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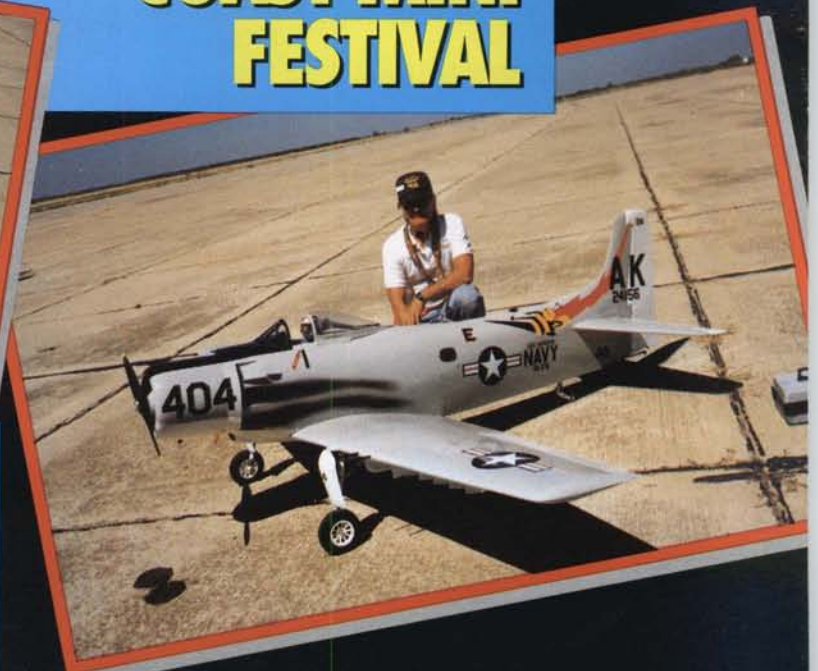
REVIEW: KALT ENFORCER HELICOPTER

BUILD: WIND SURFER BABY

IMAA WEST COAST MINI FESTIVAL



REVIEW: WEBRA SPEED 40 RC ABC ENGINE

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DEPARTMENTS

HELICOPTER WORLD

FEATURES

PRODUCTS IN USE

CONSTRUCTION

ON THE COVER

The Kalt 'Enforcer' helicopter is the subject of author James Wang *Helicopter World* review, beginning on page 68.

Upper right photo shows the 'King Crimson' flying wing, one of Keith Shaw's electric fleet seen at the 1990 KRC meet; see *Electric Power* on page 20. Lower photos: The IMAA West Coast Mini Festival featured a dazzling display of large scale model aircraft, including at left, John Andrews and his T-6, and at right, Sam Stauffer and his Skyraider; see more on page 36.

MODEL BUILDER (ISSN 0194 7079) is published monthly by RCMB I NC., 898 W. 16th St., Newport Beach, California 92663. Phone (714) 645-8830. Subscriptions: $25.00 per year, $47.00 for two years. Subscriptions outside the US (except APO & FPO) $38.00 for one year, $68.00 for two years. All payments must be in US funds, drawn on a US bank. Change of address notices must be received six weeks before date of issue that new address takes effect. Send old address with new . . . old label preferred. Duplicate issues cannot be sent. Postmaster send address changes to Model Builder, 898 W. 16th St., Newport Beach, California 92663. Second class postage paid at Newport Beach, California, and additional offices.

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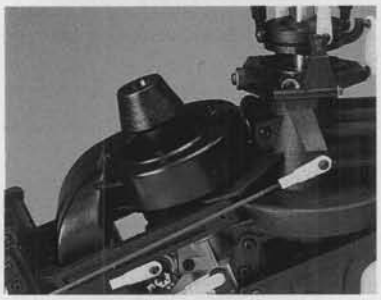

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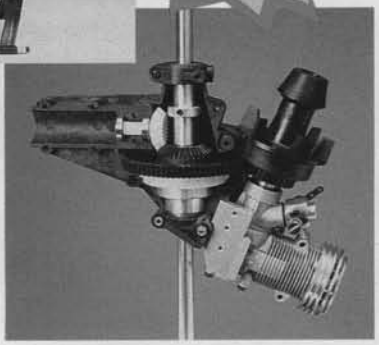

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BILL NORTHROP'S WORKBENCH

It's the evening of K + 5, January 20, 1991, as this is being written, and the world is watching a war on television . . . the only thing good about it, whether you agree or disagree with our country's involvement, being that there aren't as many commercials. And although it's the main topic of conversation at every economic and intelligence level at the time this was written, we have no idea how prominent the war will be by the time you are reading this column. (We can only hope that it has already become history.) With that in mind we will leave opinions on the world situation to the television, radio, newspapers, and national news magazines, and get on with matters about the hobby, in keeping with the philosophy regarding the showing of today's pro football playoffs (blowout, in the case of the Bills vs. the Raiders), that life goes on in difficult as well as normal times.

Bob Gialdini receives his "People's Choice" award at the conclusion of the first annual IMS Milwaukee show in October, 1990, from Bill Northrop, co-producer.

However, we can't leave the subject entirely without some comments on the effect of troubled times on our hobby. It has been a normal pattern for leisure-time activities, particularly hobbies, to gain momentum during recessions and worldly turmoils; the philosophy being that man (collectively, ladies) turns to hobbies and sports to "get away," for short periods of time, from their's and the world's problems. For instance, it is said that the hobby of collecting and breeding of tropical fish had its beginning during the Big Depression years, and has grown into a hobby that is enjoyed by millions. RCM's founder and former editor, Don Dewey, can probably fill us in very well on that subject!

The model airplane hobby was another sort of "depression baby" that grew rapidly during the early 1930's. The problem would seem to be, and Don can confirm whether the same problem exists in the tropical fish hobby, that the model airplane hobby as it is today, has priced itself out of the "therapeutic" category. Where the model airplane hobbiest could spend the price of a sandwich and a milkshake at the corner drug-

BOB PECK 1934 - 1991

It is with a great deal of sadness that we report the death of a good friend and fellow modeler/member of the hobby industry, Bob Peck, of San Diego, California, co-owner with wife Sandy, of Peck-Polymers, on January 7, 1991. Bob suffered a major heart attack in late December, was hospitalized, returned home, and then succumbed to lung congestion and related complications. He was 56 years old.

Sandy Peck, who assures us that the company will continue to produce and market the extensive line of Peanut model kits, rubber powered contest and sport models, several RC kits including the Genesis flying wing glider, the 12-13 foot long RC

continued on page 108

store soda fountain on a model airplane kit and supplies that would keep him happily occupied for several weeks, the modern "hobbiest" spends several hundred dollars in the hobby shop and has a fit if he's not flying by the weekend. And we're not sure this is the *best* way for him to get his mind off his troubles . . . unless it's based on the theory that if you smash your thumb with a hammer, you'll forget all about the headache that's been bothering you for the past couple of hours!

Our IMS Pasadena show, which found itself taking place on K minus 4, 3, and 2, January 11, 12, and 13, was being carefully watched as the industry "guinea pig" that had been inoculated with "Middle East Jitters." The first symptom was a slight drop in exhibitor attendance, that by direct consultation with those concerned, confirmed a tightening in their economic picture because of a slow-down in their business. We took the opportunity to revise the show layout so that everyone was located in the one large exhibition building, with a mix of all categories; airplanes, boats, and cars, and also increased the number of booths in the one hall to accommodate everyone. From there on, the expected symptoms failed to materialize.

First of all, the trade-only period from 9 a.m. to 2 p.m. on Friday, showed an increase over 1990; not including the gate crashers who always seem to find a way of sweet-talking their way past the registration booth. (Check your M.O., guys, it's gonna be a lot tougher next year!). Both 1990 and 1991 showed an increase over previous years when we devoted a whole Friday to industry only. Obviously the shorter no-public time made planning a visit to the show by dealers more appealing; they could come in, conduct business, and get out in time to open their shop for the remainder of the day. Whatever the reason, dealer activity was up over last year.

The next big question: Would the public come in and spend the money that they seemed to be squeezing when it came time for Christmas shopping? Eyebrows started rising as the clock reached 1 p.m. . . . already there was a long line of spectators nervously waiting for the flood gates to open at 2 p.m.! And the corners of the mouths started following the eyebrows when the bankrolls and credit cards came out of pockets and the words, "I'll take two of these and one of those," started flowing.

Saturday was much more of the same. A half hour before the 10 a.m. opening time, the spectator line zigzagging from the Pasadena Auditorium box-office was the equivalent of about two city blocks in length. It was just a little frightening, but a lot more, it was a relief . . . the hobby, at least for the moment, is alive and well in spite of the Persian Gulf War and the tightened economy. Maybe even the "therapeutic" value is still there, in spite of its much higher relative cost!

While we're on the subject of IMS shows,

continued on page 106

ADVICE FOR THE PROPWORN—

BY JAKE

Dear Jake:

What's the fastest an RC car has ever gone?

Ellis in Elk Grove, Idaho

Dear Ellis:

Well, I had one that lasted only 14 seconds before it was run over by a septic tank service truck. I don't know if that's the record, but I bet it's close.

Jake

• • •

Dear Jake:

You often write about Air Force activities or programs, which leads me to believe that you may have some government connection like working at a defense facility maybe.

If so, what can you tell us about Operation Desert Shield that the Pentagon and the press aren't talking about?

Nosy in Nantucket

Dear Nosy:

Not much, I'm afraid. Despite your suspicions, I'm not privy to any inside info on the Air Force or any other military department. I do have some Air Force fighter pilot friends, but when I asked them what was going on, they were evasive and would only comment about their favorite cigarettes. It makes no sense to me, but here's what they said. "I'd fly 10,000 miles to smoke a camel."

Jake

• • •

Dear Jake:

I am a devoted Trekkie. I eat, live, and breathe Star Trek memorabilia. The new show is okay, but the original is still the best.

There is one thing about one of the original episodes that has always bothered me, and I thought maybe you could help. In an early show called "The Phaellian Parallax," Scotty warns Captain Kirk that an explosion has occurred in Anti-Matter Bay-B.

Now, I have every map or model of the Enterprise ever produced and none of them have any such place or compartment. I know the writers didn't make mistakes like that, so I must be missing something. Where's Anti-Matter Bay-B?

Morton in Missoula, Montana

Dear Mort:

With Uncle Matter, honey!

Jake

• • •

Dear Jake:

Whatever happened to the Jake Awards? Seems like you were handing them out annually, but we haven't seen any for a long time now. What gives?

Max in Toledo, Ohio

Dear Max:

It's a long and frustrating story, but I have been trying to announce another set of Jake Award winners for quite some time now. Unfortunately, protests, claims of fixing, and threats of legal action have slowed the process to a crawl.

Four or the five awards are still hopelessly tied up in red tape and deep yogurt, but one has been fully resolved and finalized. It was my intent to wait until all five were ready, but I agree with you that it's been too long.

So, with all the lack of pomp and circumstance that it so richly deserves, here is the first Jake Award for 1990.

Jake

• • •

THE HANNO PRETTNER STAND-WAY-OFF SCALE AWARD

This award was inaugurated in 1984 when Hanno Prettner showed up at the Tournament of Champions with a blown-up deBolt P'Shooter biplane and, with a straight face, called it a scale Skybolt. In keeping with that precedent, this award goes to the individual who most blatantly stretches the interpretation of scale rules in order to further the performance of his model. Selection of a winner was difficult due to the large number of highly qualified contenders in this year's field, and the final choice had to survive a protest by the French Federation d'Aeronautique.

Honorable Mentions go to the following: 1. Fennel Sinclair of Mossport, Mississippi, who glued a piece of wire to a fruit bat to simulate a radio antenna, let it fly at night in the dark, and claimed to have a model of the Stealth Fighter, 2. Jean Pierre Rochambeau of Cannes, France, who suspended a cupcake baking paper under a helium filled Happy Birthday balloon and tried to pass it off as a model of the Montgolfier brothers' history making aerostat, and 3. R. Gordon Baines of Tacoma, Washington, who installed wheels on the top of his yellow Astro Hog, then flew it upside down and declared it a Piper Cub.

continued on page 81

GLASSING ?

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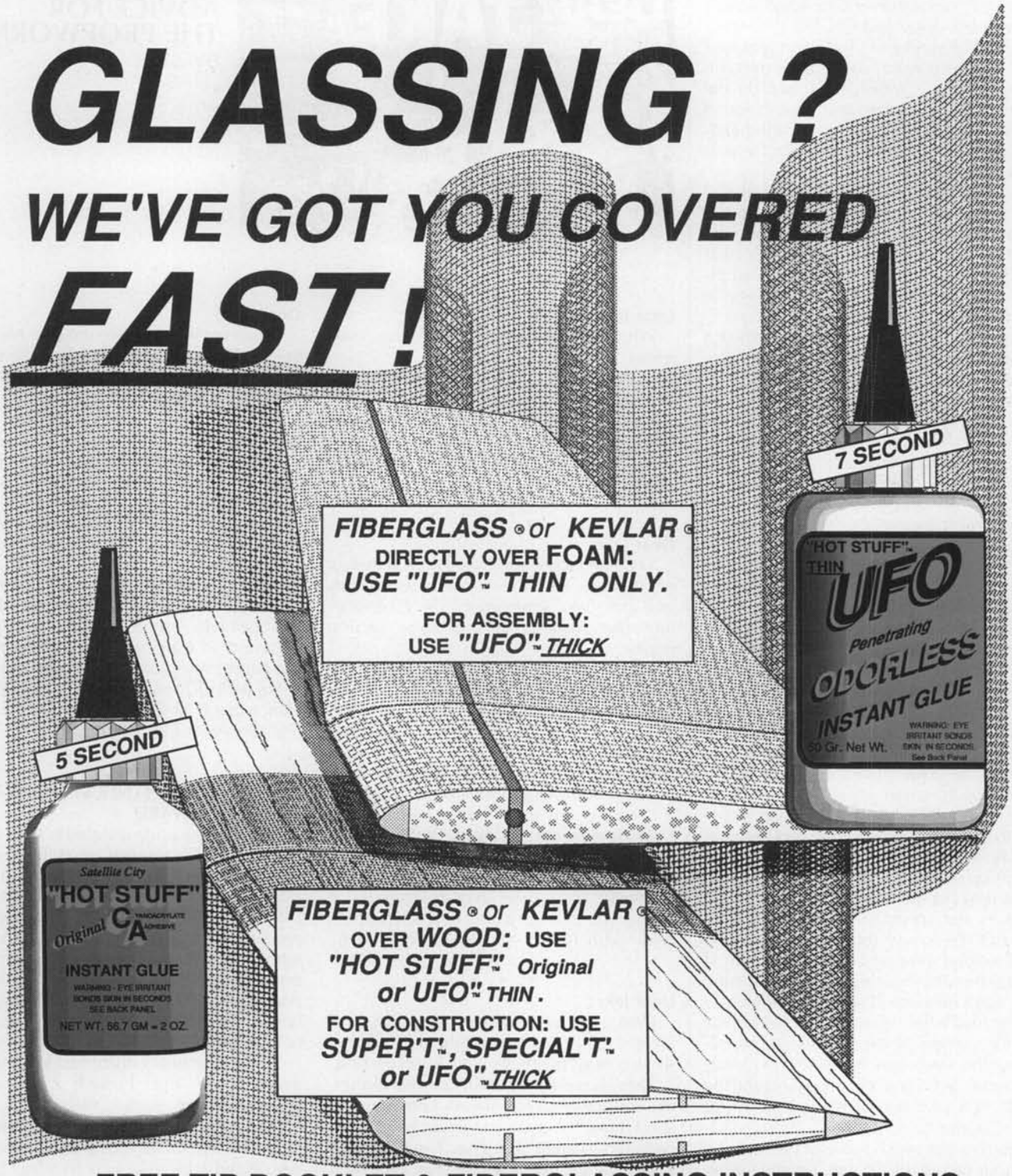

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ELECTRONICS CORNER

BY ELOY MAREZ

USING THE E.G.A.S.

The World Engine's E.G.A.S. is our first subject of the month, also the subject of a letter from Robert Fleming of St. Thomas, Ontario, Canada. For those of you not familiar with the product, the acronym stands for Electronic Glow Adjustable Switch; the unit is a transmitter-controlled glow plug power source. It is plugged into the receiver in parallel with the throttle channel, and the point at which it will apply current to the plug(s) can be adjusted at will. Thus, it can be used as either a starting glow plug supply, or as an idle keep alive for those engines that like a little juice at low speeds. Actually, with the proper adjustments and trim range it seems that it would work well for idle power, with a little higher setting possible for starting.

The E.G.A.S. can be used for single or multi-cylinder engines, requiring hookups to the receiver for its own power and of course, control signal, and separate NiCd cells for glow plug power. The number of NiCds used must equal the number of plugs to be powered—everything being in a neat easy to understand series circuit. The glow plug current is controlled by a single MOSFET, which according to the instruction sheet will handle up to six amperes (three glow plugs) without the requirement for a heatsink. If you do feel the need for a heatsink; try the RC car section of your hobby shop, there are a number of small lightweight press-on single transistor units made especially for this purpose.

Bob's letter reads:

"I hope you can help me with my problem as you have in the past. I have a seven-channel Futaba Jch PCM radio and have an older E.G.A.S. switch which won't work with a PCM radio. Is there a fix that can be made to the E.G.A.S. to make it work with PCM or am I and others stuck with switches that we can't use? I have enclosed a copy of the information with a diagram of said switch."

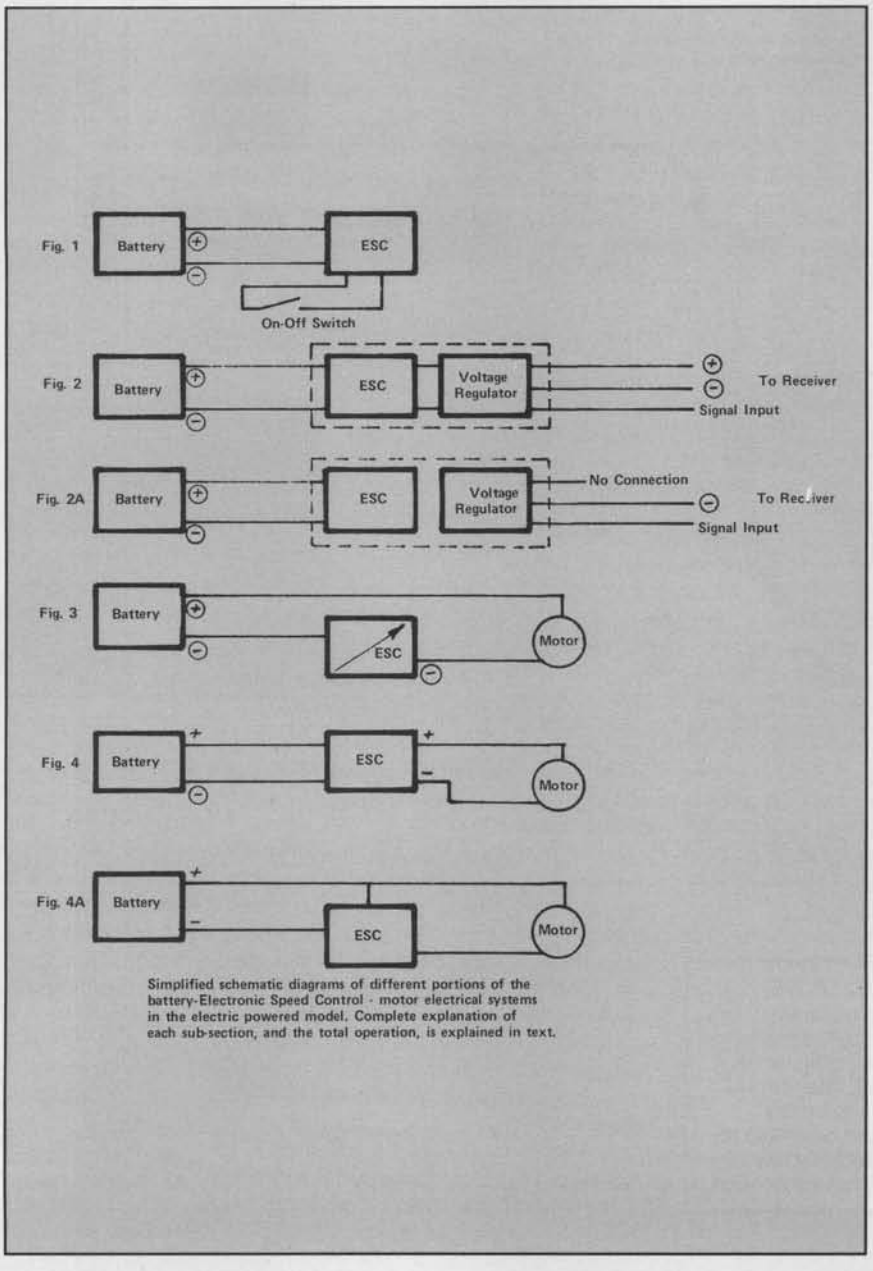
First off, I'd like to comment on that last sentence. When the occasion arises for you to write in for similar information, please never assume that I will have the same equipment, schematics, or even instruction sheets. I have a lot of stuff in my files, and can always make room for more, but I don't have it all. I didn't have the E.G.A.S. material, which even includes a schematic diagram.

Robert, there is a cure, but let us first clarify a point. The fault is not in the E.G.A.S. The Futaba Rl29DP receiver, as furnished with the five, seven, and nine channel PCM systems, will sometimes not work with auxiliary equipment, and a lot of aftermarket equipment manufacturers and owners have found that out the hard way. As a matter of fact, the receiver will not always work well with all earlier Futaba servos, even some bearing the same numbers as those now being furnished with R129DP equipped systems. Should you run into that, most of the servos can be sent in for an update.

The reason is not that this is a PCM system, nor that the receiver is putting out some sort of exotic control information to the servo. In actuality, the output is the same old PWM (Pulse Width Modulation)—output we have all been using since the Orbit 7-14 in 1966. The reason that this receiver is critical to add-ons is that it has been designed with a very marginal output pulse amplitude. When any device with an impedance mismatch is plugged into it, the signal dies or is reduced to a level too low for reliable control.

You say you like numbers! Well, in most receivers, the control

continued on page 10



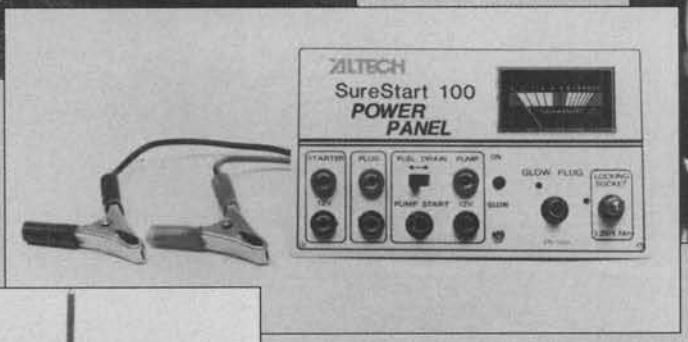
Simplified schematic diagrams of different portions of the battery-Electronic Speed Control - motor electrical systems in the electric powered model. Complete explanation of each sub-section, and the total operation, is explained in text.

OVER THE COUNTER

The RV-4, from Byron Originals.

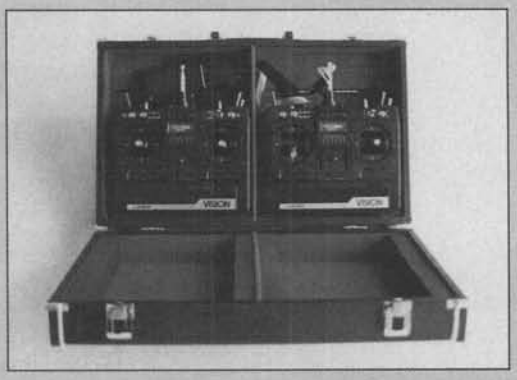
Onboard NiCd monitor from Proctor Enterprises.

One of three new pilot figures from MGA.



Altech Marketing's SureStart Power Panel.

Acoms Technisport AW-75 Mk-III surface radio, from Altech.



Transmitter protective/ carrying case from Airtronics Inc.

You could say it's a totally home state product . . . the latest scale kit being offered by Byron Originals, Inc., P.O. Box 279, Ida Grove, Iowa 51445, phone (712) 364-3165, Fax (712) 364-3901. It's a 30% scale model of the RV-4, dubbed by full-scale aircraft kit builders as the "Kit Built Grand Champion" at Oshkosh in 1989 and produced by Buzz and DJ Lauritsen, of Boone, Iowa.

The Byron RV-4 features the company's popular plug-in wings for ease of transportation; a large, clear thermoplastic canopy; fiberglass fuselage, cowl, and wheelpants; hot-wire-cut wings and stabs, with all sheeting material; complete fuel system; steerable tailwheel; die-stamped aluminum landing gear; plus wheels, hinges, control surface linkages, vacuum-formed landing gear cuffs, tailwheel pant, nyrods, and all necessary hardware. The only additional materials needed include engine and mount, radio, glue, and final finish products.

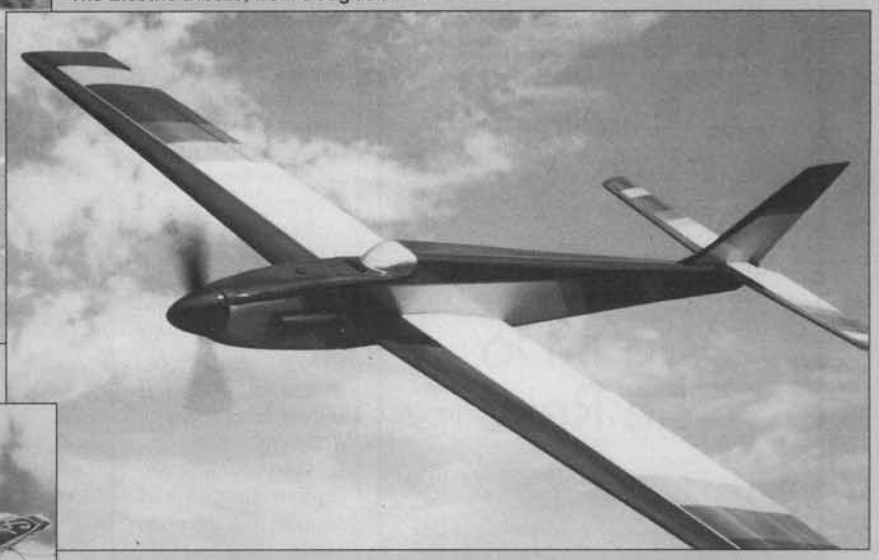
A special engine mount is also available as an option for the RV-4. Similar to the one used on the Byron Pow'r Prop Warbird Systems, it mounts to two formers for proper stress distribution. The face plate is predrilled and tapped to accept installation of the engine backplate supplied. Templates are included for mounting either the O.S. 240/300 or Saito 270/300 twin four-cycle engines. Other engine choices include the Super Tigre 3000, the Quadra 50 and the Zenoah G-62, although the use of the two latter engines does require some cutting away of the cowling and exposure of engine parts.

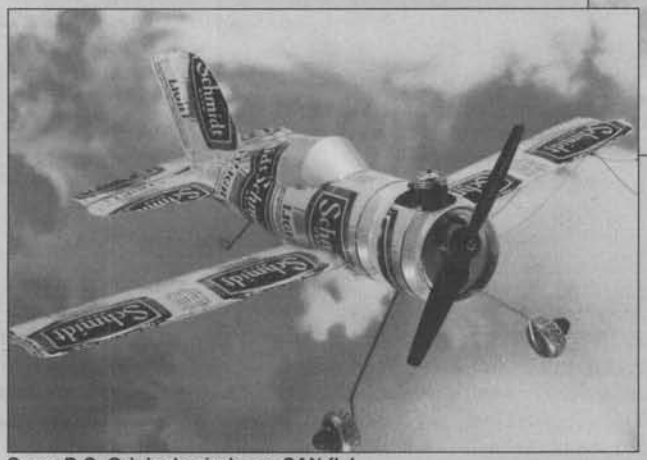
A Documentation Photo Pack is also available from Byron Originals for better scale modeling of the RV-4. A detailed info

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

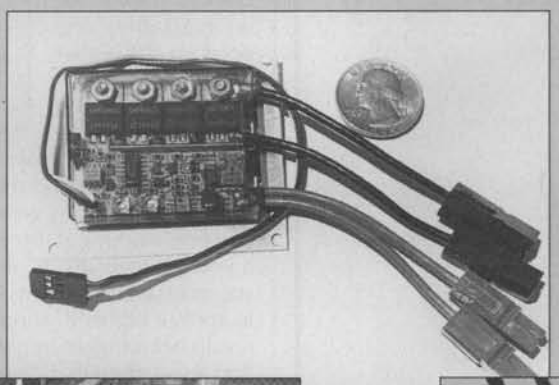
A-1H Skyraider by George Miller's Kits.

The Electric Breeze, from Douglas Aircraft.





Some B.C. Originals airplanes CAN fly!

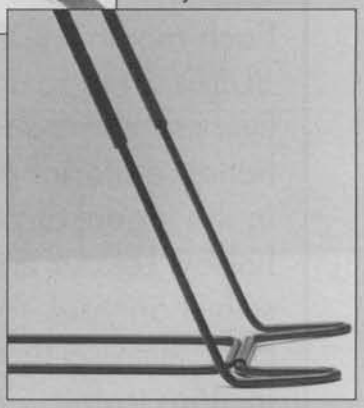


The SM-4 high rate speed control by Jomar.

