize blanks of sheet foam into a built-up wing where we want ribs, we can cut those pre-installed rib blanks into ribs all simultaneously, the same as we cut continuous foam wing cores. I have done this for fuselage bulkheads (see photos), as well as on wings.

White one-pound foam alone is too weak for individual ribs, unless the ribs are very thick. I built one wing with 1/4-inch-thick white foam ribs and put balsa rib caps on them. That works well on small wings, but I

feel we need more rib strength on a larger built-up and covered wing.

Blue foam is available in four different densities, and is stronger than white beaded foam. Its strength-to-weight ratio is still poor

Paul Weston has used several grades of blue styrofoam for sandwich cores in his "Sea Era" kits. From experience he prefers the HI-60, at about 3 lbs./cu. ft. Not only is it lighter, but Paul says it is less brittle than he

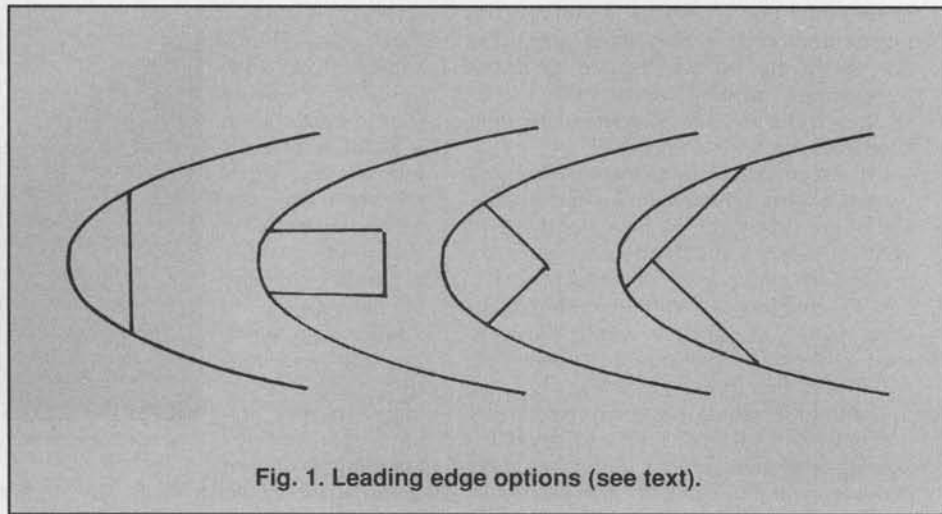


Fig. 1. Leading edge options (see text).

I never use plywood ribs except for a special one or two that have to carry a concentrated load... I don't use lightening holes.

compared to balsa, but since its density is only about half that of the softest balsa, it can be used in thicker sheets, giving better beam properties.

The blue foam most common to modelers, Dow Styrofoam SM, is the lightest, at 2 to 2.5 lbs./cu. ft. It has an advertized compression strength of 25 psi. The strongest Dow blue foam is Styrofoam HI-115, with a compression strength of 115 psi. Dow is not very specific about its weight, but they appear to say it is about 3.5 lbs./cu. ft. If so, it has much better strength-to-weight than the SM, and better than common beaded foam.

HI-115, and it has all the compression strength he needs to back up epoxy/glass.

Bare wire-cut blue-foam ribs are easy to make and strong enough for a sixty-powered model if they are thick, but a bare foam surface does not cover well, so I prefer the addition of 1-32-inch balsa cap strips to the foam ribs. Glue the rib caps onto the foam with thick UFO. Don't use normal CA, or your foam ribs will become unidentifiable, non-flying objects.

For truly big birds, we can still hot-wire-cut the ribs in place, but if HI-115 foam by itself isn't strong enough, we can put on stronger rib caps or use a sandwich of foam and a stronger material for the skins. Commercially available "Artcor" foamboard is such a material. It has a white foam core and .005 ABS skins. The whole sandwich can be cut with a hot wire. I have cut all the bulkheads in fuselages in place from Artcor (see photo); but Artcor has a tendency to tear under repeated stress, so I reinforced the bulkheads with balsa strips.

Spectra fabric, unlike fiberglass, Kevlar,

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or carbon fiber, can be cut with a hot wire. Therefore we could make our own super sandwiches of Spectra skins on foam sheet, and wire-cut ribs from it. My tests show that the Spectra cuts slower than the foam, how-

PARTING WORDS

Lorenzo Pugliatti, my modeler grandson of London, England, wrote to me. Quote: "Grandpa, the wether here has been terrible lately (a bad spell of weather)" unquote. I

Astronautics membership number ends in 9241. And my house number was once 4214. My modeling buddy, Paul Weston's, house number is now 4214.
RC seaplane modeler Dr. Julio Quevedo

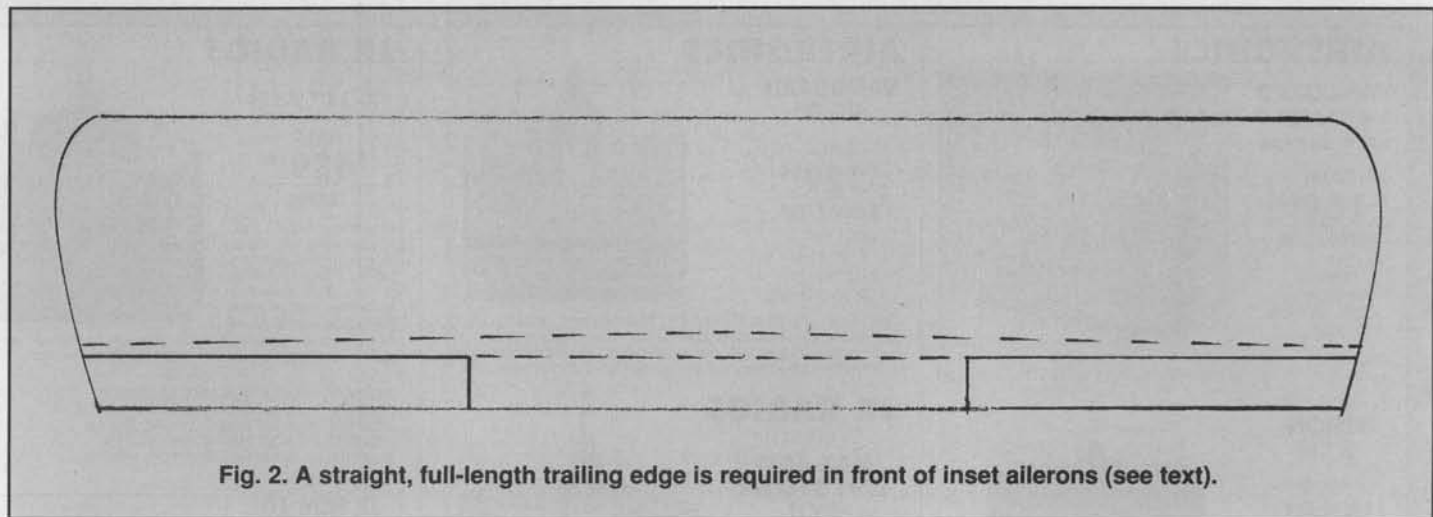


Fig. 2. A straight, full-length trailing edge is required in front of inset ailerons (see text).

ever, causing the Spectra skins to extend slightly beyond the cut edge of the foam.

Another approach would be to add epoxy/glass or other skins to foam ribs after wire cutting them. Considerable work. I therefore prefer reinforcing bare foam ribs with balsa, if needed.

thought that would have been a fairly subtle play on words for an adult, let alone a ten-year-old.

In the trivia department, I noticed two personal one-chance-in-ten-thousand coincidences recently. My AMA number is 9241. My American Institute of Aeronautics and

of Guatemala is the latest to write and tell me he now understands how the windmill sailing car can sail directly downwind faster than the wind.

Francis Reynolds, 3802 127th Ave. NE, Bellevue, WA 98005-1346. SASE please. (206) 885-2647. **MB**

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PRICES SUBJECT TO CHANGE



HANNAN'S HANGAR



BY BILL HANNAN

"It is easy to build things strong or light, but to do both at the same time is the art of a true engineer."

Our lead-in line, by Dean McInnis, was shared with us by Laird Marsh.

Oshkosh, Wisconsin, is an aviation buff's paradise! Thanks to reports from Vern Clements, Harry Robinson, Dick Gates, Frank Scott and George Ardwin, we have a taste of the world's largest aviation gathering each year in Oshkosh. How large? Estimates were that more than 12,000 aircraft were involved in one way or another, including ultralights, antiques, homebuilts, classics, rotorcraft, warbirds and airplanes employed simply to transport their owners to and from the meet.

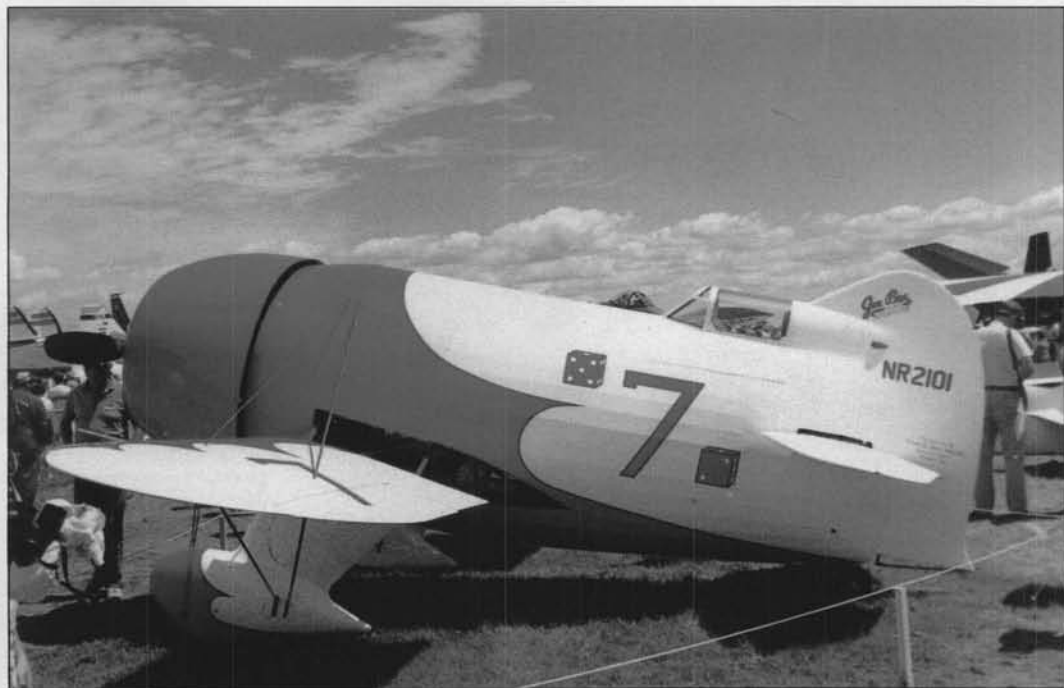
The theme this year was "The Golden Age of Air Racing," and certainly it lived up to advance billing, graced by such notables as Tony LeVier, Steve Wittman, Bobbi Trout, Lynn Kauffold, Marion Henderson and histori-



Believe it or not, this is a man-carrying rubber-powered aircraft! See details in text. Photo by Frank Scott.

Reproductions featured were Bill Turner's Gee Bee Z (still bearing cowl markings from *The Rocketeer* movie in which it starred),

purely whimsical, only appears to be rubber-powered, however the other actually is. Mark Lokker's 37-foot span RB-1 combines Lazair wings and tail assembly with a tubular "motor stick" encasing 35 pounds of latex cord rubber. The craft itself weighs 143 pounds, and has a range estimated at 1,000 feet at a speed of 21 miles per hour. Photos of the machine in flight were displayed, and as Frank Scott put it: "Oh, they must have had fun!" Who will be the first to make a flying scale model of it?



Marvelous Gee Bee R-2 reproduction by Steve Wolf and Delmar Benjamin, as it appeared at Oshkosh for "The Golden Age of Air Racing" display. Photo by Vern Clements.

ans such as "Pappy" Weaver, John Underwood and Don Berliner.

Racers displayed included originals (or partial originals) such as Roscoe Turner's Wedell-Williams, Art Chester's Goon, Benny Howard's Pete, Ike and Mike; Lawrence Brown's B-1; Keith Rider's 8-Ball; and more.

a Gee Bee R-2, Gee Bee Y, Wedell-Williams No. 44, Mr. Mulligan, Travel Air Mystery Ship and...well, I think you can get the idea.

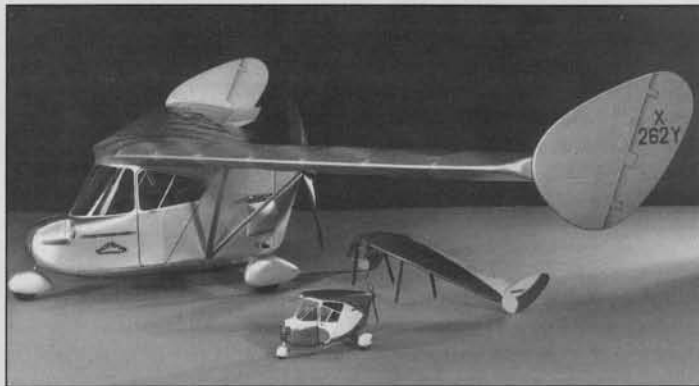
Quite apart from the glamorous racers, but delightful anyhow, were two full-size rubber-powered man-carrying aircraft! Both appear in our photos. One,

NFFS HONOREES

Tony Italiano of the National Free Flight Society has announced the recipients of the 1991 NFFS Hall of Fame awards, who are: Joseph Ehrhart (deceased), Wakefield winning model builder for 1930 and again in 1931; William Gieskieng, long an experimenter with advanced model technology such as flapped, folded and extendable wing surfaces; Milton Huguelet (deceased), a champion competitor from the Chicago Aeronauts with an impressive list of contest wins and published designs.

Another famed Chicago Aeronaut is Richard Obarski, with a winning record in outdoor and indoor events, as well as a history of model product development. The final award was bestowed upon Carl Wheeley,

Junior Florian Glockner with his second place Peanut Pietenpol during the Liege, Belgium, indoor contest. Florian placed first with his other entry, a clipped-wing Piper Cub. Photo by Tonda Alfery, of Czechoslovakia.



Doug McHard, of England, constructed this fine pair of Waterman Arrowbiles. Large, 30-inch span model is powered by a Z model Italian compressed-air system. Small static-scale model features detachable wings, opening doors, lowering windows and steerable nose wheel.

former Editor/Publisher of *Model Aviation* magazine, for maintaining his balanced approach to all forms of modeling and all skill levels of modelers. Our congratulations to the winners and NFFS.

INTERNATIONAL MODEL EVENTS

Three important world-class contests have been conducted recently, and we have brief news from two of them.

34 entries! Apparently the attraction was that modeler-inspired color and markings schemes were encouraged, and judged separately from the duration aspects. The idea was that anyone building a full-size homebuilt would likely create his own paint scheme, so why not allow it in model form?

Variety is truly the spice of scale model contests, and the Nagoya gathering was no exception, as witness these more-

P-Tech newsletter. Keep this great contest in mind for 1993!

The 15th Annual Belgian International indoor event was conducted in Liege this year, according to reports from Fernand Van Hauwaert, Heinz Neumann, and Tonda Alfery. Entries from at least nine countries took part, including a few by proxy. Regrettably, Lubomir Koutny, one of the top fliers from Czechoslovakia, was involved in an auto accident on

Maquette and Peanut Duration (54 entries total) and Pistachio scale, which attracted 16 entries. Unlike so many contests, this one consistently involves numerous junior fliers. Perhaps we should learn their secrets?

We do know the site was appreciated by the contestants, and a variety of prestigious prizes was awarded. Tonda Alfery summed it up by saying: "The contest in Liege was splendid! A wonderful hall for Peanuts and



(Above) How's this for a jumbo rubber job? Full-size Piper seen at Oshkosh. Photo by George Ardwin. (Right) CO₂ engine Waterman Arrowbile by Fritz Mueller is based upon Paul Matt scale drawings.



The Nagoya Nuts, of Japan, sponsor a beautifully organized contest every other year, and they are always well supported. Thanks to Shoichi Uchida, Kazuhiro Suzuki and Jiro Sugimoto, we have these impressions: 100 Peanuts from Australia, Germany, Israel, Japan and the USA were entered, including 11 which were proxy-flown. Categories included Pioneer, WWI, Golden Age, WWII, Postwar and a special BD-4 homebuilt class, which attracted

or-less random selections: Drezewiecki canard, Avro Spider, Cierva C-6 autogiro (which placed third!), Boisavia B80, Beechcraft Staggerwing, Farman monowheel racer, Pou Du Ciel, Yak 3 and North American F-86.

The three-day event included static scale judging, outdoor flying, indoor flying, plus a banquet and awards ceremony. The custom-made prizes were delightful, and all entrants received the results quickly in the fine

the way and was unable to attend. We understand that he was slightly injured, and wish him a speedy recovery.

The Belgian meet featured numerous categories, including F1D Microfilm, F1D Beginner, Micro 35, EZB, Sainte Formula (which garnered 36 entries), CO₂ and electric scale, Peanut

Pistachios!"

We hope to have information on the British Internats '91 next month.

CLOSER TO HOME

We had the pleasure of attending the Flightmasters Flying Aces Club Fun-Fly held at Mile

continued on page 68

RENO AIR

Heralded High Technology Pond Racer



Lyle Shelton's "Rare Bear," winner of the Gold for the fourth consecutive year in Unlimited, at a record 481.619 mph.

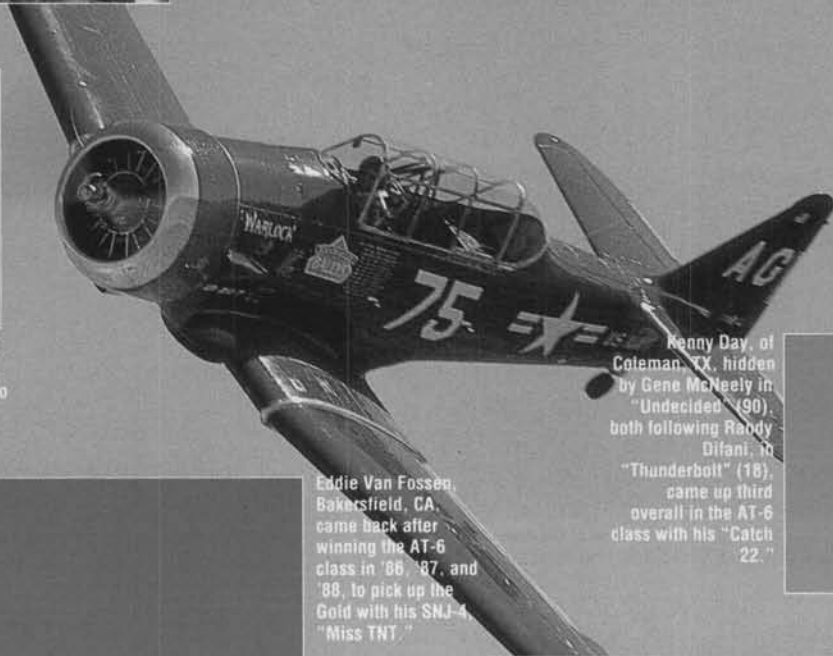
"Tsunami," piloted by Skip Holm, placed a close third in the Gold Unlimited at 478.140 mph. It will not be seen again. See text.



"Warlock," an SNJ-6 flown by Al Goss, of Woodland, CA, placed second in the AT-6 class.



Bill Rheinschild's T20 in Navy markings was nostalgic, but not up to the demands of Unlimited racing.