Epoxy glass finishing products by Glass-Ez.

World War I Pedal Plane fighters by Fantasy Toys.

The Finger Saver Safety Retainer.



pack on the kit can be obtained from the company by sending $3.00.

If your local dealer doesn't stock Byron Originals products, contact the company direct, and be sure to tell them you read about the RV-4 in *Model Builder*.

• • •

Now there is a practically weightless, very compact, onboard NiCd monitoring device that is easy to install and use. Proctor Enterprises, 25450 N.E. Eilers Rd., Aurora, OR 97002, phone (503) 678-1300, has been named the exclusive US distributor of the monitor, which is manufactured in England.

Simply mounted by drilling two small holes in an area where the red and green LEDs can be easily seen, the monitor plugs into a vacant channel on the receiver, into a servo 'Y' lead, or connects directly into the battery pack. When only the green light glows, all systems are 'go.' When the red and green lights glow, it's still safe to fly, and when only the red light glows, it's time to field charge or pack it in for the day! What could be simpler?

Price of the unit is only $12.95 . . . pretty inexpensive crash insurance. For more information, contact Mark Heininge at the above address or phone, and tell him we sent you.

• • •

Whether for competition or just sport flying, every scale model of a plane which has a pilot visible from outside, should have a scale pilot at the controls. It's as logical as having the correct color of finish and markings. MGA Enterprises, P.O. Box 5631, Fresno, CA 93755, phone (209) 224-4710, Fax (209) 224-2789, known for its line of scale pilot figures, has three new "ready-to-fly" pilot busts . . . meaning that they are already painted in proper colors and ready to install.

The pilot busts, all waist deep and of molded vinyl that can be trimmed to fit the cockpit, include 1/5-scale World War II American USAAF and German Luftwaffe pilots, and a 1/9-scale Japanese Navy fighter pilot. See your local dealer or contact MGA at the above location for further information.

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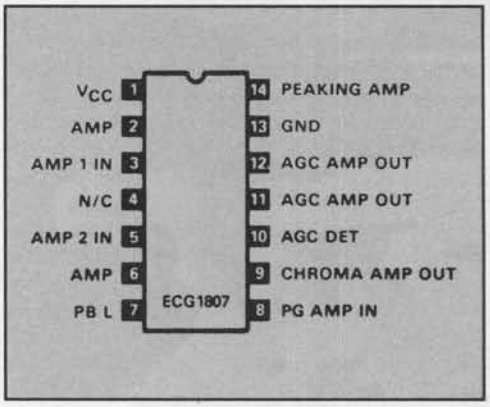
CORNER *Continued from page 7*

pulse amplitude is at least over four volts, often the same as the supply (battery) voltage. For confirmation, I hooked up my Airtronics 92784 FM receiver, which upon being powered with a regulated five-volt supply, put out a steady stream of five-volt control pulses which remained steady with as many as three servos connected in parallel to one channel.

In turn, the R129DP, with the same regulated five volts in, emitted control pulses of only three volts amplitude. They remained usable with some combinations of two (Futaba) servos, but not with all and never with three of them.



Why? I can't even began to guess, I doubt if a reasonable answer is known. The voltage is available, the need for the higher amplitude pulses was established years ago - who knows? In checking over the R-129DP receiver I was able to borrow for this test, I find that the IC which is generating the control pulses is working at three VDC, supplied by a voltage regulator IC in turn supplied by, you guessed it, five volts It would be so easy to apply a higher IC supply voltage with the results being higher amplitude control pulses, and even though I have access to SMD (Surface Mount Device) equipment and components, I wasn't nervy enough to ask the owner of this receiver if I could experiment with it.

The cure! Well, simply beef up the control signal. It is quite possible that it might be as easy as changing a component value in the E.G.A.S., but not having one available on which to test out any theory, I opted for a completely external buffer amplifier. Simplicity itself—it takes one IC and associated wiring!

The IC is a CD-4O69 Hex Inverter, a readily available less-than-a-buck~ unit. It encloses six (Hex) similar units, with simple inputs and outputs without the need for any external processing components. The only negative feature is that it inverts the input signal; that is, a positive polarity control pulse as developed by the RC receiver comes out in the exact wave form, but of negative polarity. It is therefore necessary to use two sections of the 4069, one to amplify the signal and the other to re-invert it to its normal polarity (This should not be confused as to what takes place in servo reversing circuitry, where the action of the control signal is changed, but not the polarity). I have shown the pin connections for the CD-4O69, with the connections you will have to make to fit it into the RC system. Notice that I have brought out two outputs, one which will be used for the throttle servo, and the other for the E.G.A.S.; this to prevent any loading of the receiver by this outboard device. If, for some reason, you are running the E.G.A.S. off a separate channel all by itself, simply use one output and connect the throttle servo as is done normally.

Radio Shack sells a small experimenter's PC board, No. 276-159, on which the IC and all associated wiring can be neatly and reliably mounted.

As stated earlier, some auxiliary equipment makers have already faced this problem. One of them told me that if anyone wanted their receivers to work with his gizmo, they would have to redesign the receiver. Fat chance, huh! Another company, McDaniel RC (which makes a system similar to the E.G.A.S.) takes a much more reasonable approach to the situation. McDaniel developed an interface amplifier, I believe using discrete components, that reportedly does exactly what my IC unit does. I am not sure at this point if they are only built into those units known to be purchased for use with Futaba receivers, or if they are available as a separate plug-in item. If you don't like rolling your own, as I've described, or if you've run into similar problems, check with Bob McDaniel for availability of his buffer amplifier.

• • •

ELECTRONIC SPEED CONTROLS for airplanes is our next subject this month, in answer to a letter from Bearl J. Duddles of Mountain View California, who writes:

"Thanks for a very informative and pertinent column on RC electronics. My query concerns wiring up my electric RC model with an Aristocraft Model SP-1801 speed control. There's a pictorial wiring diagram included with the package, but the individual wires from the battery and receiver to the speed control are not shown.

"Since I don't have the kind of radio they provided a connector for, I can't just plug in like they assumed I can.

"Also, I want to install the fuse provided by Goldberg for the Mirage 550, and I understand from one of the electric RC columns that you can end up frying your motor if you don't install it in the right place. Thank you for your help."

ESC's (Electronic Speed Controls) can be a little confusing to the uninitiated, and since I can't really treat this as a particular combination, not knowing what kind of RC system is involved, we will have a general discussion that will show you how to connect any ESC to any type of system.

First of all, the ESC, whose primary function is to provide proportional motor speed, operates from the same input control signal

continued on page 81

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FIFTY
SIXTY

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'90 DAYTON SPRING MASTERS CONTEST
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'90 MICHIGAN FAI CHAMPIONSHIPS
1st FAI - Wayne Mann - X-Cell Long Ranger .60
4th FAI - Doug Law - X-Cell .60
1st Intermediate - Mike Bantz - X-Cell
2nd Intermediate - Tom Erb - X-Cell
X-Cell dominates other makes by 2 to 1

'90 KINGS COMPETITION AND FUN FLY
1st Expert - Wayne Mann - X-Cell .60
2nd Expert - X-Cell .60
3rd Expert - X-Cell .60
1st Intermediate - X-Cell .60

'90 MICHIGAN FUN FLY
X-Cell dominates other makes by 2 to 1

'90 BURLINGTON, NC CONTEST
1st FAI - Wayne Mann - X-Cell Long Ranger .60
1st Intermediate - Jack Koontz - X-Cell .60
1st Novice - Steve Hodges - X-Cell
2nd Novice - Gary Whitford - X-Cell

'90 GREENWOOD, SC CHAMPIONSHIPS
1st FAI - Wayne Mann - X-Cell Long Ranger .60
4th FAI - Wes Suggs - X-Cell Long Ranger .60
1st Novice - Richard Mann - X-Cell .60
2nd Novice - X-Cell .60
3rd Novice - X-Cell .60

'90 1ST KYOSHO CHALLENGE - .30 SIZE HELIS
1st FAI - Cliff Hiatt - X-Cell .30
2nd FAI - Wayne Mann - X-Cell .30
4th FAI - Tim Schoonard - X-Cell .30
X-Cell dominates FAI class – even against Japanese factory teams!

FLASH! X-CELL SWEEPS '90 NATS

1st FAI - Cliff Hiatt
X-Cell .60

2nd FAI - Wayne Mann
X-Cell Long Ranger .60

4th FAI - Curtis Youngblood
X-Cell .60

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R/C PRECISION AEROBATICS

BY RICK ALLISON

WE VISIT RC CITY

This month we have something a little different on tap . . . you might call it rediscovering our roots, a trip home, or maybe even a return to the womb!

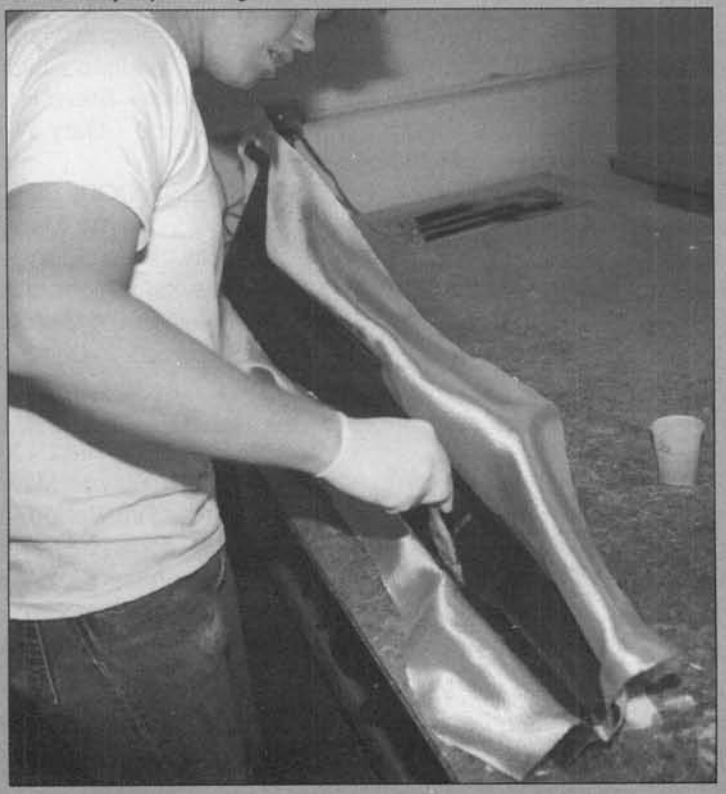
The traditional industry standard pattern plane basic kit consists, as I am sure most of you know, of a fiberglass fuselage, foam cores for the wing, stab and rudder, a plywood firewall, and some plans; with or without instructions.

Pattern plane kits are a specialty product in the world of aeromodeling, as are most Scale kits, Formula One pylon racers and competition sailplanes. "Specialty" is an industry code word meaning "low volume." Trainers and sport planes are mass produced in relatively huge numbers for the sport flying RC public by the industry giants. The packaging is brightly colored, the manuals and brochures are profusely illustrated and professional, and the product is demographically targeted, advertised, distributed and merchandised as ably as any household cleanser, circular saw or tennis racket. The products are high quality, on the shelf, and readily available. About their only real fault is that they don't score very well when flown through the pattern.

For specialty items such as pattern planes, we have long depended on small "garage" manufacturers to supply the demand. Cottage industry is a much blessed modeling tradition in this country, and without the small manufacturer who caters to the specialty market, the free flighters, racers, control line stunt and combat folks, scale addicts, and pattern fanatics would truly be up the creek without a place to purchase a paddle. Or a canoe or even swim fins, for that matter. In the world of specialty products, the advertising budget usually resembles a gnat's grocery bill, the stuff comes in a plain brown box, the plans are smeared blueline drawings, and the manual most often is a stack of paper with a staple in the corner. The volume is tiny, the profit margin is low, and what money there is goes into the product. As the folks who do this are nearly always master modelers, and as the enterprise is usually a labor of love, the products are generally excellent, if you can find them. Every so often, one of these small enterprises really succeeds, and another industry giant is born.

Finished TOC Skybolt fuselage weighs a mere 30 ounces!

John Neff lays up a fuselage. All hand work.



Reflecting the increased interest in RC aerobatics in recent years, the pattern marketplace has blossomed from coast to coast with a number of new small manufacturers and distributors. One such outfit which has enjoyed no small degree of success is Jim Graham's RC City. As *Model Builder* spares no effort to bring you, the reader, the full and complete story, and as I, the corespondent, was driving right past the joint on my way to the TOC, I figured I might as well drop in. The distance between rest stops on California highways exceeds my personal design limits anyway!

In the very best cottage industry tradition, RC City began in Jim Graham's Fairfield, California garage workshop in 1987 with the production of Jim's own design, the Avanti. The Avanti RE followed, and the RC City name began to be heard outside of the local area. In late '88, Jim secured the rights and assets of Henry Piorun's High Performance Models, including Henry's very popular Eclipse pattern design. Along with the Eclipse, Jim inherited the massive headache of Henry's 70-name waiting list.

The answer to the demand was expansion, and 1989 found RC City installed in new quarters in Suisun, just a few miles down the freeway from Fairfield. The Eclipse waiting list was cleared, and in rapid succession, my "Cursor" design, Dino Perra's "Punch," Doug Ferguson's "Fresh Aire," and Ron Chidgey's "Typhoon" were added to the catalog. Dave Patrick's "Conquest VI" and "Conquest 120" were next through the door. In early 1990, Jim acquired Dave Scully's Aero Composites firm, adding Geoff Combs' popular LA-1 and Ivan

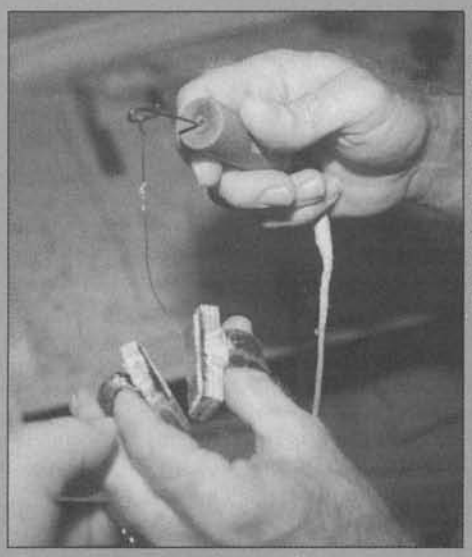
Kristensen' "Summit III" to the inventory along with Dean Koger's "Vortex," Wayne Ulery's "EU-1A," and Don Lowe's "Phoenix 8," as well as the Scully Skybolt TOC bipe. With the present line of 13 pattern designs representing the work of 12 designers, RC City can lay claim to being the world's most diverse manufacturer of pattern planes, if not the biggest!

Resting on past accomplishments isn't in the works, however. Planned additions to the line for next year are the Phoenix 8 .45, Mike McConville's "Desire: design, the TOC sized Kryer Kraft bipe, and Steve Stricker's beautiful 34% TOC Ultimate; the latter scheduled for availability in the late fall of '91.

So what was my trip through the candy store like? Enlightening is the proper word, I believe. By "factory" standards, the place is rather little . . . only about 2300 square feet, about the size of your average suburban home. The space is well utilized, however, and by the time you read this, several thousand more feet will have been added on a second floor for in-house foam work.

The employee work force is small. John Neff is the layup man for fuselages. Recently hired Dave Birmingham does the wing honeycombing and packing, Bud Garric pre-builds the deluxe kits, and Jim does what every good small businessman does: the accounting, order-taking, worrying, planning, supply ordering, and everything nobody else had time to do. The day I visited was typical, which meant everyone was very busy.

The thing you should realize, and which is obvious from the above paragraph, is that pattern plane kits are handmade products. The plugs are hand carved, the molds are handmade, the foam cores are cut by hand, and each and every fuselage and fiberglass part is produced by hand work. The process is labor intensive and exacting, and production volume is small. RC City ships only 15-20 complete aircraft per week, plus a number of cowl and wheelpant sets for designs such as the Goldberg Ultimate. When you buy one of these airplanes, whether you buy it from RC City or from any of the other small manufacturers active in the market, you are buying one of the last totally handcrafted products made in America. A sobering thought, right?



(Top) Jim Graham holds Ivan Kristensen's finished "Summit" wing cores. Quality shows. (Middle) Dave Birmingham, of RC City, honeycombs a Summit III wing for Ivan Kristensen. Note extra templates hanging from bench. (Bottom) Close up of the honeycombing rig. Metal plates on the fingers grasp the wire and carry the current.

In producing any handcrafted item, the main difficulty is to achieve and maintain a standard level of quality. To this end, I was very favorably impressed with the attention to detail and the obvious pride in workmanship that was evident at RC City, and even more impressed with the effort made to keep everything light. In fact, that's why I said the visit was, er... enlightening!

RC City uses epoxy rather than polyester resin, and a typical fuse layup begins with a layer of gelcoat painted in the mold to reduce "pinholes" in the final product. This is allowed to cure for around an hour, a layer of aerosil and epoxy "mud" is painted into all the corners and sharp edges, and then the layup proper begins with a layer of four-ounce cloth, followed by six-ounce reinforcing strips at all stress points, and then a final layer of six-ounce cloth. Each half then goes into the curing room to tack dry before trimming. After trimming, the halves are joined with a strip of glass tape while still in the molds to insure perfect alignment in the finished part. The average finished Cursor fuselage, complete with belly pan and canopy, weighs only around 510 grams, or approximately 18 oz.

As I said, the main difficulties with hand crafted products are achieving standardization and maintaining quality control. The main advantage to this type of manufacturing is the ability to easily make minor changes to improve either the product or the process without major retooling. Jim was very enthusiastic about recent changes at the plant in the wing honeycombing process, new optional clear canopies available for the Eclipse and Cursor designs, a new way of using carbon fiber tow to stiffen fuselages (I was sworn to secrecy concerning the method of manufacture, but believe me, these babies are stiff!), new and stronger methods to make tape seam joints, and about half a dozen other minor refinements, including redoing all of the plans supplied with the kits on CAD. This last step is being done by a fellow named Gus Ozols, and I must tell you that the examples I was shown . . . which include

my Cursor, the Eclipse, and both Conquest designs . . . are the very finest and most accurate model aircraft plans and template sets I have ever seen, and about as far from the usual "bluelines" as you can get.

All in all, it was an impressive visit. Going in, several of the questions I had in mind to ask were why the kits were so expensive and why the wait for delivery was still averaging two to three weeks on most designs. I walked out wondering how Jim was managing to build them so well, sell them so cheap, and still get them out the door so fast. RC City is located at 96 Railroad Ave. #F, Suisun, CA 94585. The number is (707) 428-3119. Jim will probably answer; he's also the receptionist.

Jim Graham holds Dave Patrick's "Conquest 120," RC City's newest release.

The scene at RC City; author's Cursor fuse in foreground. Jim Graham supervises.

HONEYCOMB WINGS

Although honeycombed flying surfaces have been an accepted part of pattern plane technology for at least the last five years or so, I still see a lot of confusion out there about them. Some folks swear by them, others question if they offer any real advantage, some don't trust them from the strength and durability standpoint, and as is evident from my mail, a lot of people don't really even know what the rest of us are talking about.

To answer the last folks first, "honeycombing" refers to the removal of some or even most of the foam from a foam wing or stab core prior to sheeting the core with balsa. This is usually accomplished by means of a hot wire rig (see photo) and a pair of templates which sandwich the core. The templates may be made of posterboard, plywood or aluminum. The structure which is left is an open lattice work of foam. Alternate methods of honeycombing include removing the foam with a knife, cutting rib "bays" instead of a lattice work, or merely using a sharpened pop can as a hole saw to cut circular holes in the core before sheeting.

The idea behind honeycombing is to remove weight. A foam wing is a stressed skin or "moncoque" structure. The bending strength of a foam wing derives from the sheeting, not the foam. The foam merely acts as a sheer web and a building form. The structural purpose of the foam is to hold the top and bottom wing skins rigidly in place relative to each other. Any more foam than the minimum needed to accomplish this task is excess structure, and this is the foam that honeycombing is designed to remove.

The amount of foam removed varies from design (and designer) to design. One of the early honeycombing innovators and still an acknowledged master of the art is Henry Piorun, of Eclipse and Meridian fame. Henry is a meticulous craftsman, and his latest Meridian wings have approximately 85% of the foam removed. He adds some carbon fiber and wood structure back in to support the wing tube and landing gear bracket, but still manages to produce a balsa sheeted panel completely ready to cover which weighs a mere five to six ounces.

By contrast, the honeycombed wings supplied for the Cursor by RC City have approximately 50% of the foam removed, but require far less additional internal structure. A sheeted panel (with contest balsa!) weighs seven to eight ounces, but the one piece design doesn't require the three-ounce wing tube. The core is left solid around the landing gear area for additional strength and grass field durability.

In both cases, honeycombing saves between a third and a quarter of a pound in finished aircraft weight. The savings come not only from the missing foam, but also from the weight of the glue that isn't used for the foam that isn't there.

The case made against honeycombing by those who don't believe in it rests on the following points:

1. A third to a quarter of a pound isn't much weight.
2. Like the guy in the pizza ad, you are "making a lot of work for yourself."
3. A honeycombed wing can't possibly be as strong as a solid one.
4. Honeycombed wings are harder (or impossible) to repair, and less durable in a crash.

Well, okay. How about the case for honeycombing wings?

First of all, I have to say that I do use honeycombed wings, and I do believe they offer significant advantages for those competing from the Advanced level on up, and most especially in the Turnaround classes. The following is a point by point rebuttal of the points listed above:

1. A third to a quarter of a pound may not be much weight, but it is significant, especially in a long vertical line on a hot afternoon. Much more important than the amount of weight removed, however, is the location of the weight removed. The poundage comes off of the wing and stab tips.

If you reduce the amount of wing mass outboard of the aerodynamic center of the airplane, you reduce the rolling moment of inertia of the wing (a moment is weight x distance from the fulcrum, which in this case is the AC) and the amount of aileron force (Newton's 2nd Law is Force = Mass x Acceleration, right?) needed to stop, start, and damp motion in the roll axis. What this really means to you and me is that all rolling maneuvers, including snap rolls, are easier to start, and more important, easier to stop. Aileron deflection can be less for a given roll rate, which means that adverse yaw and the need for aileron differential is reduced.

I have flown both Cursors and Eclipses with and without honeycomb wings. The light wing versions of both designs are most definitely better in point rolls, snap rolls, spins, gusty weather, and overall "feel." This

continued on page 84

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BY FRANCIS REYNOLDS

COMPARING NEW MATERIAL

Recently, modelers George Barker and Lawrence Ragan established U.S. AirCore in Dallas, Texas, to sell RC model kits in which the chief material is "AirCore" (tm), which is a clever name, since the core of the sheet material is indeed full of air, making its weight competitive with balsa.

The basic material is a plastic, polypropylene. The board, like corrugated cardboard, has a row of longitudinal holes through it, but unlike cardboard, the separating shear webs are vertical and extruded integrally with the face sheets. AirCore has a glossy fuelproof and waterproof white finish.

A similar "fluted polypropylene" is available from plastics supply houses in various thicknesses and is sold under several trade names, including "Coroplast" and "Corax." It is normally used for making signs etc. U.S. AirCore sells their AirCore board in 2mm (about 3/32 inch), 4mm, and 6mm thickness. The material has been treated to improve glue and paint adhesion.

Art Steinberg reported on their "CoroStar 40" kit and model, which is made from AirCore, in his "All About ARFs" column in the November 1990 issue of *Model Builder*. U.S.AirCore also sells an RC trainer, called "AirCore 40," which is made of the same material.

Engineers need numbers before they are happy, so I ran some tests on a sample of the 3/32 AirCore, comparing it to 3/32 medium balsa. Its weight turns out to be equal to that of medium balsa (.0071 lb./cu.in.), but in all other respects it is most unlike balsa.

My tests showed it to have a tensile yield strength parallel to the "grain" of 800 psi. The medium balsa went to 4000 psi in tension. I didn't test them for cross-grain tensile strength, but obviously the balsa cross-grain strength is almost negligible, while I would expect the cross-grain tensile strength of AirCore to be about two thirds as high as its longitudinal strength. In other words, AirCore doesn't split like balsa, and would be more comparable to LitePly in this regard.

In longitudinal bending, my data shows medium balsa to be many times as stiff as AirCore. In another test I found the cross-grain compression strength (crushing or bearing strength) of medium balsa to be three times as high as the AirCore.

These comparisons don't seem favorable to AirCore at first glance. In fact, George and Lawrence don't propose AirCore as a universal replacement for balsa. Why AirCore models then? Quoting them, "A quick-built plane you can take a few risks with." The material can be folded up to make fuselages and wings, making construction very rapid, once you learn the techniques. Contact cement is used in most of the joining, since not everything sticks to AirCore.

The biggest advantage of AirCore for models is durability, however. Their literature claims, "World's first 'rubber' airplanes." Because of its toughness, AirCore can be used to build a model that is difficult to damage in a crash. George and Lawrence like RC combat, where durability is a big plus. I have a copy of their videotape wherein George Barker impressively demonstrates the durability of these models by jumping on an AirCore wing. The tape also shows many violent crashes of RC models where the model was often undamaged and could immediately fly again.

This Spitfire, held by its designer-builder Tom Davis, is an example of hand-launched RCs with unlimited vertical performance, as discussed by author.

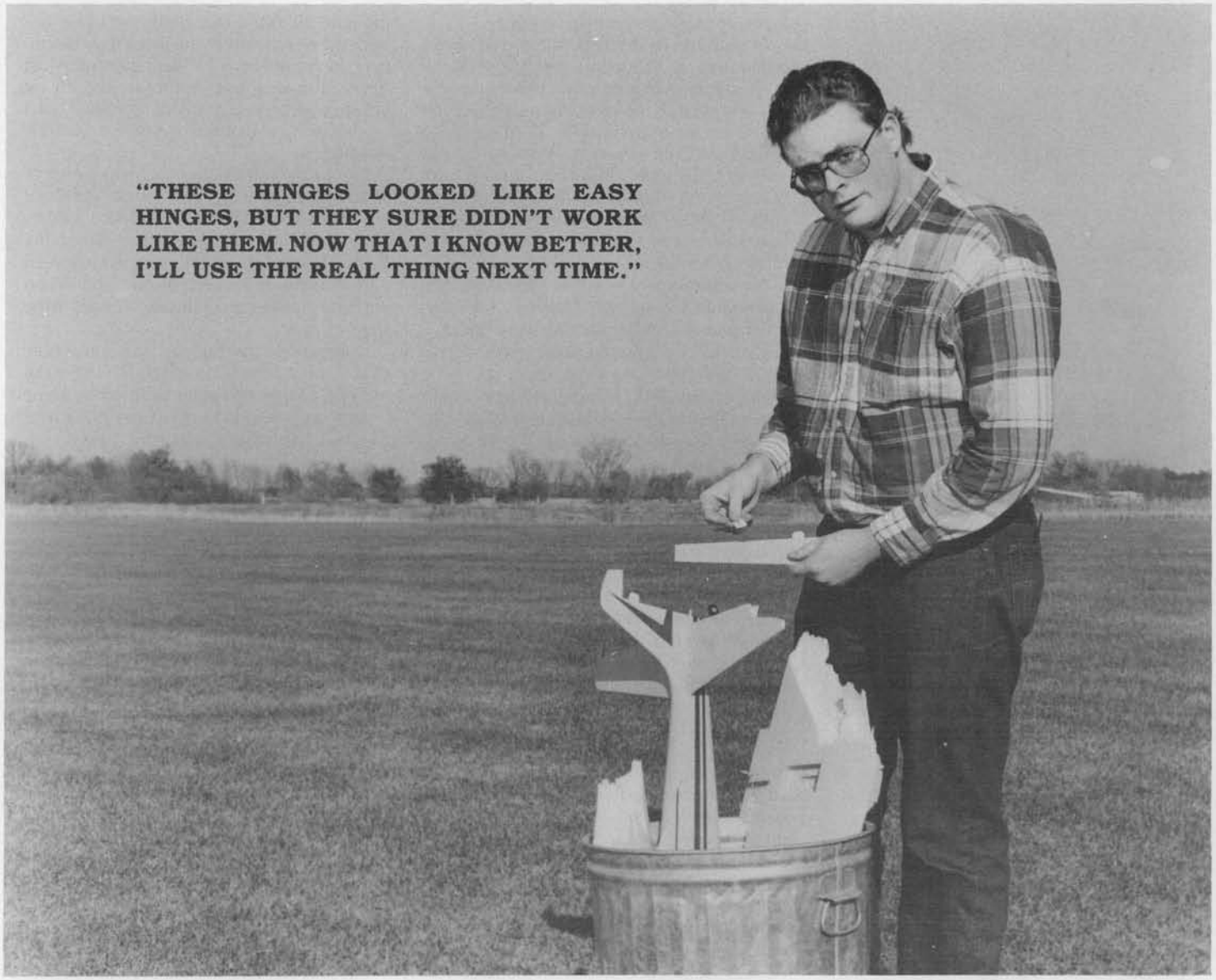
I have personally done quite a bit of experimenting with an ABS-faced foam board, called ArtCor. It was once sold for model building under the name Aerolite. It has a lot in common with AirCore, since you can fold up fuselages etc., and it doesn't need finishing if you are satisfied with white. That foam board is *far* less durable than AirCore, however.