Kenny Day, of Coleman, TX, hidden by Gene McNeely in "Undecided" ('90) both following Randy Difani, in "Thunderbolt" ('88), came up third overall in the AT-6 class with his "Catch 22."

Eddie Van Fossen, Bakersfield, CA, came back after winning the AT-6 class in '86, '87, and '88, to pick up the Gold with his SNJ-4, "Miss TNT."



Last year's winner in Formula 1, Jim Miller, of San Antonio, TX, with his original and unique "Pushy Cat," was second in '91.



RACES

Has Teething Problems

BY FELIX VIVAS

The approximately 160,000 enthusiastic Reno Air Race fans who attended the 28th Annual Race on September 12, 13, 14 and 15, 1991 came with more anticipation and expectation than usual, for a new gauntlet had been thrown into the arena of unlimited air racing. It was state-of-the-art high technology aerodynamics versus nostalgic, highly modified World War II fighter aircraft.

Robert Pond, owner of the Minneapolis Air Museum "Planes of Fame East," enlisted the help of Burt Rutan, of Scaled Composites, Mojave, California, the designer of the round-the-world non-refueled "Voyager," to help launch his quest. *continued*



Bob Yancey flew his relatively inexpensive Yak-11 to fourth in Unlimited, coming in ahead of five very costly and heavily sponsored "Gold Iron."

Jon Sharp, in his original Sharp DR90 "Nemesis," won the Gold in Formula I.



Bill Destefani's P-51 "Sirega" averaged 478.680 mph to place second in the Gold. Sirega and Bill won the Gold in 1987.



John Bumford, of San Diego, CA, placed third in Formula I, flying his Grove GR-7 "Bummer's Bullet."



The Pond Pacer, designed by Burt "Voyager" Rutan, suffered teething problems with its high tech auto racing engines. As they used to say in Brooklyn, "Wait 'll next year!"



"Lil Drifter," a Mong Sport X-1 flown by Andrew Buehler, Renton, Washington. No, those aren't rubber bands holding down the top wing!

Pond's dream is to build up the beginning of a new breed of unlimited air racers; a prototype that would be fast enough to break the world speed record for propeller driven aircraft, set by Lyle Shelton in "Rare Bear" (a highly modified Bearcat), in August 1989, at a very fast 528.329 mph for 3-Km, and win the Gold Unlimited Championship at Reno.

The real goal for Pond is to preserve the shrinking, limited supply of unmodified World War II aircraft for future generations, instead of losing them at a high rate through risky air racing.

The "Pond Racer" was the number one attraction at the 1991 Reno Air Races. Mr. Pond had the foresight to hangar the aircraft, otherwise it would have been the equal of Charles Lindbergh's night arrival in Paris when he soloed the Atlantic and was mobbed by a crushing crowd of well wishers. The front of Pond's hangar was continuously four deep in fans, all clicking their cameras and triggering video recorders from dawn to dusk every day.

Unfortunately, the all-composite cross between a delicate mini P-38 and the Voyager, powered by two highly modified six-cylinder automotive racing engines producing 1000 horsepower, each burning methanol and turning custom designed four-bladed Hartzell propellers with the tips operating in the .98 mach speed range, did not live up to the fans' expectations.

The Pond Racer qualified at 402 mph, and in the heats, it had to pull out after a few laps each time due to "teething" problems. In the Bronze Unlimited race on Sunday, with eight other aircraft, just before the flying start of the race, it blew two rods through the bottom of the left engine. Its pilot, Rick Brickert, a 1986 winner, declared "mayday," shut down the engine, extinguished the fire, feathered the left prop, and coolly landed the racer in a safe manner.

The interest of the fans was peaked Friday by Bill Destefani, of Bakersfield, California, flying his 1987 winning P-51 "Strega" to a heat race record of 462 mph, beating Lyle Shelton's three-time champion, "Rare Bear," being flown by John Penny.

Saturday saw the fastest unlimited heat won by Rare Bear with Lyle Shelton back in the cockpit, beating Strega by three seconds, roaring around the course at 465 mph, to build great anticipation among fans for Sunday's Gold Unlimited showdown.

Sunday's weather was clear, beautiful and warm, a replay of the previous three days. Forty-five thousand plus fans watched Rare Bear and Strega take the lead at the start of the Gold Unlimited, followed by John Sandberg's "Tsunami," flown by Skip Holm, of Woodland Hills, California.

Shooting pictures at the west pylon, I felt Rare Bear and Strega were flying the fastest of anything I'd seen in my four previous years at the pylons. I was panning my camera faster than normal to get a shot of them roaring by. Rare Bear's engine was singing in a range I'd never heard before. I couldn't

help getting excited as the race unfolded. Strega was really pressing Rare Bear, with Tsunami hot on their heels, waiting to pounce if either one experienced engine failure or cut a pylon!

At the end of eight exciting laps, Lyle and Rare Bear had set a new record, with Lyle winning his fourth consecutive Reno championship at a record 481.618 mph (his last lap was a "hot" 489 mph). Strega finished second at 478.680 mph, with Tsunami third at 478.140. All three broke Lyle's previous record of 462 mph, set in 1990.

The 1991 Gold Unlimited Championship race doubly delighted and gratified the experienced, knowledgeable Reno Air Race fans. They were treated to an exhibition of

A fly-by of the awesome, lethal-looking F-117A Stealth Fighter, star of Desert Storm, drew a great roar of appreciation.

very smooth "down on the deck, let's get it on" type of flying by the highly respected Bob Yancey, of Klamath Falls, Oregon. In his Russian YAK II "Perestroika," he finished a very admirable fourth, just behind Tsunami and ahead of five very expensive, costly supported "Gold Iron."

Over the last half decade, Yancey, a crop-duster pilot, has captured the admiration of the fans with his down home, gallant, gentlemanly, laid back attitude, along with smooth flying abilities. It's the American Dream. On a "shoe string," he brings his inexpensive Russian steed, powered by an overhauled R2800 CB engine out of an F4U Corsair, climbs into the cockpit, and without a spare engine, and supported by one mechanic and a couple of volunteers (Mrs. Yancey is one), takes on the "high rollers" of the very expensive, very fast unlimiteds, all supported by a small army of mechanics and helpers working out of huge trailer/workshops containing spare engines and parts, and Yancey beats all but three of the fastest! To go from Yancey's 440 mph to Lyle Shelton's 489 mph, we're looking at 50 mph difference, and a half a million to one million dollars to get it.

In Formula I, Jon Sharp, of Lancaster, California, flying his nifty "Nemesis," a very streamlined, clean, unusual looking aircraft, won the Gold on Sunday, beating James Miller's rear-engine-powered "Pushy Cat" (last year's winner) in a very exciting, tight race. John Bumford of San Diego, California, flew a very respectable and close third in his Grove GR-7 "Bummer's Bullet."

The Biplane class had more than its usual color and flair. A very large contingent of Japanese photographers invaded Reno to cover the activities of the rookie biplane pilot Takehisa "Ken" Ueno, flying a white-

and-pink Mong called (can you guess?) "Samurai." Ken, a well-known aerobatic pilot from Japan, won Sunday's Gold Biplane Championship, which delighted the platoon of Japanese press, and highly pleased his co-sponsor, Circus Circus Hotels and Casinos. Many of our readers are appreciative fans of the bi-annual Tournament of Champions, also sponsored by Circus Circus Enterprises and its Board Chairman, Bill Bennett.

The AT-6's, always loud, very colorful and exciting, especially rounding the pylons two or three abreast, are race fans' delight and pleasure, as well as this photographer's. Eddie Van Fossen, a crop-duster from Bakersfield, California, flying his "Miss TNT" in U.S. Marine Corps colors, won the AT-6 Gold and became the only four-time AT-6 champion. Al Goss, of Woodland, California, was second in his well-known "Warlock," while Kenny Day, of Coleman, Texas, in his "Catch 22," came in third.

For race fans, this year the numerous exhibitions of various military hardware on display, missiles, communications, RF4's of the Nevada Air Guard and Aerial Tankers, F-15's, F-14's, and F-111's, all just recently returned from Desert Storm in the Persian Gulf, was viewed with more keen interest and respect, plus a touch of awe.

A fly-by on Saturday and Sunday of the awesome, lethal-looking F-117A Stealth Fighter, star of Desert Storm, drew a great roar of appreciation, accompanied by the expected amount of picture-taking.

A fine selection of memorabilia for sale could be found in the numerous stalls in front of the grandstands at both entrances.

Again, we had safe races, with the exception of Wednesday afternoon. Jim Mott, while qualifying his AT-6, struck the ground with a wing tip while rounding a pylon. During his hurried "wounded duck" emergency approach to land, he lost control as he came off the power. The plane cartwheeled on impact and landed upside down, totaling the aircraft. Firefighters put out the fire, and Mott survived with a few cuts and bruises, to become a very stiff race observer in the pits on Thursday.

If you haven't seen the Reno Air Races, as my editor Bill Northrop says, you have to see them at least once during your lifetime. See you there next September 17 through 20, 1992, and make your reservations early!

As a sad aftermath to this story, I have to report that John Sandberg, the owner and driving force behind "Tsunami," which placed third, as flown by Skip Holm in this year's Gold Unlimited Championship, was killed while flying his beloved Tsunami on the way home from the Reno Air Race. It seems that while turning on final for a refueling stop in North Dakota, he crashed.

John Sandberg, air racer, entrepreneur and, above all, gentleman and dreamer, will be missed. His dream to win the Gold and his beautiful Tsunami, the first homebuilt unlimited air racer in forty plus years, goes with him. The air racing family and fraternity will greatly miss him. **MB**

SAFETY DEPENDS ON YOU!

Big Bird safety is just like any other sport or occupational safety. No matter how much you write about it, or talk about it, if the desire to do things in a safe manner is not there, accidents will happen. Safely flying Big Birds or any type of aircraft is solely dependent on the attitude of the person flying the aircraft.



Edward Hess did a great job of scratch-building this 12-ft. Lysander. It weighs 32 pounds, is powered by a Quadra 52, and is guided by a Futaba 1024 PCM.

A Big Bird pilot who continually makes low passes over spectators and other pilots is saying that he does not give a damn about them or anyone else. The person who makes low passes a few feet in front of other pilots is only a glitch away from trouble.

Some of our local Big Bird enthusiasts are trying to convince me that we no longer



An O.S. FR 500 powers Ward Emigh's scratch-built Ziroll N2S-5 Stearman; 28 pounds, Futaba radio. Robart landing gear is fully functional.

need safety inspections at our Big Bird fly-ins because the equipment we have today is superior to that which was available when the Big Bird movement started back in the mid-1970's. It is true that we have a lot more quality hardware than we did back in 1976, but safety inspections insure that the hardware we have is properly installed. Safety



Contest director, Rocky Dickerson, takes a break from the Keizer Fly-In to pose with his 1/4-scale "Keleher Lark" homebuilt. Has 69-inch wingspan, O.S. .91 F/S Surpass, and weighs 9 pounds. Radio is a Futaba FGK6 AM.

The person who makes low passes a few feet in front of other pilots is only a glitch away from trouble.

inspections protect everyone from the person who takes short cuts that make his plane potentially dangerous. Safety inspections also help the careful pilot who may have missed an important safety item.

It is difficult to understand people who are offended by safety inspections, because these same folks are often the first ones to run their hand through the propeller, or they will often be the first crash of the day. Show you care, develop a safety consciousness that is not offended by safety inspections and that puts safety of friends and family before the

Jim Carpenter has his 101-inch Balsa USA Cub set up to compete in Q.S.A.A.'s cross country endurance event. Airtronics module 7 SP, 17-1/2 pounds dry, 26 pounds with fuel; more detail in text.



desire to be a hotshot showoff.

• • •

Soft engine mounts have been with us for some time. Unfortunately, they are not being used to any great extent, probably because their use is not fully understood. They also add to the overall expense of the aircraft, however their long-term use may be of great benefit.

The pictures with this month's column show two different applications. One picture shows the soft mounts used on my 9-ft. Cessna 190, which uses a single-cylinder Zenoh G-38. These are Lords mounts that have the studs vulcanized into the rubber mount. In the past, four mounts would have been used, but this would allow the engine to oscillate too much at idle. If seven or eight mounts are used, there is little oscillation at idle and the airframe and RC equipment are protected from vibration.

The second picture shows the Saito instal-



This Roadrunner has a 96-inch wingspan and weighs 14 pounds. It is powered by a Zenoh G-23, guided by an Airtronics PCM. Bill Maloney really enjoys his plane.



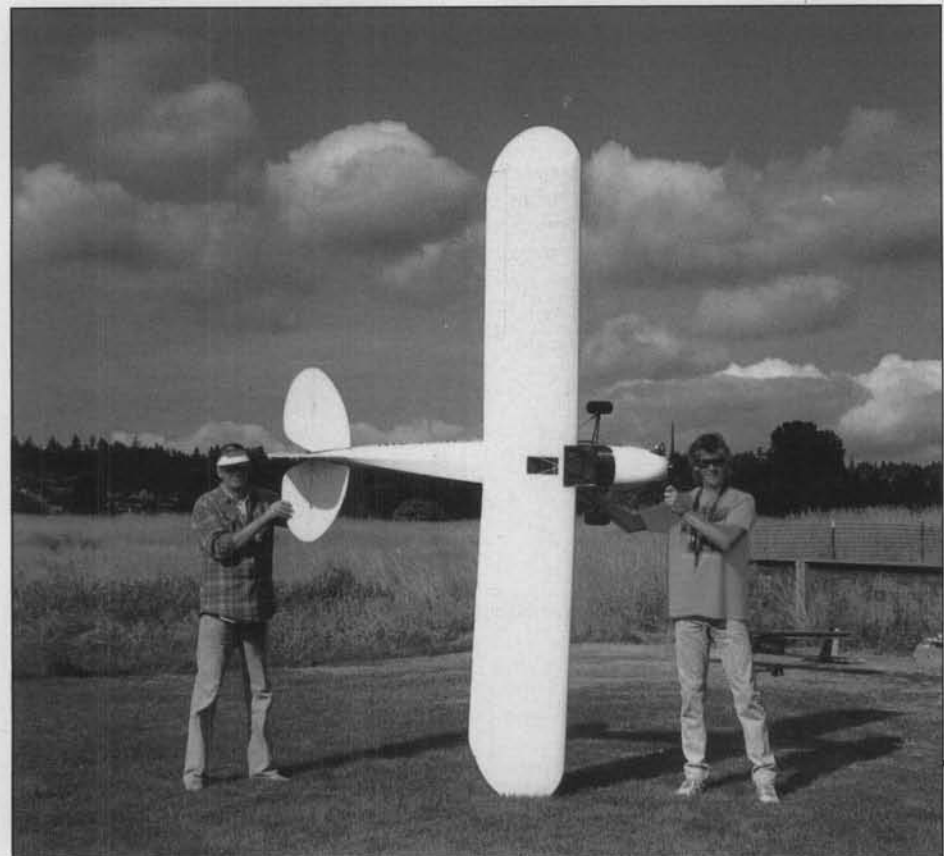
A Sopwith Pup built by Sveng Lee has a 66-inch wingspan. Sveng uses a JRx347 radio and an O.S. 1.20 F/S for power.



Bert Baker, at 6 ft. 9 in. tall, dwarfs his BT-13 Vultee Valiant, better known as the Vultee Vibrator. This Big Bird has a 92-inch wingspan, weighs 21 pounds, and is powered by an ST3000. Radio is a JR PCM 9. New kit is available from Bert.



Troy Klein builds like a pro. His Sig Spacewalker weighs 20 pounds, has a 104-inch wingspan, and a Futaba five-channel radio. The Spacewalker is powered by a 2.5 cu.in. Remington.



lation on my Big Bee. The 270 is a smooth-running, horizontally opposed twin-cylinder engine, and with six Lord mounts to hold it to the firewall, the airframe is well protected from engine vibration. Fewer mounts are required on the twin because it is already smoother than a single-cylinder engine.

Most models covered with a plastic heat-shrink covering emit a drumming sound. My Big Bee is covered with clear Monokote to simulate a bee's wing. Due to the soft engine mounts there is no vibration of the covering material. There are several benefits from using soft engine mounts that include dampening of noise generated by the covering, airframe, and engine. The receiver and battery packs are isolated from engine vibration, and the airframe may be designed lighter.

Noise reduction should be on everyone's agenda because this will help save flying sites as well as our hearing. In addition to a good muffler, soft engine mounts will go a long way towards achieving AMA's 9-foot and 90db noise guidelines. continued

Gary and Elmer Waugh built their Balsa U.S.A. 1/3-scale Piper Cub in 25 days. It weighs 24 pounds. The engine is an O.S. 240 twin.

Isolation of all your RC equipment—radio receiver, battery packs, servos, and any other support equipment mounted in the airframe will help extend the service life of these items when they are not subjected to a lot of engine vibration.

Another area that may benefit from the

to cure poor design or glasswork with additional horsepower. We can only hope that this practice is the exception rather than the rule.

• • •

Do you often question the amount of flying time you have left when your fuel

easily reset.

The flight timers are available from Charles Allyn International, c/o Stewart Heatter and Tony Schwartz, 900 Cynthia St., #120, West Hollywood, CA 90069. The cost is \$4.95 plus fifty cents handling.

• • •



Bud Tamm built this Ultra Hots from Santich plans. Tartan twin power, 13 lbs. and JR radio.



Jay Hopkins, left, built this candy bomber; Dave Denison does the flying. Dave says the "Butterfingers" uses stealth smoke. Big Bird has a 96-inch wingspan, uses O.S. 91 F/S and Futaba radio.

use of soft engine mounts is the airframe. The practice of building a heavy plane and then adding horsepower is not a good one. A model with a high wing loading will not fly as well as the same size model that weighs thirty percent less due to good engineering.

Big Bird designers are often guilty of trying

starts getting low? Charles Allyn International has a handy little flight timer. It is small enough to mount easily wherever you want it, and loud enough to be heard. It counts down from your input time and gives three warnings before time to land. Should you choose to land early, the flight timer is

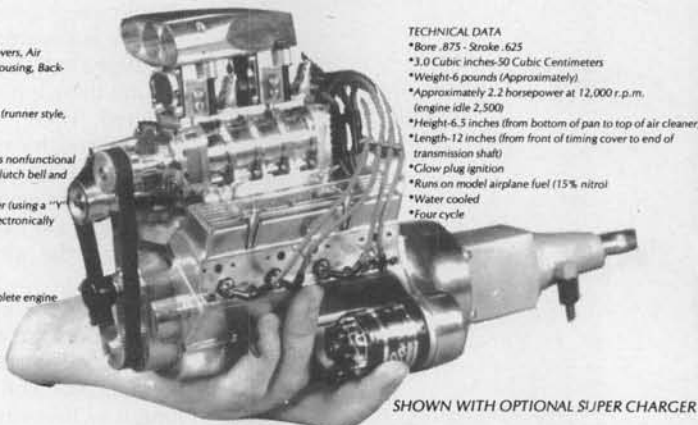
The Marymoor Quarter Scalers, Q.S.A.A. Chapter 18, held its first annual Fly-In last August, at Marymoor Park near Redmond, Washington. This was a very friendly group and although not all of us could produce a scale Big Bird, anything that was a giant was allowed to fly. Mark Freer did a good of job

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- *Approximately 2.2 horsepower at 12,000 r.p.m. (engine idle 2,500)
- *Height-6.5 inches (from bottom of pan to top of air cleaner)
- *Length-12 inches (from front of timing cover to end of transmission shaft)
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WRAM SHOW

92

FEB. 22-23

SPECIAL STATIC COMPETITION NOTICE. Read Carefully.

All judging will take place Saturday evening after close of show. Winners will be announced on Sunday. Registration of models will start at 8:30 AM Sat. and will end at 1 PM. Models may be brought in thereafter for display but will not be eligible for prizes.

All models must be operable & RC controlled. Trophies and/or prizes to be awarded. VCR's to be awarded in three categories: "Best-in-Show" flying, "Best-in-Show" cars and "Best-In-Show" boats. Top of the line RC systems for 1st place in each category. Trophies for other winners.

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- Post WW I (Military)
- Post WW I (Non-Military)
 - Stand-Off Scale
 - Giant Scale
 - Pattern
 - Old Timers
- Sport (Non-Scale)
- Gliders
- Helicopters

BOATS

- Scale (Military)
- Scale (Non-Military)
- Racing (Deep-V)
- Racing (Hydro)

CARS

- 1/12 Scale
- 1/10 Scale
- 1/8 Scale or larger

JUNIORS

- All categories
- Planes • Boats • Cars

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To obtain pre-registration Static Competition forms, write: (include self-addressed stamped envelope) Allen Reinhardt, 2 Douglas Dr., Pleasantville, NY 10570.

Polish Aero Club (FAI Sanctioned) to exhibit scale air craft at this year's WRAM Show

A selection of the most prominent Polish Scale Modelers are scheduled to appear at this year's WRAM Show. Their aircraft will compete with all other scale entries just as the Russians did last year.

SWAP SHOP

The WRAM's Swap Shop has become one of the major show attractions with thousands of individual items changing hands. To help eliminate "registration crush," the Swap Shop will provide for preregistration forms. To receive these forms send a self-addressed stamped envelope to: John Isbister, 4 Devon Rd., Larchmont, N.Y. 10538.

SPECIAL NOTE

This year there will be no restrictions in the number of built-up models a registrant may place in the Swap Shop.

ADVANCED TICKET SALES

Save time, order your tickets now — send check or money order made payable to WRAM, Inc. (allow 3 weeks for check clearance) and self-addressed stamped envelope to: Ed Alexis, 21 Pamela Rd., Peekskill, NY 10566.

One day Ticket: \$6.00
under 12 yrs.: \$1.00/day.

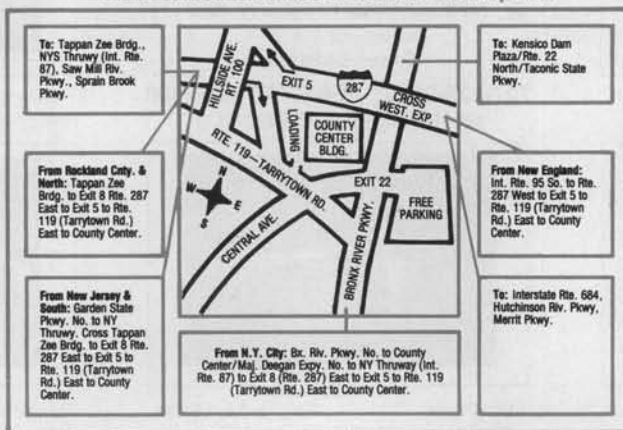
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announcing and everyone did a lot of flying.

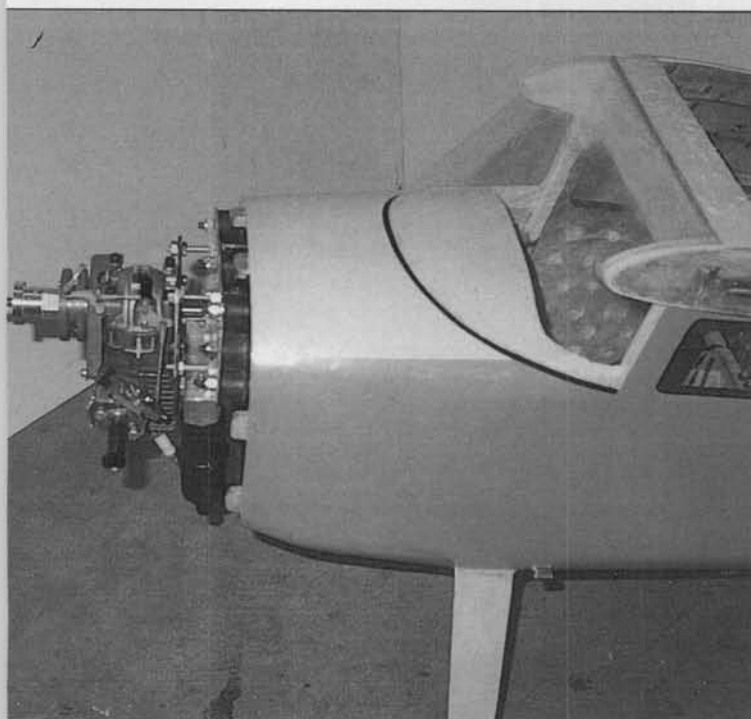
One of the activities that everyone enjoyed was the mass flight of J-3 Cubs and Super Cruisers. One of the Pipers was a 13-foot, 1/3-scale Balsa U.S.A. Cub. Eight of them took off in a "Blot Out the Sun Fly-By."

Jim Carpenter was flying his quarter-scale Nosen J-3 Cub. Jim has this Big Bird set up to

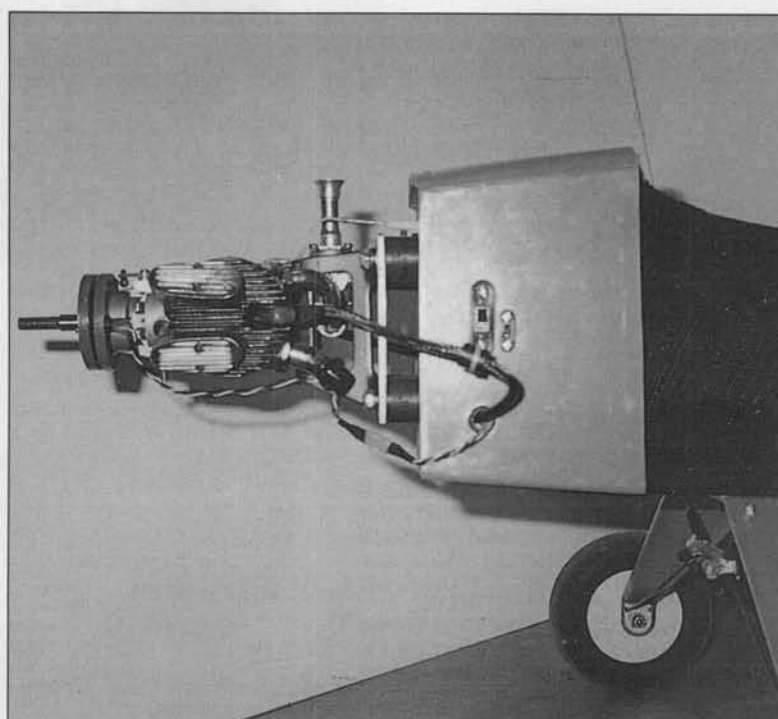
After vacationing for a week on the Oregon coast, Eileen and I drove to Keizer, Oregon, to attend the Keizer RC Association's 9th Annual Big Bird Fly-In. Rocky Dickerson and his crew did a good job with their Fly-In, and we can only look forward to their 10th anniversary. Once a year Carl Weathers, a local farmer, invites the Keizer RC

new BT-13. Bert is a fine pilot and really put his new plane through its paces by demonstrating the flap system with silky smooth landings. The Vultee Vibrator is proving to be an agile performer with a Super Tiger 3000, and the 21-pound weight shows that Bert has done a good job designing his kit.

I was able to examine the BT-13 very



A Zenoah G-38 using eight soft mounts, Snuffler muffler, and homemade adaptor for C.H. ignition. Velocity stack on the carburetor makes all the fuel go through the carburetor, giving about 200 to 300 more rpm on the top end.



This Saito 270 uses six Lord soft mounts for very smooth running. Extended carburetor stack gives better performance. C.H. ignition gives 850 rpm at idle.

compete in the Q.S.A.A. cross country endurance event. The plane is powered with a Super Tiger 3000 that has been dieselized. The fuel tank is a modified one-gallon can, and the radio and servos receive their power from a 4000 mAH battery pack.

• • •

Association to use his private 3000-foot grass strip for a Big Bird Fly-In. Oregon hospitality was at its best, and the friendly inspection crew had us flying before 10 a.m. Each pilot received a free lunch and a lot of merchandise was raffled off.

Bert Baker attended and was flying his

closely, and found the glasswork to be flawless. The pre-covered foam core wings were light and straight. The full-size BT-13 had fixed landing gear; the model uses a Byron gear that has been modified for scale effect. If you are looking for a good plane to build in giant scale, then Bert Baker's BT-13 may



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Wing Area: 840" Engine: .60

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LA-1
Phoenix 8
Phoenix 8/45
Punch
Skybolt
Summit III
Sundowner
Typhoon
Vortex



DESIRE

Wing Span: 66" Weight: 8.5-9.0 Lbs.
Wing Area: 920" Engine: 1.20



SKYBOLT

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

be for you.

It was indeed a pleasure to meet Jim Wardrope, the fellow who makes those dandy little Astrodata L.E.D. expanded scale volt meters. Jim is a very knowledgeable fellow and makes a high quality product that enables you to know the condition of your in-flight batteries at all times.

One of the things that the pilots enjoyed was the pit area that allowed the spectators to converse with the pilots and view their planes up close. Engine start-up was accomplished in a special area next to the runway so that there was no danger to the spectators.

The Keizer Fly-In is well advertised and attendance is usually over 3000 people. The Keizer RC Association makes a lot of friends for model aviation and presents Big Birds in a good light.

The Crow's Landing Mini-Festival was very impressive last year and even more so this year, according to several Northwest participants. The parking arrangements were most appreciated by those who attended, because they could park right behind the spectator area, directly behind where their plane was in the pits.

In most cases this is not too difficult to set up, and it sure makes it easier for the attending pilots to keep their equipment safe and secure. Give the pilots who attend your next fly-in a break, let them park close to the pits; after all, the event is for the pilots, so why

should they get parking spots far from their planes and equipment?

Several months have passed since Kevin DeShazer took an afternoon to show me some of the research and development on his Big Bird mufflers. I called Kevin for an

One of the things that the pilots enjoyed was the pit area that allowed the spectators to converse with the pilots...

update and found that his R&D continues.

I asked Kevin if his custom-built transmitter trays were still available, and found that they are. If you read last month's column and decided to try a tray, but have not been able to locate one, Kevin will be happy to help you. Send your order to KDI, 10426 S.E. 206th Place, Kent, WA 98031; telephone (206) 854-8053 after 4 p.m. PST. The cost is \$49, check or money order, no handling fee.

The Northwest Model Exposition will be held at Puyallup, Washington, February 1-2, 1992. That is just around the corner, and

if you are not just about ready to put the finishing touches on your entry, you may be too late. The hobby industry continues its support of the Northwest Model Exposition because of the good turnout of modelers and spectators, and the friendly, helpful atmosphere they have come to know and love.

Whether you are an exhibitor with the latest equipment to display, a contestant in the many categories of competition, or you just want to see a great model show, visit the Northwest Model Exposition. You will be treated right.

Joe Buffalini visited us from Pennsylvania during the L.S.G.A.S. Big Bird Fly-In last June. Joe is a member of the Beaver County Model Airplane Club Inc., and sent a Beaver County club patch to those of us who showed him around. Thanks, Joe, it's always a pleasure to have visitors from other parts of the country attend our fly-in. Let us know about the Big Birds being flown in your part of Pennsylvania.

Big Bird Book of the Month is *Biplane* by Richard Bach. If you believe real airplanes have two wings and round engines, you will enjoy this book. It is an Avon publication, Library of Congress Card Number: 66-10622.

That is about it for this month, keep your landing and flying wires tight till next month. Bruce Edwards, 8304 53rd St. Ct. West, Tacoma, WA 98467; telephone (206) 564-4416. **MB**

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RC SOARING

BY BILL FORREY

18TH ANNUAL VISALIA FALL SOARING FESTIVAL

PART I

Sometimes called "Soaring's Tournament of Champions," Visalia's Fall Soaring Festival is the biggest and the best soaring meet in the U.S.A.! It's the biggest and most important because, year after year, it attracts the biggest number of America's leading pilots. It's the best because it's run professionally, and is a pleasure to participate. Also, it's a big, fun, outdoor social event. Entire families look forward to attending. For a change, it's not "just Dad and his sailplane" out doing their thing.

Due to its extreme popularity, the FSF's host club, the Central Valley Radio Control (CVRC), has had to limit the number of entries in this event. Attendance is by invitation ONLY, and they are sent out every July. Your name is on the guest list only if you have attended before. For this reason, invitations are frequently copied and distributed among new club members who have yet to attend.

Entries are not accepted before an August 1st postmark, nor are they accepted beyond an August 15th postmark. However, if you



CVRC member and FSF Contest Director Marshall Searcy presents Barbara Renaud of Airtronics with a bouquet of roses and a wall plaque of appreciation for her support of RC Soaring over the years.

don't postmark your entry right on August 1, don't bother. Last year 150 entries were postmarked on that date, this year 180! The cut-off is 180. Talk about popularity! In the words of one of the organizers, Steve George, "When they sign up for the Festival, they are serious about coming." Seven notable fliers were no-shows, including 1991 AMA Nats winners Brian Agnew and Blayne Chastain.

FSF participants are mostly Californians. However, they also come from as far away as Utah, Arizona, Nevada, New Mexico, Oregon, Washington, Oklahoma, and this year two from Illinois!

The Festival's popularity stems from many factors. Firstly, the CVRC knows how to organize and run a big meet very professionally and efficiently. When you go to the FSF, you fly seven or eight times in two days. Even with 179 contestants, you are done flying by lunch time on Sunday.

The CVRC leases, improves and maintains the field, and therefore the meet, by the sweat of their brows. This is not a public park. They have installed underground AC power lines for lighting, PA systems, electronics, and winch battery charging. They have installed their own irrigation system and pay for their own water to keep things green in the parking, camping, landing, and aircraft pit areas. They have tractors, mowers, and a locked tool shed for grounds-keeping equipment and winch storage.

They have five permanent concrete-and-steel, elevated turnarounds and winch

The top ten 18th Annual Fall Soaring Festival finishers: (l to r) 1st, Fred Weaver (Legend); 2nd, Jason George (Legend); 3rd, Daryl Perkins (Falcon 880); 4th, Ben Clerx (Falcon 880); 5th, Bob McGowan (100" Legend); 6th, Myles Moran (Thermal Eagle); 7th, Joe Wurts (modified Falcon 880); 8th, Jerry Tonnelli (Cumic Plus); 9th, Mike Reagan (Falcon 880); and 10th, Todd Billman (O.D., Vector)





The US F3B World Championships team in full regalia! (L to R): Randy Spencer (team manager), Larry Jolly (pilot), Dean Clark (crew), Joe Wurts (pilot and new World Champion), Norm Timbs Jr. (crew), and Daryl Perkins (pilot and second place WC winner). Congatulatory plaques presented by Airtronics to the team at pilots meeting by Barbara Renaud of Airtronics (a main sponsor).



The top finishing team at the FSF was the Central Valley RC: (l to r) 12th, Keith Kindrick,; 1st, Fred Weaver; 2nd, Jason George,; and 14th, Ryan George. All flew Legends except Ryan, who flew a Keith Kindrick original design, the Hyperlon.



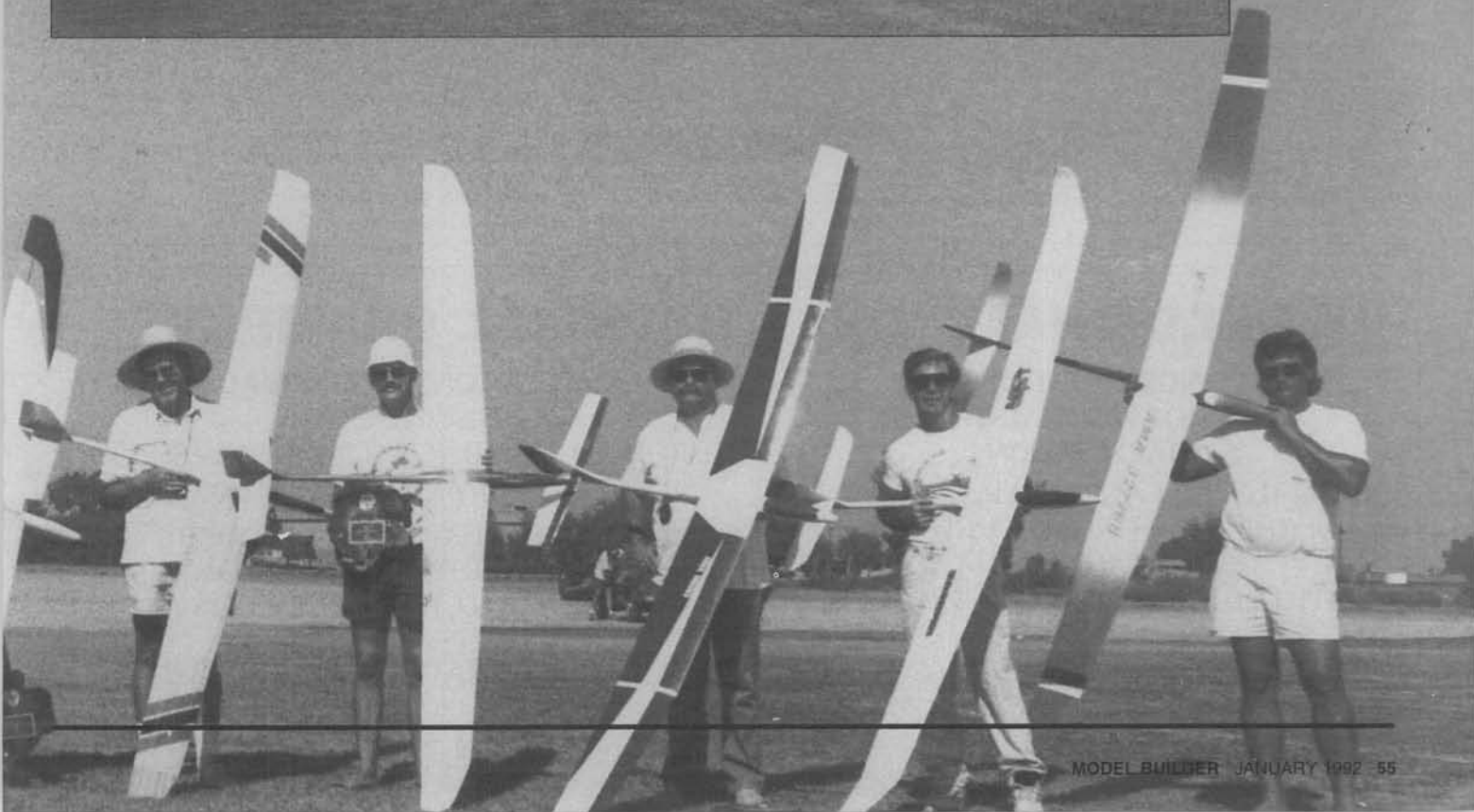
Chris George always seems to come up with the latest Airtronics stuff. In this case a 95-inch Whisper prototype kit. Says it flies just like the big birds!



Jim Smith of the SULA club poses with an eye-catching stretch wing Gemini MTS. No mistaking that bird for any other in the sky! Bright yellow with color polka-dots!



Twenty five Legends all in a row. This design has become very popular among thermal duration fliers in a very short time. Conventional wood wings and high performance are two main contributors.





The latest Flite Lite Composites super thermal ship! Myles Moran had only been flying this Thermal Eagle two weeks before the FSF, but took a very respectable 6th out of 172 scoring pilots! Claims he always out-thermals the competition with the Eagle.