The toughness and resiliency of AirCore material is wonderful, but its low yield strength and its flexibility are disadvantages. It is interesting to observe that in our search for better materials with which to make model airplanes, we are using brittle graphite-epoxy composites with a modulus of elasticity of 40 million, and tough polypropylene (AirCore) with a modulus of elasticity of 220 thousand. The one is 180 times as stiff as the other! (Data from Materials Engineering Handbook.)

It would be difficult to build a carefully-aligned pattern ship or a sailplane with a high aspect ratio wing and an accurate airfoil out of AirCore, but that isn't what it is being used for. For the knock-about sport RC models that U.S. AirCore is selling, AirCore is a good choice.

There is, in my opinion, a better choice. Polycarbonate plastic is much more rigid and stronger than the polypropylene from which AirCore is made, yet it too is remarkably durable and resilient. In addition, high-strength joints can be readily made in polycarbonate with most common glues and cements. Fortunately for modelers, polycarbonate, like AirCore, is available as a fluted or air-cored board. Plastics distributors sell these sheets under the trade name "Polygal." Your columnist will have more to say on this subject in months to come.

I have discussed polycarbonate as a modeling material with George and Lawrence of U.S. AirCore. They concur that it has interesting potential, but point out certain manufacturing problems relating to their using it in kits. They are considering at least selling the fluted polycarbonate board to modelers as raw material for scratch building. Drop them a line of encouragement if you are interested. They need to know how large the potential market for the material is. Balsa may be here to stay, but it has some serious high-tech competition other than



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2.) After a minute or two, touch the hinge (if there is still a puddle, don't bother). Is the glue still tacky? It will be if it's an **EASY HINGE**! *ONLY* Sig **EASY HINGES** are chemically treated to retard the curing time of thin CAs. This allows the adhesive time to penetrate to the full depth of the hinge before it sets up for maximum bonding strength. No pins are ever necessary!

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

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In addition to the two AirCore RC kits I mentioned, U.S. AirCore offers a "Scratch 40 Designers Kit" for experimenters, designers, and scratch builders like us. I have one of these raw material kits. In addition to enough AirCore in two thicknesses to build a 40-size RC model, the kit contains a wealth of very good information and instructions, with all the tricks George and Lawrence have discovered in working with this novel model material.

The address of U.S. AirCore is 4576 Claire Chennault, Hangar #7, Dallas, TX 75248. Their phone number is 1-800-336-0602.

How far AirCore and polycarbonate will go in the modeling world remains to be seen. At any rate, I applaud George and Lawrence for their continuing efforts to advance the art and science of model building.

HAND LAUNCHING

Hand launching is what kids do with their first toy gliders and with their wind-up models that don't have enough power to get off the ground. I hand launched my first models, in 1930. Shortly after that I graduated by building an "ROG," which was actually able to "rise off ground" under its own power! Big boys and men always have planes that "take off"; or do they?

Most competition free flight models, indoor and out, are still hand launched, as are most gliders, some electrics, a few control line models, and some R/C models. I want to talk about a special type of R/C model where hand launching has big advantages. The photo shows such a plane built by fellow Seattle modeler, Tom Davis.

Tom's hand-launched Spitfire has unbelievable vertical performance. The following specs will tell you why. The wing area is one square foot. The model weighs only 12 ounces including engine, two micro servos, mini receiver, and 100 mAH battery. It has a bladder-fed high-compression Cox TD .è09ü up front, carrying a 6x4 prop! The displacement loading is 8.3 lb./cu.in., but even that very low number is misleading because the engine wraps up to about 25,000 rpm. Tom estimates this .09 to be putting out a third of a horsepower. He measured the static thrust at 32 ounces, so the initial thrust is 2.7 times the weight! Tom wrote in a letter to me, "This model is so fast and maneuverable that only the most seasoned fliers with excellent eyesight should attempt to fly it." I believe it; I saw it fly.

This unusual class of RC model is rapidly becoming my favorite sport flying configuration. Mine need to have a little more wing and less power than Tom's. But even mine have very low power loading and very low wing cube loading. (See "Cube Loading" in this column for October 1990.) In other words they are powerful for their weight and light for their size.

The low weight and high power, combined with clean design, gives this class of model unusually high performance. I like them for the challenges and the excitement they provide in sport aerobatics. If you thought all hand-launched airplanes are underpowered dull-flying models for beginners, forget it! For now, I and others are just having fun with this type of model, flying hot-dog aerobatics and RC combat, but I predict that competition events for it will be developed.

"Vertical performance" is a measure of how nearly straight up a model can climb, or how long it can maintain a vertical zoom. Unlimited vertical performance, the ability to fly straight up indefinitely, is achieved when the thrust exceeds the weight. When we have that we can really "bore holes in the sky."

Competition free flight planes bore a hole during the climb. But boring holes in the sky with RC planes has been belittled by some writers as a less-than-desirable objective. Maybe their attitude was sour grapes. Another possibility is that these anti-bore types know that most full-scale airplanes can't perform like that, and they are locked into scale modeling to the point where they find any nonscale performance sacrilegious, even with a nonscale airplane. As I have indicated in the past, unless I'm building a scale model, I'm challenged to build not "models" but "miniature flying machines." If these can outperform full scale planes, so much the better.

I find long high-speed vertical climbs exciting and spectacular, as well as an indication of design and building achievement. Spinning down from great heights is fun. Spinning (axial rolling) straight èupü to great heights is a lot èmoreü fun and represents a much larger modeling accomplishment.

Early full-scale airplanes could climb only very slowly at very shallow angles. Likewise they were never purposely put into steep dives for fear of ripping the fragile wings off. Unlike land vehicles and boats, they entered the domain of the third dimension (height), but just barely. For the most part they still operated in the horizontal plane. As airplanes got more powerful, structurally stronger, and more aerobatic, they were able to use the vertical dimension more completely. I'm having a ball using the third dimension to the hilt with models these days. Come join the fun. The sky is the limit.

Why hand launch this class of model? Because if we hand launch, we can eliminate the landing gear weight and drag and further improve the performance. That is, eliminating the gear is one important way by which we make it light and clean. As secondary gains, eliminating the landing gear also reduces building time, improves reliability, and reduces cost. Also, hand launching sometimes allows us to fly from areas where take off would be impossible.

The landing gear on most models contributes a sizable percentage of the total drag and weight of the model. A retractable gear will eliminate the drag of the gear, but it doesn't help the weight problem; in fact it increases the weight even more. It is a bit hard to get thrust greater than weight while carrying a landing gear, especially with a

continued on page 84

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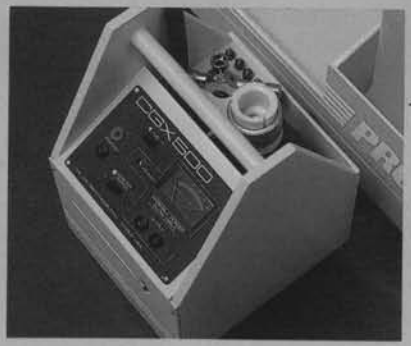

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ELECTRIC POWER

BY MITCH POLING

BATTERY PACKS

There were several problems that I mentioned in the January issue concerning the way battery packs are made commercially, and I outlined how to take care of these. The two major faults were: 1) No spacers or spacing between cells, so that they can contact and short out. This can occur when the heat shrink on the cells cracks from heat. 2) Cells can short out due to the bare battery straps cutting through the heat-shrink when they get hot. The only exception to these problems that I have seen are the packs from SR Batteries. They are built correctly. I have had to rebuild all other manufacturers packs to meet my standards. Perhaps these standards are too high? I do it because I have had the problems mentioned above. What has been your experience?

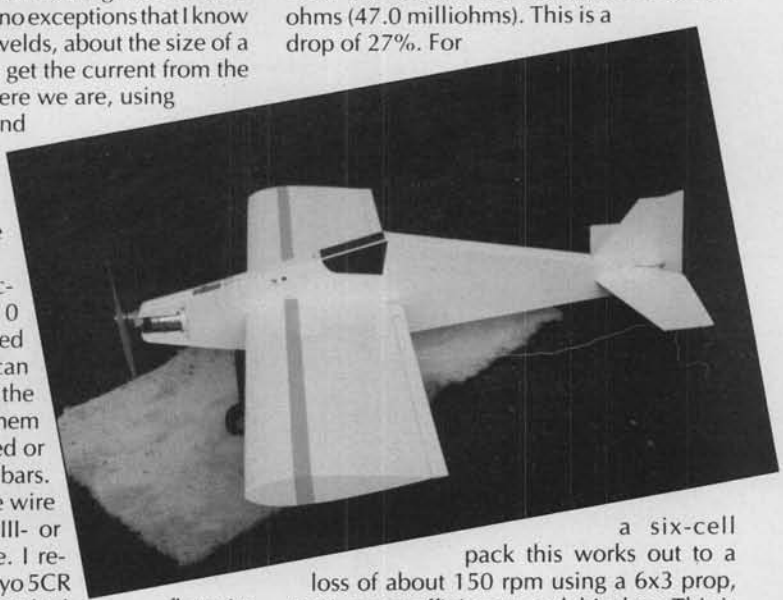
TABLE 1.	open voltage	load voltage	amperes
before rebuild	7.68	6.95	11.3
after rebuild	7.62	7.00	1.5

There are other problems with commercial packs that prevent you from getting full performance from them. Many are supplied with good old extension cord type wire and Molex or Tamiya type plugs that cut performance. The solution is easy: replace them. There are machined pins available now for the Tamiya plugs which should bring them up to an acceptable performance. Oddly enough, the ones I have seen are gold plated, which is not the best. Silver plating is best for the lowest possible resistance. Even bare copper works better than gold. Gold has one virtue, in that it will never oxidize, so it requires no maintenance. In my opinion, Sermos connectors, which are silver, are the best commercial connectors available. I use homemade connectors from brass tubing, which also work well. Always use high flex wired 100 strands or more, minimum size #16. I usually use #14 or #13. The #13 is available from Stage III, 1189 Chicago Roads Troy, MI 48083.

Another performance killer is the weld used on the straps connecting the cells. All commercial packs, no exceptions that I know of, have four spot-welds, about the size of a pencil dot each, to get the current from the cell to the strap! Here we are, using high-flex 100-strand wire, and four little dots per cell end are carrying the load inside the pack!

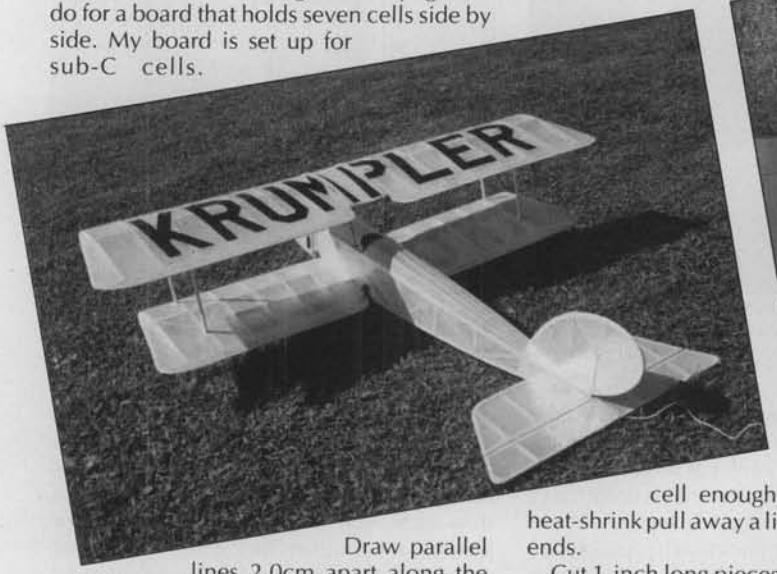
Competition electric fliers and 1/10 scale car drivers need all the power they can get. They remove the straps and replace them with high flex wired or wire braids or solid bars. I use the 1cm wide wire braid from Stage III- or #13 high flex wire. I recently rebuilt a Sanyo 5CR six cell pack using #13 high flex wire to connect the cells. Please see table 1. for the data for the pack before and after the rebuild.

I did not recharge the cells after the rebuild; the test was done on one charge only. Note that after the rebuild, due to no recharge, the open voltage is lower. But the load voltage and the current delivery are both higher. Clearly the pack has more "punch," due to lower internal resistance. Use the rule that the change in voltage is equal to current times internal resistance. Before the rebuild the internal resistance is .0646 ohms (64.6 milliohms). After the rebuild the resistance is .0470 ohms (47.0 milliohms). This is a drop of 27%. For a six-cell pack this works out to a loss of about 150 rpm using a 6x3 prop, 60% motor efficiency, and this data. This is equivalent to using a throttle made in the



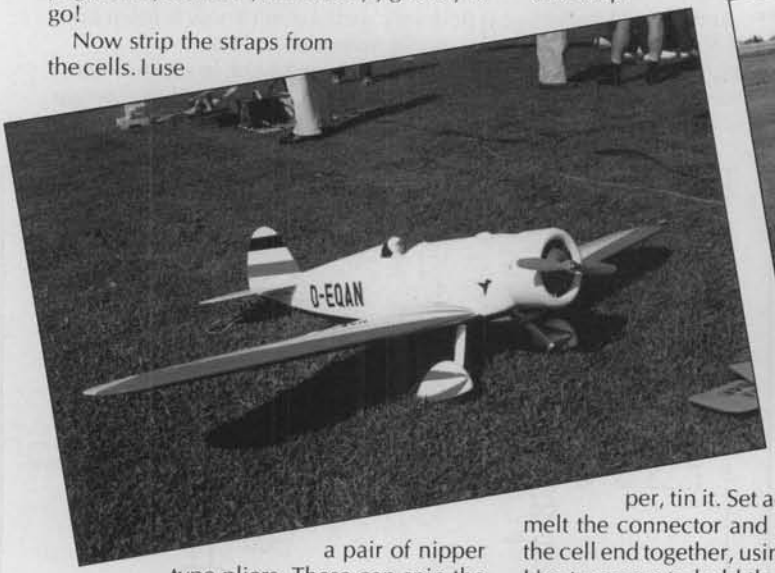
70's, or using five 25 amp fuses in a row in the wiring! As you go up in the cell count, this power loss adds up. Multiply the effect by two for 12 cells, by three for 18 cells, and so on. If you want to get the maximum from your packs, here is how to do the rebuild.

You will need a jig to hold the cells while assembling the pack. I use a fixture which can be built in less than half an hour. I made mine from a 2-1/2-inch x 12-inch board 3/4-inch thick, with pegs cut from 1/8-inch dowel, 1-1/2 inches long. Sixteen pegs will do for a board that holds seven cells side by side. My board is set up for sub-C cells.



Draw parallel lines 2.0cm apart along the board, then lay out hole centers 2.3cm from center to center on each lined so you are making a series of rectangles. Drill 1/8-inch holes 1/2-inch deep. Try to make these holes as vertical as possible. If any holes are off from the vertical, put the drill back in and run it while vertical. The hole will be off-round, but will be good enough. Push in the pegs, and you have your battery jig ready to go!

Now strip the straps from the cells. I use

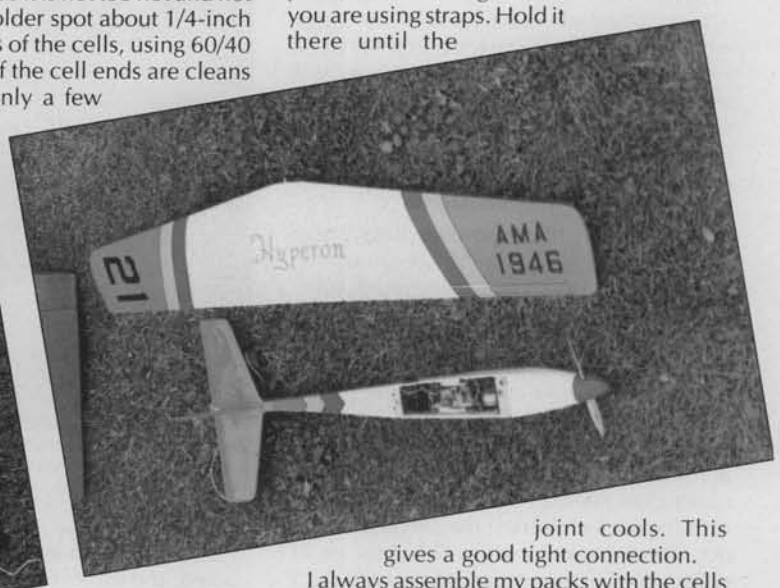


a pair of nipper type pliers. These can snip the pips left on the cell ends. I then file the pips down a little-so they do not have sharp ends. Use emery sticks to make the ends of the cells clean and shiny. Now for the critical part. Use a 40-watt pencil iron for pre-soldering the cell ends. The 40-watt iron does the best job by far, as it is not too hot and not too cold. Flow a solder spot about 1/4-inch wide onto the ends of the cells, using 60/40 rosin core solder. If the cell ends are cleans this should take only a few seconds. It may heat the cell enough to make the cell heat-shrink pull away a little bit from the cell ends.

Cut 1-inch long pieces of wire or strap for the connectors. Strip away 1/4-inch insulation at the ends. If you use #12 or #13 wired use the 40-watt iron to pre-tin the wire ends. If #14 or less is used, use a 25-watt iron as the 40-watt iron will melt the wire insulation.

It is very easy to miss areas when you pre-tin the wire. Turn the wire to check all sides, and if you see any bare copper, tin it. Set a cell in the jig, then melt the connector and the solder spot on the cell end together, using the 40-watt iron. Use tweezers to hold the wire, it gets hot!

It is easy to make a solder joint that is not tight, i.e. one that has a layer of solder between the strap and the cell surface. I press the wire or strap down tight with the back of a #11 blade while making the joint. Right where the insulation ends is a good place to press, or at the edge of the solder area if you are using straps. Hold it there until the joint cools. This gives a good tight connection.



I always assemble my packs with the cells side by side, with enough clearance to put a thin cardboard shim (postcard stock) in between. I always put a thin plastic or cardboard shim underneath bare straps to forestall shorts between the positive post and the edge of the cell. If you wish to, use hot melt glue, latex caulk, or silicone glue to glue the cells together. Use glues that have bulk, so you can make sure the cells have about a postcard thickness separation between them. Do not use cyanoacrylate glues, as they leave the cells too close together. I do not use glue at all; I use plastic, cardboard, or doublesided foam tape to space the cells.

Now cover the completed pack with a 3-inch wide heat shrink sleeve to hold the cells

(Top row, l-r) 1.Brian Hunt came down from London, Ontario, Canada to participate in the 1990 KRC meet with his very nicely done Piper Colt, powered by an Astro 40. 2.Martin Irvine's very fast looking Heinkel 219 Uhu (owl) night fighter is a smooth performer with two Leisure LT-5OX motors. Ship has no landing gear, so all flights start with a hand launch and end with a belly landing. 3.Cute sorta-scale "Krumpler" was Martin Irvine's last-ditch effort to have a biplane at the KRC meet, proved to be a great flier. Span is 39 inches, weighs only 36 ounces ready to fly. 4. The last word in seven-cell pylon racers? Keith Shaw's "Hyperon" with Astro 05 power has been clocked at 140 mph! (Bottom row, l-r) 1. A hot performer is Joe Pasqueto's clipped-wing (49-inch span) Super Hots with geared Astro 40 on 18 cells. 2. Keith Shaw's Messerschmitt M.35b is a replica of the machine that aerobatic champion Willy Stor campaigned in Germany in the mid-193Os. A real beauty! 3. Keith Shaw's electric fleet includes, among many others, a Gee Bee RI, 450 Stearman, Messerschmitt M.35b, and his original design King Crimson tailless.

together. A heat gun or paint stripper gun is ideal for shrinking the sleeve. The heat-shrink is available from stores stocking off-road cars, or from the Stage III company. I like the clear heat-shrink from Stage III; it makes it easy to see how the cells holding up in use.

I am using my own homemade plugs, with 3-inch leads from each end of the pack. I do not make the leads so that they will come out together at one end. One reason is so that the plus and minus connectors cannot accidentally touch. If you are using Sermos connectors or Adams style connectors, you can do the same.

Since I started to use my own plugs, I have found that there are some advantages to single plugs as opposed to using plugs paired together in one housing. I realized that using paired plugs (plus and minus in one housing, as in the Tamiya or Molex plugs) uses more wire and more connection points. This is particularly true if you are using battery packs in series, which I frequently do. Look at the diagram to see why this is so. Paired connectors need a "Y" type harness to connect the packs in series; the single plugs do not. Three packs in series (18 cells, or 21 cells) have 16 connection points with the Y harness, and only eight with single plug connectors. The single plug connection style saves money, material, time, and reduces connector inefficiency. That is a lot for such a simple change!

You will note that I use six or seven cell packs in series to make packs for the Astro 15, 25, 40, etc. Competition fliers do not; they use packs that are all wired together in blocks of 12, 21, etc. This does save four connector points. However, in this one case I favor using several packs instead of one big one. There are several reasons for this. One is economy, the six and seven cell packs are easily available and fairly inexpensive. Another is convenience in the model. I mount my packs with Velcro; if I am using three packs, it is easy to mount two on the sides and one on the floor of the fuselage.

Gregor Poulles' smooth flying Kaos is more of a precision aerobatic machine than a hot-dogger, performs well at 6-1/2 pounds on a geared Astro 40.

King Crimson spans ten feet and gets its power from four Leisure LT-5O motors. Needless to say, it steals the show wherever it's flown.

This makes them easily accessible, easily cooled, and leaves room for the other equipment. I can charge each pack separately or as a unit. Maintenance is much easier, as I don't have to take apart a big pack; just locate the particular pack that has problems.

• • •

Fred Sauerberger sent me over sixty photos, all excellent quality, plus two cassettes and a video of the KRC meet! Thank you, thank you! It was certainly the next best thing to being there. One of the more impressive models was Martin Irvine's Heinkel 219 "Uhu" night fighter. This is a plane that I have considered as an electric project; it just seems to have the right lines. Martin powered it with two Leisure LT-5OX motors and twelve 900 mAH SCR cells. It uses 6x4 props, has a 57-inch span, and weighs 75 ounces. The video showed very smooth flight, complete with a no-wheels landing (it does not have wheels).

Martin's "Krumpler" biplane made quite a hit at the meet. It has very attractive lines and the construction is classic old-timer. It flew very well with a Goldfire 05 motor turning a Graupner 8x4 prop. The flying weight is only 36 ounces! The video showed it flying in a pretty stiff wind, which it handled well, but limited it to just circuits of the field.

Brian Hunt entered a beautiful Piper Colt powered by an Astro 40, with eighteen 12OO SmAH cells and a Jomar SC-4 speed control. The span is 74 inches, flying weight 140 oz. The wing loading is 20.3 oz./sq. ft. This is a very reasonable wing loading, and it flew very well. I don't know if Brian built the model from plans or not.

Gregor Poulles brought an electric Kaos, Astro 40 geared, with 21 cells. Flying weight

continued on page 31

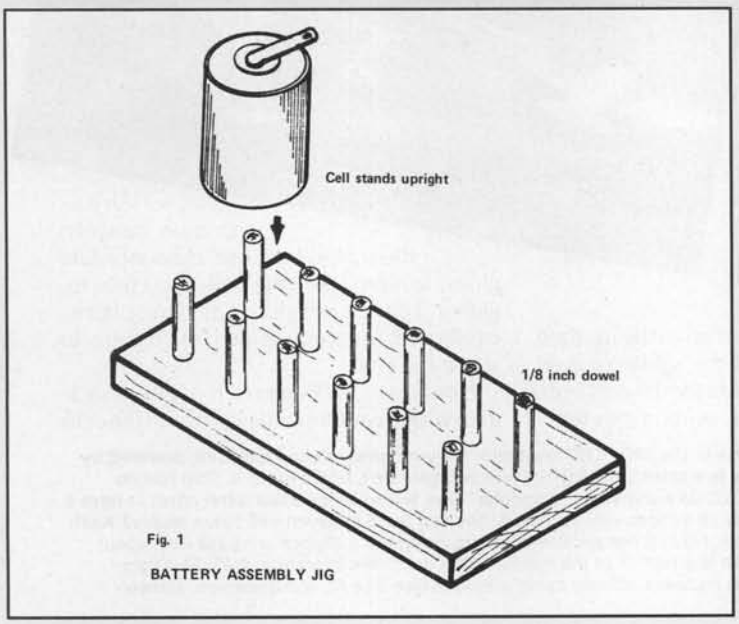


Fig. 1
BATTERY ASSEMBLY JIG

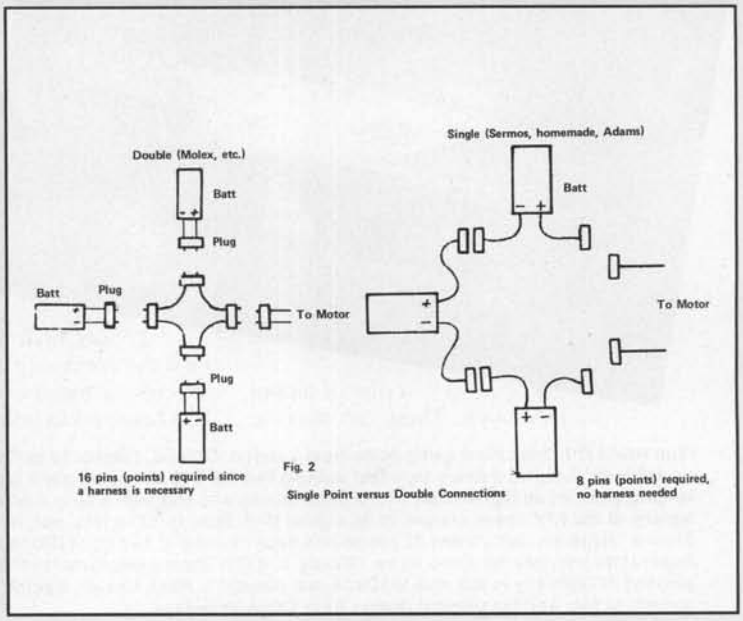


Fig. 2
Single Point versus Double Connections

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PLUG SPARKS

BY JOHN POND

ANTIQUES AND CHAMPS

For this month's issue, we are going to present a two-for-one report on Karl Spielmaker and the Michigan Antique Modelers Annual; the MAM Mini-Champs that drew 66 Contestants!

Before getting into the contest report, here is another candidate for the "Spark Plug Award" as issued by this columnist. We are referring to Karl Spielmaker, who seems to be tireless in putting on the Mini-Champs, flying at the various meets, promoting the junior events, and manufacturing spark ignition engines. Of the latter, he has produced two original design engines similar to those of that era known as the "Golden Eagle" and the "Spielmaker 60."

In his spare time, Karl writes the *Michigan Antique Modeler* newsletter. The contents are almost a direct reflection of how Karl conducts himself on the field; friendly, peppy, and always ready to give a hand. His antics on the contest site are well known, earning him the various titles of "The Mad Baron," "Krazy Karl," and "Bearing Von Spielmaker."

Spielmaker never seems to tire of promoting Junior free flight events. Proof of that can be seen in the photo depicting Zack Dock holding his winning rubber powered Pacific Ace 30, a Modelcraft design produced in 15, 18, 20, 30, and 40-inch wingspans. Two Modelcraft gas designs of 1936-38 also carried this name.

Zack is the grandson of Ted Dock, well-known Midwest free flighter. Ted son, Denny, and his four sons, have also been very active, but during the fall, Denny Dock is a football coach at Eastern Michigan College and finds little modeling time to spend during the football season. Regardless, this is a real free flight family that flies together!

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Despite the strong winds at the annual, Karl noted the rubber power models were making excellent flights. Noted in the results were four Junior events. In the two-day meet, there were 18 free flight events and six O.T. RC events. You couldn't say this wasn't a busy meet!

Inasmuch as there was so much discouraging wind, Spielmaker has decided to put on two annuals in 1991, the first on June 9 and the other meet on September 21-22. Both meets will be at Sturgis, Michigan. Karl says this should make up for the blown-out 1990 meet and encourage those who sat out the "Big Blow." So mark those dates for strictly a fun time!

Those modelers wishing to get the jump on this meet can write to Karl Spielmaker at 4690 Burlingame SW, Wyoming, MI 49509. Better yet, send $3.50 to get his monthly newsletter.

For all of the foregoing hard work and dedication to model flying (especially Old Timers), this columnist hereby nominates and presents the "Spark Plug Award" to Karl Spielmaker.

DESERT MEETS

That's what the meets at Taft, Las Vegas, and Jean can be called. However, rather than report the meets in detail, we would rather run photos of interesting models that showed up.

First off, courtesy of Mik Mikkelson, comes a photo showing a most interesting model by Bob Langdon of San Diego. This colorful model is a Burd Model Airplane Company "King Burd" of 66-inch wingspan.

This model indicates the trend for the I/2A F/F Texaco event: big and light. The Cox Texaco .049 powered model disappeared at Taft during the SCIF Fall Annual in October 1990.