(Above) The "Old Buzzard" is back! And very welcome back, too! Dave Thornberg launches his O.D. Bird of Time into another great flight. Finished 24th. Guess the air hasn't changed much since the seventies, eh Dave?

(Above right) Here's the difference between a stock Legend (112") and a Standard Class Legend (100"). Ed Holder and Bob McGowan both claim they favor the clipped wing versions. (Right) "Number Two" Daryl Perkins holds up the new version Flite Lite Composites Falcon 800 with obechi veneer wings. Lighter, more accurate wings spells higher performance.



Safety first AND second! Two emergency manual power circuit breakers keep the motors from running away unchecked. Left one is a quick disconnect from an electric forklift charging system, and the right one is a Norm Timbs Engineering rotary cut-off switch built just for winches.

Col. Robert Thacker can't possibly be enjoying all the fun and games of the FSF . . . nahhhh! Looks like his early prototype Legend lost the polyhedral and gained some ailerons this year. The "23" is Thacker's Legend number. Most Legends sported such serial ID numbers.

WORLD CHAMPION!

CONGRATULATIONS TO
JOE WURTS AND
DARYL PERKINS

ON THEIR 1ST AND 2ND PLACE SWEEP
OF THE 1991 WORLD CHAMPIONSHIP
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They have FREE, on-site overnight camping with water. They rent the world's newest, cleanest and best smelling port-a-potties. They hire caterers to provide a super, on-site, Saturday evening barbeque dinner with live entertainment. It's a party for the people who attend, but it takes a lot of hard work on behalf of the CVRC! The results are phenomenal, and believe me it is very much appreciated by all who attend!

And then there is THE raffle... they have the BIGGEST industry, club, and community-sponsored raffle this writer has ever seen! It always features several radio systems, dozens of expensive kits, tons of modeling supplies, plus household and gardening items, and even one FREE VASECTOMY by a qualified doctor! About that vasectomy... last year you should have heard the roaring laughter when a young mother carrying a toddler came up to accept the envelope... and then called out for her husband! This year this same gal was called on to present this year's treasured prize to its new winner, a young, single man who probably has no need of it... yet! There's never a dull moment at the FSF!

If you wish to experience the FSF personally, I would recommend that you write to the CVRC in care of Marshall R. Searcy, P.O. Box 1508, Porterville, CA 93258, and ask to be placed on the mailing list.

WHAT WAS FLOWN AT THE 18TH FSF

According to the feedback I receive, this is the most interesting and important subject. Contests of the size and nature of the Fall Soaring Festival give an excellent status report on the state-of-the-art in American RC soaring. If you want to know what's "Hot" on the high performance hit parade, this is where you look. This report will be presented in two parts, this month and next. So, without further delay, here's the meat of part one.

Two commercially-produced model sailplanes are becoming VERY popular among the contest crowd. Last year, the Flite Lite composites Falcon 880 showed up in strong numbers. This year, there were even more Falcons present. So many, in fact, that jokingly I made a comment to a fellow Falcon flyer that it was beginning to turn into a Falcon one-design class contest. But there was another new design very much on the popularity upswing, Airtronics' Legend. At least 27 Legends were flown in the competition, 25 of them staying after the meet to get their group picture taken. When you con-

continued on page 82

11th ANNUAL N.W. MODEL EXPO '92

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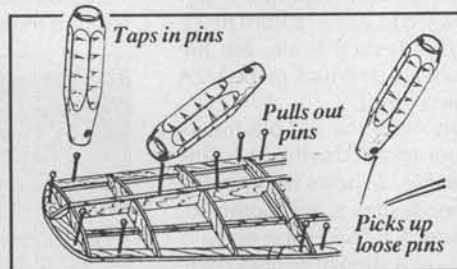
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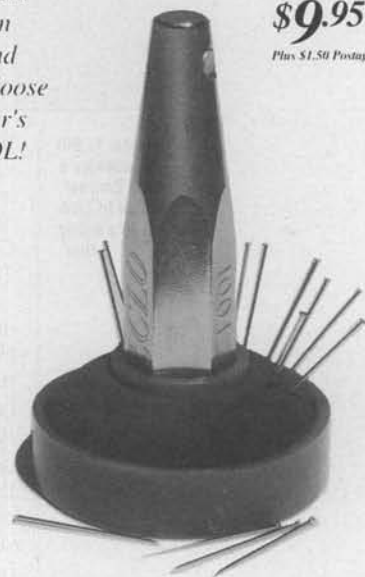
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PLUG SPARKS

BY JOHN POND

Contests and Photos

Every so often, we get a contest report complete with results and, most important of all, good photos! We thank Walt Geary, who sent in the account of the Atlantic County Skyblazers O.T. meet at the club field located at Egg Harbor, New Jersey. Gene Gatti is responsible for the write-up and all photos used. Naturally, we like to start with an action shot as seen in Photo No. 1, a Scientific Coronet built and

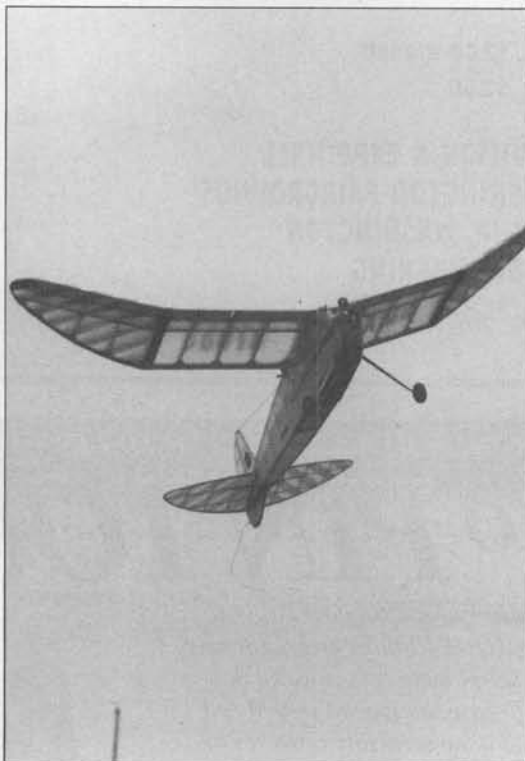


Photo no. 1. Bill Brenchley's Scientific Coronet, adapted to 1/2A Texaco, is a dandy flier.

flown by Bill Brenchley, who came up from Baltimore. Bill managed to garner a third place in 1/2A Texaco Scale, but the Coronet had no luck in the 1/2A Texaco event.

Who says the *old old* timers are not attracted to the O.T. fun? Photo No. 2 shows well-known model designer, Sal Cannizzo, holding a 1/2A Texaco entry, a Playboy. Although he didn't win, no one could complain about the weather at the start. It was one of those beautiful days with sunshine (lots!) and a gentle breeze. This was too good to last; things deteriorated to rain and stiff winds, thanks in no little part to Hurricane Bob, only 10 hours away. Got lucky!

Here's a real hero! Charlie Stager is seen in Photo No. 3 with his Playboy, which ran out of both luck and control. Seeing the model was headed right for the crowd, rather than risk an accident, Charlie put the model nose down on the hard, hard concrete. Needless to say, that Playboy will not fly again. Charlie is to be commended for his foresight and consideration. Getting along with photo-

to the fact that "Woody" Woodman supports every contest on the East Coast. Woody is always available and cheerfully attacks all problems. He is seen with a scaled-up Comet Zipper he has nicknamed "Crazy Horse." If the reader has never flown a Zipper under radio control, get ready for a shock. The model rocks back and forth in the climb very ominously. This is because the Zipper design



Photo no. 3. "Hero" Charlie Stager demolished his Playboy Senior to avoid endangering the crowd. Not much left!

graphs of the Atlantic County Skyblazers meet, Ed Baltera is seen in Photo No. 4. When this columnist first saw this snapshot, he thought he was looking at Eut Tileston, inasmuch as Ed does nice work, builds more than one for photos and has that familiar snow on the roof. Should be more like Ed!

Last but not least, Photo No. 5 is long overdue. We are referring

was made (in free flight) to spiral upwards. When the flier attempts to fly a hot Zipper straightaway, he gets a nasty surprise. Takes a little doing! He didn't name it "Crazy Horse" for nothing!

ENGINE OF THE MONTH

When the gas model craze first took hold in 1937, no one



Photo no. 2. Real old timer, Sal Cannizzo, with his 1/2A Texaco Playboy.



(Far left) Photo no. 4. Ed Baltera had a great time, at the recent Skyblazers meet in New Jersey. He flew a Playboy in 1/2A Texaco and won 1/2A Texaco Scale with his Velie Monocoupe. (Left) Photo no. 5. Woody Woodman rests with his oversize Zipper, named "Crazy Horse." (Below) Photo no. 7. Carl Carlson inspects the original Big Crate for damage to the fuselage after a spiral dive.

in his right mind expected this new phase of modeling to explode like it did.

Initially, engines were sold as separate items, but it didn't take long for the companies to realize that a package deal of engine, kit, and fittings would attract many modelers who did not have access to a local hobby supply store.

Those companies which come to mind are the Comet Zipper with Comet 35 engine (an early version of the Vivell 35), the Pee Wee Speedster with the Pee Wee engine, Megow with the Cardinal and the Lykens Brown (by Bill Brown of Brown Jr. fame) and, of course, the Baby Cyclone people who were the biggest and largest with three kits, the California Champ and the California Chief in Mk. I and Mk. II versions. This was followed by the highly successful Ohlsson Pacemaker powered by the Ohlsson Gold Seal engine.

Not to be outdone, the Cleveland Modeling Co. produced two outstanding scale models, the Stinson SR-7 and the Rearwin Speedster with a Bunch engine shown on the plans.

Early in 1938, the Packard Brothers contracted with Danner Bunch to produce an engine very similar to his successful Bunch Tiger called the "Tom Thumb." This enjoyed sales for two years until the outbreak of WWII.

Bill Effinger, of Berkeley Models, quietly observed all of this and eventually arrived at a deal somewhat similar to Cleveland, and began selling an engine known as the Berkeley "Cobra." Sales were never that great, as the engine had little exposure in the advertising pages of the modeling magazines.

Also in 1941, most all non-essential machining work came to a screeching halt when the



U.S. entered the war. Of interest was that at the end of the conflict, Bunch again produced the engine known as the Bunch Cobra. Not too many were sold as the Tiger and Mighty Midget were enjoying good sales through their own plant and through Bud Warren, who advertised extensively in *Model Airplane News*.

Bud flew a modified Bunch Scorpion Major, in which the

cabin section was faired over to a fuselage model called the "Warrior." Warren was very successful with this combination and did quite well at the contests, with resulting sales.

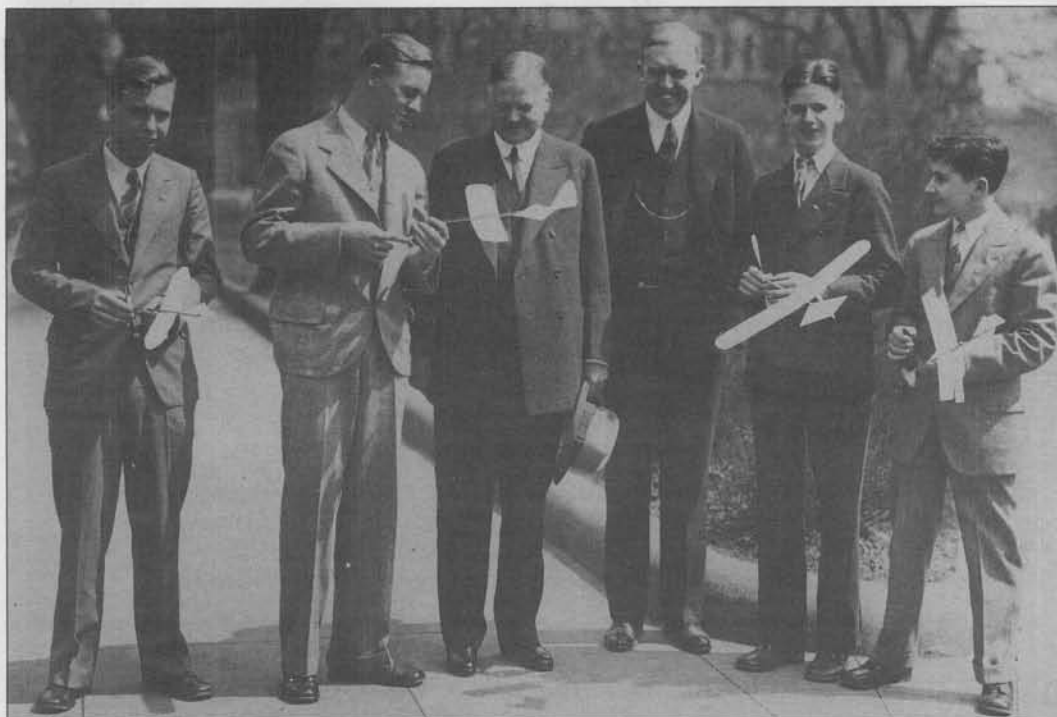
The Bunch engines were widely distributed and manufactured under a variety of names. It wasn't until the war was over that Roy Acord took over the sales of the Bunch Tiger and enjoyed a successful run of sales. The Bunch engines, regardless of name, are practically interchangeable for parts. Of course, the sideport versions were all alike with a side exhaust stack. The rear exhaust version (a la Brown Jr.) was called the "Mighty Midget" and turned out to be an excellent running engine. After Danner Bunch sold out to Acord, sales eventually fell off and the Tiger type engines dropped from the market.

SIXTY-FIVE YEARS AGO!

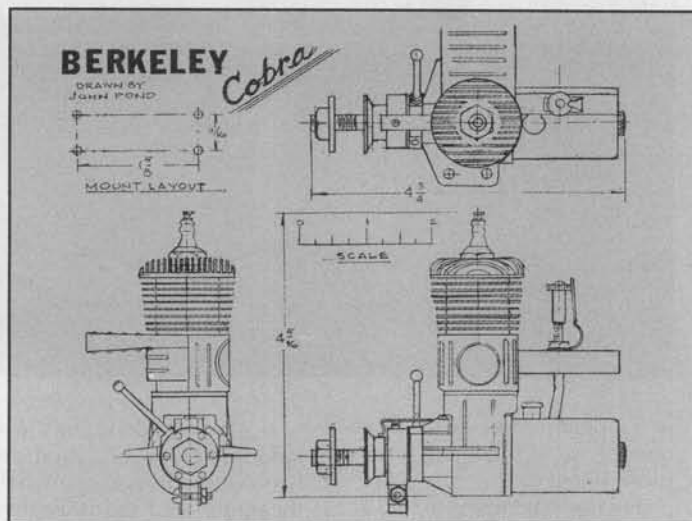
Man! That's a mighty long time ago from 1927. It is hard for this columnist to realize he has spent all his life promoting this hobby.

We have been looking for a

Photo no. 6. Winners of the 1928 AMLA National Championship meet with Secretary of the Dept. of Commerce, Herbert Hoover, and assistant secretary William McCracken. See more in text.



PLUG SPARKS



ENGINE OF THE MONTH

spot to feature Photo No. 6 showing the winners of the 1927 AMLA National Competition. Seen in the picture is Jack Loughner, 1927 Outdoor Stout Winner. In 1928, he placed 3rd in Stout Class A Indoor, 9th Bronze Award in Outdoor and

Photo No. 8.

One of the most popular non-standard AMA events, a Pan-Am Payload model by Bobby Parhin. A reworked Pacer called the "PAA-Sir."

2nd in National Outdoor Senior. Our next boy is Thomas C. Hill, who was one of the lucky recipients of a free trip to Europe offered by *American Boy* magazine, the meet sponsor. Herbert Hoover, then the Secretary of Department of Commerce, along with William McCracken, are seen next admiring Hill's model. (Hoover was elected President in 1928



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Photo No. 9. Per Holmberg produced this "Flyg-44," a proven design by Bjorn Karlstrom.



and took office in 1929.) Next is Ford Grant, who placed 8th in the Outdoor Senior Division. The star of the Nats, Aram Abgarian, 4th in Outdoor Junior Stick and 1st in Stout Indoor Class B is next.

Those receiving free trips were Hill and Abgarian. Of particular interest is the Bronze Medal Award Winner, Bill Atwood of Riverside. Old Bill went a long-time back! No question about it, *American Boy* went all out for the winners, even providing Merrill Hamburg, AMLA Secretary, as Manager, Guide, and

P.R. man. The trips were no less than magnificent, with visits to Toronto, Montreal, Liverpool, London, Paris, Geneva, Venice, Florence, and Rome. What a great trip! The nearest thing we have had to that is the Plymouth Aero League, which staged the famous Plymouth International, all expenses paid to Detroit for all qualifying contestants.

Good things couldn't last forever, especially in Depression times. The Detroit Board of Commerce was unable to contribute its annual \$7,500. *American Boy*, after four years

of contributing its staff for contest management, paying for the European trips and final banquet, dropped its sponsorship. The magazine solicited support from interested people and conducted AMLA activities for four years.

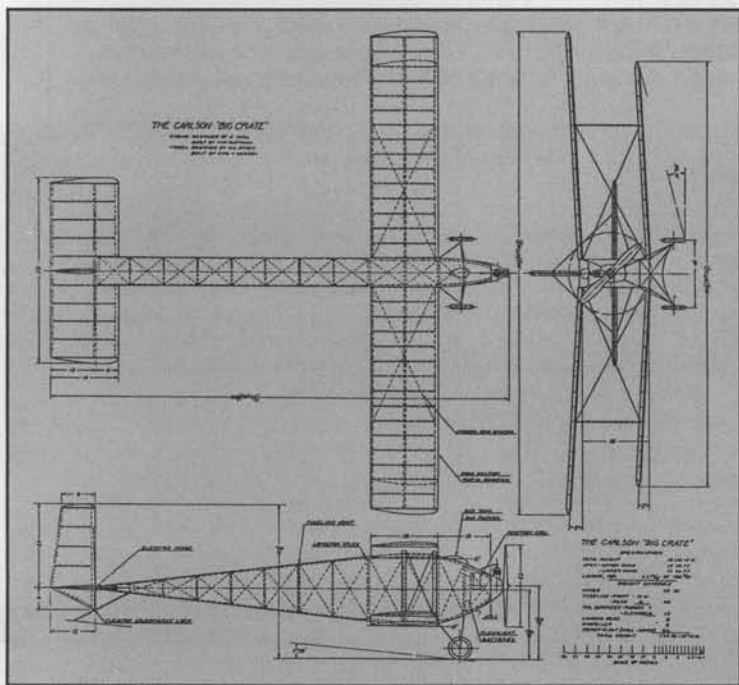
The last AMLA meet was held at Dayton, Ohio, with Merrill Hamburg conducting the meet. The four winners received trips to Detroit and then to Washington to meet President Hoover. The contests and trips were sponsored by the George D. Wanner Co. (model airplane supply) of Detroit.

and U.S. Model Aircraft, about the only model manufacturers prior to 1930.

At that time, *Model Airplane News* was the foremost (and only!) publication devoted to model aviation. However, at that time *Aero Digest*, the thick monthly magazine for full-size aircraft (might be considered the RCM of its day), featured a column written by R.E. Dowd called "Experimental." In each issue, a rubber or glider design was presented, and as it turned out, never too much of the same type design.

In April of 1932, this writer spotted an article on model gas engines by the Wall Engine Laboratories in Chicago, one of the early heavy successful engines used primarily in boats. This was followed by the exciting write-up in May 1932 on the Carl Carlson "Big Crate." This was truly a big model, a biplane with an upper wing span of 10 ft., 10 in. All totalled, the wing area came to 21 sq. ft., with an

continued on page 76



MODEL OF THE MONTH

MODEL OF THE MONTH

In the early thirties, this columnist had a penchant for buying any pulp magazine that featured airplanes, in particular WWI types. These magazines consisted of *Wings*, *Aces*, *Daredevil Aces*, *Air Trails*, *Flying Aces*, and many other pulps. Only a few featured an occasional model plan from Ideal

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Robbe/Schluter Jr. 50 II

PART II • BY JAMES M. WANG

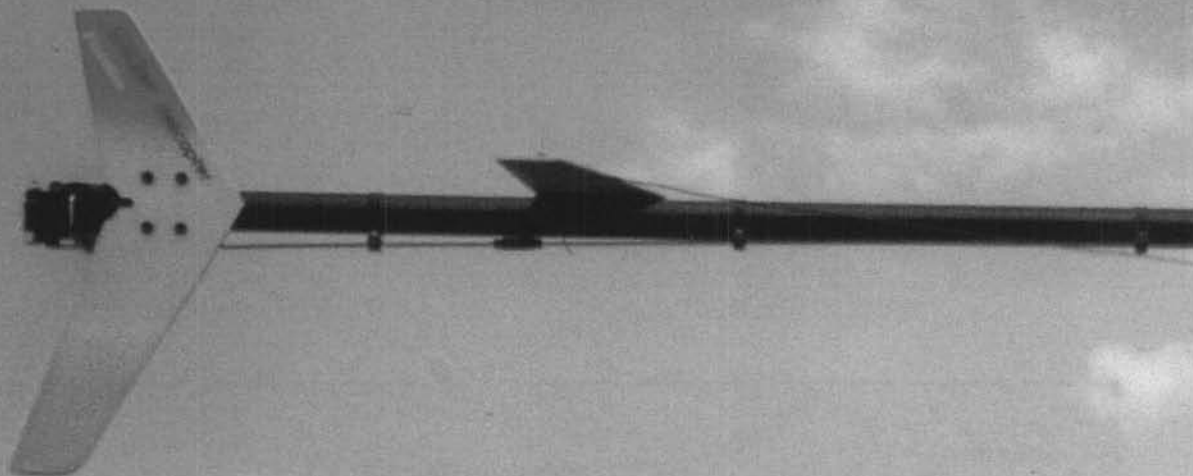
In Part 1 of this review (November 1991 *Model Builder*), we looked at the history of Schluter helicopters and discussed the engineering and crashworthiness of the Robbe/Schluter Junior 50 II. Now, let's examine the kit in the order of the building instructions, and evaluate the flying qualities. It took me four evenings, or about 20 hours to finish the model. The first thing I did when I got the kit was to cut and paint the canopy and fins. This way, when the mechanics were done, the paint would be dry.

When you open the box, you will find 17 bags of very well-packaged parts. Schluter kits are time intensive to build, but the

superb drawings and parts fit make it an enjoyable experience. There are two large sheets of detailed isometric drawings to help you assemble the model. Schluter kit drawings are the best in the world. They take pride and spend mucho dollars to have these drawings done. They are impressive. This gets an A grade.

First, I painted the canopy and fins. The canopy is humongous. It is bigger than the ones on many 60-size helicopters. The canopy alone is 10 ounces. Personally, I think the canopy should have been smaller, to reduce weight, and most importantly, aerodynamic drag. The canopy is big because the servo tray is similar to the Scout 60 tray. If the plastic servo tray was

Schluter Junior 50 II in a stable hover at big, green grass field of author's field, the Miniature Rotary Wing of Virginia. The canopy is very big and long makes the model very easy to see in the air.



helicopter world

smaller, then the canopy could have been smaller, too. But then, the model would become tail heavy. The eight-pound weight, small rotor, and the large fish-head canopy makes the Junior slow, but the material used in the canopy is very thick and resilient, and has endured three crashes.

The first two bags are the frame and skid assemblies. No problem; it took me one hour. The nylon landing struts are very strong. The landing skids are attached to the struts in a unique fashion, to ensure the front tip of the skids point up, and to prevent the skids from turning.

Bag 3 is the autorotation main gear assembly (one hour was spent here). The plastic main gear is mounted onto the aluminum autorotation hub with eight 3mm bolts. This is an overkill. Four or six bolts would suffice. For example, the X-Cell 60 only uses six bolts, and GMP used four. When fitting the plastic gear onto the hub, read the instructions carefully to avoid mounting the gear upside down. The autorotation one-way bearing is excellent. It has two rows of needle bearings. Even many 60-size units only use one row of needle

bearings. Also check to make sure the gear free-wheels in the correct direction.

Bag 4 is the centrifugal clutch. Another hour was used here. The centrifugal clutch is supported by two ball bearings. Very nice. Most models use only one bearing. The clutch lining is not the familiar black color asbestos-type material. Schluter linings are very wear resistant. It is a fiber material with threads of wire. The gap between the centrifugal clutch and the lining is perfect (around 15 thousandth of an inch). The blades stop when the engine idles. The self-aligning feature of the clutch is best illustrated in the picture. The entire assembly gets an A+ for quality.

An hour was spent on Bag 5, which is the engine mount. Care is needed to make sure the main gear meshes perfectly with the engine clutch pinion gear. A rule of thumb says the gears should spin together freely, but when you hold the big plastic gear fixed, the clutch gear should only wiggle very slightly. The gap between the gears on all helicopters should be about the thickness of notebook paper. Check this

Schluter kits are time intensive to build, but the superb drawings and parts fit make it an enjoyable experience.



by feeding in a strip of paper. It should be perfectly corrugated.

Bag 6 is the tail rotor drive front pick up. Bag 7 is the engine cooling fan housing. An hour was spent here. Bag 8 is the horizontal tail. This horizontal tail is the same tiny one as used on the Champion. It is so small, it is almost aerodynamically useless. The Junior, especially, has such a short tail boom, and

the stabilizing moment arm from the horizontal tail is so short, that it would seem to need a 100% larger horizontal tail. But surprisingly, the model has almost no nose-up pitching tendency in high speed forward flight. This shows the main rotor design has excellent dynamic behavior.

Bag 9 is the tail rotor gear box. This is an excellent unit. The plastic gear box is molded very cleanly. The four ball bearings supporting the two steel shafts fit perfectly in the recesses. Unlike the Champion, the tail rotor pitch control does not have two tiny ball

bearings. The plastic tail blade grips are each held on by only one radial bearing. This causes some slop on the tail rotor blade grip assembly.

Fellow heli modeler, David Ramsey, recommends upgrading the single radial bearing unit with a double-bearing unit from Schluter (one that has a thrust bearing and a radial bearing). Without a thrust bearing, all the centrifugal load is taken up by the radial bearing, and radial bearings are designed for spinning radial loads, not axial pull loads. David's locked up after four hours. Mine did not lock up after 100 flights, but the radial bearing cage started to come off. Once the cages come off, the steel balls will soon leak out. The symptom of soon-to-fail cages is a lot of flapping play in the tail blade grip. It is best is to open the tail blade grip periodically and inspect the bearing. But not every Junior owner has this problem. Specifically, the Junior I has been around for four years. Any problem that existed would have been corrected by Schluter of Germany. Ideally, there should be a radial and a thrust bearing, as on the X-Cell, and Schluter's 60-size models. I have recently updated mine with a Scout 60 double-bearing unit.

Bag 10 is the tail rotor pitch control. The pitch control system is nice and smooth. It uses the traditional, slightly old fashioned sliding wire inside the tail rotor shaft design. But, it works.

Bag 11 includes the swashplate and the four control bellcranks.

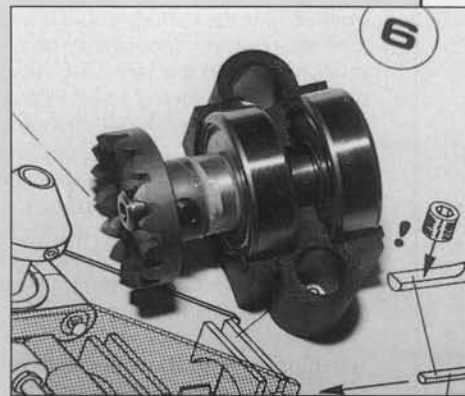
The swashplate is plastic, but with a metal center pivoting ball. The ball is sandwiched between two metal plates. By tightening three machine screws, you can get a perfectly slopless swashplate. Most other swashplate designs are not adjustable. The Schluter brass ball and black ball links are probably the best kit ball links. Even when they are new, they are not too tight or too loose... just perfect. There is also a hole at the end of the threaded hole on the ball link so you can see how far the pushrod has been threaded into the link.

The four bellcranks are excellent in design, because at the pivot, the bellcranks are 1/2-inch thick, which helps prevent the bellcrank from wobbling. White Delrin bushings are used at all bellcrank and mixing arm pivoting locations. When the pivoting bolt is tightened down properly, these Delrin bushings are slopless; they are just as good as ball bearing bellcranks. However, these bushings will wear out faster than ball bearings. To get slopless movement from any moving arms, keep on tightening the bolt until the arm moves with slight friction. All Schluter kits come with a generous big tube of Bosch grease. Use plenty of grease inside all the moving bushings and tail drive wire, and gear box.

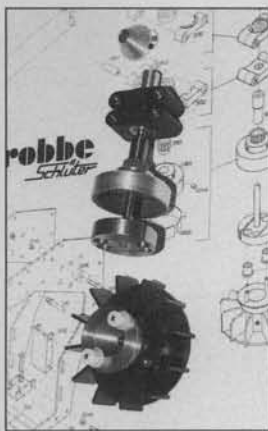
Two hours were spent on Bag 12, the main rotor head. The rotor head is a floating axle design, similar to the X-Cell 60. But the inside of the Junior's System 88 rotor head has a ridge that forces the floating axle to pivot at the center of the axle. The ridge also prevents the axle from compressing the top side of the two rubber O-rings. The flybar is located underneath the main rotor plane. I have said in other articles that this really does not affect the dynamics of the helicopter, nor does it improve the usefulness of the flybar. It just makes the model more compact and easier to fit inside your trunk. The other benefit is that it shortens all the pushrod lengths to make the control more rigid.

Bag 13 is the fuel tank. The tank is only 300cc (about 8 ounces). For a 50-size model, this is too small. You can only safely get a 10-minute flight.

Its location is hidden by the canopy and makes it difficult to see in flight. I subsequently strapped a two-ounce feeder tank to the frame, below the cooling shroud and behind the engine. This increased the flight time to 12 minutes and makes the fuel



This is the tail rotor drive pick-up gear. As shown in the drawing, this metal gear (0191) rides directly on the clutch bell's pinion gear. Notice the 3341 2mm tail drive wire showing in the drawing. It is already flattened by the manufacturer. This prevents the drive wire from slipping. Excellent attention to details.



Our author's favorite feature on the Junior is this centrifugal clutch assembly. As shown in the drawing, the clutch (3156) is not attached rigidly to the flywheel/fan (3178). Instead, the clutch is mated with the flywheel through two steel pins. And two plastic nipples are slipped over the pins to absorb vibration.



level in the feeder tank very easy to see. This is because fuel in the main tank will empty before the feeder tank.

At this stage, the only things left are to bolt everything together, and add the plastic servo tray and radio. The convenient plastic tray requires only a few screws to whip it together; no glue! The rocking servo collective/cyclic control system does require two hours to properly align. When the collective servo arm moves, all three servos will swing in unison. This raises or lowers the swashplate. The two servos on the back are for fore/aft cyclic and roll cyclic.

The Scout 60 and Magic use identical setup and parts. In my Schluter Magic review (March and April 1990 *2*Model Builder*1*), I showed that I used the four-servo CCPM (collective-cyclic pitch mixing) electronic mixing feature on my Futaba 9VH radio. Electronic mixing eliminates the complicated mechanical System 88 mixing arrangement. But after more than a year of flying on my Magic, I think I actually prefer the mechanical mixing on the Junior. If I were to build another Magic, I would not use CCPM. CCPM causes servos to bind when cyclic commands are given at extreme ends of collective

travel (at full positive or full negative pitch). This causes excess wear on the servos, and leads to build-up of slop at the servo output shaft. On the contrary, the mechanical System 88 rocking servo mixing design does not cause binding, and the Hiller paddle seems to be very nice and tight.

The plastic servo tray acts as a very strong protective cage. I have crashed my Junior three times already,

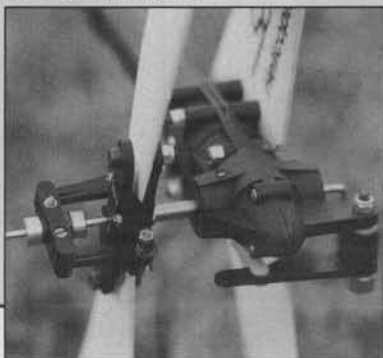
Closeup of the remote glow plug extension system. It's fabricated by using two alligator clips and a 1/8-inch mono phone plug.

with no damage to the radio. The gyro is hidden inside the center of the plastic servo tray cage system. You should always wrap the receiver and battery pack loosely in foam. I recommend you keep the plastic bags that come with the kit, and use them to bag the receiver and battery. I have found that putting the foam-covered receiver inside a plastic bag enhances the crash survivability tremendously. The bag has a cushion of air and helps absorb shock. In the past seventeen years, I only recall one receiver being totalled from all the crashes I accrued. So, protect the fragile receiver and battery with foam and a bag.

Finally, the last bag, number 17, is an assortment of extra free nuts and bolts for spares. Very thoughtful!

Now, let's evaluate the handling qualities. What good is it if a helicopter is well kitted, but doesn't fly well? The Junior is designed with the beginners in mind. All of Schluter's 60-size machines cater more to the experienced fliers or the meticulous builders. Learning how to fly with a Scout 60 or a Magic is like learning how to drive with a Mercedes.

The tail rotor hub and gear box. Classic style of a single wire through the hollow hull shaft is used for tail rotor blade pitch control. Unlike the Champion, there is no ball bearing inside the rotating pitch control plate.



The left side of the Junior. A special MAC header sold by Robbe or Chapman was used for the MAC tuned pipe or V-Tech pipe. The convenient cone starting system is used. Entire servo tray is molded from plastic; very convenient and light weight. The only wood parts in the kit are a wood bulkhead and the main rotor blades.

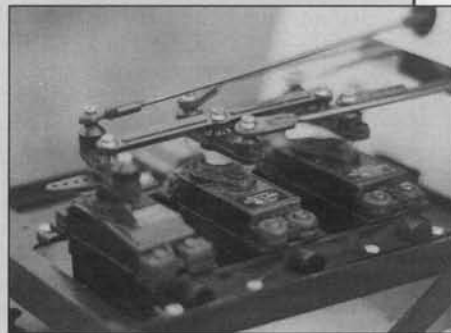
If you can afford to do so, you can consider yourself lucky. The less expensive Junior retains the solid control feel of the bigger 60-size models. The Junior is very stable in hover. It doesn't diverge or peel away. But, if you want to hover it dead still without moving an inch, then it becomes difficult

with the Junior. I think this has to do with the small main rotor disk, and high disk loading nature of Junior.

Disk loading is the weight the main rotor disk area has to support. It is similar to wing loading on fixed wing airplanes. For example, both the Junior 50 and Concept 30 have about the same main rotor diameter, but the Junior weighs 8 pounds, 4 ounces, while the Concept weighs six pounds. This means the Junior has a much higher disk loading. Disk loading has a strong influence on flight characteristics. The analogy is like comparing a light wing loading propeller plane to a high wing loading jet plane. One characteristic of the higher disk loading helicopters is that they behave more like balancing a short broomstick in your palm. When you are balancing a short broomstick in your palm, you will notice that the stick will want to fall quicker, but because the stick is shorter you can also control it better and faster.

With the Junior, there is plenty of cyclic control. Two sets of Hiller control paddles are included in the kit. With the thin paddles and the flybar weight all the way outboard, I can easily roll the model into inverted from hover. I am using plus and minus 35 degrees of paddle movement in the roll direction, and plus and minus 30 degrees paddle movement for fore/aft cyclic. When the control is maxed out like this, the Junior is great for hot dogging. For beginners, I recommend using the thick hollow paddles that come with the kit. I suggest 20% exponential on fore/aft and roll cyclic, and 8% exponential on tail rotor control.

Tail rotor control on the Junior is quite sluggish. Pirouettes are slow compared to other 30-size and 60-size helicopters. The reason is that the Junior has a very short tail boom which gives it a short leverage arm. Also look at how far the canopy nose sticks forward. The model has a lot of yaw inertia and flat plate drag to overcome when doing the pirouette. I only do 180-degree stall turns and not 540-degree stall turns on my Junior.



Closeup of the triple swinging servo collective and cyclic control system. The servo on the front is for collective. When its servo arm moves, it rocks itself and the two cyclic servos in unison. The servo in the middle is for roll cyclic, and the back one is for fore/aft cyclic.

I'm afraid it might not make it at low altitude. However, it yaws to the right faster than yawing to the left. This is observed on other Schluter models, too. The reason is simply because the Schluter tail blades are highly cambered Eppler airfoils. When yawing to the right, these cambered airfoils are great at producing lots of lift to pull the tail to the left. Hence the model yaws to the right faster. You can go into your programmable radio's ATV section and reduce the servo throw for right tail rotor command by 10% to make the yaw control feel symmetrical.

It would be interesting to lengthen the Junior tailboom by two to three inches, which would improve the yaw control, and allow reduction of the main rotor disk loading by using two-inch longer blades. This would also leave an extra inch of gap between the main rotor and tail rotor disks, which reduces the aerodynamic interactions. I have seen a friend's Junior with longer tail boom and blades and it flew great. David Ramsey says Bruce Wheedon has replaced the short Junior tail boom with a Scout 60 tail boom and it now floats down in autorotation. I will soon replace mine with a Champion tail boom because it is three inches longer. By the way, the Champion tail boom is the same price as the Junior tail boom (\$16).

Why does the Junior come with such a short tail boom? The model is designed on a different philosophy than other models. The Junior and its predecessor, the Miniboy, were designed to operate at high rpm; 1800 to 2000 rpm. I have tached some best flying Juniors revving at 2000 to 2200 rpm. The philosophy is to achieve dynamic stability by revving the main rotor at high speed to get gyroscopic stability. The only way to avoid producing too much lift at high rpm, while still operating the blade pitch at three to four degrees in hover, is to reduce the rotor diameter. Most helicopters hover at three to two degrees because this angle is the most efficient, giving the most lift and minimal drag. And, it still allows six to seven degrees of collective pitch remaining for climb before the blade stalls. Most model blade airfoils stall around 10 to 11 degrees.

Another general rule of thumb: high rotor rpm improves the cyclic control feel and fore/aft and lateral stability, but makes the vertical control more sensitive and less stable. Low rpm gives the opposite. The Junior uses high rpm to achieve longitudinal and lateral stability. To prevent vertical instability, the rotor diameter is reduced to lessen the amount of rotor vertical inflow change. Inflow is the amount of air flowing through the main rotor disk per second.

The stock wood blades are not weighted. I think they should be. I milled a slot in my blades and epoxied 35 grams of lead in

each blade. The stock blade was 90 grams each. With the weighted blades, the model became even more stable. I highly recommend that you buy the optional slotted and weighted blades from Robbe. At 90 grams per blade, my Junior is a good hot dogger, and very controllable, but it is more relaxing to fly it with weighted blades.

Without any lead weight you can forget about doing any autorotation with the Junior. My first set of blades, with 20 grams of lead, has a total weight around 110 grams per blade. When the engine suddenly quit on one flight, I knew it was "adios amigo." Even with my new set of blades, I still don't dare to auto the Junior. Put it this way, I have tried a hovering auto from four feet. The model would float to the ground, but you cannot hold even a one-second hover. There is no reserve. Ramsey weights his Junior blades to 145 grams each and he can do an auto, provided he does not play around on the way down nor have to flare and touch down precisely. It's like landing a jet plane when the engine flames out; because of their high wing or disk loading they do not have much of a glide.