We are again indebted to Phil McCary, retiring newsletter editor of the VAMPS for some very little known (or seen) rubber designs. Phil, always one to be a little different, produced a Megow AYA-5 model. This 36-inch wingspan came out in 1940 in response to the American Youth Association

(1) Junior flier Zack Dock represents the third generation of the Dock free flight family...still winning as much as ever, too! Model is a Model craft Pacific Ace 30. (2) With no minimum weight restrictions, F/F 1/2A Texaco ships tend to be large, extremely lightweight types like this 66-inch King Burd by Bob Langdon. Engine is a Cox Texaco .049. Bob unfortunately lost it 00S at a Taft SCIF meet. Mik Mikkelson photo. (3) Here's a rare one: a Megow AYA-5 rubber job as replicated by VAMPS member Phil McCary. (4) Beautifully built Zeek by Jack Jella, of Salinas, California, competes in two classes of Nostalgia events by swapping engines. Photo by Mik Mikkelson. (5) Dan Walton shows us his "Jayhawk" rubber job, originally an Orr Dept. Store model, built from Ernie Linn's plans. Took 3rd at SAM 56 "WHAM-BAM" Annual. Linn photo. (6) What's going on here? It's just Gene Wallock (cranking) about to terrorize one and all with his Orwick powered baby buggy during a years-ago night-flying contest. Dick Everett photo. (7) The venerable E-2 Cub is a popular choice for the RC 1/2A Texaco Scale event; this silk covered replica was produced by Texas modeler Lou Fairman. (8) C.D. Lou Sayre (right background) poses with the SAM 21 K.I.S.S. event winners: Fred Terzian (1st) and Fred's daughter Debbie (2nd). Details in text. Photo by Steve Roselle. (9) An interesting pre-war German glider design, the "Strolch" (hoodlum), flown by Swedish modeler Ove Meissner. Might make a good choice for the RC O.T. Glider event being promoted on the West Coast. Pond has plans. (10) SAM 41's Jim Alaback is one of the prime movers for the RC 1/2A Texaco Scale event on the West Coast, seen here with his very pretty Taylor J-2 Cub. Photo by Ken MacLean.

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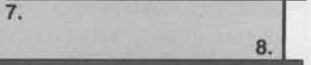

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drive to interest the young in model aviation. All the major manufacturers (Berkeley, Comet, Megow, etc.) produced simple designs that would fly well, both in rubber and gas competitions.

Probably the most outstanding AYA gas design was the Brigidier (misspelled by Berkeley). Designed as a beginner's gas model, the Brigidier turned out to be a first class performer when the expert modelers got hold of it..

We couldn't resist the photo of Jack Jella holding an absolutely impeccable Zeek as designed by Lew Mahieu. This all-red model can fly in two classes by simply interchanging Torpedo .19 and .23 engines. Jack reports this model was started in 1955. The popularity of the Nostalgia event aroused Jack's interest. The model was rescued from the storage area, re-covered and finished in Jack's usual impeccable style.

ENGINE OF THE MONTH

This month's subject came about in a very unusual way. When the list of officially accepted engines was published by SAM Speaks, Gordon Burford, who was staying at the Pond residence, spotted the G.B. 50 as a legal diesel engine.

Well knowing it was quite a rare engine, Burford suggested I try to find a "bare bones" model. Burford would rebuild it. Luckily, this writer did find a G.B. 50 in pretty sad shape in the collection of Peter Lloyd, well-known Australian modeler and engine collector. A quick deal was worked out and the "junk" engine sent to Burford in Queensland.

Imagine this columnist's surprise when he received a brand new G.B. 50 engine with a note saying the original "junk" engine was truly a junk; just too much effort to restore. In its place, Gordon found he could make up a new engine much more quickly.

This comes as good news to those modelers who have been unable to obtain a good running diesel engine. Gordon will produce only enough to satisfy the initial demand for a good Class A diesel engine that qualifies as an ignition engine under the 1950 rule. A telecon to Burford in Australia indicates the price will be between $85 and $100. Write for particulars to Gordon Burford, 86 Tierney Drive, Currumbin, Queensland 4223, Australia.

The engine, according to tests by *Model Aircraft,* back in the early fifties, showed maximum .22 bhp at 12,000 rpm. The engine is a single cylinder, air cooled, compression ignition type with shaft-type rotary valve induction featuring sub-piston supplementary air induction. Annular exhaust and transfer porting are combined with a conical piston crown.

General specifications show the swept volume at 2.458cc (.1499 cu.in.) resulting from a stroke of. 555 in. and stroke of .620 in. Weight of the engine is 4-1/2 oz.

For the technically minded, the gravity die-cast alloy crankcase features a detachable screw-in rear cover. The hardened steel cylinder liner is threaded into the crankcase with a copper gasket. Onto the cylinder liner is threaded a machined duraluminum finned cylinder barrel. The nickel-steel crankshaft is hardened, ground and lapped to a mehanite main bearing with a connecting rod machined from duraluminum. The very positive action spray bar needle valve comes with brass body and polished needle valve.

All in all, a very well made engine (as are all Burford types) that provides the modeler with the choice of beam mounting or three point bulkhead mounting.

"GAWGE DOES IT"

Last month's column and subsequent letters to George Aldrich have brought out more useable information for modelers on engines and fuels.

First off, in his declaration that he considers SAE 70 wt. oil the best lubricant for the old engines, he readily admits that spark plugs do foul up easily. Aldrich has found a special detergent and now runs a 30% lubrication, 70% Texaco Hi-Test unleaded gas mix that he feels is great. He has tested this in Super Cykes, Andersons, and Orwicks. What surprises Aldrich is that he only gained 200 to 300 rpm when using Fox Super Fuel; i.e, 28% castor oil, 5% nitro.

In spite of his many experiments with other fuel combinations, Aldrich finds that in gasoline mixes, SAE 70 wt. oil is still the best for O.T. engines!

In a discussion about propeller sizes with

this columnist, George checked three Super Cyclones and only got 6200 rpm using a 13x6 Top Flite propeller. This prop size was based on Jim Reynold's use of a 13x Rev-Up propeller for the Orwick .64 which obtained 8200-8300 rpm.

When George used a "Texas" (high compression) head, performance of the Cyke went to 7800 rpm still using a 13x6 Top Flite prop. George then made his own high compression head that ran up to 9000 rpm! However, the revs dropped off to 8200 when the engine heated up due to its straight cylinder (no taper) which bellmouths at Top Dead Center (TDC), thus losing power.

Aldrich made up some tapered liners that proved out in four Dunham built Orwick engines. While still tight, the engines turn 13x6 props at 8500-8900. On the other hand, the Anderson Spitfire turns the same prop at 9800 rpm.

Wrapping up this discussion, George's buddy and two-time SAM champ, Jim Reynolds, finds the best climb with 13x6 or 13x7 props. The biggest surprise is the Spitfire 65 out-turning the Orwick .64 by 1600 revs.

George concludes his observations with the comment that the use of alcohol (for F/F), pressure, and converted glow engines are run under the same rules as O.T. engines. These factors do accelerate performance for all; far past what were its original figures. In short, we are advancing the state of the art!

Aldrich is quite concerned this Old Timer movement as envisaged by this columnist will eventually turn into another "AMA Javelin Chucker" event. If winning becomes the only thing, he feels the pleasure of building and trimming the old designs will pass. At 58 years of age, he notes that converted-to-ignition glow engines just don't cut it in the definition of Old Timers. (Ed. note: I'm with you, George!)

NOSTALGIA NOTES

This new section of "Plug Sparks" may not meet with the approval of some Old Timer (pre-1942) fliers, but the era following WWII was unprecedented for the number of modelers and model designs that appeared in competition.

Back in 1945-1955, a tremendous number of modelers were in their young twenties. This would make the average modeler of then between 55 and 65 now. Even the Nostalgia cutoff date is 36 years ago!

In correspondence with Gene Wallock, long-time O.T. modeler, he sent a flock of photos taken by Dick Everett, who wrote the "Western Roundup" column for *Air Trails*. Just before his untimely death, Dick gave a flock of photos to Wallock in the hopes they would be used.

The first one we feature is a shot of Gene Wallock (strictly a fun man when not a top competitor) with his Orwick powered baby buggy. Wallock reasoned why chase airplanes at night contests, when just as much fun could be had with hot running ground craft?

Seen in the photo is Gene Wallock cranking with a large crowd of onlookers. This writer cannot identify them all, but everyone is enjoying this stunt. Seen in the photo are Hal Cover, Toshi Matsuda, Bob Hunter, and a flock of other well known modelers. If you can identify them all, send your solution to John Pond and receive a free Nostalgia plan of your choice. What can you lose for a 25-cent stamp?

READERS WRITE

Received an interesting letter and accompanying photo from Lou Fairman of Houston, Texas. Lou says the model is a Taylor E-Z Cub that he flew and won with at the Lawrenceville SAM Chapter 57 Annual. Fairman sent in the photo in the hopes it will increase the interest in the l/2A Texaco Scale event. The model, according to Lou, under favorable conditions, will max consistently. In fact, he says it flies as well as any Old Timer l/2A Texaco model.

K.I.S.S. CONTEST

For years, the SAM 21 club has been noted for the amount of innovative events it has developed and pioneered (.020 RC, l/2A Texaco RC, 05 Electric, etc.), but one of the SAM 21 members, Lou Sayre, annually sponsors a K.I.S.S. (Keep It Simple Stupid) club contest in the off season.

For a club that does not have an official flying field to its name, the membership of 40 is astonishing and a credit to the membership in general as they will turn out for anything.

Sayre has sponsored one-type model contests for the last three years (Miss World's Fair and Clodhopper), but really rang the bell with his A.J. Interceptor meet. Lou not only ran the meet, but provided all the A/J Interceptor gliders and the prizes. Great stuff!

SAM 56 "WHAM-BAM" Annual

We received a flock of photos from Ernie Linn of the SAM 56 club (Wichita Hawks Antique Modelers) showing Considerable interest in their annual "WHAM-BAM" Contest.

We recently ran an article on the Orr Department Store line of rubber models and in particular, the "Jayhawk" that Ernie is promoting both in kits and competition. To that end, we present a photo of Dan Walton, who took third place with his Jayhawk. Just goes to show you, the old commercial designs do fly well!

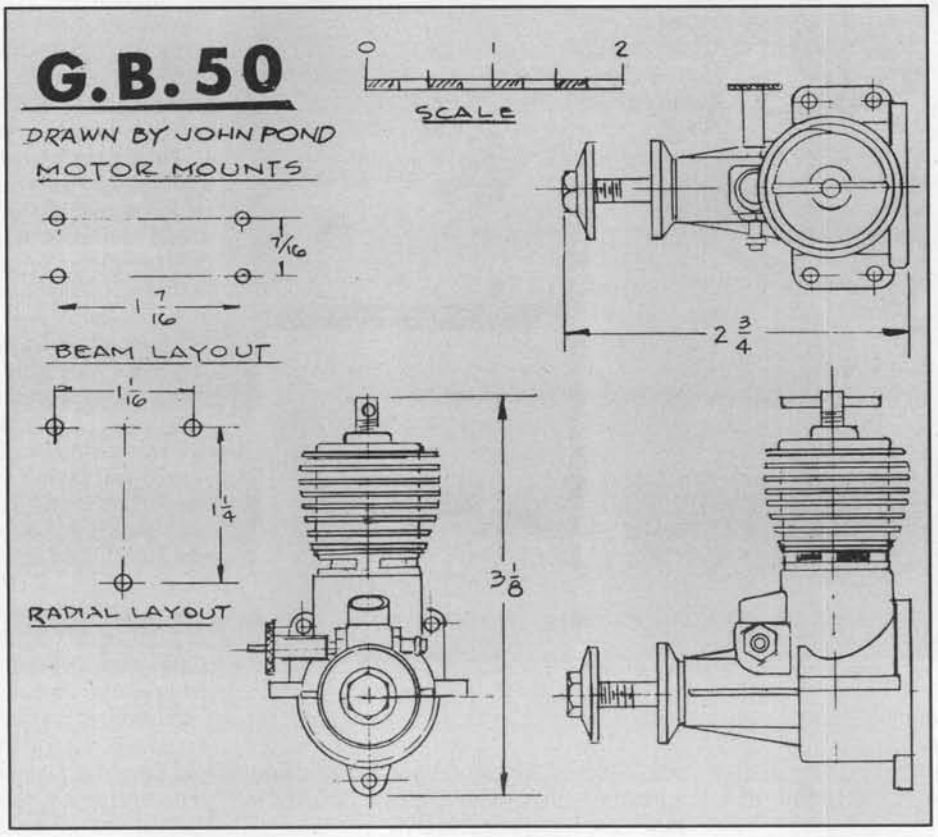
SAM 41

Those modelers who have enjoyed the SAM 41 newsletter *Aero News*, will want to join us in honoring the retiring news editor, Jim Alaback, for his many years of fine writing. We have a photo of him showing his l/2A Texaco Scale entry, a Taylor J-2 Cub. This photo was taken at the SAM 41 flying field located at Alpine (east of San Diego), California.

Jim has been one of the driving forces in establishing the new event on the West Coast. SAM 41 has been extremely active in the O.T. RC Flying Scale, offering three events: Gas, Electric, and Rubber, and now a fourth: l/2A Texaco. The latter has turned out to be extremely popular on the East Coast, the event having been originated by Jack Brown of the Western New York SAM Chapter 48. This writer hopes they keep the *flying* in the flying scale event!

SWEDISH SALLIES

It is always a pleasure to hear from the Swedish Old Timer boys and Sven-Olov Linden is no exception. Having received



their *Old Timer* magazine No. 3/90, I was rather hoping for some of Sven's good photos. He came through with one showing an old German design called the "Strolch." The model, built in 1941, is still flying in the hands of Ove Meissner. This design spans six feet and flies well.

VIVELL 35 EVENT

Ideas and events for Old Timer RC flying seem to grow and proliferate to the point where we have a dozen or more basic and special RC Events at the SAM Champs. At the rate we are going, one will have to be selective about which type models he prefers.

The latest special event is the Vivell 35 event promoted and sponsored by Howard Osegueda, who, incidentally, is manufacturing new Vivell engines from original castings and parts left over from the Earl Vivell estate.

Rules are pretty much the same as the other Limited Engine Run events except that Antique and Old Timer designs are flown together. The standard rules apply as in L.E.R., that is, 45 second engine run, seven minute max flights, and three official flights. Engine modifications are permitted but the engines must run on ignition points as per SAM rules.

Howard Osegueda can be reached at 7000 Utica Ct., Dublin, CA 94568 or telephoned at (415) 829-6914. Howard, is offering a repair service in addition to a few new engines. Howard will back up all parts and engines on a money back deal or any deal that is right by you. Sounds like a lot of fun coming up!

SAM 75 "LONG ISLANDERS" ANNUAL

In line with our policy of promoting and encouraging new clubs and their activities, we are pleased to carry a mention of the Second Annual SAM 75 meet held on August 5, 1990. Material and photos were provided by Larry Davidson, who was Contest Director of this meet. Twenty contestants with 31 event entries comprised this East Coast meet.

Larry sent in four photos from which we have selected one showing him holding the

continued on page 31

Larry Goldstein (right) fires up the engine in his Super Quaker with an able assist from Larry Davidson. This 1941 Megow design with single retracting wheel is a real sleeper for RC L.E.R. events.

JET TRAILS

BY SCOTT STAUFFER

BUILDING TIME!

Well, it's wintertime again . . . time to hangar your jets for another season, unless you're fortunate enough to live in a more tropical environment. But here in the northeast, the flying season is more or less over. The months of November, December and January are usually pretty slow . . . flying-wise, that is. No rallies, contests or shows. That all starts up in February. Around here, winter is for flea markets and building! So the subject for this month is indoor activities, ranging from engine and building tips, to book and video reviews.

A good tip for Rossi 90 engine modification was shown to me by Ralph Dibiase of Lox, Florida. It involves modifying the timing barrel of the Rossi 81 and 90 engines for better lubrication. Refer to Figure 1. Using a Dremel cut-off wheel, grind some 45 degree slots in the back face of the barrel towards the direction of rotation. They only have to be a few thousandths deep and the width of the cut-off wheel wide. When the engine is running, the slots force the oil down along the barrel for better lubrication. Neat, huh? Ralph has a lot more nifty engine modifications that I'll share with you later.

VIDEO & BOOK FOR FLIERS

The latest video from R/C Video Review Magazine is the "Greater Southwest Fan Fly," by Barry Cohen. It brings to life the planes you saw and read about in January's *Model Builder*. From the fastest Aggressor to the newest prototypes, Barry captures them all, plus interviews with noted pilots and manufacturers. Running time is approximately 1-1/2 hours, and features some really great planes, such as Steve Korney's Cobra with unlimited vertical climb capability (Something of which most jets and a lot of prop planes are not capable). Also shown is Steve's French Mirage fighter, with an incredible roll rate, like about three rolls a second. I was also impressed with the prototype planes, such as Yellow's twin-engined F-1, Violet's F-16 and Col. Bob Thacker's Ryan X-13 Vertijet, plus the latest kit release of George Miller's T-38 Talon. You get to see them all fly.

(Above) An Israeli F-15 in desert camo takes off on another Desert Shield mission? No, its author's Parkinson Reagle Eagle in the skies over East Berlin, PA. Powered by a Rossi 90, it weighs 11 pounds, but develops over 12 pounds of thrust! Uses B&D retracts and JR PCM-10 radio with eight servos for guidance. (Right) This picture proves you can fly jets even if you have a small car. Here is author's Reagle Eagle in his father's Honda Civic, with plenty of room for the flight box, stand and a passenger.

Barry uses a laid back home movie approach to this video, which makes it fun and easy to watch. If you're interested in ducted fans, then this video is worth checking out. The tape sells for $24.95 and is available directly from Barry, or R/C Video Review Magazine, 13360 Kingsburry Drive, West Palm Beach, FL 33414; (407) 790-3495.

RC HANDBOOK: ENGINES FOR DUCTED FANS

And for you readers, here it is. Eight chapters and 63 pages of what every DF modeler should know about the care, feeding and set up of DF engines. Written by England's David James. It covers installation,operation, glow plugs and fuel, as well as adjustments and servicing your engine. It also contains a great chapter on tuned pipes, and helps you select the right engine/fan combo for your needs. David strikes a nice balance of what's available here in the US and overseas. He concludes by discussing the future of fan flight. This is the most up-to-date book I have seen on this subject so far. The only fault I can find with this book is that some of the manufacturers' addresses in the back of the book are wrong, but that's only minor. It's a must-have book for your collection. Sells for $9.95 plus S&H from Zenith Books, Osceola, WI; telephone (800) 826-6600.

DIESEL DF UPDATE

Bob Davis is still at it! I recently spoke with Bob on the telephone about his latest work with DF engines. He informed me that he is currently working on dieselizing the K&B 82, the O.S. 91 and the CBM 85 engines. If you would like to know about diesel DF, give Bob a call at (203) 877-1670.

FINISHING FOAM WING CORES

It's building time again! Or at least at the time I'm writing this (around Christmas). Time to clean off the old work bench and begin on next year's planes. Some builders I've met seem to be intimidated by foam

wing cores. I'm not sure if they are afraid they may be too complex, or fear just plain messing them up. I have been working with them for years and actually prefer them. I'm going to show you just how simple, fast, and easy finishing a foam wing can be.

This process is one that I've been using for a number of years and does not represent the only way to do wing cores. It's just the way I prefer. I recently upgraded this process, with the acquisition of some new tools and a couple of new products, which greatly reduced the number of steps and overall time it takes to complete the job.

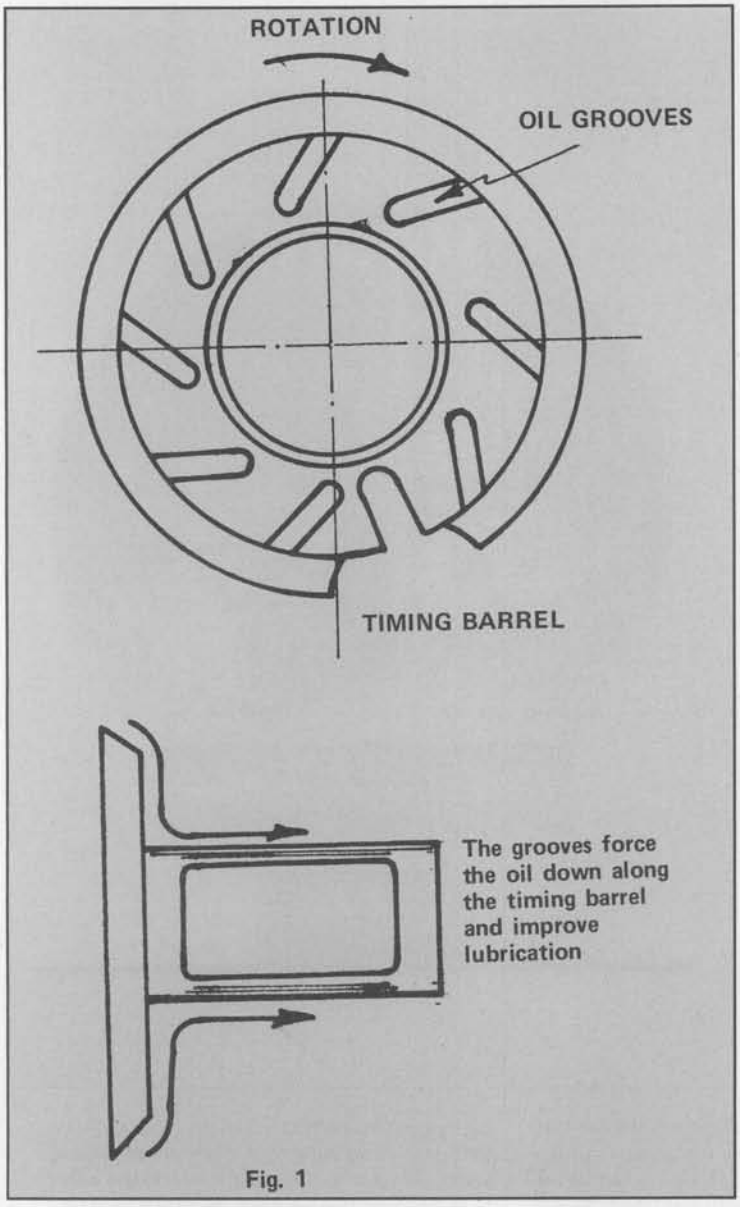


Fig. 1

I'm going to use a Barracuda wing (made by Bob Parkinson Flying Models, Box 856 11th & 25th Sideroad R.R.1, Stroud, Ontario, Canada L0L 2M0; telephone (705) 436-7041) for my subject, as it's what I'm currently working on.

The first step is to attach the outer wing panel. Because of box restrictions, Bob has to cut them off to fit them in the box (not all cores are like this, and you may omit this step).

Spread a thin film of thick UFO glue on the core and re-attach the panel. Quickly wipe off any excess glue, because it's difficult to sand off later. If done properly, you should hardly notice the seam. It's a good idea to join the saddles together also. Then, using a felt tip marker, mark the cores, left and right, top and bottom. That way you will always get the cores back in their proper saddles.

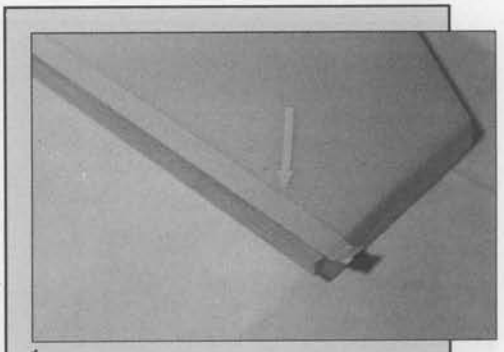
Next, place the cores in their saddles and position them on a flat table. To keep them straight, I weight them down with fuel jugs filled with water. Use a metal yardstick to check for straightness. Shim the wood leading and trailing edges. (Note: because of the type of wing skins used, there will be a double leading edge. The sub-leading edge is made from scrap balsa and is not provided in the kit. It is used as a hard point to attach the wing skins). After the glue dries, place a strip of masking tape on the foam near the glue joint. This will protect the foam while you sand the wood into shape. See picture #1.

When you are finished, remove the tape. This next step is also indicative of the Barracuda and may not be used on your wing. Using a long knife, cut a slot out for your wing spar. Next position and mark the outline of your plywood retract mount. See picture #2.

Then, using a Dremel tool with a router attachment, rout out the thickness of the plywood mount. See picture #3.

If you hold a shop vacuum hose close while you're doing this, all the scraps will be removed and this whole process will be mess-free. See picture #4.

Now mark and cut out the wheel wells and servo compartments. Fire up the router again and cut a channel for the servo wires and air lines. Tape a piece of waxed string into the channel, this will be used later to pull the lines through. I also like to epoxy short lengths of yellow Nyrod into the corners of the servo compartment. These act as bearings for the hatch screws. See arrow in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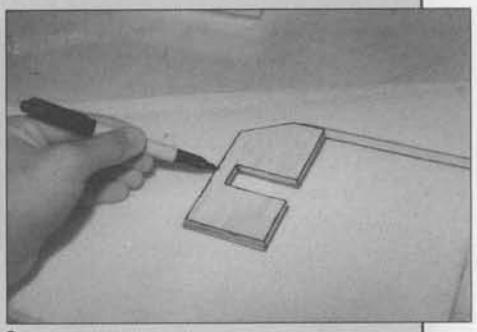
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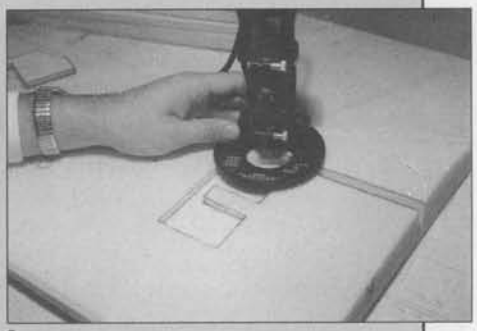
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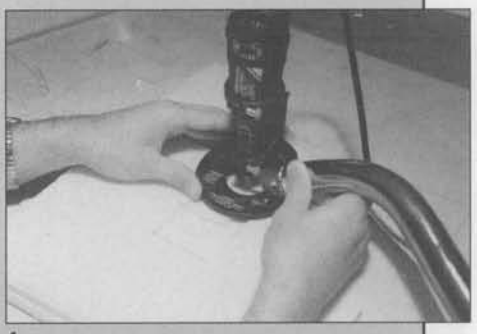
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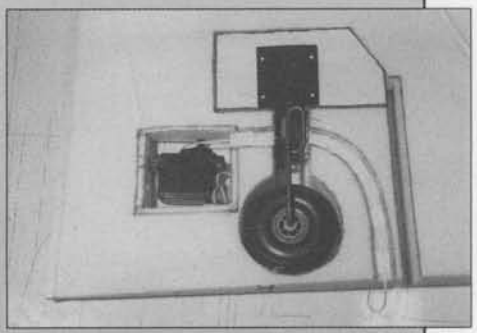
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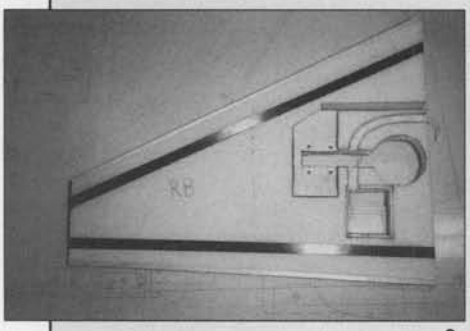

6.

7.

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10.

picture #5.

Now is the time to epoxy the ply retract mount in place. After it cures, sand any rough edges off and give the overall wing a light sanding with 400 grit sandpaper. At this point, I added a couple of strips of carbon fiber for a little extra strength. See picture #6.

Now comes the neat new product. Fiberglass wing skins! Aerospace Composite Products (P.O. Box 16621, Irvine, CA 92714; telephone (714) 250-1107) makes these super glass skins. They come in sheets of 24x36 inches and assorted thicknesses. I used .010. They make .007 and thicker, and they are literally glass smooth. It takes two sheets to do a Barracuda, with plenty of leftover to line the wheel wells. In one quick, easy step, you go from bare foam cores to finished wings, ready for caps, primer and paint. Place the sheets on the table, mark and cut out a top and bottom skin for each core. Leave about a one-inch overhang on each for trimming purposes. In the past, I used to squeegee thirty minute epoxy onto the skins (See picture #7), then, put them back in their saddles and weight them down (See picture #8), but lately I have been using 3M 77 spray adhesive. Before spraying, I mark and mask off the wheel and servo wells on the skins. After applying the spray, remove the tape. This keeps them from becoming too sticky. Hold the can about a foot away from the surface while spraying. Spray both the skin and the core and let dry for about 30 minutes. This allows it to tack up for better adhesion. Do this in a well-ventilated area.

After it tacks, place the skin on a flat surface (table top). Place the trailing edge of the core down first, to keep it straight. Then roll the wing forward toward the leading edge. Be careful, once the core and skin touch, it's almost impossible to get them apart. After I get both skins on, I like to put them back into the saddles, weight them down and let them dry overnight. The next day, trim off the excess and sand the edges smooth. Add the wing tip and the second leading edge (Now you see why the double leading edge). Sand the leading edge round and you're nearly done. Cut out the wheel well and servo hatch. Use the scrap skin to line the wheel wells.