Unlike the Scout 60, the Junior 50's main rotor head does not have any thrust bearings. I have never heard of any blades flying off, but I don't add that much lead weight (mine is 125 grams each), and I operate mine at 1800 rpm. If you want to add lots of lead weight and rev yours at 2000 to 2200, I recommend you buy the optional thrust bearing from Robbe/Schluter. Even though the Junior blades may like to rev at 1800 to 2000 rpm, because the blades are very short, the centrifugal force is still less than experienced on 60-size machines at 1500.

There are three engines that we recommend for the Junior: Webra 50 Speed, O.S. 50 FSRH or 50 FSR, or O.S. 46 SFH. The O.S. 50 puts-out 1.45 hp., and the 46 SF puts out 1.43 hp. The Webra 50 also puts out about the same. The Junior is not a speed demon. In fact, I call it a slow poke . . . zipping around, full throttle, at 50 to 60 mph. My 30-size helicopters fly just as fast. Typical 60-size models can do 60 to 70 mph. With modified engines, 30% nitro fuel, and streamlined fuselage, a very good 60-size model can move at 80 mph. The Junior may be slow, but the control feels are solid and responsive due to the floating axle head design.

The 50 FSR is probably the most user-friendly engine in the world. Its 5B carburetor is extremely easy to set. The new 6B carburetor on the O.S. 61 SFN is a copy of the 5B carb. As long as you run the 50 with nice rich smoke, it will give you years of trouble-free service. The 50 does have a slightly bigger crankcase than the 46 SF. Hence, when mounting it on the Junior, the

two steel brackets will bow out slightly, but don't worry. I recommend 10 to 15 percent nitro fuel. I usually use fuel with synthetic lubricant to prevent varnish build-up on the shiny muffler. Castor oil lubricant causes brown dots on the shiny muffler. Experts such as Cliff Hiatt only use fuel with synthetic lubricants.

Three different exhaust systems have been tested on my Junior: MAC tuned pipe, Hirobo box muffler, and Schluter 925 can muffler. My friend had a Chapman V-Tech pipe on his. The V-Tech and MAC pipe give very good power, but the standard Robbe/Schluter 925 muffler is the easiest to set up and is the most trouble-free

continued on page 76



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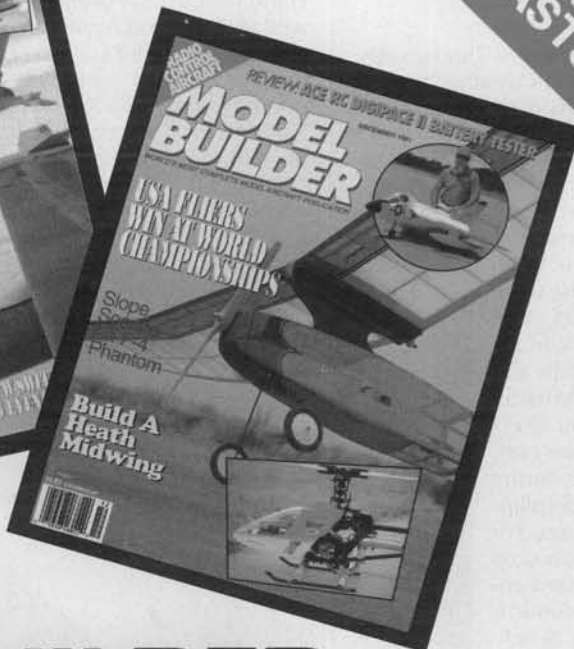
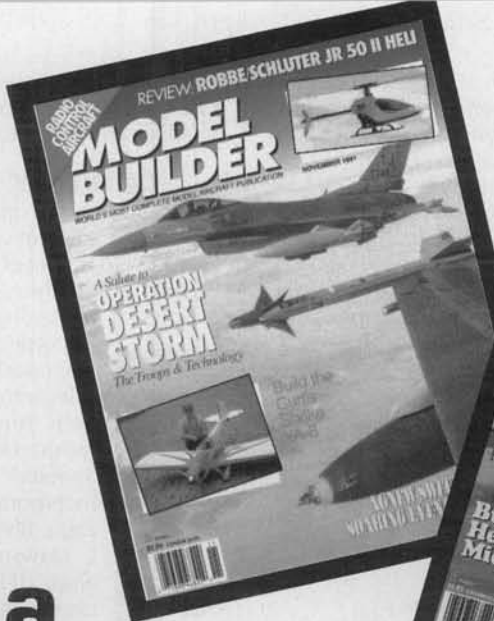


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Square Park near Los Angeles. This two-day meet was blessed with fair weather, a good turnout and a fine variety of models, including Peanuts, Jumbos, regular rubber-powered scale models, Power Scale plus the massed-launch types.

Contestants traveled from as far away Texas, and a great time was had by nearly everyone. What a treat visiting with these wonderful model builders, and seeing their handiwork in action. For complete results and photos, see the *Flightmaster* newsletter. What, you don't subscribe? Six issues are published each year, featuring news, handy hints, model plans and three-view drawings. For membership information, drop a stamped, pre-addressed envelope to Byron Calomiris, 3406 Fela Ave., Long Beach, CA 90808.

AND IN FLORIDA

Each year the Florida indoor modelers conduct a change-of-pace outdoor R.O.W. contest. Hosted by Jeanne and Millard Wells, the low-pressure, high-satisfaction affair is held in a shallow bay, with only two categories, "fuselage" types and "stick" designs. The more complex models are judged for charisma as well as Rise-Off-Water ability, on a scale of 10, Olympics style. By contrast, the simpler models are judged only on duration after R.O.W.

Entries this year included a Pistachio, several larger scale models, sport models and a Comet Aeronca K. Millard Wells offers the following advice for other clubs that may care to try R.O.W.: Have some sort of a retrieval boat available. Be selective in your choice of launch site. A shallow beach with enough area to launch into a shore breeze is best.

Model float design is critical. The best Florida results have been with floats mounted well forward, and having a step about 33% ahead of the model's center of gravity. Short-winged subjects seem less tricky. More power is required for R.O.W. than for R.O.G. Note this most practical admonition: "Count on your model getting wet!"

In keeping with the fun flavor of the meet, every entrant able to R.O.W. a model re-

cording to his mother, Margaret Pinkston. Our condolences are extended to all of Bill's relatives and many friends.

COWBOY BIPLANE?

Ever hear of a Tom Mix model airplane kit? During a recent visit to the hangar with his marvelous fleet of Pistachio models, Gil Caughlin, of Washington state, brought along a little kit belonging to Charlie Glassie.

According to Gil, Charlie has a real knack for attending garage sales and swap-meets at the right time. Anyhow, the kit, manufactured for the "Ralston Straight Shooters" by Scrambled Eggs, Incorporated (honest!), of Chicago, Illinois, was designed by J. Dawson. The rubber-powered, all-balsa two-winger featured a fairly elaborate instruction sheet, from which we extracted these timeless comments: "Always work as neatly as you can, as a well-built model will not only fly better, but will be something that you will be proud of." And, "Should the model be damaged in any way by flying, it can be repaired as good as new with the cement in the kit."



Akira Igami, Kinya Ichikawa, and Howard Voss are still smiling after judging 100 models in the Nagoya, Japan, Peanut Contest. Photo by Jiro Sugimoto.

ceived a handsome certificate, and the winner was presented with an original watercolor (naturally!) by Millard Wells.

BILL PINKSTON

Another fine friend and model builder has passed away. Bill Pinkston, of Mt. Vernon, Washington, had far-ranging interests including autogyros, hydroplanes, naval vessels, and racing cars as well as most conventional aircraft. Several of his large-scale models are displayed in the Seattle Museum of Flight, and photos of his projects have appeared in this column from time to time.

Sadly, Bill was soon to be married, ac-

BITS 'N PIECES

Here's an unusual name for an unusual publication! Published quarterly by Louis LaValle, it is aimed at the not-so-serious RC aero-enthusiast, and promises no politics or heavy-duty editorials: "Our belief is that this exciting sport of model aeronautics is primarily for fun." The first 12-page issue has light, interesting reading, with an eye toward entertainment, an aeromodeler crossword puzzle, publication reviews, classified advertising and more.

Balsadust also markets specialized RC products, the first of which are model and transmitter I.D. labels. For complete subscription and pricing information, contact Balsadust Enterprises, Box 78, New York, NY 10021.

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Model Builder contributor and *Model Aviation* magazine columnist Bill Warner has recently compiled a source list called *Cottage Wings*, aimed at "beginners of all ages." This strictly nonprofit undertaking is intended to point out sources of supplies, plans, publications, newsletters, kits and organizations relating to free flight models. For \$1 you can obtain your very own copy of this very useful guide from: Bill Warner, 1370 Monache Ave., Porterville, CA 93265. Not incidentally, the first volume of Bill's long-awaited *Hey Kid...Ya Wanna Build A Model Airplane?* is now available from better book outlets. Ask for it!

Imagine what it must be like taking inventory for Bob Banka, who now stocks over 10,000 three-view drawings and over 3,000 photopacks! If you'd like to tap into this remarkable wealth of reference material (and let Bob find it for you), simply send \$4 for his catalog: Scale Model Research, 2334 Ticonderoga Way, Costa Mesa, CA 92626.

Allison gears (Not the type employed in full-size aircraft engines) are used to extend the duration of small rubber-powered models. Individually cast from epoxy by Mark Allison, these lightweight gears are available in a variety of ratios. Dedicated builders can drill and mount them in their own gearboxes to suit particular models. Do they work? Well, Mark's own gearbox-equipped Falcon Pistachio recorded 80 seconds duration under a 27-foot ceiling, compared to his direct-drive version which achieved only 45 seconds. One dollar will bring you highly-detailed instructions on making a gearbox, as well as a price list: Mark Allison, Route 1, Box K4, Bishop, CA 93514.

Daniel Baird manufactures a line of items for CO₂ engines, including tiny refilling nozzles and chargers which will accept large sporting goods-style cartridges. He also offers very reasonably-priced machined aluminum radial mounts for Cox .010 engines, which are stronger than the old plastic variety, but weigh practically the same. Workmanship on all of these items is first-class. For full information, contact: Daniel E. Baird, 3529 Koon Lane, Knoxville, TN 37931.

"Rejuven" is a multipurpose product intended to rejuvenate and restore resiliency to almost anything made of rubber. According to the manufacturer's literature, it can be used to clean rubber strand motors before lubing, and again before storing, to extend rubber life and increase performance. To learn more about Rejuven, write to Edward Schlosser Associates, Inc., Box 412, Ridgefield, NJ 07657.

BOOKS FOR MODELERS

Subtitled *An International Guide to Plans and Kits*, this book was compiled by professional librarian John Fredriksen, and is a surprisingly comprehensive production. Featuring over 8,000 listings, it enables quick location of model designs from 25 different

countries! Most descriptions include the model's wingspan, type of power, mode of flight (free flight, CL or RC) and price. One can only marvel at the correspondence which must have been involved in even locating this material, let alone typesetting and proofreading it!

Also featured is a global directory of sources, documentation, organizations and publications. This 304-page book is priced at \$14.95 plus \$2.95 shipping from Air Age Publishing, 251 Danbury Rd., Wilton, CT 06897, and other book outlets. How about a civil aircraft book next, John?

Herb Gifford is trying to thin out his accumulation of aviation books and magazines (sounds to be a good idea for many of us!), and offers a list of reasonably-priced and carefully described publications. Herb also suggests you might ask, in case you are looking for something not on his list. Write: 417 Howertown Road, Catasauqua, PA 18032.

Ducted-fan enthusiasts may be interested in this fine monograph published in Czechoslovakia, featuring the MiG 21 and its many variations. The 48-page book has text in both English and Czechoslovakian, so no translation is required. Contents include historical background information, highly-detailed multi-view scale drawings, a cutaway view, and many black-and-white photos, plus more than 100 in color, obviously selected with the modeler in mind.

We were particularly impressed with the comprehensive cockpit coverage. For ordering information or dealer inquiries, write to: Michal Ovacik, 4+ Publishing Co., P.O. Box 27, 198 00 Praha, Czechoslovakia.

SIGN-OFF (AT LAST!)

In our September column we spoke favorably about the rubber-powered model plans offered by Flying Scale Incorporated, then failed to give the address. Apologies all around, and here 'tis: 1905 Colony Rd., Metairie, LA 70003.

According to a clipping from John Walker, of Suffolk, Virginia, officials there contemplate permitting Planters Peanuts, Inc., to erect a nine-foot high monument celebrating the 75th anniversary of Mr. Peanut in a local park. Meanwhile, the Peanut Scale model concept, originated by Dave Stott and Bob Thompson, is nearly 25 years of age. How time flies when you're having fun.

Raymond LeFrancois, of Stafford, Vermont found this quotation on a jar of Newman's All Natural Bandito Salsa:

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take some glue,
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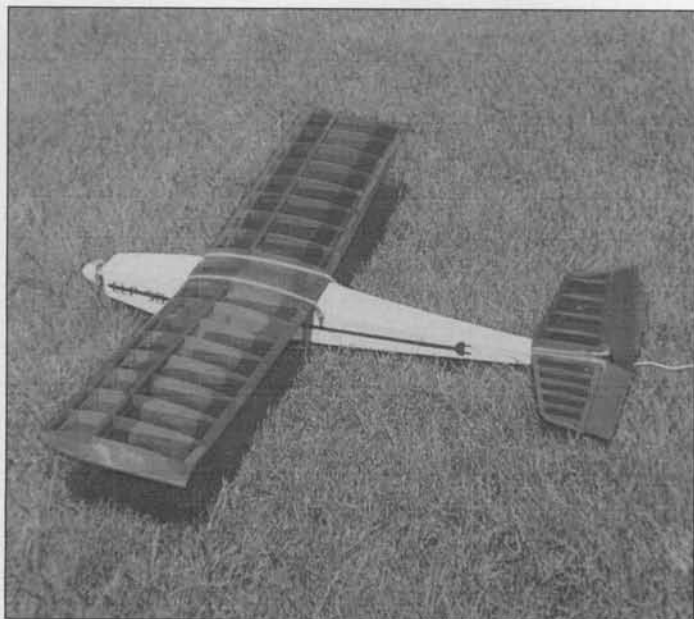
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LLP-50

BY RON STANDLEY



This little model (38-inch span) is powered by a Peck-Polymers Silver Streak motor and six 1000 mAH AE cells. Radio is a Futaba FP-4NBL electric, with S133 servos and pull-pull cable linkage. Total weight is only 17 ounces, and total flight time averages 10 minutes (including a few aerobatics and some 1/2-power cruising).



This project started after a search for a small electric powered airplane. I found a few airplane kits and some nice designs in various magazines, but none were exactly what I was looking for. Most of the small airplanes were for the 05 size motors, with six or seven 1200 mAH cell power. This resulted in a plane larger and heavier than I wanted. My only recourse was to design a small plane more in line with what I was after.

This airplane is not a trainer. It is small, and does not have the power reserve that a good trainer should have. It is maneuverable, light and will produce flights of eight to twelve minutes under normal conditions. With a wing loading of around 10 ounces per square foot, it will thermal quite well. All balsa should be light except for the 1/8x1/4-inch spars; use medium balsa here. By accurately cutting the balsa, thin CA glue can be used for all assembly except as noted.

First, some quick specs on the airplane shown in this article. Wingspan is 38 inches (256 square inches), length is 25-1/2 inches, and power is a Peck-Polymers Silver Streak motor and six 1000 mAH AE cells. It is controlled by a Futaba FP-4NBL electric radio and S133 servos using pull-pull cable control. By using contest balsa and light covering, the weight of this combination came out to 17 ounces. I have been flying this configuration and can achieve flights of around ten minutes of sport flying (a few loops, spins, etc., and 1/2 throttle cruising).

FUSELAGE CONSTRUCTION

Cut two identical fuselage sides according to the plans. Pick one side and mark as the right side. Cut formers F2 and F3 from 1/32-inch ply. Cut F1 from 1/16-inch ply. All other fuselage parts will be cut to fit as they are installed.

Lay the right side on the plans and mark the location of formers F2 and F3 on it, then align the left side on the right side and transfer the former marks to the

left side. The two fuselage sides should now show the position of formers F2 and F3. Trim 1/16 of an inch from the front of the right side and mark the position of F1 as flush to the front of each side. This will give the proper right thrust to the motor mount F1.

Pin the right and left sides down on a building board. Be sure the inside of both sides are up (you should see the marks locating the formers). It is not necessary to pin the sides on the plans, since the critical locations of the formers are marked on the sides. Again, note that the position of former F1 on the right side is 1/16 of an inch back from the position shown on the plans, since this side is 1/16 of an inch shorter than the left side (the plans show the length of both sides, before the right side is trimmed).

Glue formers F2 and F3 in place on the right side, keeping both vertical to the side. Note that the notches on F3 are at the bottom.

Glue the 1/8x5/16-inch brace for former F2 in place on the right side behind F2. Glue the 1/8x5/16-inch brace for F2 on the left side, located to the rear of the mark for F2.

Glue the top and bottom 1/8-inch square stringers to the right and left sides. The bottom stringer slides into the slot at the bottom of F3. Glue the 1/8-inch square stabilizer support stringers in place on both sides.

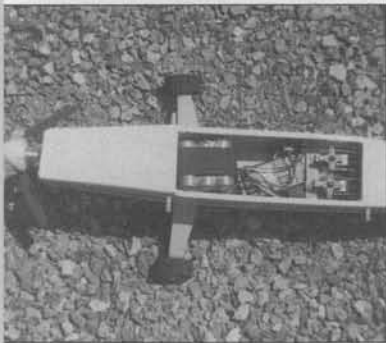
Glue the 1/8x5/16-inch wing saddle braces to both sides, and trim to the contour of the wing saddle.

Glue the 1/8x5/16-inch front motor mount (F1) braces to both sides. These braces are positioned 1/16 of an inch back from the front of each side.

Join the left and right fuselage sides by gluing the left fuselage side to formers F2 and F3. F3 should slip into the slot created at the back of the left side wing saddle brace. F2 should rest against the front of its brace on the left side. Before gluing, squeeze the back of the fuselage sides together so they meet to check the alignment. This step

is critical to the alignment of the fuselage.

Bring the fuselage sides together at the back and glue. Square off the end, and glue a piece of 1/16-inch scrap balsa,



with the grain horizontal, as former F4 across the fuselage ends.

MOTOR INSTALLATION

The method of mounting the motor depends on which motor is to be used. This article will describe the installation of the Peck-Polymers Silver Streak motor. Any of the small 50 watt motors can be used, including an Astro Flight 020 Cobalt. In the case of the Astro Flight, mounting is a little more difficult since the brush holder ears keep it from being installed through the front of F1.

Cut the hole in former F1 for a loose fit around the motor to be installed. Allow at least 1/8-inch clearance around the case of the motor for cooling. Glue F1 in place against the 1/8x5/16-inch braces on the left and right fuselage sides.

Glue the 1/8x5/16-inch braces at the top of both fuselage sides, between F1 and F2. Trim to the profile of the fuselage after gluing. Glue a 1/8x5/16-inch horizontal brace at the back of F1 between the braces just installed. Glue a 1/8x5/16-inch horizontal brace at the front of F2 between the braces just installed.

MOTOR MOUNT

The motor mount is designed to break away and allow the motor to be pushed back into the fuselage in case of a sudden stop. This, and using a folding prop, should help keep the motor shaft from bending. I know that this works, having had a few opportunities to test it.

Start assembling the mount by cutting a 1-1/2x1-3/4-inch

piece of .025 clear semi-flexible plastic. This is the same plastic that is sometimes used for model airplane cabin windows. Cut a hole in the center for the motor shaft, and two holes for the motor mounting screws. Attach the motor to the mount, and insert the motor into F1. Locate and drill four holes at the corners of the mount for sheet metal mounting screws. Don't pre-drill the screw holes in F1; let the sheet metal screws tap their own holes. After the mount is fitted, remove the motor from the mount, and cut the mount into two triangle shaped pieces as shown on the drawing. This will allow cooling air to flow around the motor. Also, it will be easier for the motor mounting holes to split open and free the motor to push back into the fuselage (the aforementioned sudden stop). You might make a spare mount at this time to keep in your field box.

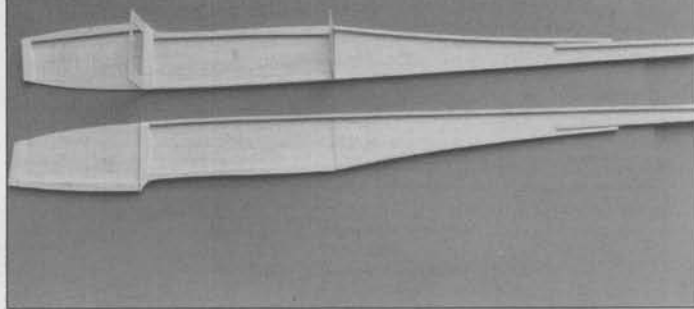
MORE FUSELAGE CONSTRUCTION

Locate and drill the holes for the 3/16-inch wing hold-down dowels. The dowels should be flush against F2 and F3 for gluing later. Remove the dowels until after covering.

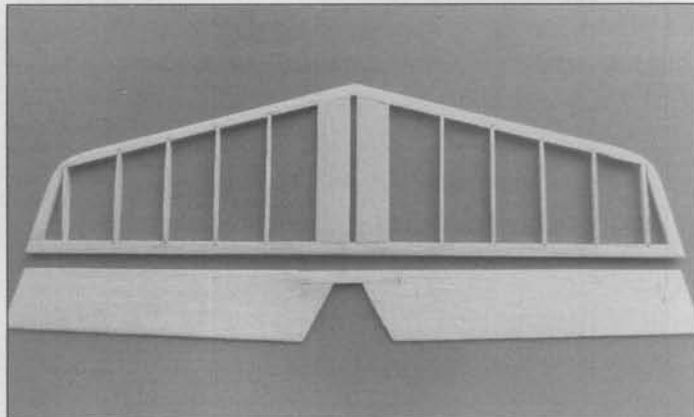
Sand the front top of the fuselage for a good fit for the 1/16-inch balsa top, and glue the top in place. The grain for this piece runs front to back. Glue the 1/8x5/16-inch balsa lower front fuselage braces in place. Trim to the contour of the fuselage after installation. Glue the 1/16-inch lower front fuselage sheeting in place with the grain crosswise. Glue the 1/32-inch ply fuselage bottom in place, and drill a few 1/2-inch holes for cooling. As the Silver Streak motor draws eight amps or less, the motor, battery and speed control don't require much ventilation.

If you are going to use a landing gear, install the 1/8-inch plywood landing gear brace behind F2. It goes between the 1/8-inch stringers and flush to the back of F2.

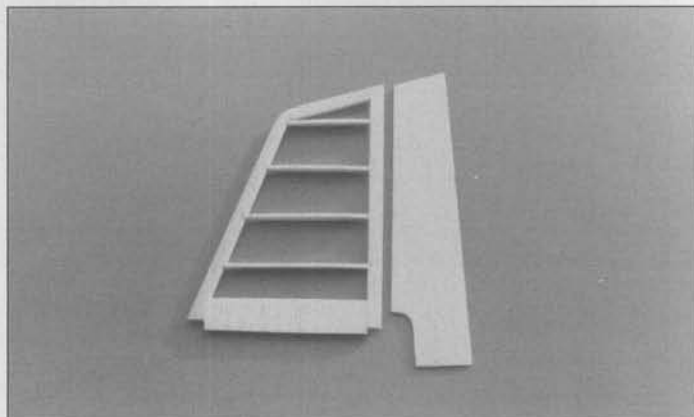
Sand the top and bottom rear fuselage sides for a good fit with the rear top and bottom sheeting. Glue the 1/20-inch rear fuselage top sheeting in place. The rear fuselage bottom sheeting will be glued later, after the rudder and elevator cable routing is checked. *continued*



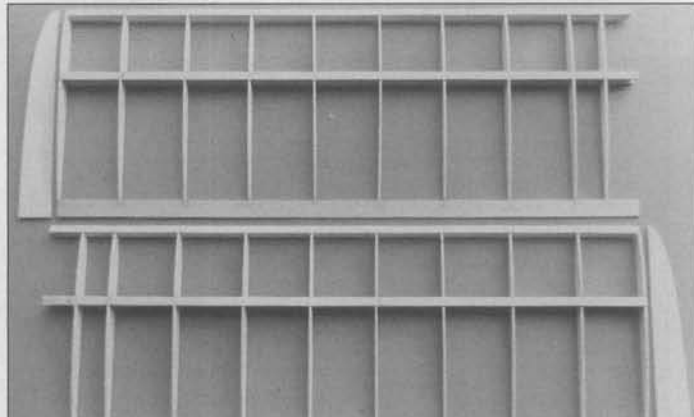
Fuselage sides ready for joining. The right side is cut 1/16-inch short at the nose to produce needed right thrust when the motor is mounted.



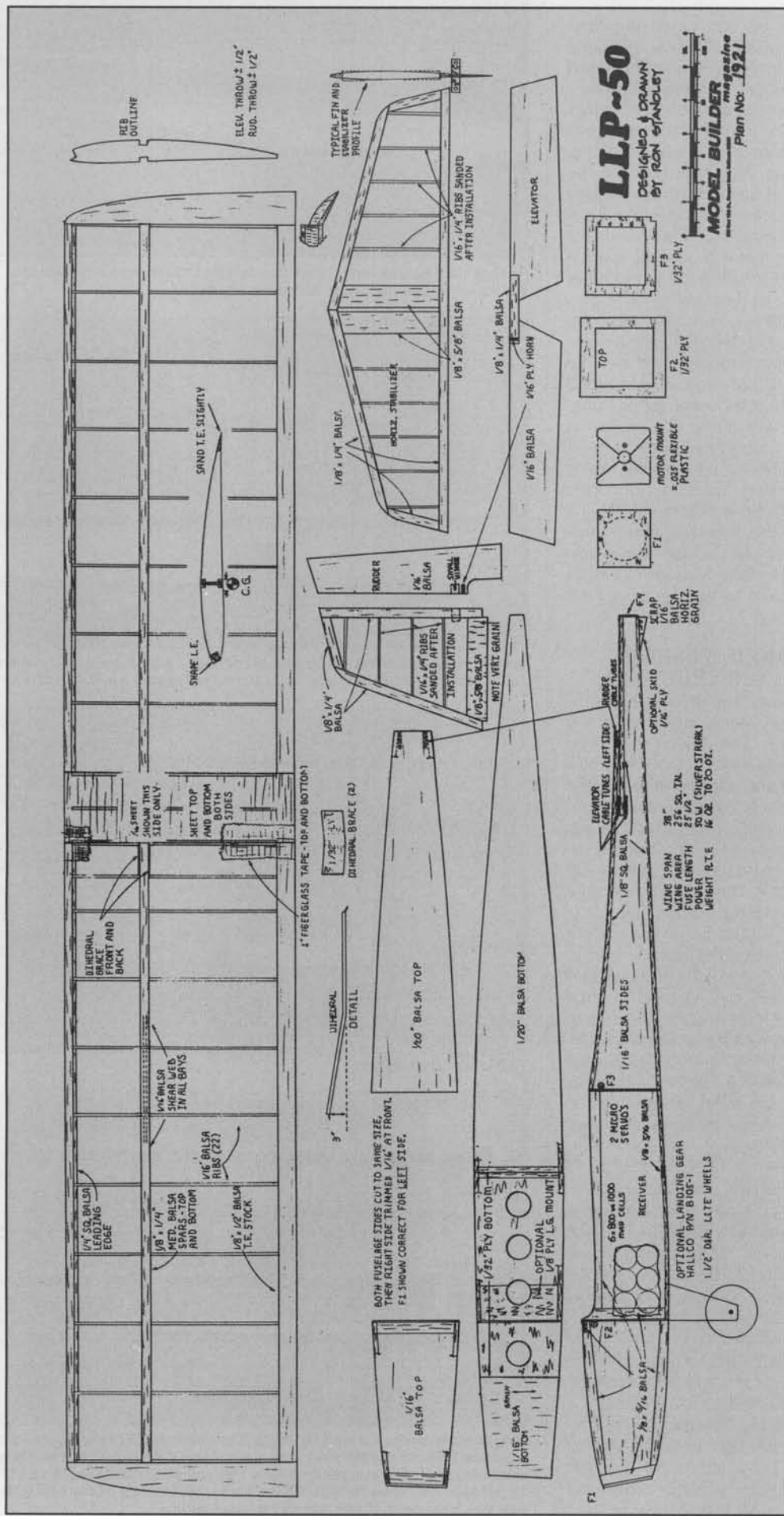
Stab and elevator. Note that ribs are notched into leading and trailing edges of stabilizer. This is good construction technique, and lighter than using gussets to reinforce the joints.



Fin and rudder construction similar to stab and elevator. Note cut-away in rudder leading edge to clear elevator joiner.



Wing panels completed and ready for joining. Tips are beveled 30 degrees on the inside to produce a Hoerner tip effect when glued in place. Note that turbulator spar seen in lead photo is missing. This was added by designer after several months of flying. It's a 1/16 x 1/4 inch spar, inserted vertically about 1/3 of the way back from the leading edge to the main spar. It seemed to slightly improve low-speed handling.



VERTICAL FIN AND RUDDER

Assembly of the vertical fin is started by framing up the structure over the plans. Start construction by cutting the 1/8-inch thick balsa frame pieces to fit, then assemble and glue the pieces together. Note the vertical grain of the base piece.

Mark the position of the 1/16-inch balsa ribs on the frame, then remove the frame from the building board. Cut notches in the frame where the ribs go to make it easier to position the ribs. Cut the ribs to fit, and glue into the notches in the frame. Center the ribs so they extend equally above and below the frame.

Cut the rudder to size from 1/16-inch balsa sheet. Sand the rudder, tapering to about 1/32-inch thickness at the trailing edge. The fin is somewhat delicate, so be careful when sanding to shape. It is easy to sand the ribs too much, so go slow, checking the profile often.

STABILIZER AND ELEVATOR

Assembly of the horizontal stabilizer is started by framing up the structure over the plans. As with the rudder, start by cutting the 1/8-inch thick balsa frame pieces to fit, then assemble and glue the frame together. Glue in the center pieces, allowing a 1/8-inch slot between them.

Mark the position of the 1/16-inch balsa ribs on the frame, and remove the stabilizer from the plans. Cut notches in the frame where the ribs go to make it easier to position the ribs. Cut the ribs and glue in place, keeping the ribs centered so they extend equally above and below the frame. Sand the stabilizer ribs to the shape shown on the plans. As with the vertical fin, sand carefully and check the profile often.

Cut the 1/16-inch balsa elevator pieces as shown on the plans. Sand the trailing edges to about 1/32-inch on both pieces. Glue the 1/8x1/4-inch balsa joiner in place, joining the two elevator halves. The joiner will be 1/16 of an inch above the surface of the elevator.

WING

The wing is assembled in two pieces over the plans, then joined in the center. Both panels can be built at one time if desired. Start the wing by pinning the 1/8x1/4-inch medium balsa bottom spar and 1/8x1/2-inch balsa trailing edge in place over the plans.

Starting with the second rib out from the center, glue this rib in place on the lower spar and T.E. stock. Be sure the rib is vertical (right angle to the spar). Glue a shear web from the rib to the center of the wing. Glue a second shear

web to the rib and spar, extending outboard to the location of the third rib. Continue working toward the outboard end, gluing ribs and shear webs in place, until all ribs except the center rib are in place. At this point all ribs and shear webs, except the center rib, are glued to the lower spar and trailing edge.

Glue the 1/4-inch square leading edge stock in place on all ribs. Fit the top spar in place. It is important that the top spar lies flush with the top of the ribs and shear webs, so trial fit the spar in place. Sand any high spots on the ribs or webs to obtain a close fit. It may be easier to remove the wing panels from the plans to do this. Glue the top spar in place. If the wing is removed from the building board for this step, make sure the wing is not warped when the top spar is glued in place.

The wing tips are shaped from 1/8-inch balsa to the profile shown on the plans. Sand the tips to shape, and sand a 30 degree angle at the inner edge where it attaches to the outer rib on the wing panels. Also taper the outer edge of the tips to about 1/16-inch thick to remove extra weight. Sand the outer wing ribs flat where the tips will be attached, and glue the tips in place. They should be centered from the L.E. to the T.E., and droop down 30 degrees.

Prop each wing panel up so the outboard rib is 1-1/2 inches off the building surface. Sand the inner edges of the wing (top and bottom spar, and the L.E. and T.E. ends) until they are vertical to the building surface. Use a sanding block long enough to span the chord from the L.E. to the T.E. to maintain a straight edge. This establishes the angle at the center point where the panels join.

Sand the L.E. to the profile shown on the plans, and taper the trailing edge to about 1/32-inch thickness. Be careful sanding since the structure is somewhat flimsy until the covering is applied.

Glue the panels together. This is critical so check all joints carefully for a good flush fit. Start by gluing the 1/32-inch ply dihedral braces to the spars on one panel. Use epoxy here. After the glue sets, fit the other panel, doing additional sanding as necessary for a good joint at the spars, and leading and trailing edges. Epoxy the two panels together, keeping the 3-inch total dihedral.

Fit the two center ribs to the joined wing panels by removing a section of the center of the ribs as required. Glue in place.

Fit and glue the 1/16-inch balsa center section sheeting. The top and bottom surfaces are both sheeted. Extend the sheeting to the front of the L.E. and back of the T.E. Sand the sheeting at the front so it is round to match the L.E. contour.

Sand the sheeting smooth, and glue a 1-inch wide strip of fiberglass tape completely around the center of the wing. It works quite well to use thin CA to attach the glass tape, and follow with thick CA to fill the fabric, wiping with a paper towel before the glue sets. Sand the tape smooth after the glue sets.

continued

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BODY PARTS ALIGNMENT

Trial fit the vertical fin into the slot in the horizontal stabilizer. The fin should be perpendicular to the stabilizer. Remove the fin and pin the stabilizer onto the fuselage. Check the fit of the wing onto the fuselage. Sand the wing saddle or the stabilizer mount as necessary so the wing is parallel to the horizontal stabilizer.

CONTROL CABLE FITTINGS

Fit but do not glue the 1/16-inch ply cable horns to the elevator and rudder by cutting a 1/16-inch slot 1/8-inch deep in the rudder

and in the elevator connecting brace as shown on the plans. Cut a 1/16-inch wide slot in the rudder horn, and a 1/8-inch wide slot the elevator horn, each slot 1/8-inch deep.

Trial fit the servos, marking the height of the servo wheel on the inside fuselage sides. Cut a few 1/2-inch long sections from small diameter plastic tubes. These will need to be bent where they go through the fuselage panels, so determine the angle of each tube by poking small holes in the fuselage panels at the points indicated on the plans, and running the cable from the control horn,

through the holes, and to the mark indicating the servo wheel locations. Note the angle of the cables going through the fuselage, and bend the tubes (over a warm soldering tool or Monokote covering iron) to those angles. Glue the tubes in place and cut flush with the outside of the fuselage. Glue two more 1/2-inch pieces of plastic tubing where the cables will enter the fuselage at the front of the stabilizer mount. These should not need bending since the cable run to the rudder servo should be almost straight. Glue the 1/20-inch lower fuselage rear sheeting in place.

COVERING

Sand all structures to remove extra glue, rough spots, etc. Cover with your favorite material; the lighter the better. After the wing is covered, put 1/8 inch of washout at each tip (when each panel is flat on the board, the rear of the wing tip should be 1/8 inch off the surface). Cover the remaining parts of the airplane.

Glue the rudder and elevator horns in place. Attach the rudder to the fin, and the elevator to the stabilizer, using a full length of clear plastic tape as the hinge. As shown on the plans, glue a small hinge just above the rudder control horn. This is needed to keep the rudder from being pulled to either side by the cables.

FINAL ASSEMBLY

Glue the completed fin to the stabilizer, and then this assembly in place on the fuselage. Be sure to check the alignment with the wing before the glue sets. Glue the wing mounting dowels in place, and attach the landing gear if being used. Install the radio gear, motor and battery, and check the balance. Move the receiver and/or battery to get the balance point as shown on the plans. It may work best to use a battery pack containing six 800 mA/H or 1000 mA/H AE cells arranged in a two-by-three block, and located in the radio compartment just behind F2. I secure the flight battery by gluing a small piece of velcro to the fuselage bottom just behind F2, and using two pieces of velcro to go around the battery (opposite types, each a little longer than 1/2 the distance around). Then just push the loop onto the bottom piece, with one of the overlaps at the top so it can be opened to change the battery pack.

FLIGHT TRIMMING

Proper trimming is critical to the performance of this plane. It is possible to fly with a nose-up trim, but the plane will need full power just to maintain a constant altitude. With the balance point as shown on the plans, trim the elevator to obtain a smooth glide with power off, and straight level flight at about 1/2 throttle setting.

Lastly, the name. It should be apparent the 50 in the name LLP-50 is for the motor wattage, but what is LLP? Well, if you build one, you will notice it's made from Lotsa Little Pieces. **MB**

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Just by entering their names to *Model Builder*, Walt Teel, of Young, Arizona, has won a Techno-power seven-cylinder radial engine; Stan Eames, of Underhill, Vermont, has won an Uber Skiver knife set; and Boris Zissoff, of Toronto, Canada, and Czizmarik Ferenc, of Gombasi, Hungary, have each won a six-month extension to their *Model Builder* subscriptions.

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helicopter world *cont. from page 66*

unit. A pressure tap is added to the 925 muffler to pressurize the fuel tank.

The main rotor head on the Junior is the same as on the Scout 60 and Magic, but the two rubber O-rings used on the Junior are smaller. Hence, the head is a lot softer in the flapwise direction. The reason is that this makes the model mellow and docile in flight, which also reduces the cyclic response rate. And it also makes the rotor balancing less critical. However, if you are not a total beginner, we recommend you replace the small O-rings with the larger O-rings for the Scout and the Magic. The larger O-rings make the control feel more solid in hover and forward flight. For people who are buying the Junior as a first helicopter, don't modify anything. Learn with the small O-rings, replace them with larger ones later.

One nice trait of the Junior is that the model does not pitch nose up in forward flight. The suggested pitch settings are; -3 degrees at low stick, 3 degrees in hover, and 7 degrees at full stick for normal throttle collective mode. For idle-up, use -6 degrees, 3 degrees, and 7 degrees. For throttle hold, use -4 degrees, 3 degrees, and 10 degrees.

I am using a Futaba Super 7 heli radio on mine. On normal mode, the percentage setting for the five throttle points are, 0% at low stick, 40% at quarter-stick, 70% at half-stick, 75% at three-quarter-stick, and 100% at full-stick. Notice that it needs quite a bit of throttle at half-stick to hover, because it likes to rev at 1800+ rpm in hover. The high rpm also gives jumping acceleration out of hover, but the acceleration bleeds off after the initial high speed rotor inertia is used up.