This next step is also optional. I like to take a straight edge and mark a line on the leading edge. Then, using the router with a thin blade, cut a slot and glue in a .050 thick carbon fiber rod (available from Bob Violet Models, 1373 Citrus Road, Winter Springs, FL 32708; telephone (407) 365-5869). See arrow in photo #9. This provides extra resistance to dents in the leading edge.

Next, dry fit your wings to check that everything fits correctly. Finally, apply epoxy to the spar and wing root. Then re-install the wing, using an incidence meter, set the wing to 0 degrees and let cure. See picture #10.

After it's set, glass the wing to the fuselage using some medium weight cloth. Attach the ailerons and seal the bare wood. That's it, you're ready for primer and paint. I'm sorry if I was a little long-winded in my directions, but I wanted to give you as much detail as I could. And thanks to Aerospace Composites for producing such an outstanding product. It's saved me hours and hours of work!

Well, that's it for this month, hope you enjoyed it. Until next time, keep your gear up, your burners lit, and watch your six. **MB**

POWER *Continued from page 22*

was 6-1/2 lbs. It flew well, though these were the first flights for it! I think the Kaos is a good place to start if you want to try electric pattern. If you "build electric" you could probably cut the weight to 6 lbs. with an Astro 40 and 21 cells, which is the number I recommend for aerobatics.

Joe Pasqueto flew a clipped wing Midwest Super Hots, geared Astro 40, 13x8 prop, 18 5CR cells. It had 640 square inches, 49-inch span, and weighed 6-1/2 lbs. It flew well.

Keith Shaw's planes are in a category by themselves. I didn't get info on the planes, but the video certainly was impressive. The "King Crimson" flying wing is powered by four Leisure LT-50 motors, and looks like a stealth bomber, very awesome in flight. The Messerschmitt M.35b was beautiful in the air and fully aerobatic. The best way to describe it is "graceful." It did all the maneuvers with an elan that is hard to describe! Unfortunately it did have a serious crash, I hope Keith will rebuild it so we can see it fly again.

Keith's Stearman flew just like the full scale Stearmans. The smoke system added a nice touch. The Gee Bee zips through the air with surprising ease, it is fast and flies well. The Hyperon is Keith's answer to the "Snoopy" pylon racing in Europe. It uses an Astro FAI 05 cobalt motor on seven 5CR cells. It is incredibly fast. I have seen the Graupner Race Cat fly here in Germany, and the Hyperon looked as fast or faster than the Race Cat. On a timed course the Hyperon was clocked at a top speed of 140 mph, and an average of 130 mph. The Graupner Race Rat (a larger plane than the Race Cat) was clocked at 105 mph. The Hyperon moves! It also won the most rolls/minute, with 47, a club record for KRC. The best gas planes have done about 35. How about publishing some plans, Keith?

Well there are lots more KRC photos, I'll show some more next time. Until then, fly high with electrics! My USA address is: Mitch Poling, 7100 CSW/MC, Box 734 PSC 2, APO NY 09220-5300. My overseas address is Normannenweg 20, 6200 Wiesbaden-Biebrich, Germany.

SPARKS *Continued from page 27*

Megow Super Quaker built and flown by Larry Goldstein. With help like that, Goldstein couldn't help but place third in Class C Ignition Limited Engine Run.

FT. WAYNE FLASHES

There is nothing so discouraging to a brand new SAM Chapter when putting on its first big annual than to suffer a "blowout." Dick Brace of SAM 28, the "Flying Circuits," reports a very successful burger and bean feed held at the flying site on Wednesday evening. This more than offset the wind that caused many to pack up on the second day.

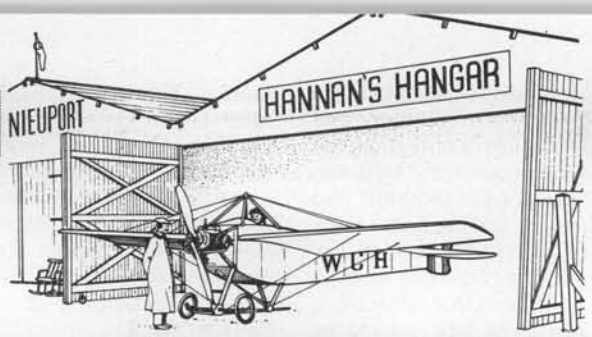
Far from being discouraged, Dick points out that before WWII, Fort Wayne was a real hotbed for free flight contests. He feels that with any sort of luck, model flying can be rejuvenated in this area. Look for their 1991 Annual which will probably be held about the third week of June.

OBIT NOTICE

The Central Indiana Assn. (CIA) drew this columnist's attention to the fact that Jim Cahill, long time famous rubber free flight man, recently passed on after a rather lengthy illness. Cahill will be remembered for his outstanding rubber power flying over the 1935-40 era, at a time when gas powered events were attracting worldwide interest. Although Cahill dabbled infrequently at F/F gas, he still was the man to be reckoned with in rubber.

Perhaps his biggest win was in Paris at the 1938 Wakefield Champs with his modified "Clodhopper" design later kitted by Comet. By simply reducing the tail area of his 1937 design, he was instantly competitive under the 1938 Wakefield rules.

At Paris, Cahill used an unusually large long motor. Most contestants, watching the model, did not pay much attention to the slow climb until they realized the motor run was well over one minute. Needless to say, Cahill won the Wakefield event going away. ***MB***



BY BILL HANNAN

"THERE IS NO SUCH THING AS PURE PLEASURE, SOME ANXIETY ALWAYS GOES WITH IT"

Our lead-in line, by Roman poet Ovid (circa 43 B.C. - 17 A.D.), was sent in by Herb Weiss, who thinks it applies perfectly to model builders wondering if their latest creations will fly.

JIMMIE ALLEN IN CANADA

The Jimmie Allen Club of the 1930s was very successful in the United States, however Canada was also an enthusiastic supporter, with some 250,000 members. Thanks to Don Campbell and Peter Mann, we received a copy of the 1938 Canadian Jimmie Allen Model Aeroplane Races Souvenir Programme. From it we can easily understand how one key to their enthusiastic reception may well have been the number and variety of contest prizes offered. Note this partial sampling: A silver cup, a Bunch gas model engine, a bicycle, wrist watches, cameras, a cocker spaniel(!), roller skates, footballs, airplane rides, and 25 shares of Canadian mining stock!

Even non-contestant spectators were eligible for such "Lucky Number" prizes as Sherwin-Williams paint, a theater pass, an electric razor, hockey sticks, perfume, pen-and-pencil sets, and another 25 shares of mining stock. Anyone arriving via automobile was entered in a "Parking Prize" drawing, which was a chance to win a half-ton of coal! Is it any wonder that participants were so plentiful? Perhaps present-day Contest Directors should reconsider their prize incentives?

SPEAKING OF CONTESTS

International events are multiplying during 1991, as communication and mutual understanding in the modeling world grows. Opportunities for participation are increasing because a greater variety of events are being conducted in more locations. And, thanks to postal proxy classifications, one need not be a member of the "jet set" to take part. Here are some forthcoming events deserving support:

(Above) Professor Dr. Keishiro Uchiike, of Keio University in Japan, holds two of his Baxter "Pussy-cats" from Model Builder plans. (Left) Jack Larson, of Florida, constructed this rare rubber-powered Bleriot 510 biplane.

Belgium

The Flemalle, Belgium international indoor contest, now in its 15th year, has been expanded to four days, August 22-25, and moved to a much larger site, which has a 38-foot ceiling height and is located in a "Village Sportif" which includes complete lodgings, eating and camping provisions.

Two days will be devoted to non-scale events such as F1D microfilm and EZB, while the remaining days will be given over to Peanuts and Pistachios, which traditionally attract the largest number of entries. As in past meets, proxy entries are invited. From personal experience we have found such truly "remote control" participation to be most satisfying and rewarding.

Special attractions this year include the Rene Jossien Challenge, the Pottier lOOTS Challenge, the Alfred Renard Cup (for any model of a Renard design), and the Walt Mooney Memorial Cup (for the top placing model of Mooney design). Every *Model Builder* reader has plenty of Walt's plans from which to choose!

Full information and rules can be obtained for three International Reply Coupons (these pay for return postage, and are available at low cost from most post offices). Send your request to: F.L. Van Hauwaert, Grand Place 1 Bte. 52, 4110 Flemalle, Belgium.

IN England

Interscale '91, sponsored by the British Model Flying Association, will be an open international indoor flying scale model event, according to Doug Sheppard, to be conducted on September 21-22. This should allow plenty of preparation time—but don't delay too long!

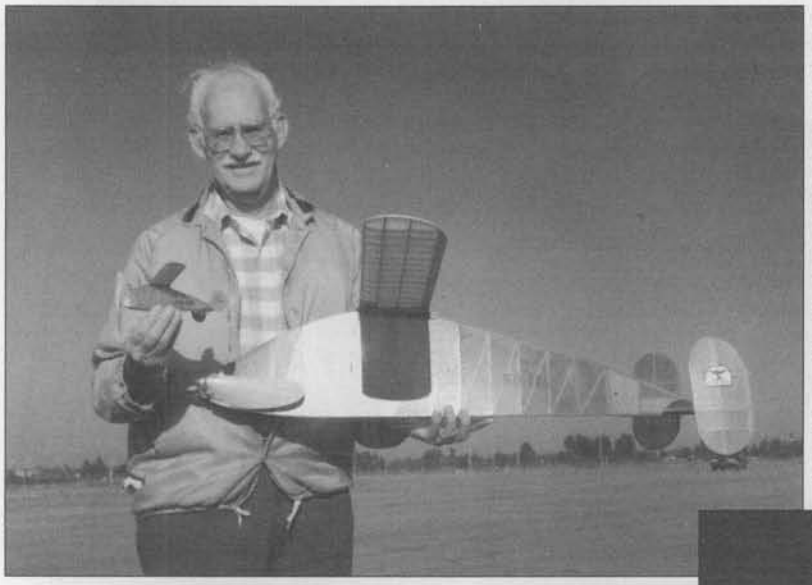
The location will be Nottingham University, whose two large sports halls, a social area, eating facilities and lodgings will be available. A variety of activities for non-model-making family members are also planned. Scheduled competitions include CO2, electric and rubber-powered scale, including Peanuts and Pistachios. Pistachio Scale postal entries are encouraged for those unable to attend in person. These tiny (eight-inch wing span) models may be easily and inexpensively mailed from almost anywhere in the world. Bonus demonstration and entertainment features include a model air race, jet scale and kit scale.

The organizers hope that Interscale '91 will serve as a sounding board and rules-test

in preparation for official F.A.I. recognition of indoor flying scale as a world-class category that it patently deserves to be. The rules are very comprehensive, and are intended to encourage accurate scale models which also fly in a realistic manner. Yet, they also recognize the lighthearted philosophy that is such an integral part of free flight scale. As an example, although the rules do not specifically require it, if the model carries a pilot while flying,". . .the judge is likely to view this favorably." We applaud such provisions for interpretation and fun!

IN Czechoslovakia

The Middle European Indoor League will be conducting contests for Peanut Scale, F1D, and hand-launched gliders to test new rules and promote international recognition. Participation is expected from Austria, Czechoslovakia, Poland and Hungary, according to Lubomir Koutny.



(Left) Dick Drake with Pistachio and Wakefield versions of the "Pollywog." He also has them in Peanut, Bostonian and P-30 sizes! Mik Mikkelson photo. (Below) The New England Air Museum full-size reproduction Gee Bee R-1 during construction. Note Whitehead repro and Henry Haffke's Gee Bee model in background. Photo by Tom Waddington.

For outdoor flying, 1/20 scale models remain most popular, says Koutny, explaining that the larger sizes are more easily mastered by beginners, and can be successfully flown under less-than-favorable weather conditions.

Hungary

Gyorgy Benedek has prepared rules for international COD powered models, and according to Fritz Mueller, one provision is truly unique:

rules shall not restrict the size or type model nor the type of motor or propeller size used; this will provide the best possible environment for further development of COD technology as applied to the widest possible variety of model." How's that for innovative free- thinking?

By contrast, says *Airborne* magazine, participation in several New Zealand control line events has diminished because, it is thought, they have become "overruled" and a lot of interest has been lost.

Japan

The 4th International Proxy Peanut Contest has been announced by the Shonai club of Nagoya. Although complete rules are not yet available, past meets have included categories for Pioneer, World War 1, Golden Age, World War 2 and Postwar models plus a one-design class, which will likely be for the BD-4 this year. Past contests have been extremely successful and well-organized, even gaining site support from the Toyota automobile company. Complete entry forms and rules should be available by sending three International Reply Coupons to: Mr. Shoici Uchida, 3-24 Asanaka, Ogaki-shi, Gifu-Ken, 503, Japan.

ALSO FROM JAPAN

Gordon Cervo, recently returned to Bellingham, Washington, following about four years of living in Japan, was associated there with the Yokohama Aero Modelers. This very active group consists mostly of free flighters and some RC sailplaners, who do most of their flying in a small forest park. The majority of their models are also small, however 0.0.5. (Out Of Sight) and S.I.T. (Stuck In Tree) flights are quite common. In fact, the club emblem is a white model nested in a green tree!

Among the many notable club members are Mr. Yoshida, a champion paper glider designer, and Professor Dr. Keishiro Uchiike, who appears in one of our photos this month. He has an entire room filled with Peanut Scale models, plus another containing miscellaneous other types.

Gordon Cervo sums up his findings by saying: "Isn't this a great international hobby we enjoy? Knowing the Yokohama Aero Modelers and spending time with them, even though I speak almost no Japanese, helped make my stay in Japan a very pleasant experience."

HOW'S THAT AGAIN

Joe Wagner explains: "Years ago, radio control was strictly a rich man's hobby. Now, however, there are many thousands of poor RC pilots."

LOW COST REFERENCES

Sam Welch, of Moab, Utah, discovered that most public libraries belong to an interlibrary exchange system which permits access to almost any book. Thus, Sam was able to peruse a copy of the expensive "Menthuen Handbook of Colour" at his local library, which had borrowed it from a library in Indiana. Although some weeks of waiting was involved, the total cost to Sam was a mere 25 cents!

NEW PRODUCTS DEPARTMENT

Bill and Bunny Kuhlman have expanded their line of model aircraft blueprints to include the paradoxically-named "power Scale Gliders," an apparent contradiction in terms which refers to RC slope-soaring models of subjects which would normally have engines. Offered are the Gloster Meteor, Vought Corsair, Supermarine Spitfire. Focke-Wulf 152H, North American Sabre and others.

Also available are various RC and free flight gliders, including some canards and flying wings. Other free flight offerings are Old Timers redrawn from magazine plans as well as many original designs, ranging from Peanuts to Wakefields. One dollar will bring the complete catalog from: B^2 Streamlines, Box 976, Olalla, WA 98359-0976.

MORE NEW PLANS

Steve Dinstbier is marketing a series of small, low-cost free flight model construction drawings, such as Old Timer reductions, sport models, Peanuts and Pistachios. Among the Old Timers are the Guff f, Spook 48 and Dennyplane, while Peanuts include the Waco 10, Bellanca CF, Avro Spider and Fairchild 51. Sport models range from a "Fly Baby" Bostonian to a 26-inch span Cloud Climber. The Pistachios are two-to-a-page reductions of the Peanuts, and are very

reasonably priced.

For a complete list, send a stamped pre-addressed return envelope to: Steve Dinstbier, 1159 W. Taft Rd., St. Johns, MI 48879.

CLEMENTS' CREATIONS

Among the most elegant delineations available are those of Vern E. Clements, which include plans for the Gee Bee R-1, R-2, and Gee Bee Z; the beautiful Hall "Bulldog" racer, Art Chester's "Goon," the clipped-wing Monocoupe, Culver Cadet and Rearwin Cloudster. These meticulous drawings are now available in a choice of sizes, making them suitable for almost any sort of model from static scale to RC. For example, the Gee Bee RI may be ordered in 1/6, 1/8 or 1/12 scales. All of the productions are exceptionally detailed, being true labors-of-love representing incredible numbers of hours invested.

Vern's new catalog shows reduced examples of all eight plans, giving prospective purchasers a preview of what they can expect. The catalog itself is unusual and entertaining, containing photos of finished models, testimonials from satisfied customers, useful charts, model building philosophy, and tidbits of news from builders of models and full-size aircraft. Example: From Vern's catalog we learn that air show pilot Steve Wolf is hoping to have his full-size Gee Bee R-2 racer ready to fly at Oshkosh '91!

For your copy of Vern's catalog/newsletter, send $3 (or $5 air mail to foreign countries) to Vern E. Clements, 308 Palo Alto Dr., Caldwell, ID 83605.

When responding to any of our mentions please tell 'em *Model Builder* sent you!

HOW DO YOU SAY THAT?

Pronunciation of certain names has always been elusive, if we have only seen them in print instead of hearing them spoken. Such names as WACO, Porsche and Guillow are certainly open to different interpretations.

Another such name is Roy L. Clough, Jr., for many years a published designer of model planes, helicopters, autogyros and novelty items such as kites and space ships. Roy has recently been in touch with us, so we asked him how to say his last name. To our surprise, it is correctly said "Cluff." So now we know.

Another name which has frequently mispronounced is that of the well-remembered kit manufacturer, Megow. Although the subject has previously been mentioned in *Model Builder,* we double-checked with Bob Megow, son of the company founder, Fred Megow. Bob set us straight on that question and graciously provided a capsule history of the firm also.

Fred Megow was an Industrial Arts and Drafting teacher during the 192Os. One of the projects he assigned his class was a rubber-powered R.O.G. model, which was so enthusiastically received by his students that he added other designs to his schedule and began kitting them as well. During the early l93Os he quite bravely quit his teaching position and ventured full-time into the model airplane business. All of the family including four sons and grandfather Megow were enlisted to help, and business prospered to the point that eventually more than 350 people were employed. At their productive peak, Megow Models was turning out 10-cent kits at the astonishing rate of a million per month! The line also included model boats and trains as well as gas model engines which they manufactured themselves.

Although the business was closed many

continued on page 90

(Right) Charming Mimi Aime, of France, displays Tonda Alfery's Vought "Pancake" during an international indoor contest in Belgium. Roger Aime photo. (Below) Dr. George Merta shows his 1/20 scale rubber-driven P-51D during a Czechoslovakian contest. Photo by Lubomlr Koutny.

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IMAA WE MINI FE

Harold Bayley built this Anderson "Kingfisher" from Tapsfield plans. O.S. 120 powered, it has a 9-foot span.

This Valliancourt Hurricane design was built by Jack Voegler. It weighs 25 pounds.

Big Bird pilots on the West Coast were pleased when they discovered that a West Coast Mini-Festival was being planned for the Crow Landing Auxiliary Naval Air Station near Modesto, California, on the 1990 Labor Day weekend. The Modesto Quarter Scalers, I.M.A.A Chapter 187 and the Bay Area Giant Scale Association, I.M.A.A. Chapter 10, should be commended for promoting the event. Event co-directors Budd Crane and Dwight Cathcart put together an excellent team of spotters, safety inspectors and transmitter impound crews.

Support for the Festival was evident by the large attendance, with over 350 planes and 275 pilots. Many fliers had not seen each other since the Big Bird Festival in 1984, so a great deal of time was spent renewing old friendships and meeting new friends.

ST COAST STIVAL

BY BRUCE EDWARDS

Sam Stauffer and his Skyraider. The big bird spans 120 inches and weighs 53 pounds. Sam flies it with authority.

John Andrews flew this T-6 very realistically. Ship is G-62 powered and weighs 33 pounds.

Flying conditions were what one would expect in California. Perfect!Bright sunshine, 95° F and a nice breeze that blew right down the runway. As the day progressed the wind would stiffen but it was always down the runway, so it was never much of a factor.

Shortly after registration all models were given a thorough inspection by friendly, competent inspectors, consequently the few crashes were mostly the result of thumb glitches.

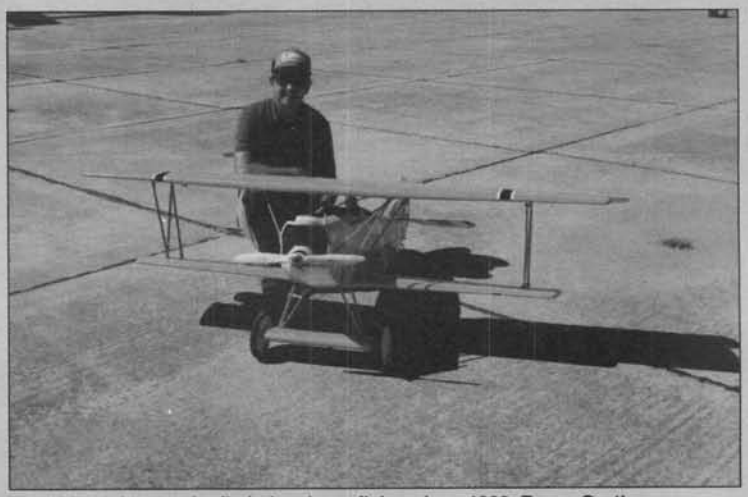
Although there were long lines at some of the flight stations, they moved fairly quickly, with as many as eight planes in the air at one time. Only one midair collision occurred during the entire weekend and that happened when only two airplanes were in the air. Very few people would disagree with the statement that the RC Aero Flight Team was the highlight of the Festival. Cliff Adams, Tom Easterly, Mike Adams and

Doug Wilber flew formation aerobatics that were the most precise any of us had ever seen performed by radio control models. The team, flying O.S. 300 powered Sukhoi SU 26's, seemed to fly closer and more precisely each time they took to the air. Team leader Cliff Adams and his crew were very helpful, talking with everyone and sharing their expertise with anyone who came by for a chat. Cliff said that anyone wishing to order one of the SU 26's, fully built with engine installed, need only to call (714) 622-1814 to place an order.

This may have been the first Festival of this size with good flying giant electric powered planes. Tom Piper, flying his 1933 Pietenpol Sky Scout and Jim Collin, flying his Pietenpol Air Camper, put in flight after flight with their big electric powered planes. The quarter scale, electric powered 1929 Ford pickup these fellows used to pull their planes down the half mile pit area was the envy of many footsore Big Bird pilots.

Giant electric powered models are at about the same stage of development as most giant scale models were at the inception of Big Birds back in 1977. We will probably see

A half-mile pit area left everyone envious of Tim Piper and Jim Collin's 1929 Ford pickup tug, a Pietenpol Sky Scout and an Air Camper. Both birds are giant electric powered planes using Astro 60s.



The oldest plane at the fly-in has been flying since 1968. Roger Grothers refurbished this Fokker D-VII in 1980.

A Waco UPF-7 built by David Newell weighs 31 pounds, has a 7.5 ft. span and is Zenoah G-62 powered.

John Barron powers this Grumman J2F-6 with a Saito 270. Plane weighs 32 pounds.

Dick Smith with his RV3B. Quadra powered plane has glow ignition and alcohol fuel.

This Consolidated kit of the Bell Aircobra P-63 was built and flown by Joe Zimmerman. Power is a G-62, and the span is 96 inches.

bigger gear-driven electrics as the demand for large diet models increases.

Dr. Roger Tennyson s Team Pilatus entertained us royally when their radio controlled skydivers plunged to earth from their 1/6 scale Pilatus Porter. The plane's takeoff weight was 26 pounds with the skydivers aboard, and despite the high temperatures the Super Tiger 3000 powerplant pulled the promptly invited to become the official pit crew for a certain "Big Bee." These guys were a lot of fun and we had a great time sharing power and glider flying stories, interspersed with some of our full scale flying experiences.

World War II types made up a high percentage of the planes present and the pilots did some really low fly-bys. It would be doubtful Winding our way home from high California sun to low northwest cloud, it appears that Big Bird flying is approaching its golden years. We would have a difficult time seeing any better flying than the first three days of September 1990 at Crow's Landing! Most Big Bird pilots on the west coast hope Dwight and Budd, along with Chapters 187 and 10, make the Mini-Festival a yearly tradition. ***MB***

Bob Francis poses with his Stuka JU-87B. This Consolidated kit is powered by a Sachs 3.7, weighs 28 pounds, and has a 104-inch wingspan.

Dwight Warner with his P-51C. Plane uses a 5.8 Sachs engine, Likes retracts, weighs 34 pounds.

John Krohn powers his 20-pound, 108-inch Aeronca LC with a Saito five-cylinder four-stroke radial engine.

Duke Crow's Polen Special weighs 28 pounds and is powered by a Zenoah G-62 using RC's ignition system. Span is 82 inches.

Pilatus to jump altitude in short order. The team did a good job of keeping the skydivers close by in the stiff 15-knot wind.

There were so many fine Big Birds on hand that it is difficult to chose the cream of the crop to present to you. I can only encourage you to attend next year's event so you won't miss all the great sights and sounds. The fellows who put together the West Coast Mini Festival will certainly want to keep up the good work.

Despite low publicity the crowds were fairly large and many modelers from other facets of our great hobby stopped in to see our Big Birds fly. Del-Val Canyon glider pilots Chet and Dave Greely, Mike and Mason Ross, Bill Guensche and Otto Weis were looking for Big Bird information and a place to pitch their shade tent to view the fly-in. They were if some of the fellows could have extended their landing gear without gaining a couple of inches altitude. There were a lot of Extra 23Os, Laser 2OOs and 3OOs, Sukhoi 26s and many other aerobatic planes putting on quite a show. Many had smoke capabilities, and it was a real pleasure to watch tailslides back through thick smoke.

Back during World War II a thousand Bomber raid was considered really unique, which brings to mind the fact that I.M.A.A.'s big Festival at Oshkosh drew 650 Big Birds, and our West Coast Mini-Festival drew 350. Perhaps we will one day see a 1000 plane Big Bird festival. The mind boggles, but fills with joy at the thought.

The R/C Aero Flight Team flew with great precision. Cliff Adams, Tom Easterly, Mike Adams, and Doug Wilber use Sukhoi SU-26's powered by O.S. 300's.

ELECTRIC FLIGHT WORLD CHAMPIONSHIP

1 • 9 • 9 • 0

Performance of F.A.I. class electric models is still increasing, but the new world champion remains the same: Austria's Rudi Freudenthaler . . . even against a very strong competition and a number of new young talents . . . including the astonishing American team. Freistadt, in the northern part of Austria and just a few kilometers from the Czech border, is the home town of renowned champion Rudi Freuden-

The top teams in the Electric Flight World Championships included the first-place Austrians, the USA in second, and Germany third.

BY GUY REVEL

This original flying wing racer was one of the few not resembling a Race Cat (by Dettwiler) or a Race Rat (Graupner adaption of the Race Cat).

Rudi Freudenthaler's large and well-stocked shop was a focal point for many participants after the day's flights.

The British team enjoyed their competition in spite of a few mishaps. Nigel Bathe (#11), the latest member of the team, displayed a good potential, but needed more competitions. Radio is the new JR X-437.

Very high-tech "Ariiane 7" by Franz Weissgerber attracted a lot of attention. Not a single grain of wood inside. It is a reduced span and length version of the world speed record holder, and of the earlier Ariane flown at the last world championship.

thaler. This was the site of the third electric flight (F3E) World Championship. Freistadt is a delightful medieval city surrounded with walls and moats, amidst big forests in a region of low mountains. The competition field itself, actually the Freistadt sport airfield, is almost entirely surrounded with trees, which did not bring any special inconvenience, except for some of the lesser level competitors.

Eleven nations were represented, all of them except one fielding a full team. As is now almost traditional, the week before was devoted to a number of international competitions for all classes of electric flight models, official or unofficial.

F3E INTERNATIONALS

Let me just remind you of what F3E is about: two widely different tasks are flown during a single flight. First is distance, around a 150-meter course between two imaginary parallel planes determined by judges through a sighting device. The total time is limited to three minutes, including climb. Models must climb outside the course and the motor is switched off before actually entering the course. There may be as many climbs as necessary, provided the motor runs only when outside the course. Obviously, a good rate of climb is essential as well as a low sinking rate at high speed. The best pilots succeed in achieving at least 24 laps within two minutes, the other minute of accumulated time being used for the motor on climb. One completed lap earns 15 points.

When the distance task is finished, the pilot must fly a low pass through a "gate" and directly into the duration task. Precisely five minutes total, with the total motor run time subtracted from the score and points lost for any second over or under the precise goal. Last, a 30 or 15-point bonus is awarded for landing within a 15 meter or 30 meter circle. Every second of gliding flight is worth one point, every second of motor run is one point less.

With such rules it is very easy to compute the results and one can readily guess the maximum achievable. Weather conditions affect the performances somewhat, a difference of two distance laps being typical between bad conditions and excellent weather flights. A good starting level for F3E competition is 600 points, while over 650 is a must for international level competition. The few world's top pilots return over 700 points on every flight.

Just before the actual world championship, an open international competition was just right to assess the relative value of prominent teams and pilots. it was also an opportunity for helpers to actually fly themselves, as well as an additional training session for quite a few team pilots. All in all, 41 entrants, including 16 Austrians, showed to what extent F3E electric competition is becoming popular in continental Europe. *cont.*

Contrary to most expectations, this competition brought some surprises. Certainly not because the winner was Rudi Freudenthaler, but because next behind were two American pilots. Even better, the US members were five among the top fifteen, quite an unexpected performance for most. Even more so if one considers the level of performances. Not only Freudenthaler, but the prices are prohibitive. However, most developed countries were present; the most notable exceptions being Japan, Canada and a few nordic countries (Denmark, Norway, Finland).

With eight rounds to go, only the poorest result was discarded before computing the final score. A single mistake was already bad news. Alas, this is exactly what happened to decorated own-design model, US team members Jason Perrin and Steve Neu with almost identical models of extremely light weight, and French F3B competitor Martial Legou, just returning from the F3B European Championship in Czechoslowakia where he won a bronze medal. Ten competitors reach 650 points or better.

Thanks to very good organization, the

Large electric gliders were flown in competition during the preceding week.

Urs Leodolter's model placed very high with a small Geist 90 motor.

Rudi Freudenthaler is undoubtedly the most precise pilot. Notice the transmitter tray. During the distance part of the flight, the helpers play an essential role to enable the pilot turning exactly at the right moment.

Impressive closing ceremonies on the city's central place.

Americans Steve Neu and Jason Perrin returned 26-lap distance scores, quite impressive indeed! Just think that during the last World Championship in St Louis, USA, only Rudi Freudenthaler and Swiss Urs Leodolter could reach 24 laps. At that time, nobody had ever done better.

With such performances, we could really expect a high level of competition, and moreover, the result could well be not quite so clear-cut as could be believed just a week earlier. The American team was very strong indeed, the Austrian fliers were as strong as ever, not to mention Urs Leodolter and the three German team members who did not enter this opening competition.

FIGHT BEGINS

With only eleven participating countries (thirty two competitors) the low numbers say that electric flight needs some top-level equipment, especially batteries, which are not available in all parts of the world and/or US member Jerry Bridgeman, who suffered a circuit failure. The motor switched off actually a fraction of a second after the model was launched, returning a no score. Minutes later, it worked perfectly again. Too bad.

Meanwhile, things were going well for Rudi Freudenthaler, with 25 laps and an almost perfect duration with only four seconds of motor run for a 685-point total score. Actually, such a good score was expected from the reigning world champion, but his two traditional close competitors were way behind; German Franz Weissgerber, the fully-molded model guru, only 14 points but five places behind, and Swiss Urs Leodolter way behind, being short of motor before the end of the 5-minute duration.

On the opposite, a few pilots earned many more points than expected; young Austrian Michael Geringer with a brightly-

first round, as well as the following ones, was completed in about two hours, so that pilots had ample time to prepare their models, test propellers, batteries or even, for some of them, to repair.

The second round, run in the afternoon, was almost a repeat, but the other Austrian and German team members were much nearer to their usual performance level. Jason Perrin demonstrated an excellent consistency with another 24-lap flight. A surprise came from Swiss pilot Jean-Pierre Schiltknecht, new to this competition class and much more a duration pilot of long free-flight experience, who was one of nine to better 650 points with what was, by far, the smallest and lightest model of the entire competition.

CONSISTENCY, CONSISTENCY

The same scheme remained valid during the following days. Freudenthaler remained supreme, Weissgerber and Leodolter im-

proving up to their true value, albeit too late. However, the US team was really showing everybody what a small and tightly united group could achieve. Well-planned training was evident during every flight and the results were up to the work done. Freudenthaler was improving on his previous flights, so also was Jason Perrin. This young pilot was performing, flight after flight, some of the most precise path and clean turns along the distance course I had ever witnessed. It was even more impressive when one considers that his model, although a very sound design, really lacked that finishing touch one could admire all around. But with his precise flying he could really get 110% out of his model potential.

Now well into the contest, Urs Leodolter and Franz Weissgerber finally reach their full potential, although Rudi Freudenthaler was still keeping an edge. Of course, flying on his own, familiar flying field was an advantage, but Rudi trained several months before the championship like never before, and this reflected in the results. He is clearly the most precise pilot, his model staying precisely at the same speed throughout the distance task: about 4.8 seconds per lap, meaning an average speed of almost 115 mph.

Flight after flight, Jean-Pierre Schiltknecht showed his potential. His model was by far the fastest-climbing of all, reaching a clean 103 ft/s. Other competitors get 72 to 93 ft/s, according to the weight of the models. Unfortunately Jean-Pierre clearly lacked some training hours and lost a large number of points through errors. His most common mistake was climbing too high for the size of his model, losing it and recovering after a sizeable altitude loss.

Further rounds did not appreciably change the standings. The competitors were very clearly split into two groups: the "historical pioneer" nations are clearly above the others: Germany, Austria, Switzerland. The Americans, all of a sudden, belong to this select high-performance group, while the French, while slightly below, showed for the first time the same capabilities.

The Italians, on the contrary, wasted some good potential as an insufficiently-trained group with lack of serious preparation work. And the other nations really belong to another class. This reflects the fact, for most of them, that their pilots do not regularly enter high-level competitions.

So the logical end; Freudenthaler World Champion for the third time, a plain result which does not reflect how the competition, and among them Jason Perrin, pushed him to the limit, a condition he superbly mastered.

Three time World Champion. Remember he is Austrian. Could we see there the beginning of a tradition, following Hanno Prettner's six successes?

SIDETHOUGHTS . . .

Jean-Pierre Schiltknecht succeeded in building a very light model, just under 2 kg, while the best of the others was a good 550 g heavier. His very small model used a specially made and drastically lightened motor as well as a battery pack of only 24 900 mAh cells. The model relied on its very low weight to reach a record climb rate.

At every World Championship we can meet many specialist manufacturers. Fritz Geist (Geist motors) and Gerhard Plettenberg (Hecktoplett motors) were on the field. Also present was Ernst Scherbl, famous for computing very high efficiency propellers, now as popular as those (RFM) made by Freudenthaler, himself a competitor. Another was Hans Sommerauer, who manufactures most of the speed controllers used by the World Champ competitors. Among electric power model manufacturers were Walter Rechttaler (Aeronaut), Serge Natanek (SN Models) and Jacques Ptignaud (MAP), as well as Hans Graupner (Graupner) and Harry Wolff (Robbe). A number of distributors/importers were also seen.

As usual Hans Graupner came with a large number of people from his staff, and many Graupner models were entered in the traditional "Sunrise-Sunset" competition.

Robbe was very popular among competitors, helpers and spectators, as a technician came specially to test, on the bench made by Heinz Keller and presented during the last Nuremberg Fair, any motor one wanted. A good opportunity for everybody to know

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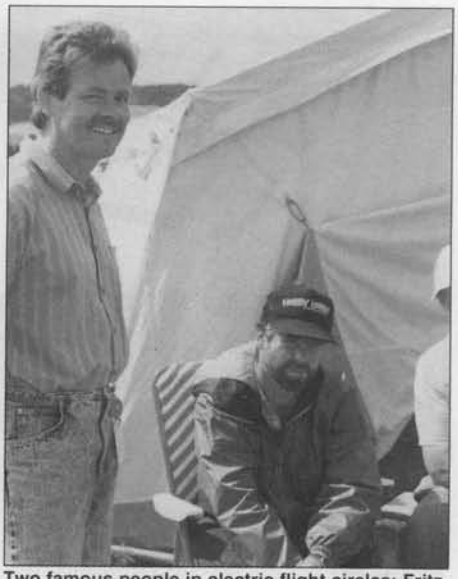
Young and cool American Jason Perrin was more impressive while flying than his model was for its finish. The USA was this time extremely competitive, pushing everybody behind except the Austrians.



Two famous people in electric flight circles: Fritz Geist (left), builder of the famous motors, and Werner Dettweiler, chief designer at Graupner.

FREE FLIGHT

BY BOB STALICK

FREE FLIGHT ORGANIZATIONS

"Cultured Pearl" by C.O. Wright is a real screamer with a hot K&B 6.5 and only 737 sq.in. C.O. also has a 250 sq. in. version in 1/2A events. Photo by Lee Schroeder.

When I was a youngster, the model magazines of the time were almost entirely devoted to free flight. Many of us have fond memories of *Air Trails, Model Airplane News* and *Flying Aces*. Stories of heroic real-life deeds of famous airmen, both real and fictional, spurred our imagination toward flight. Articles and plans about the latest developments in model theory and design were read and re-read time and again. Many of us collected these classic magazines and periodically peruse their contents for a glimpse of our youth.

I think that for many of us "old timers," these were the golden years. It is why we have such organizations today as the Society of Antique Modelers (SAM), the Model Engine Collectors Association (MECA) and the National Free Flight Society (NFFS). We can prolong our youthful dreams through these organizations, and we can relive those days when we crank up an Ohlsson or Brown engine on the field and smell that distinctive and fragrant odor of a gas and oil mix exhausting from an engine that is turning a modest 5,000 or so rpm. R.O.G. takeoffs from plywood boards enthrall us. The sight of a big Ohling or Lanzo silhouetted high against the fluffy white clouds gives us a grand memory worth many stories as we gather for informal sessions with our flying friends, both young and old.

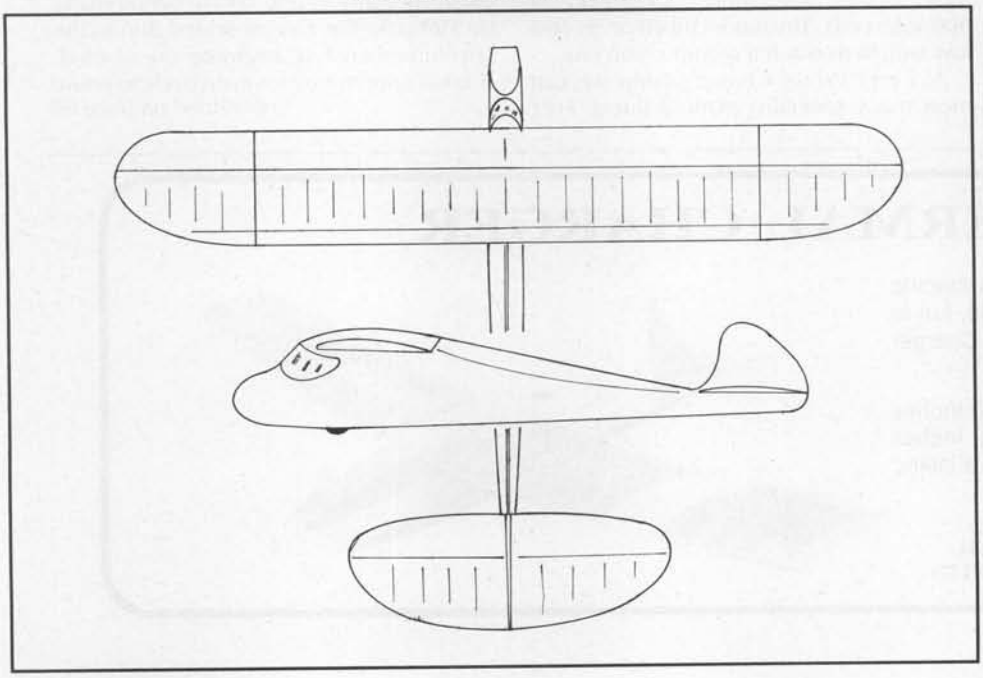
For those of us who were flying before WWII, Old Timer flying may be our idea of what free flight really should be. For those of us who began our flying in the late 40s and early 50s, the Nostalgia events seem more like what Free Flight is supposed to be. I wonder what kind of development will be in store for those who are just now beginning their free flight experiences? What will they remember about these days—their future past? Or will free flight no longer exist in any form that current active free flighters will recognize? Let's hope not!

At any rate, besides allowing us to acknowledge the accomplishments of our present and past heroes, the organizations that help support our current free flight interests are there to cater to our fantasies and memories. If the survival of these memories is important to you, and if you want to support the organizations that make them possible, you should subscribe or become a member. In addition to supporting worthwhile causes, you will become the recipient of some good information and ideas.

The Society of Antique Modelers (SAM) is devoted entirely to the Antique and Old Timer movement. Although some of the energy of the organization is devoted to RC Old Timer events, a large amount is given to free flight old timer activities. I recommend it strongly. If you join, you will get a copy of the current SAM rules book and a one-year subscription to SAM Speaks, a very well done newsletter. SAM membership also allows you to purchase SAM jacket patches, decals and other goodies at very reasonable prices. Membership is available for $10.00 per year. Send to Bob Dodds, 209 Summerside Lane, Encinitas, CA 92024. Include the following information with your membership fee: Name, Address, AMA Number and signature.

Model Engine Collectors Association (MECA) is an organization devoted to the study and research of old model engines. The organization publishes periodic news-

APRIL MYSTERY MODEL



letters containing information about the development and history of various engines. More popularly, the organization publishes a swap sheet that allow members from around the world to buy and/or swap all kinds of modeling related equipment. Engines, accessories and the like are available through MECA. Also published are notices of upcoming swap meets—called "Collectogethers" in each geographic area of the US. If you are looking for some goodies to help you relive those glorious memories of yesterday, join MECA. Here's. how: Send $20 to Bob McClelland, 3007 Travis St., Westlake, CA 90669. Include your name, address and telephone number.

Capt. Zip, aka Ed Miller, also flies a Cultured Pearl 737/K&B 6.5 combo, caught here by photographer C.O. Wright at the 1989 Max Men's Annual at Taft.

NATIONAL FREE FLIGHT SOCIETY (NSSF)

This organization is one that caters mostly to more modern free flight interests, but it also covers the complete range of activity from indoors to out, from FAI to Old Timers, from strictly USA to overseas action. It is the existing replacement for the coverage that most national magazines (except *Model Builder*, of course) no longer include in their pages. Membership includes ten issues of Free Flight, the group's superb newsletter. In addition, you can purchase the annual Symposium Reports, plans of the Top Ten Models of the Year, other publications, decals and the like. To join, send $15.00 to NFFS, 12324 Percival St., Chester, VA 23831. Send your name, address and AMA number along with your check.

MYSTERY MODEL FOR APRIL

For years, I have been looking for a good design that would give me a two-event Nostalgia model. This month's ship is the one that does it. It is eligible for the Nostalgia Ignition event as it shows a Torpedo .29 Ignition engine in the article. It also qualifies for the Nostalgia Cabin event that we fly here in the Northwest. The model has a wing area of just over 4OO sguare inches and an easy-to-build layout. It should be worth a look. I have not found any source for the full-sized plans, but it was featured in an old *Flying Models* magazine, so the full-sized parts were included for those lucky enough to have the magazine. However, it is our intention to feature it as a monthly three-view in a future issue. The designer of the ship was one who produced many sleek designs in the prewar and early postwar period. If you think you know the name of the ship, drop a note with the pertinent information to Bill Northrop at *Model Builder*. The winner, as usual, gets a free subscription to this magazine. A bargain at any time.

Fabled Russian FAI Power flier, Eugene Verbitski, with his latest state-of-the-art F1C ship. Stalick photo.

DARNED GOOD AIRFOIL: Gottingen 187 (SchutteLanz 2u lo)

This is one of those sleeper airfoils. I had not seen it until I was looking through the pages of the *Comprehensive Book of Airfoils* and there it was. What attracted me to it was that the leading edge is quite sharp with a slight Phillips entry. This should mean that the section will not need artificial turbulation in order to produce a good glide. The slight undercamber feature also contributes to its gliding characteristics. The drawback would be the rather thick high point as far forward as it is. A thought would be to decrease the high point to around 8.5%, which should improve the climb and the glide phases at the same time.

I would think this month's airfoil would fit the bill for most AMA gas ships and might even be useful on larger rubber powered models.

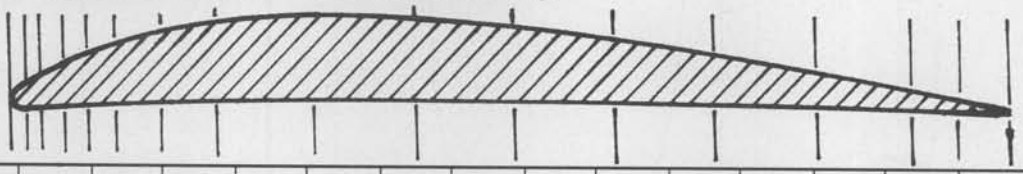
APRIL THREE VIEW: LAZY BONES P-30

Jim Richmond is best known in free flight circles for his prowess in FAI Indoor events. When a modeler of his stature turns his attention to outdoor events, you can't help but pay attention. The model was featured in the Phoenix MAC newsletter, edited by Sal Fruciano, who accompanied the plan with the following commentary:

"Jim Richmond's name has gained worldwide acclaim for his superb performance as World Indoor Champion on five consecutive occasions. As a teenager, Jim won a Perdue Aeromodellers free flight outdoor contest with a 37-minute 0.0.S. flight using an original design. Several years later, Jim was deeply involved with control line, then

continued on page 90

DARNED GOOD AIRFOIL — GOTTINGEN 187



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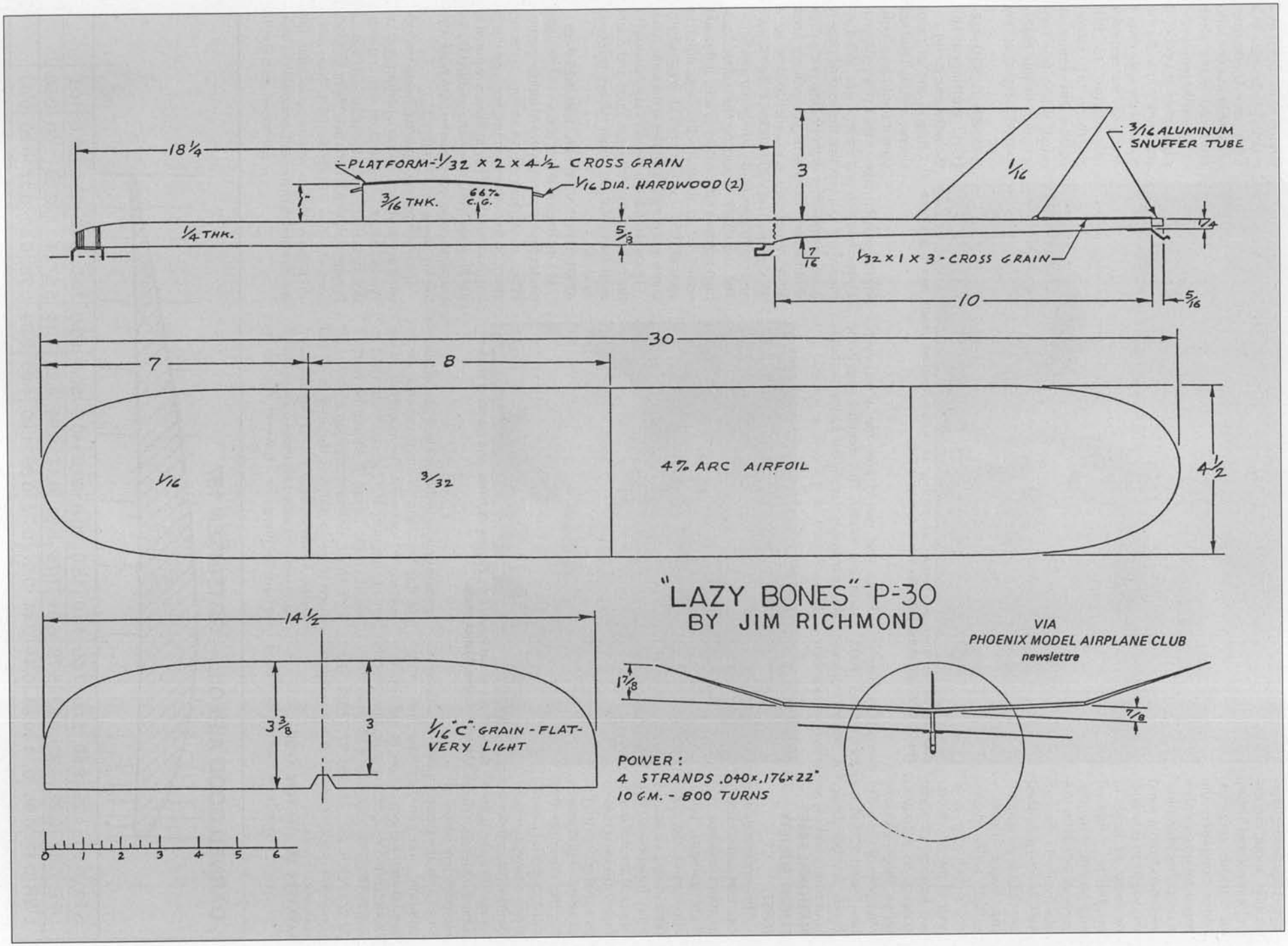
UPR	0.17	2.22	3.33	4.83	5.78	6.61	7.78	8.61	9.17	8.94	8.28	7.11	5.67	4.11	2.39	1.50	0.50	
LWR	0.17	0.06	0.11	0.28	0.44	0.44	0.61	0.72	0.89	1.00	1.00	0.89	0.78	0.56	0.17	0.00	0.00	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CONTROL LINE

BY JOHN THOMPSON

FINDING FLYING FRIENDS

If you look out your window, wherever you are, you'll notice that the weather is starting to look better and better for flying. Check the mail and you'll see that the contest calendar has been filling up. If you didn't waste your whole winter watching football or fishing, you're ready to get out to the flying field. If you did, it's time to hit the workshop hard, or you'll regret it when the phone starts to ring and your fellow tiers are saying, "Lets go flying."

Planes that survived last season need to be thoroughly examined to make sure everything is in good working order, safe and structurally sound. Lines, handles and anything else that has previously been used should be checked as well.

C/L flying is enjoying a resurgence in New Mexico, where this happy group gathered in Albuquerque for a Fun Fly. Shown are, standing, l to r: Dave Esken, Taos; Mark Schluter, Albuquerque; Andy Wells, Santa Fe; and Bruce Doyle, Taos. Kneeling: Gil Merriman, Los Alamos; Burt Goldsmith, Cedar Crest; Frank Bowman, Farmington; and Phil and Bill Frost, Santa Fe.

Once you've got everything built, checked and ready to fly, where do you go to do it?

Well, if you're a long-time flier or a member of an established club, you've probably got a customary flying site. If you're a new flier or new in town, you may still be looking for a flying field. Here are some suggestions for finding a field—and a group to fly with—that's a little more scientific than just wandering around town looking for open space.

• Drop in at the local hobby shops and ask if they know of a club or of a designated flying site. If they don't, ask if you can leave your name and telephone number so that anyone else who drops in with the same question can contact you. Maybe you can post a notice suggesting that CL fliers get organized and leave your phone number on it.

• Contact the Academy of Model Aeronautics headquarters and ask if there is a chartered club in your area. They can get you in touch with the club officers. AMA's address is 1810 Samuel Morse Drive, Reston, VA 22090. The headquarters telephone number is (703) 435-0750.

• Join the AMA if you are not already a member and check out the contest calendar in the Competition Newsletter, which appears in the back of *Model Aviation* magazine or comes separately, depending on which kind of membership you choose. The contest calendar tells you where the organized flying activity is in your region. Also ask at the hobby shop if they have fliers for local area contests. Some contests are not advertised in the magazines because they are planned too late for publication.

Even if you are not a competition flier, attending contests is an excellent way to meet CL fliers and to learn about the hobby. Though some areas have more activity than others, there are control-line fliers almost everywhere. If you look hard enough, you'll find them.

In many areas, the flying goes on all year round, as the mail coming into *Model Builder* headquarters shows, even as this is written in as winter sets in. In fact, there's enough news in this month's mail to fill the rest of this month's report.

And, as if to illustrate our point that CL activity has a way of popping up all over, here's a letter from Gil Merriman of Los Alamos, New Mexico, reporting on an upsurge of activity in his area. His letter shows how one interested modeler can get things started:

"As a regular reader of *Model Builder*, I enjoy reading that CL flying is enjoying a resurgence across the country. Enclosed is a photo of people who participated in a CL fun-fly in Albuquerque last October. I hope this photo and letter add to your claim.

"These people are all from the northern part of the state. To my knowledge this was the first even Voccurrence like this to take place in Albuquerque in the past five years, or perhaps longer. This photo is proof that CL is enjoying a resurgence here also.

"A year ago I started searching for others to fly CL with but could find no one. Several phone calls and a few letters later I started making some contacts. The number of interested parties grew faster than I had expected. So far we have had six fun fly events and the interest keeps growing.

"We are a group of about 50 people all over the northern part of the state, with an active core of about 20. We put out an occasional newsletter.

"When this picture was taken there was a quarter scale RC event taking place only 100 yards away. Many of those fliers came over to wish us well. Several others came over because they had never seen CL flying."

Gil's letter also shows that an exchange between CL fliers and those from other sectors of the model aviation hobby can be beneficial. We know of quite a few instances where some incidental contact has made at least partial converts of people from other sectors. Here in the Northwest over the past several years we have picked up valuable and energetic new CL fliers from both the RC and FF contingents.

The latest place where this has been taking place has been in the Eugene, Oregon area, where your columnist's home club has signed up several new members from the

local RC club who developed interest in CL while helping out with judging at the locally sponsored Northwest Regional Control Line Championships.

Therein lies a suggestion to clubs looking for manpower to help put on contests: Your local RC or FF group may enjoy helping out at your contests, and a few may become interested in CL in the process. However, remember that if you ask for their help, you should be willing to return the favor when they put on a contest—you might enjoy seeing their activity close up, too.

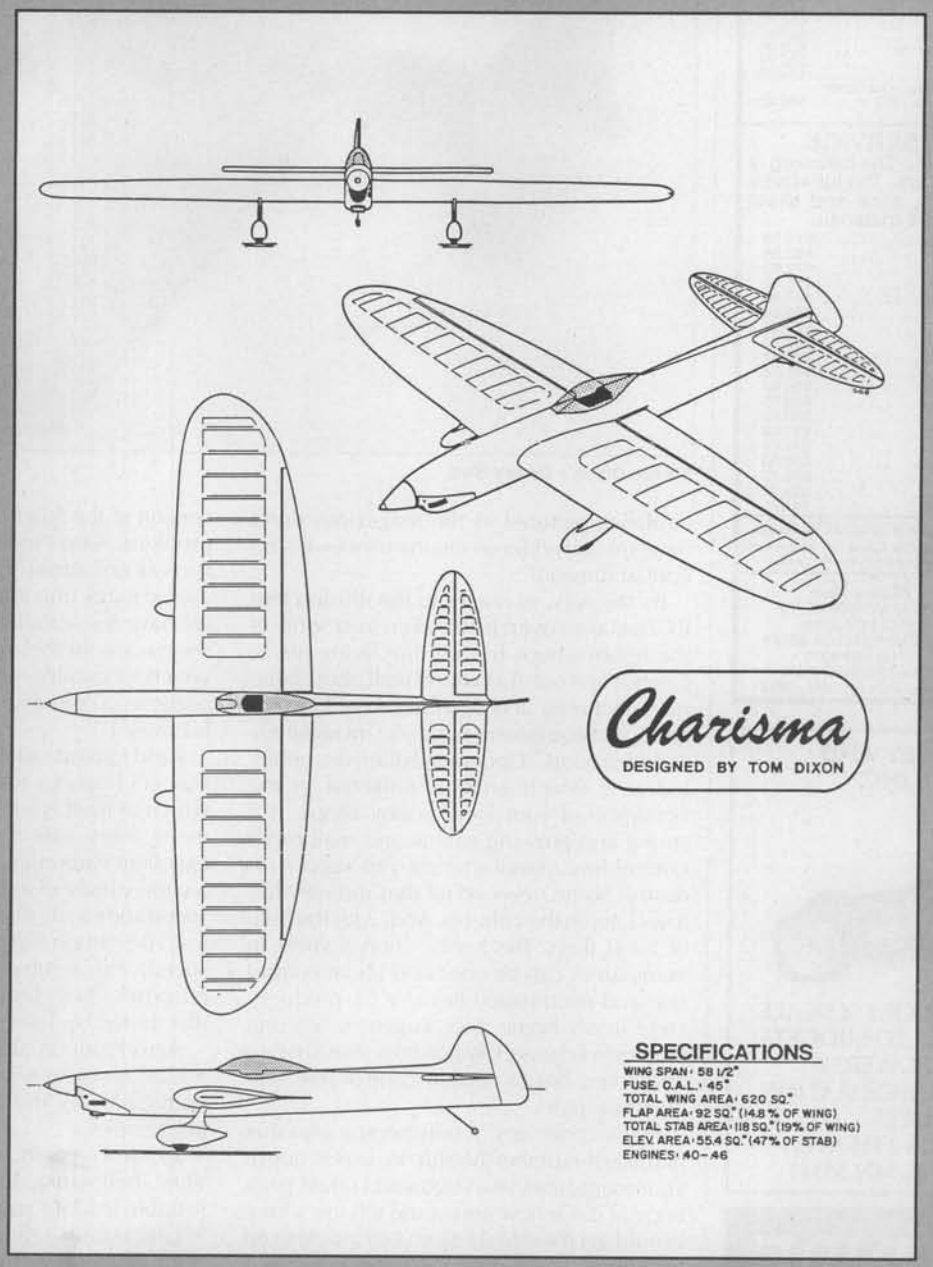
• • •

Frank Paskovich of Weikert, Pennsylvania gives us a chance to briefly review a topic that has been discussed here at some length in past issues—line rake. There are always new readers, so a little rehash can be beneficial. We'll include the rest of Frank's letter, too, just to bring us up to date on his return to CL model aviation. Because he raises several interesting points, we'll interject some comments of possible general interest in parentheses:

"I have recently returned to model building after about a 20- or 25-year layoff. My interest is control-line. It seems some things have changed. I recently built a Sig Banshee as a refresher and flew it through the old stunt pattern without too much problem. Nothing that some practice wouldn't cure. (The Sig Banshee is an excellent 35-powered profile stunt trainer or refresher airplane, still readily available from Sig Manufacturing Co. and carried in all CL-friendly hobby shops. It's close enough to modern design standards that you can build it just as the plans say and it will fly the stunt pattern well enough to compete in the beginner and intermediate classes. Sig kits are excellent in regard to materials, completeness and plans.)