With idle-up on, the Junior does a very nice half-roll from hover into a switchless inverted hover. In fact, my Junior seems to be more stable when hovering inverted than right side up! Even though the thrust-to-weight ratio is not that fantastic, the agile cyclic control response makes up for the speed to make it a nimble hot-dogger. But do not try maneuvers that require lots of brute power to bail you out. It is not a rocketship.

Do we recommend the Junior 50 as a first helicopter for beginners? It is not for every beginner. Presently, the 30-size plastic helicopters are excellent beginner models, because they can take abuse and fly great, too. For people who do not like to build, or may not be precise and careful builders, the 30-size models are a better choice. For people who appreciate and enjoy assembling fine machined parts, the Junior is a good choice.

As I like to play with mechanical things, I enjoyed assembling my Junior. Mine was built without slop and it flew very smoothly. My major complaint is that it is too slow for me (anything that doesn't accelerate to 70 mph in three seconds is too slow for me!), and it doesn't autorotate in the stock form. But don't forget, it is designed to be a high quality beginner machine, not a speed demon, and that is what it is. **MB**

SPARKS *continued from page 61*

overall weight of 10 lbs., 10 oz.

The fact that Carlson had H. W. Hartman machine up a 1/8 to 3/8 hp single-cylinder, two-cycle ignition engine was an accomplishment in itself. Most interesting was the need for four flashlight batteries for the Wall coil. A 22-inch diameter, 12-inch pitch propeller was used, turning at 2260 rpm. As it turned out, it put out more than enough thrust to fly the model.

As can be seen in the drawing that appeared in *Aero Digest*, there is a striking similarity to the early Fokker D2. Several advanced features such as full-floating rudder and stabilizer were employed. In addition, all wing halves were attached to the fuselage and were fully rigged with flying and landing wires and turnbuckles for alignment. No ailerons were used, the builder feeling that ample adjustment for torque could be obtained through the rigging wires.

In spite of all the spruce and metal employed in construction, the model came out at the surprising weight of 10 lbs., 14 oz.—say 11 lbs. This gave a rather surprising wing loading of 6.2 ounces per square foot.

Carl Carlson says the model did fly and quite well considering there were no thrust adjustments; i.e., down or sidetrust. On one flight, the model stalled, recovered, and went into a very shallow spiral. Eventually it hit the only post on the airport. Murphy's Law!

After 1931, Carlson produced several other flying designs, "Big Crate II," a 1933 low-wing design, and "Big Crate III" built in 1934, another low-wing design. Photo No. 7 shows Carlson examining the original Big Crate for damage. The fuselage was built in two pieces for ease of transportation, and so that any crash or hard impact would separate the fuselage.

This model design so intrigued me that a few years ago I actually drew up the plans with the idea of startling the boys into action on something different. Unfortunately, a rule change was adopted to the effect that only open rocker arm type four-cycle engines could be used to gain the 60% displacement advantage. There is only one O.S. 90 open rocker four-cycle engine available this writer knows of, and it is in his "Super Clipper," a ten-foot version of the Comet Clipper.

As if that wasn't enough, another rule passed to increase wing loading from 8 to 10 ounces per square foot. This pretty well put paid to any idea of a competition project for the Texaco event. Truly a shame as there are other large designs such as the "Little Bitty," a large biplane which also appeared in *Aero Digest* looking for all the world like an Albatross D2. Perhaps the best idea is to pass another (!!) rule reducing the wing loading to 6 oz./sq. ft. for biplanes. This might stir up some interest!

What about Carlson? He is still active, living at 22 Northwoods Lane, La Crescenta,

CA 91214. Business keeps Carl commuting between California and Chicago. This columnist will have to write again as it has been over four years between letters.

NOSTALGIA CORNER

In line with using all the old Dick Everett photos, we picked out the most interesting models of all, the PAA "Pay-Load" event models. In many cases, standard designs such as the Sal Taibi "Pacer" were modified to suit the size of the dummy men.

Such is the case as seen in Photo No. 8 showing Bobby Parhin with his entry in the PAA-Load event called the "PAA-Sir." Note the design is a modified "Pacer" with tails and rudder modified for upright installation.

The Pan-Am events were extremely popular with those modelers looking for something different. This writer enjoyed .35 powered two 8 oz. dummy carrying models; .19 powered model with one 8 oz. dummy, .049 powered using a 4 oz. dummy, and an .020 version (the last of the PAA types). In addition, Clipper Cargo went from .19 to .049 to .020 engine sizes. Took quite a bit of rpm to get a 16 oz. Clipper Cargo off the ground for 40 seconds. Another event, Jelex Payload, was run, but failed to catch on. This writer can remember setting fire to the field with his version!

SWEDEN O.T. CHAMPS

Just as we were going to press, a letter came in from Sven-Olov Linden, enclosing photos and accompanying write-up. The Two-Day Championship was held on August 24-25 with varying types of weather. Saturday found a strong breeze coming across the field which required the officials to shorten flights to two minutes. Sven cheerfully notes that the weather was nice otherwise.

Sunday was almost a repeat with the wind running parallel to the field. Then came the rain! At noon, a regular downpour pretty well ended all flying. The weather was tough on the tissue-covered models.

Photo No. 9 shows a model called the "Flyg-44." This design came about when a Swedish magazine commissioned Bjorn Karlstrom to design a small power model to suit the new diesel engine, "GP." This copy was built by Per Holmberg of Stockholm. No report on how well the design performed.

Photo No. 10 shows Karl Landegren with an original design gas model of 1946. Karl was the Swedish Champ from 1943 to 1946, and was regarded as the invincible champion of rubber-powered models during World War II. What most modelers didn't know is that Karl designed and flew power models. This model, carefully preserved since 1946, was taken out, refurbished, and flown at the 1991 Old Timer Champs.

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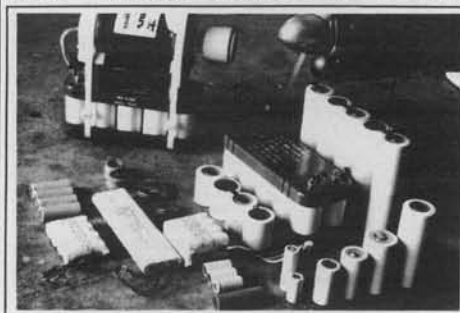
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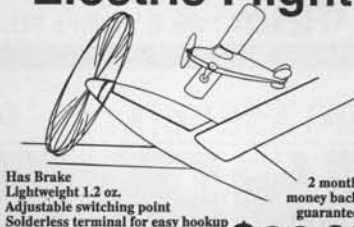
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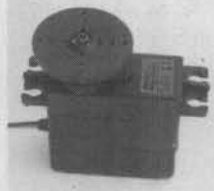
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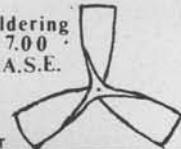
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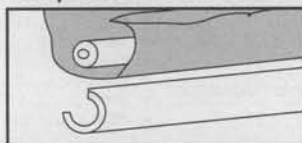
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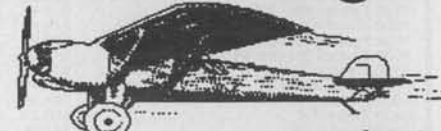
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more clubs are announcing 50th Annuals. Following the lead of the Chicago Aeronuts, Oakland Cloudusters, S.F. Vultures, etc., the Hampton Roads Brainbusters announce their Fiftieth Anniversary Reunion to be held during April 1992.

For those interested in meeting old friends, modelers, etc., write to Ed Sullivan, 19



Photo no. 10. Outstanding rubber-power man, Karl Landegren, displays his restored 1946 original power design at Swedish Champs.

Frederick Drive, Newport News, VA 23601, or better yet, talk to Ed at (804) 596-6104. Ed says it should be a real show.

THE WRAP-UP

This month we acknowledge the loss (and I mean loss!) of Phil McCary, well noted modeler and outstanding rubber power man.

Even as late as six months before his demise at the Olive View Hospital on 16 September, 1991, Photo No. 11 is the living proof Phil never gave up. He is seen at his favorite flying field, the El Dorado Dry Lake (about 20 miles from downtown Las Vegas). The model is a Comet AYA-5, designed and kitted in response to the 1940 American Youth Association program.

Lest it be thought that Phil was strictly a "rubber-man" in his early days with the SCIFS (SAM 3) flying at Taft, Phil flew gas models in competition regularly. Being a geologist by profession, Phil was self-employed and engaged in extensive consulting programs. From the Los Angeles area, he moved to Carson City, Nevada, where he built his own home, a two-story log house! It was quite the sight.

Work took Phil to Las Vegas, and he finally settled in Henderson, one of the outskirts towns. His work took him into the uranium mines, which turned out to be much higher in radiation count than first supposed. He was eventually diagnosed as having contracted uranium poisoning, an irreversible sickness.

Nevertheless, Phil maintained his high interest, running the 1989 SAM Champs at



Photo no. 11. The late Phil McCary with one of his favorite subjects, a rubber-powered AYA-5 from 1940.

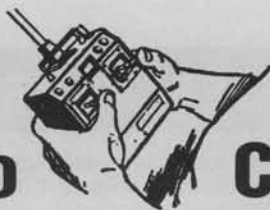
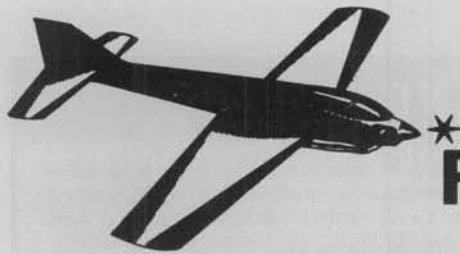
Jean, Nevada, as well as the VAMPS Annual at El Dorado Dry Lake. Phil will be sorely missed by all he touched. **MB**

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8. SAM 65, Alaska	7592	17. SAM 55, New Zealand	4071
9. SAM 29, Texas	7263	18. SAM 79, Pennsylvania	2489

There you have it, men. SAM 26 and Bob Angel will host next year's postal meet.



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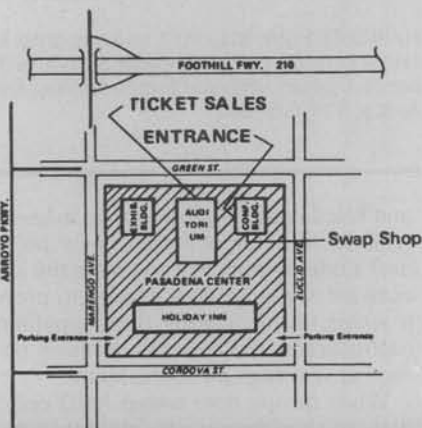
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RC SOARING *continued from page 57*

sider that the Legend kits weren't available to the public until early last spring, to see this many involved in thermal combat seven months later is noteworthy.

The Legend is a beautiful sailplane. It has a unique, five-panel wing with dihedral at every break, which gives it a not-quite-but-almost curved look reminiscent of the classic Hobie Hawk or the old JP Models Javelin. The center panel, which bolts onto the fu-

selage, is flat and has a constant chord (width). The two middle panels and two tip panels are tapered. The trailing edge is kept straight which gives the leading edge a swept, racy, high-tech appearance. Obviously, the influence of Wil Schuemann's theory of boundary layer separation control and drag reduction has been observed in yet another high performance design.

Regarding this Schuemann influence, it is interesting to note that perhaps a dozen top fliers at the 18th FSF have opted to reduce or eliminate the dihedral angles of their Legend

and Falcon designs. This is more in keeping with the idea that sweep alone (or polyhedral alone) is sufficient to create the slight outward spanwise flow needed to prevent massive, instantaneous flow separations (stalls) across the entire wing (from tip to root) at very high lift coefficients.

While having both sweep AND polyhedral can't hurt the aircraft's ability to fight off these stalls, minute performance gains can be had by flattening the wing, IF you are a good pilot and keep your control inputs to a minimum. Also, the flatter the wing, the less that wing is susceptible to sideways gusts of wind that can bank a plane off course on final approach or while touching down in the landing circle. This can translate into higher point totals in the landing circle.

The disadvantage of a flatter wing is that it requires more pilot input to keep on course in a thermal turn or while slowing down. Flat wings are definitely NOT hands-off stable. This has to do with a reduction in spiral stability. Better pilots aren't bothered by this, in fact, many enjoy the extra pilot/model involvement. Fifth place FSF finisher (and past Masters of Soaring winner), Bob McGowan, lowered both tip dihedral angles on his 100-inch modified Legend. Seventh place FSF finisher (and current F3B World Champion), Joe Wurts, flattened out his Falcon 800 wings and glass-bagged them.

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Getting back to the Airtronics Legend, it is interesting to note that the top two finishers in the FSF flew this design. First place Fred Weaver and second place Jason George flew basically stock Legends with stock dihedral angles. What the stock Legend really has going for it is light wing loading (under 10 oz/sq.ft), which provides great "hang time," coupled with a great L/D or glide path thanks to high aspect ratio wings with broad chords. Having a decent airfoil like the Selig 3021 is also a definite advantage because it provides you with a broad speed range.

All of the above factors add up to a real advantage in those "dead air" early morning hours. Making just three minutes from the typically downwind, short winch lines at the FSF can be a problem. With the Legend, you don't really need to find lift; just launch, fly a giant, lazy circuit of the field, then set up your approach, and land. This characteristic may find great favor with Midwestern and Eastern fliers who often face weak lift conditions.

The Legend is a conventional wood kit with a fiberglass fuselage. For this reason, I would expect it to become very popular with the silent majority of modelers who prefer balsa, ply, and spruce structures and conventional glues over foam cores, epoxies, and vacuum bags. Yes, it does have spruce and carbon fiber spar caps in the main

panels, but these just glue on, no big deal.

At this point, I'm going to have to let the photos and captions, the results, and the sponsor list tell you the rest of the story of Visalia. Next month we'll take up where we leave off this time.

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FREE FLIGHT cont. from page 33

located at 40%. Many people may think it is a bit too thick, as I do, but nevertheless, it is a successful section that should not be overlooked.

Another reason for presenting it to you is as a means of introducing some information that I received from Bob himself a few months ago, regarding his beliefs about airfoils and their use. Here's Bob:

"Rightly or wrongly, I have always believed that the lift characteristics of an airfoil are determined predominantly by the shape of the mean camber line, and that drag and various other 'flow' characteristics were determined by the streamlined shape that was wrapped around the mean camber. Remember, I'm no aerodynamicist. Further-

more, one way to define lift is to equate it with the mass of air accelerated downward by the wing.

"Well, 40 years ago or so, I reasoned that a wing would be most effective if every increment of chordwise flow gave an equal downward acceleration to the air flowing over and under it. Since I knew no way to calculate skin-friction losses in the chordwise flow, I ignored them and it seemed to me that a circular arc mean camber would give me the constant acceleration I was seeking. Hence I based the airfoil on a circular arc mean camber. And then I wrapped a 'shoe sole' streamline around that.

"The first of these airfoils had a mean camber of 5% at 50% of chord and had a maximum thickness of 10%, which was placed at 40% of the chord. It worked! And it worked as well as any airfoil I ever plotted.

Among designs that were supported by this section were my 1953 Nats winning Wakefield, my '54-55 Wake (both on page 121 of the Zaic '55-56 Yearbook), and my 1957-58 Mulvihill Winner. Call that airfoil section the RLH 5510.

"For the Skyscraper Wake, I used an RLH 6508, as I recall. This had a 6% arc mean camber and 8% max thickness, which may have been at the 30% or 35% station. In more recent years, I have been pushing the maximum thickness further forward, and I'm typically at 20% to 25% these days.

"So far, I haven't said anything about the surface shape of the wing. A thickness of 6% or more, when coupled with a moderate L.E. radius and a dollop of Phillips entry, seems to result in good longitudinal stability characteristics and a 'forgiving' nature in gusty or turbulent air. Almost every time I've used an airfoil with a sharp L.E. or no Phillips entry, I've been in trouble with bad longitudinal stability and incurable stall habits. Sanding the L.E. to a blunter shape often improves this situation, but not always. And 6% or thicker is also good structurally.

"I try to configure the bottom surface for smooth airflow: The Phillips entry is often sheeted back 1/2 inch or so and is exactly tangent to the bottom airfoil surface, which is a straight line back to about 30-35%, then it's a smooth curve back to the T.E. I usually add a light spar on the bottom about halfway between the main spar and the T.E. member to reduce tissue sag. And the T.E. is left blunt—either blunt square or with the radius down. By the time it gets to this point, I don't believe the airflow cares if the T.E. is sharp, and a sharp T.E. is either structurally weak or heavier than it has to be."

So, there you have a few comments on airfoil design by a past master at designing winning models. I hope these thoughts assist you as you consider which airfoils to select when you design your next ship. And, if you want to design an AMA power ship, give this month's DGA a second look. **MB**

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WORKBENCH cont. from page 7

mary control (Up/Down, Right/Left) interaction of the various mode choices. If you're starting fresh, and are precise and competition-minded, use Mode I and thumbs only. But remember, even the use of thumbs-only doesn't guarantee non-interaction control input. Your thumb is like the old fashioned phonograph record player (You remember those things; they came before tapes and compact discs!). The pick-up arm pivoted and moved in an arc, so the needle didn't ride in the record groove at a constant angle as it progressed from the outside of the record toward the middle. Some late-model phonographs did have parallel tracking arms to cure this problem, but your thumb isn't built that way! Consequently, your thumb doesn't want to go straight up and down for elevator, so in Mode II, you tend to put in some aileron (or rudder, if your plane doesn't have ailerons) as you move the stick forward and back with your right thumb, and in Mode I, you tend to put in some rudder as you move the stick forward and back for elevator with your left thumb (again, no problem if your plane doesn't have ailerons, as you probably have the rudder servo plugged into the aileron channel, don't you?).

Holding the stick between thumb and index finger may give you more precise stick movement, and for that reason, may be more prevalent among Mode II fliers, who are controlling the primary flight control functions with that right stick. But, it can somewhat restrict the amount of uninteractive stick movement you can obtain. It's like the tennis player who uses two hands for more power on the backhand shot; their reach is somewhat restricted, so they have to run further to get in position for the stroke. (Monica Seles has to run like hell in a tough match, as she uses two hands on both sides... but you can't argue with her success in being Number One in the world of women's tennis!)

As mentioned earlier, as a carryover from many years of flying with pulse rudder, Galloping Ghost, and Don Brown Quadruplex Analog Proportional, all using single-stick control input, this writer prefers Mode II. However, I move the stick with a combination of the two choices suggested by Charles. I place my thumbs on the ends of the sticks and rest my index finger on the sides of the sticks as a concession to the old single-stick feel.

Like Charles, we're interested in testing the RCers out there as to their choice of stick movement method. Drop us a card, and simply indicate, thumb, pinch, or combo, how long you've been flying, and your Mode choice. Expect results in a few months.

By the way, to us, Mode III is for flying aircraft that are considered "Rudder" planes, that is, their primary directional control is rudder, and the ailerons are of secondary importance. In full scale, the Aeronca C3 is a good example. In models, the Proctor

Antic fits the description. For these types, we switch the normal control functions of aileron and rudder, in some cases even reducing the amount of aileron travel, particularly in the 'down' direction. Works like a charm. **MB**

DEAR JAKE cont. from page 7

even extends to our hobby. We both fly R/C, we both built the same airplane, and we bought identical radios on the same frequency. Now here's the amazing part. If I turn on my transmitter, his airplane crashes, and if he turns on his transmitter, my airplane crashes. Is that uncanny, or what?

Darryl and Darryl in VT

Dear Darryls:

Have you guys ever considered a sibling mind meld? Two halves might make a whole.
Jake

DEAR JAKE:

What did they do to Leonard Nimoy's ears to make them look like Mr. Spock's?

Trekkie in Trenton, NJ

Dear Trekkie:

They were vulcanized.

Jake

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