"I decided to step up a bit and sent away for a "Stiletto 660" by Les McDonald. It is a beautiful kit but set me back by the lack of basic directions except for just plans, like they were taken from a model magazine. (The Stiletto 660 in McDonald's hands was the winner of the 1976 World Championships and was a very popular 46-powered stunter in the 1970s, still very competitive.)

"After five or six study sessions, I see only a few problems. They don't show any engine or rudder offset. Perhaps this is a stupid question, but why? I notice that the plans show leadout wires close together and with a pitched-back wing, could this be why there is no offset? I did notice that in some of your magazines the control line planes don't seem to have offset, but pictures can be deceiving. I hate to build the plane and find out after it left the ground that I had to duck as it came at me. Could you please help me? Since I am at least 50-100 miles from the nearest hobby shops and it seems RC has taken over, I can't get any answers."



We all share the aversion to ducking airplanes under power! But there should be no need to worry about the Stiletto coming at you. You should be able to build it according to the plans and have no worry about it having line tension problems, provided, of course, that you don't let it get too heavy—but that's another problem.

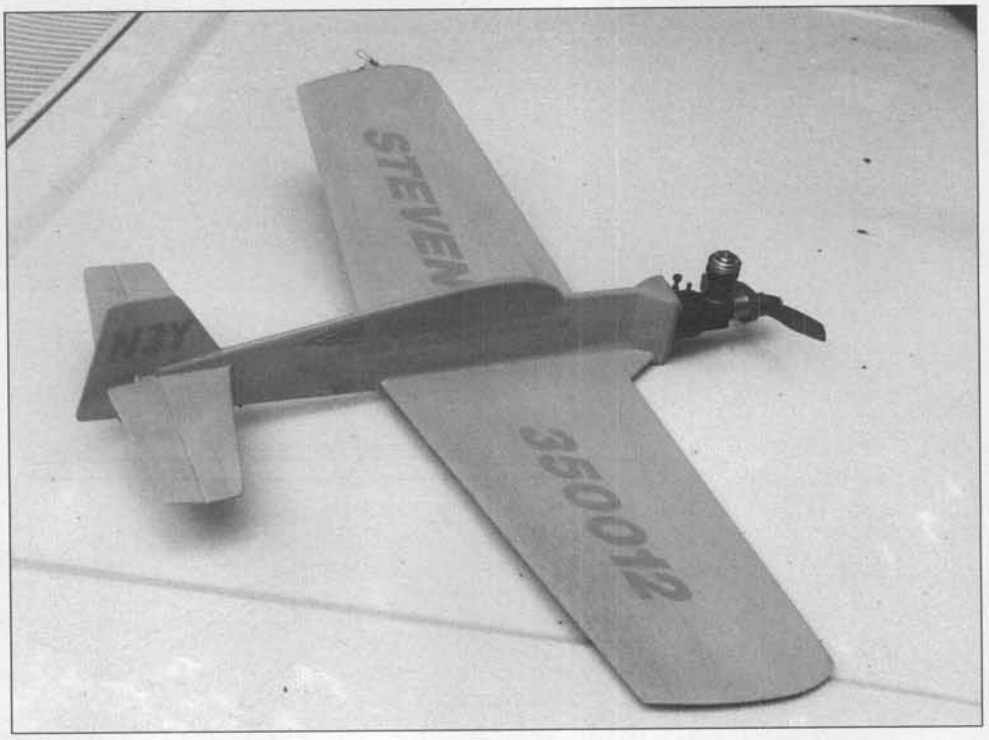
Modern airplanes tend to have little or no rudder offset because it has been learned in recent decades that rudder and engine offset are inefficient ways of assuring line tension. Such offsets only produce their effect when the airplane is moving at a good pace (rudder) and the engine is running strongly (thrust). But the times you most need the extra help you are seeking with offset is when those two factors are the least productive—when the plane is moving slowly or the engine output is substandard.

Also consider that the airplane always is trying to travel in a straight line but our flying wires are constantly pulling it to the left—which means that there is a fair amount of "offset" in a perfectly straight airplane. Some racing and speed designers in fact build a little bit of or left rudder or engine tilt to cut down on the unnecessary outward pull of the plane and direct their horsepower around the track of the circle.

What turns out to be the most efficient way of ensuring line tension is what is commonly referred to as line rake. the point at which the lines exit the inboard wingtip. For this reason, most modern precision aerobatics airplanes, including the Stiletto 660, are designed to have adjustable leadouts, which can be moved forward or backward during the early trimming flights as you search for just the right tension.

In a sense, then, that "pitched back" wing Frank mentions is in fact the answer, but not because of the wing shape. The answer is in the exit of the leadouts in relation to the center of gravity. The exact location for best results will depend on your airplane. In your stunter it will be fairly near but slightly aft of the C.G.; in a racing plane it will again be very near the C.G. Your buddy's combat plane probably will have the leadouts considerably far behind the C.G. to compensate for the wild maneuvering and adverse wind conditions it will encounter in competition.

That is why it appears that many modern



Steven Dixon's Dewey Bird.

airplanes pictured in the magazines don't have much rudder or engine offset—it's no optical illusion!

By the way, in regard to the illusion that RC has taken over: It has taken over some of the hobby shops but not the flying fields. Control line is still alive and well, though the manufacturing and distribution of kits, engines and equipment has gone increasingly "underground." Underneath the mass hobby industry, which often is reflected in the condition of your local hobby shops, is a strong and growing garage and mail-order control-line manufacturing and supply industry. Some news about that industry follows later in the column. And, with the help of local fliers, the hobby shop owners in many areas can be educated about control line and encouraged to carry CL products. Here in my home area, Eugene's Toy and Hobby in Eugene, Oregon has on its shelves about two dozen current control line kits! Don't despair!

Frank continues: "I was hoping also that perhaps this plane, the Stiletto, was in one of your magazines years ago and I could get a copy of it. Or how you could tell me where I could get the info. I enjoy your articles and wish there could be even more coverage."

The Stiletto 660 appeared in the July 1977 edition of *Model Aviation* magazine and still is listed in the AMA plans service as plan No. 193. The plan can be purchased from AMA and the magazine may be able to provide a photocopy of the article, which was written by Kent Rogers, Wynn Paul and Vince Schnetzer, who interviewed McDonald for the information.

• • •

Frank's questions lead us nicely into a mention of a catalog that appeared in the mail just as this column was being written. Randy Smith sent along his latest catalog for Aero Products which, by the way, also has a version of the Stiletto kit listed among their products. Aero Products is a new discovery for your columnist but an obvious source for a great many important CL items. (Note that we have not actually had an opportunity to review any of these items so are unable to vouch for quality—though the catalog itself suggests a professional approach to the business.)

Randy points out that he is now the exclusive US importer for Boy pipes and props, which in itself is a significant bit of news to many fliers who have found Boy to be excellent carbon/glass epoxy propellers for a wide variety of applications ranging from speed and racing through precision aerobatics. The carbon fiber tuned pipes are for CL speed and aerobatics as well as for RC purposes. Boy products previously were distributed by Tom Dixon.

Aero Products also advertises:

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- Wheels, landing gear, solder, and other miscellaneous items.
- A full line of metal fuel tanks.
- An incredible array of kits, including those made by Sig, Goldberg, Sterling, Control Line Classics, A.J., Custom Models and Galaxie Models in addition to the Aero Products line which included at this writing:

Stiletto, Barnstormer, Veco Chief, Shark 45, Novi-4, Sabre, Streak Trainer, Focke-Wulf 190, Combat Kat, Original Nobler, Super Duper Zilch, Madman, Smoothie, Stuka Stunt, Original Ringmaster (built-up fuselage), Warrior, Squaw, Ares, Thunderbird, VooDoo, and Circle King.

If the above sampling doesn't make you want to sent away for the catalog, this remark on the back of the catalog will: "New items being added constantly."

Write Aero Products, 1880 Scenic Hwy., Snellville, GA 30278.

• • •

Haven't had enough of product news yet? Well, here's a letter from Tony Drago of Control Line Classics with another exciting announcement:

"I'd like to let you know that I just bought the last remaining batch of kits from Consolidated Models. Enclosed is a list and a flyer of what I have.

"Also I bought the tooling and I'm going to add some of these kits to my Control Line Classics line under the CLC label.

"If you decide to mention this in your control line column I would advise people to call between 8 and 10 p.m. PST to find out what I have left and reserve a kit or two. If they send a selfaddressed, stamped envelope I'll send them a brochure.

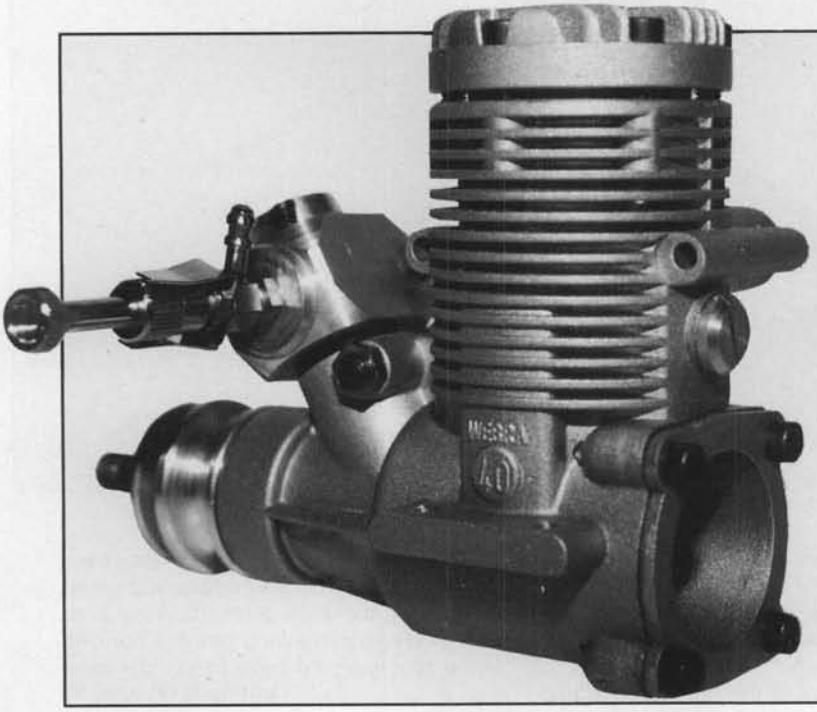
"When these kits are gone there will be no more with the Consolidated name on the kits. I will add to my line the Jubilee, Manx Cat, Bandit, Giant Killer, Fancy Pants, the Wow, Wowee, Trident, MPC-7 and the Guided Star. The Guided Star is old-time legal. Possibly, at a later date, I will add the Twin Jumping Jack."

Tom Dixon's "Black Tiger" prototype.

If you don't recall the old Consolidated kits, they cover a wide variety of types from scale and stunt through combat and speed (remember the Hell Razor?) along with several very nice-looking profiles. Looking at the brochure, I'd have to say the most

continued on page 93

Products I·N U·S·E



Webra 1034RC ABC

BY STU RICHMOND

I have a world of respect for this month's review engine, the Webra 1034RC ABC. Let me tell you why . . .

This column originates in central Florida . . . for the last two or three years Paul Benezra has been coming down here from Atlanta to fly in our Quickie or Sport Pylon races. He consistently either wins or places near the top with his "V" tailed model that's powered with an earlier version of the #1034RC ABC Webra Speed 40. He beats the Tigres, Foxes, Comos, Rossis . . . and me too. I respect a winner!

This review engine now has several air hours on it, flying in a Sportee 40 (a Hobby Dynamics Distributors kit available at your hobby shop) and it's proving to be the smoothest running and least vibrating sport 40 we've tested yet . . . its low vibration level is directly due to the low and light reciprocating mass . . . .read on for details. The strong "plus" of the low vibration is that your radio system takes less pounding.

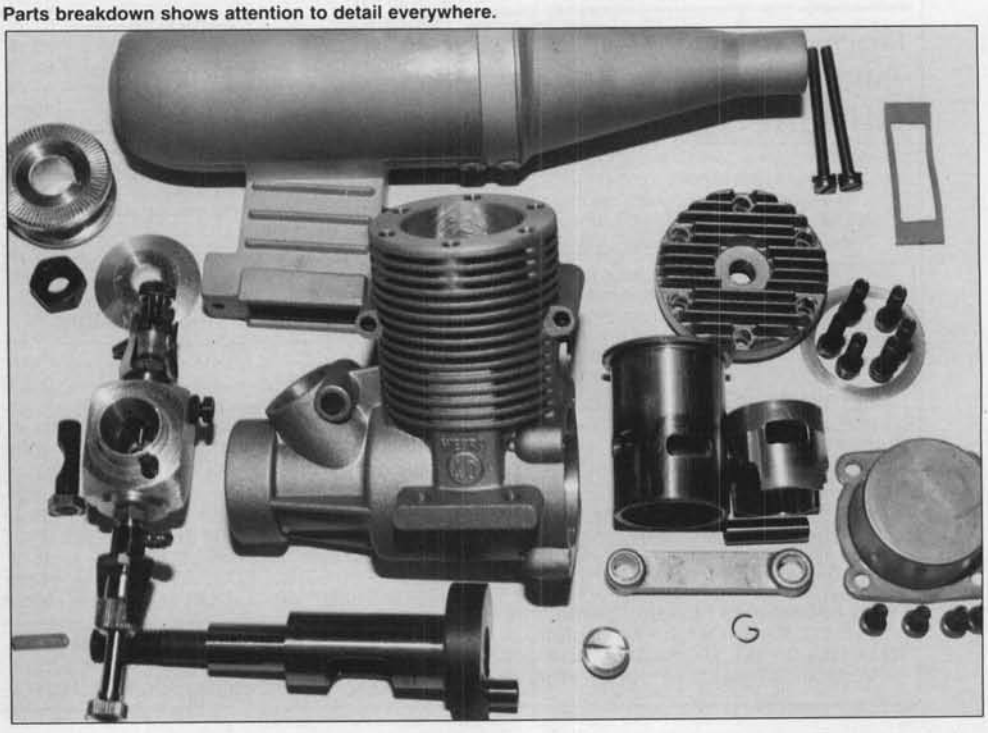
This engine is made in Webra's Austrian facility. The Europeans mostly don't have nitromethane in their fuels . . . they largely tend to run tuned pipes for a power boost. But we Americans have been very slow to accept using tuned pipes along with their costs, "mysteries" of tuning, hassle of mounting, and size.

American RCers buy somewhere between 400,000 and 500,000 RC engines each year (a staggering quantity!). The average engine only runs around fifteen hours in its lifetime and we really can hardly get enough engines to meet our needs. Also, we tend to buy front-intake side-exhaust units that come with a simple bolt-on muffler . . . all other versions are a minor percentage of the total.

To meet the demands of the American market, the Webra Speed 40 has a new crankcase casting that accommodates muffler mounting bolts. Then they took their 60 size muffler and made a tubular sheet metal insert that fits between the cast front and the cast rear section, assembled the three parts with six pop rivets and its a very sound efficient bolt-on muffler that fits the needs of the American marketplace. The muffler weighs four ounces, doesn't leak and shows no signs of the pop rivets failing.

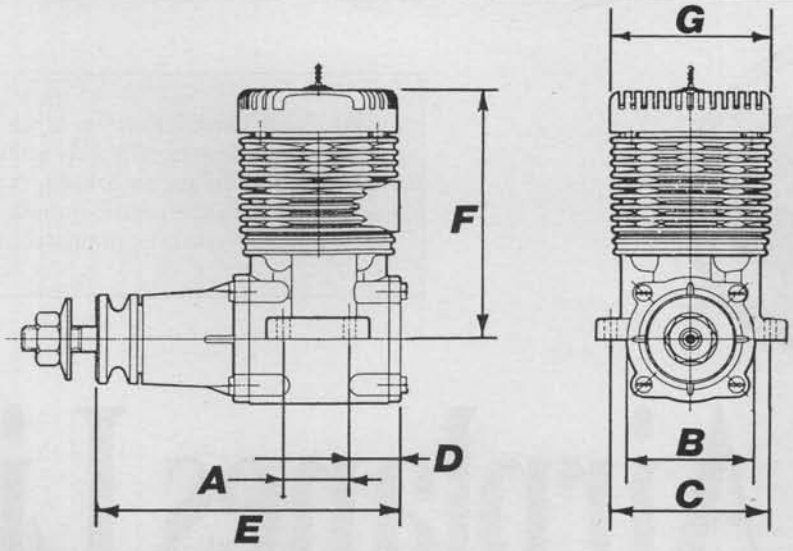
The engine comes without the muffler . . . the muffler is an extra purchase item (#1100/41 EG) and comes in its own box . . . standard European marketing style. Let's

Parts breakdown shows attention to detail everywhere.



get inside the engine. It fits the same mounting holes as the lower cost ($99.95) Silverline .40 Sport engine. They both use the same design TN Vergaser (carburetor with two needle valves) except the hole through the barrel of the Speed 40 is .300-inch ID and its only .255-inch ID for the Silverline. This computes to 18% bigger for the Speed 40 . . . this larger throat carb is used on the Speed 60 engine too. The inside diameter of the Speed 40's muffler outlet is .430-inch or about three times the area of the Silverline 40's outlet and more than twice the area of the Super Tigre 40 to 46 muffler.

The insert in the Speed 40's muffler looks like that inside the very quiet K&B Sportster mufflers and the insert is sure to promote swirling of hot exhaust gases that allows more time for the gases to dissipate heat and turbulence that is sound annoyance. If Radio Shack or Tandy sold an irritation meter instead of a decibel meter we'd get meaningful data.



WEBRA SPEED 40 RC ABC (generic engine shown above)
A = 23/32" B = 1 3/8" C = 1 21/32" D = 15/32" E = 3 3/8" F = 2 5/8" G = 1 1/2"
BARE ENGINE WEIGHT IS 12.8 OUNCES • MUFFLER WEIGHS 4.0 ADDITIONAL OUNCES

Between the air intake of this month's review engine . . . and the muffler's outlet . . . is a thoroughly high-tech modern one pound (actually 16.8 ounces) powerhouse that features a brass cylinder that has a relatively large .003-inch internal taper (the larger ID is at the bottom, naturally). The exhaust timing (the number of degrees of prop rotation that the exhaust port is open to allow hot exhaust out of the engine) measures 150 degrees, about the same as the series of five Fox .40 engines use, and gives good fuel economy as there is more "burn time" per revolution of the prop. Figures above 150 degrees tend to respond well to running on tuned pipes and tend to comfortably turn smaller props at higher RPM's. . .as on Speed models. The end of this month's column will note the differences in this Speed 40 for sport use and the new pylon racing version that's similar in outside appearances only.

The crankcase casting is plenty strong and is made with the front bearing section cast integrally . . . the strongest way to do it. High performance engines of modern design seldom have removable front sections. This is a relatively high cost model engine designed to give high performance.

Intricate internal machining that yields upscale performance doesn't come cheaply. The piston/cylinder is true ABC construction unlike most of the oriental engines. The 1034's piston is a high silica aluminum casting that runs in a brass cylinder that's been hard-chrome plated. This doesn't come cheaply either! The .003-inch internal cylinder taper is done with CNC machinery and the taper is more than commonly found on a sport type engine. It starts to approximate a Formula I pylon racing engine. As the piston goes through TDC (top dead center) it even has the standard slight piston-to-cylinder bind or click that beginners often mistake for a defect! The piston starts to bind in the final 1/16-inch of upward travel . . . with the cylinder head removed, the piston readily pushes the cylinder up and out of its crankcase for easy disassembly. The engine has a tool entry bolt on its rear much like the K&B .61 has to enter the engine and remove the wrist pin for piston removal, but it's superfluous because the bottom socket of the connecting rod easily comes off the shaft's crank pin once the cylinder has been lifted out of its crankcase. Once the piston/connecting rod assembly is removed, it's *much* easier to remove the wrist pin rather than to work through that rear small hole the aluminum bolt covers.

The purpose of internal taper inside the cylinder is so that the engine has a maximum seal between the piston and the cylinder walls as the engine fires on its power stroke and maximum expansion is used to drive the piston and turn the prop, with a minimum of blowby or waste of the burning gases. At running temperatures the upper section of the brass cylinder expands and the bind of the piston disappears. No piston ring can normally yield as fine a seal at the moment of combustion. This fine seal doesn't come cheaply either! The piston sort of "free wheels" through bottom dead center (BDC) offering an absolute minimum of drag between itself and the larger inside diameter cylinder walls . . . the only work the piston does during this coasting section is that it acts like a plunger on its bottom side. Once the piston opens the exhaust port, its bottom side is plungering down the incoming air/fuel and forcing it up the bypass and Schnuerle ports where it'll enter the combustion chamber for the next firing. If the plungering action leaks a bit it's tolerable compared to the power boost that comes from the tight piston/cylinder fit at combustion! Even the K&B sportsters use this taper feature a bit. No ringed engine uses it to my current knowledge . . . not practical at this time.

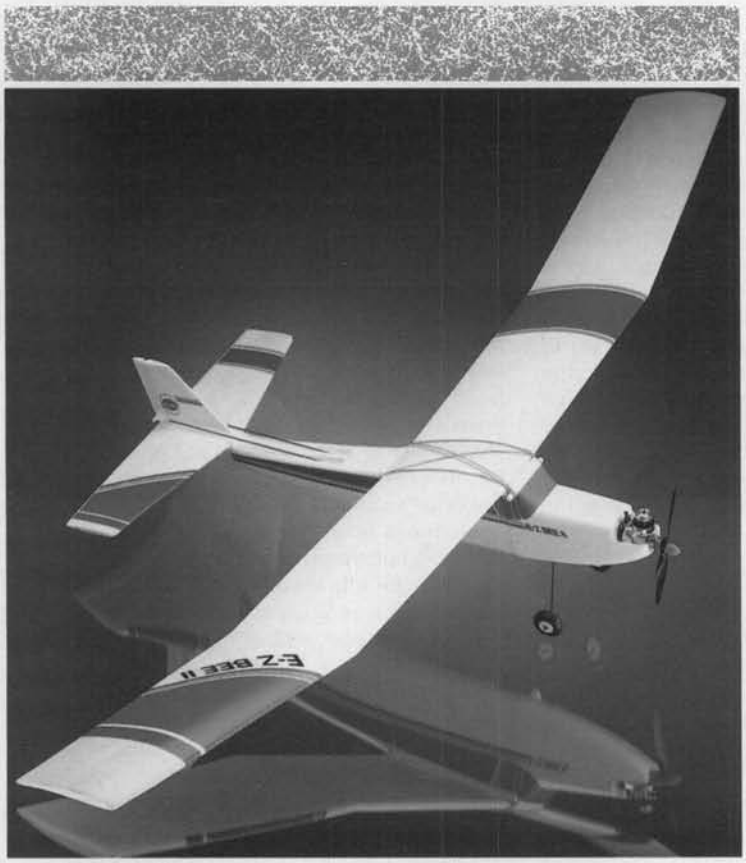
Disassembly requires a 2.5mm Allen wrench, a small Crescent wrench and maybe a putty knife (for loosening or tightening that rear access hole's closure bolt). Prop threads are 1/4-28, standard for the giant USA engine market for a 40. A 2.5 millimeter square machine key locks the prop driver to the crankshaft . . . if lost, a short piece of 3/32-inch music wire can be used as an emergency fix. Six 2.5 x 15mm bolts hold the cylinder head in place. The head has a .170-inch wide squish band angled at seven degrees which I feel helps an engine accelerate from idle. I once asked a major engine manufacturer about angling the squish band and he replied that he could never see a difference, but I respect the angle on a non-racing engine. A quarter hard .005-inch aluminum gasket forms the head-to-cylinder seal. In the middle of the head's squish band is a .500-inch diameter bowl that's only .100-inch high. . .relatively shallow. A K&B #4520 idle bar glow plug has its bottom fit practically perfectly with the bowl's surface. This plug lasted for the entire break-in and for about the first dozen flights. When the engine failed to accelerate rapidly from idle the plug was pulled. The plug's wire was frosty white instead of silvery . . . it had served its life and was replaced.

The cylinder is thick-walled at .065-inch average . . . top ID measured .827-inch and the bottom ID measured .830-inch (remember the internal taper? It's easily measured). The internal walls are very lightly honed, and these intentional scratches serve to hold lubricant. The cylinder's craftsmanship is flawless . . . the windows line up with the case flutes perfectly. Four 2.5 x 8mm machine screws hold the rear crankcase cover in place, with a paper gasket doing the sealing. As received, the bolts were slightly

Avoid ARF Shock

ARF shock *(Almost Ready to Fly* shäk) **n. 1.** sinking feeling that occurs when dreams of quickly assembling and flying an "ARF" labeled R/C airplane are dashed **2.** initial reaction to the sight of scores of pieces that need to be built, and parts that must be glued **3.** dismay that costly additional component purchases are needed

COX Airplanes Live Up



E-Z BEE II 55″ Wingspan
31″ Length
Cox .049 Engine Powered

The most stable, best flying engine powered beginner R/C airplane. Now, two servos provide independent rudder and elevator control.

Take the lid off the package of any Cox brand R/C airplane and it's immediately apparent that Cox has set the standard for the term "ARF" by providing the world's most complete, "user friendly" R/C airplanes.

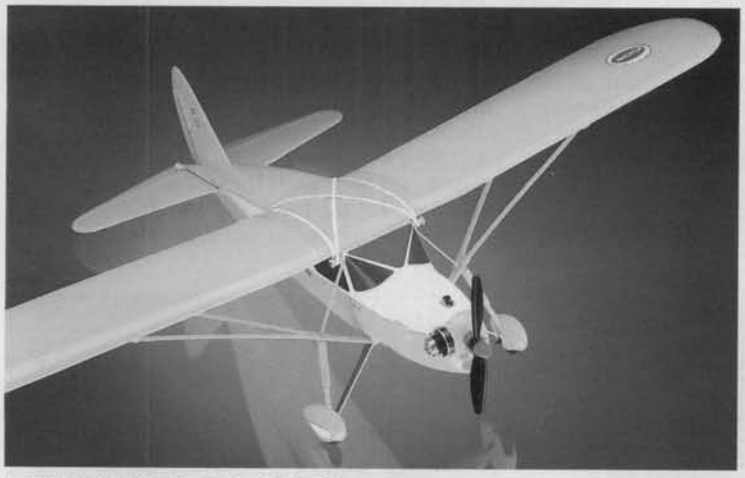
Right at the factory, Cox takes care of all the difficult, time-consuming, error-prone steps that are common to the R/C airplane building process.

All the construction prevalent with other ARF brands has already been done by Cox. In fact, every Cox R/C airplane is designed with such extreme attention to ARF considerations that even the most common step in typical ARF kits, that of gluing, has been completely eliminated! All that remains is for you to assemble the finished component parts.

Purchasing a Cox R/C airplane requires no additional, costly accessories. When you purchase a Cox R/C airplane with radio, your only required separate purchases are Alkaline batteries for the radio system and, if your model is engine powered, a Cox 400 or 990 kit with fuel and starting battery. Cox electric airplanes always include Nickel Cadmium motor batteries.

Each Cox ARF is outstanding in flight. They all have different flight and performance characteristics. Read about each individual airplane and ask your local hobby store for the one that fits your needs best.

Cox Hobbies, Inc.
350 West Rincon St.
Corona, CA 91720



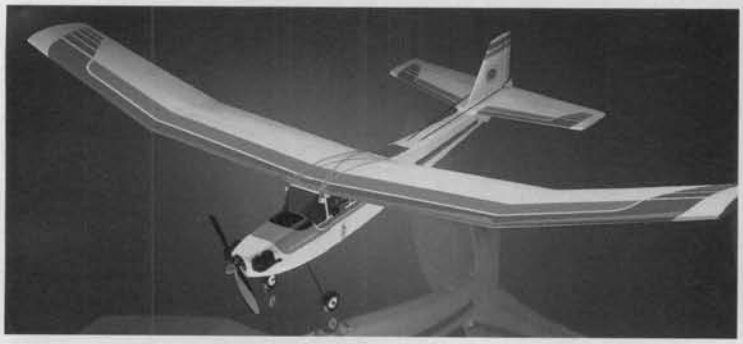
FAIRCHILD 24 38″ Wingspan
28″ Length
Cox .049 Engine Powered

A classic favorite among scale airplane buffs, the Cox .049 Fairchild provides an attractive, stable scale R/C airplane at a very affordable price.

CESSNA SKYLANE 36″ Wingspan
31″ Length
Cox .049 Engine Powered

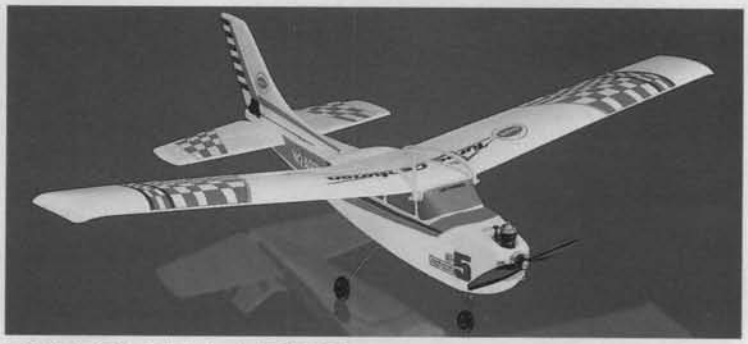
Cox's fastest model, this "turn-on-a-dime" R/C airplane also provides the stability novices need to learn intermediate level aerobatics.

To The ARF Claim . . .



ELECTRIC SUNDANCE 55″ Wingspan
31″ Length
Electric Motor Powered

Large, glider-style wings and two-servo rudder/elevator control enable beginners to learn to fly and advance to basic aerobatic maneuvers.



TURBO CENTURION 27″ Wingspan
20″ Length
Cox .020 Engine Powered

The easiest to fly gas powered R/C airplane ever. The accompanying FailSafe radio system replaces transmitter sticks with buttons. To turn, just push the right and left buttons.

FLYBOY 27″ Wingspan
20″ Length
Electric Motor Powered

Everything possible . . . motor, radio system, rudder, push rods and even decals . . . is factory assembled. Incredibly easy to fly, the special FailSafe radio system enables anyone over 9 years old to fly.

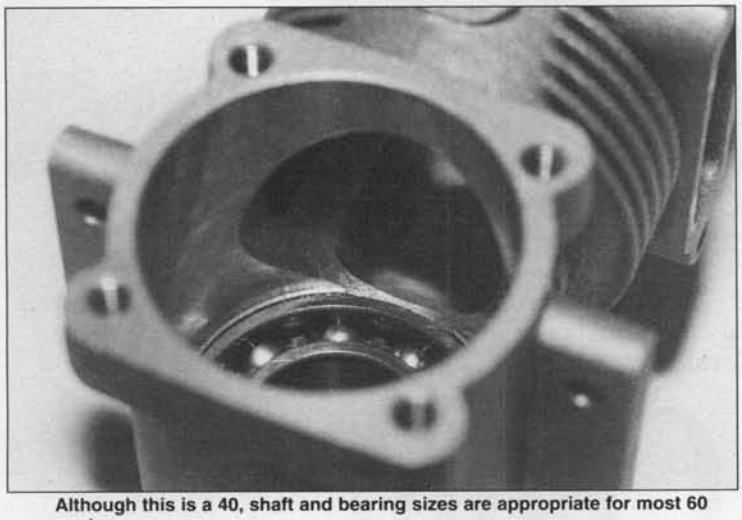
VIDEO-COPILOT™ E-Z Bee II, Electric Sundance, Fairchild 24, Cessna Skylane

Cox is the only company to include an instructional video with your airplane. Cox Video-Copilots enhance written assembly and flight instructions, helping you to correctly assemble your Cox ARF and fly successfully.

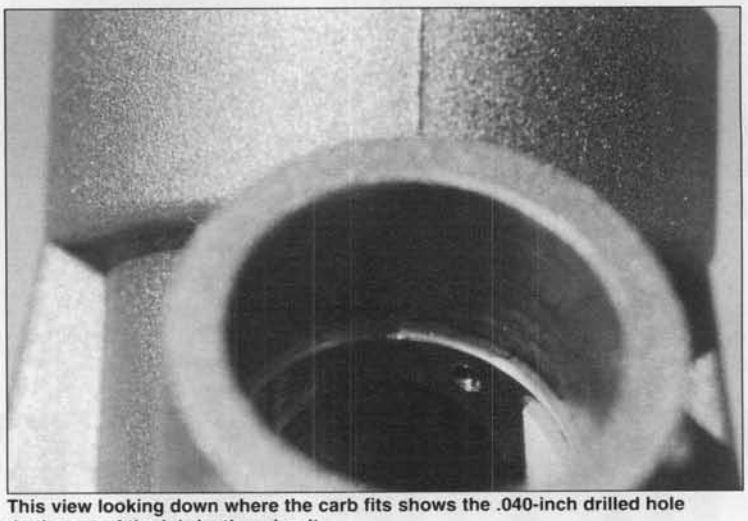
loose due to the paper gasket having compressed after assembly, a common problem with paper gaskets. That's why some engines are now coming with a neoprene "O" ring in that gasket location.

This Webra Speed 40's piston barely weighs six and a half grams (28 grams = 1 ounce). It starts as an aluminum casting that is cut, centerless ground to tolerance, relieved, ported, lubrication grooved .070-inch down from its crown, probably heat treated again and reground to final specs and then polished. It's a metalsmith's work of art, and I simply can't be sure of the production steps in this case.

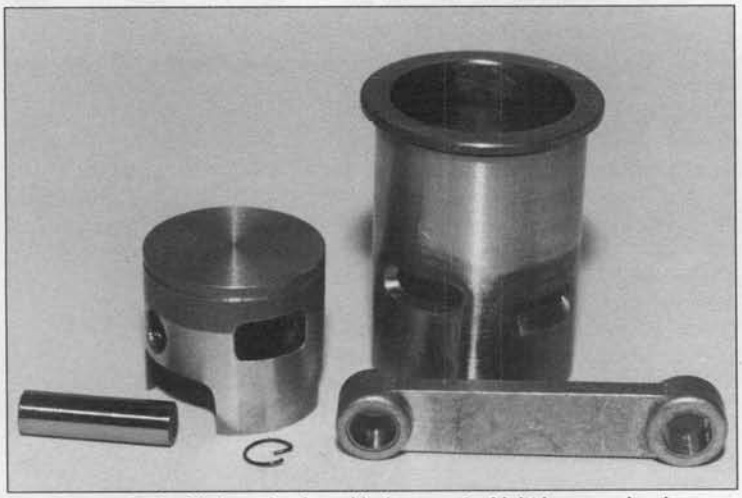
A two-cycle engine's reciprocating mass is considered to be the weight of the piston, wrist pin with retainer(s), plus one half of the connecting rod's weight. This Webra Speed 40's reciprocating mass is ten and a half (10-1/2) grams, the lightest of any this column has yet reviewed. The lower the reciprocating mass, the lower the vibration level and the faster the acceleration/deceleration.



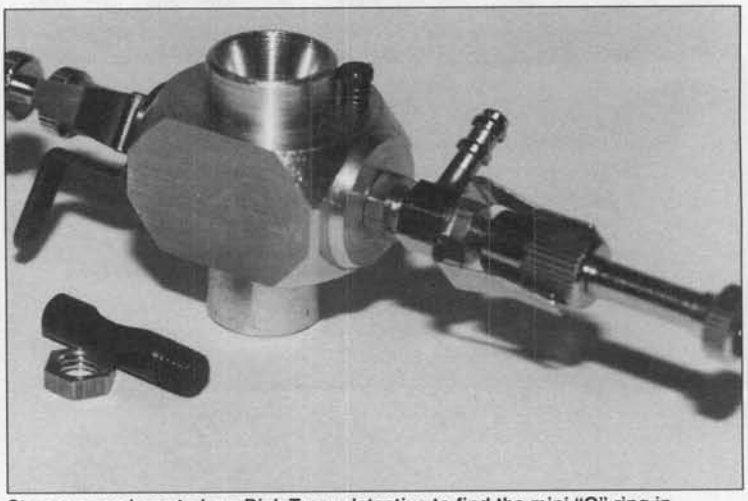
Although this is a 40, shaft and bearing sizes are appropriate for most 60 engines.



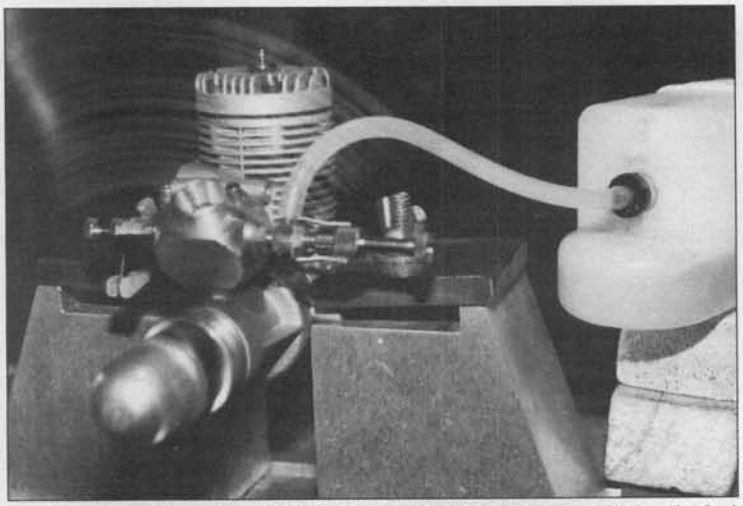
This view looking down where the carb fits shows the .040-inch drilled hole that's part of the lubrication circuit.



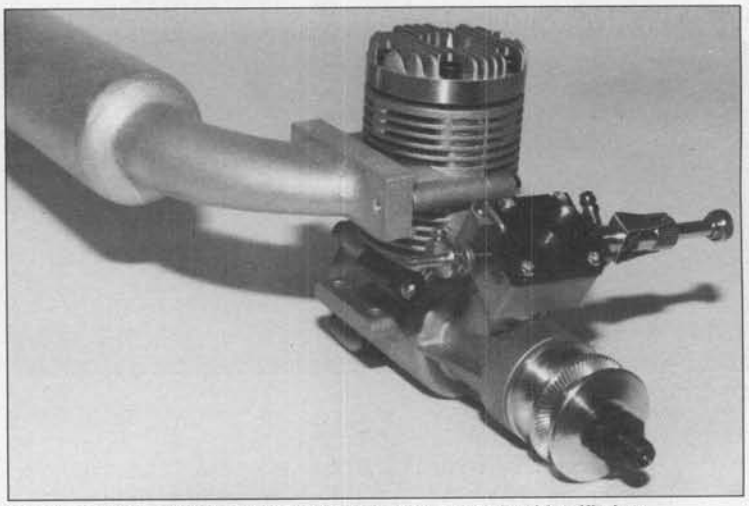
The engine's efficiency begins with these parts. Light hone marks show inside the cylinder.



Stu says you have to be a Dick Tracy detective to find the mini "O" ring in this carb.



Here's the Webra Speed 40 RC ABC running during break-in. Notice the fuel tank is half above and half below the carb's spray bar.



Here's a sneak preview of the Sport Pylon Racing version identified as #1034 PYLON . . . it's expected to be a winner!

More importantly, the higher are the attainable RPM's! The Richmond Ratios and high RPM figures that follow well document what your RC money buys you!

The connecting rod appears to be sliced from a long aluminum extrusion (like a slice of baloney, really) and bronze bushed at both upper and lower sockets before reaming to fits. Both rod ends are sliced through about 40% for lubrication entry. The rod sockets are extremely close-tolerance fits . . . unusual.

The crankshaft is a single piece forging with a 15mm diameter journal (590-inch). It's ground and polished only on its working surfaces, which include the area between the two ball bearing supports where the fit prevents excess fuel seepage. The shaft's interior passageway is .375 ID and the shaft weighs 75 grams which gives you an idea of its "beefiness." The rear bearing is 28mm x 15mm and the front one is 22.5 x 9.5mm. The shaft and bearings are virtually 60 size by yesterday's standards. One of the photos shows a .040-inch diameter hole that's drilled parallel to the crankshaft. It starts at the 11 o'clock position behind the front bearing and extends back into the intake's throat area with entry to the throat just below the bottom of the carb.

Some of the K&B .61 engines use this feature. Its purpose is to complete a lubrication circuit back from the front bearing area to the low pressure area in the engine's intake throat and to prevent a "wet front end" on the engine. As this engine was disassembled we found absolutely no chips or metallic trash "freebies" inside. The TN Vergaser (two needle carb) was covered in detail in our recent review of the Webra Silverline 40 sport/beginner's engine . . . its idle needle comes with a silicone tubing sealer in place and its high Speed needle rides inside a miniature (really tiny!) "O" ring that is pressed inside the high Speed needle's end of the spray bar . . . you've really gotta play Dick Tracy detective a bit to find it! The TN mixture control isn't quite perfect . . . it runs slightly lean just below highest Speed settings but it's simple in operation and cost effective compared to the upscale Webra Dynamix carb which we'll cover in a future article. The Dynamix gives about an 8% performance increase, reportedly.

The Speed 40 comes with a sensible pink sheet of safety instructions and a white sheet of operating instructions. I'd like to see it come with a numbered and illustrated parts/assembly sheet, as well as a glow plug.

We measured exactly 5.0 cubic centimeters volume in the cylinder as the piston just sealed the cylinder . . . and measured exactly .5cc at TDC. Now then, 5.0 divided by .5 gives a ten-to-one compression ratio. We expected an easy handling engine on the test stand . . . and got it! EXCEPT . . . except the engine defied all efforts to shut off normally/quickly at idle from the third break-in run on forward to today! This is one of the world's fine idling engines . . . with the carb fully closed it just idles and idles and idles. No, the carb barrel isn't a lousy fit that leaks air, it's a precision fit! Remember the .040-inch hole at the 11 o'clock position above and parallel to the crankshaft . . . in the oil lubrication circuit of the front bearing? With the carb barrel fully closed, this tiny hole provides combustion air for the engine to burn up every bit of combustible that's inside the engine . . . at an unbelievably slow "putt-putt" RPM rate!

continued

TABLE 1.

Prop brand	size	high RPM	low RPM	Richmond Ratio
Master A/S	**9-6**	**17,100**	read without the muffler	
(following is with the muffler and pressure tap plumbed)				
Master A/S	**9-6**	**15,700**	**2600**	**6.0:1**
Master A/S	**9.5-6**	**15,400**	**2500**	**6.2:1**
Master A/S	**10-6**	**12,800**	**2400**	**5.3:1**
Graupner	**8-6** three blader	**15,700**	**3000**	**5.2:1**
Graupner	**9-6** three blader	**12,000**	**2400**	**5.0:1**

TABLE 2.

Prop brand	size	high RPM	low RPM	Richmond Ratio
Master A/S	**9-6**	**15,700**	**2500**	**6.3:1**
Master A/S	**9.5-6**	**15,400**	**2350**	**6.5:1**
Master A/S	**10-6**	**12,800**	**2100**	**6.1:1**
Graupner	**8-6** three blader	**15,700**	**2800**	**5.6:1**
Graupner	**9-6** three blader	**12,000**	**2050**	**5.9:1**

P-40 KITTYHAWK

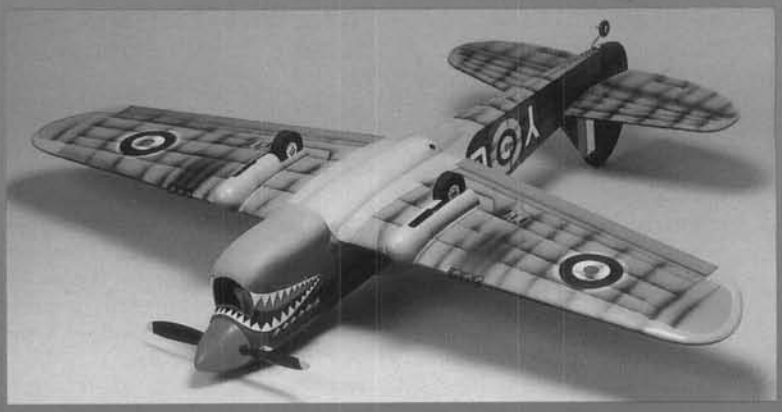
INTRODUCING THE THIRD IN OUR POPULAR LION MODELS' SERIES OF WWII WARBIRDS!

Our new P-40 KittyHawk is the latest in our revolutionary sport-scale line-up of World War 2 ARF kits.

These aircraft come 92% pre-built right out of the box. All parts are pre-covered in authentic, highly detailed schemes just like the real fighters.

This new P-40 features advanced design and quality materials, such as maple cap spars and four star plywood. Each wing panel is fixture built and held under pressure as the internal glue joints are electrically sonic dried. These features guarantee each panel is straight and every kit is 100% in workmanship and materials.

These features, accompanied with some of the best graphic designs in the modeling business provide the modeler with the most desirable appearance in a sport-scale R/C ARF.



P-40 KITTYHAWK SPECIFICATIONS:

WINGSPAN: 57 IN. - RADIO 4-5 CH.
ENGINE: .45-.60 2 CYCLE, .60-.90 4 CYCLE

The cost of the paint and finishing materials, not including your own time, would be close to 50% or more of the total price of this model.

The P-40 may be built with optional, non-scale non-rotating retracts. Order number 18565.

NOTE: This model requires high intermediate or advanced flying ability.

Lion Models ARF kits are distributed exclusively through ISC international.

ISC INTERNATIONAL

P.O. Box 40116, Indianapolis, IN 46240
1-800-332-4359 • Fax: 317-848-1015

This is a quality engine and was broken in using the Powermaster Golden Break-In fuel . . . we exactly followed the instructions for a true ABC engine. After the first dozen runs the squeak and/or clicking sound going through TDC had almost disappeared as the piston/cylinder fit progressed. Break-in was with a 9-6 Master Air Screw. On the sixth run the engine was able to idle at 2600 RPM's without the muffler . . . about .003-inch of crankshaft end play was evident too. Towards the end of the ground break-in, pinching the fuel line gave easy 17,000 RPM readings with the 9-6 . . . we already had a Richmond Ratio or Speed range of "high-to-low" well over six-to-one. Nice!

Table 1 test data indicates performance.

I suspected the muffler pressure was, for some reason, fouling up the superb idle of this engine. The pressure tap is in a relatively low/modest pressure location on the muffler. With the pressure line removed from the tap table 2 data was recorded.

The lowest reliable idle Speeds are needed for easy touch and go and landing performances . . . as well as serving as an in-flight air brake. This Webra Speed 40 RC ABC engine is currently flying on the 9 - 6 three blader. .without muffler pressure . . . burning only Golden Break-In Fuel . . . it deserves to have the best! It's most unusual . . . but this engine consistently does the Formula I type engine's "trick start." With the engine a bit "wet" from two or three chokes . . . grasp the front tip of the spinner between your thumb and first two fingers and twirl it backwards toward compression. It'll fire and take off running forwards. It's the only sport engine I have that will do it!

Sport Pylon Racing enthusiasm is gaining momentum around the world. The American 1990 Nats had a whopping 96 entrants! The British Nats even had 60 entrants. There's a brand new Webra Speed 40 Pylon ABC engine that came into the USA around early August 1990 that's #1034 Pylon ABC . . . the engine is simply an extension of this month's review engine, as the part number indicates, and it should therefore be "legal" everywhere for fun racing and the AMA class III pylon rules.

Subtle minor internal changes have been made. The connecting rod appears forged rather than cut and sliced from an extrusion. The crankshaft has a minor timing change . . . the internal cylinder taper measures .005-inch instead of .003-inch, the piston is different (and still elegant), the exhaust timing has been increased by ten degrees to being open for 160 degrees of prop rotation. The cylinder heads internals are somewhat different, it looks like the Fox Miracle plug will be the best choice of fit. And I wonder that if I get mine in flight before Paul Benezra from Atlanta gets one going if I'll finally be able to beat him on the race course!

Webra engines are imported into the USA by Hobby Dynamics Distributors, and are sold only to your local hobby shops. If not now in stock for you to see/touch/buy, UPS 2nd Day Air service works everywhere to every hobby shop! ***MB***

PYLON

BY WAYNE YEAGER

QUICKIE 500 CHAMPIONSHIP RACE

The 1990 T.U.R.N. Quickie 500 Championship Race was held in late October and was hosted by the Northern Kentucky Flying Cardinals, who once again did a magnificent job. Joe Ruh ("roo" as in kanga) and Barry Anderson were co-CD's, with Jim and Brenda Holbrook sharing the starting duties. This husband/wife team has worked the Nats for this writer and are the kind of people you want around—very conscientious, easy to get along with, and who like pylon.

There were 28 entries, blue skies, no wind and temperatures in the mid-60s on Saturday, and light winds with 70s temperature on Sunday. Barry Anderson reported the racing was intense, with no perfect scores and several personal bests. There was an assortment of airplane configurations including V-tails, mid-tails, and straight tails with no one type having an obvious advantage. Barry reported seven of the top ten were conventional designs and that the spoils still go to the people who do their homework and fly consistently. Craig Grunkemeyer, who is usually mentioned when talking about Quickie or Quarter Midget racing in the midwest, was his usual self, however a couple of cuts here and there knocked him down to third place overall. Dan Kane Jr. (and I mention "Jr." because "Sr." is starting to get his socks blown off by "Jr.") is crawling towards the top in racing and soon will be the guy to beat, I'm certain. Unless he discovers girls. However, this race did belong to Dan Sr., who battled through the ranks for fifth place.

Bob Lamb, from the St Louis area and who set fast-time at the '90 Nats, was turning teen-times. A couple of sick engine runs, however, knocked him down to fourth place. Paul Geders, from the same area, ran consistently, accumulated good points every heat, and finished second.

The TURN Quickie 500 Champions. (Front l-r) Joe Dodd caller for and holding Grunkemeyer's trophies, Craig Grunkemeyer 3rd, Doug Whitaker 1st with his arm wrapped around the Traveling Championship Trophy and caller Jon Lemmons. In the rear (l-r) are Paul Geders 2nd, Bob Lamb 4th, Dan Kane Sr. 5th with caller Dan Kane Jr.

First place was won by another guy always near the top in Quickie racing, Doug Whitaker. Doug is tough wherever he races and his win was no fluke. He finished third at the NMPRA Quickie Championships and flew fast and consistent at the T.U.R.N. Championship, and now owns the bragging rights for a year. Craig Grunkemeyer turned in the meet fast-time of 1:13.61 which will be submitted as a national record. His time was closely followed by Bob Lamb's and Doug Whitaker' 1:14s, all great times considering the racing was in accordance with AMA rules, with no exceptions.

The Cardinals held a trophy dash similar to the Rough River Quarter Midget race in which the top 12 fliers, by time, are matrixed into a few heats with the winners of each heat advancing to one final go-for-broke heat with only the winner being rewarded. In this year's trophy dash were: Doug Whitaker, Craig Grunkemeyer, Bob Lamb, Dan Kane Sr., Rex Knepper, Tom Scott, Joe Dodd, Ken Heatlie, Mike Pewitt, Al Grove, Joe Ruh and Jon Lemmons. After the smoke cleared, as they always say, Grunkemeyer was the winner.

Congratulations to the winners, Whitaker and Grunkemeyer, and all contestants, the flyers who benefit from the willingness and efforts put forth by clubs willing to host such events and perform to such a high degree. Thank you, Northern Kentucky Cardinals. In addition, we can't forget the many organizations that donated merchandise: including Daniel's Hobbies of Nashville, Tennessee; Northern Kentucky Hobbies and Hobby Hanger of Florence, Kentucky; Carl's Hobbies of Cincinnati, Ohio; and Gager Aircraft Sales of Ft. Wayne, Indiana.

In addition, Doug Whitaker donated some merchandise and T.U.R.N. (The United Racing Network) donated cash awards for the top five plus fifty bucks each for the trophy dash winner and for fast-time.

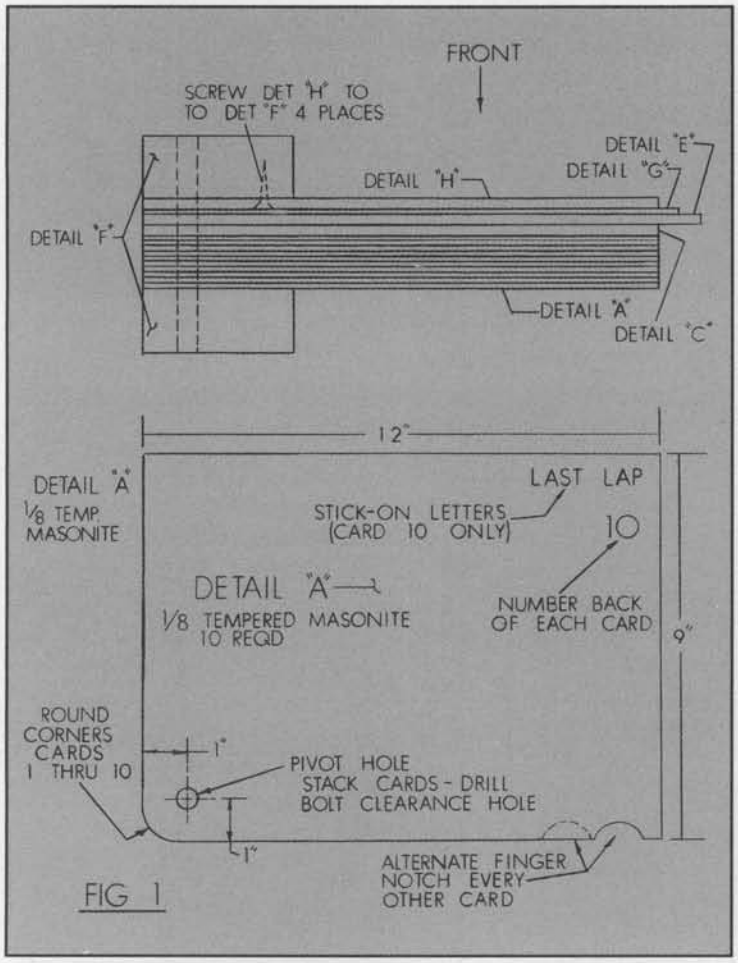

FRONT
SCREW DET "H" TO TO DET "F" 4 PLACES
DETAIL "E"
DETAIL "G"
DETAIL "H"
DETAIL "F"
DETAIL "A"
DETAIL "C"
12"
DETAIL "A"
1/8 TEMP MASONITE
LAST LAP
STICK-ON LETTERS (CARD 10 ONLY)
10
DETAIL "A"
1/8 TEMPERED MASONITE 10 REQD
NUMBER BACK OF EACH CARD
9"
ROUND CORNERS CARDS 1 THRU 10
1"
PIVOT HOLE STACK CARDS - DRILL BOLT CLEARANCE HOLE
1"
ALTERNATE FINGER NOTCH EVERY OTHER CARD

FIG 1

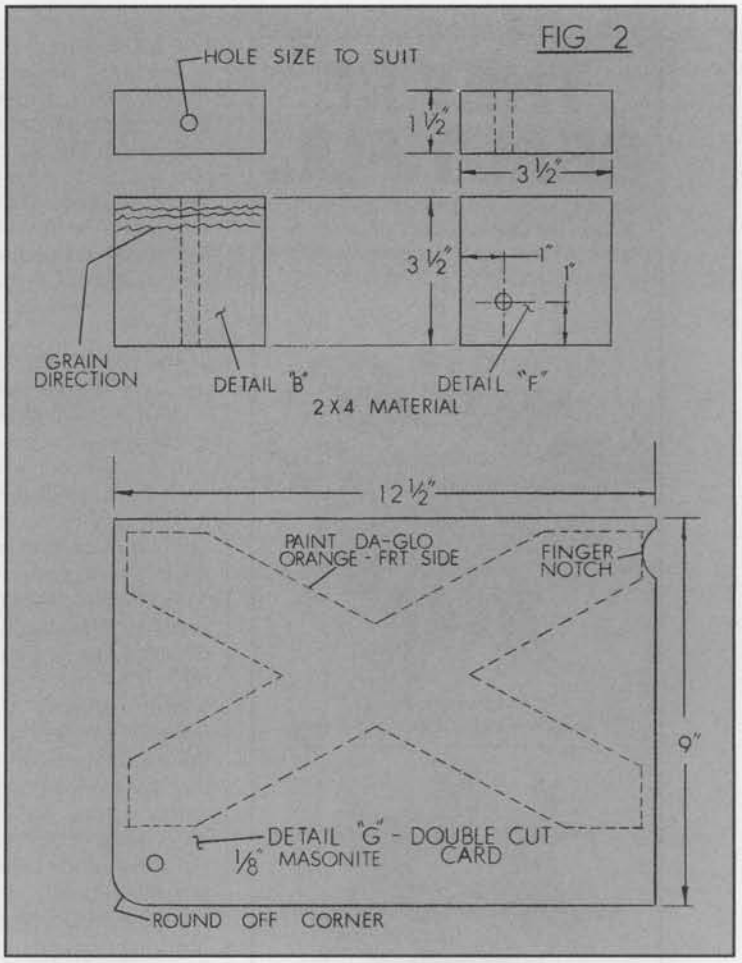


FIG 2
HOLE SIZE TO SUIT
1 1/2"
3 1/2"
3 1/2"
1"
1"
GRAIN DIRECTION
DETAIL "B"
DETAIL "F"
2X4 MATERIAL
12 1/2"
PAINT DA-GLO ORANGE - FRT SIDE
FINGER NOTCH
9"
DETAIL "G" - DOUBLE CUT CARD
1/8" MASONITE
ROUND OFF CORNER

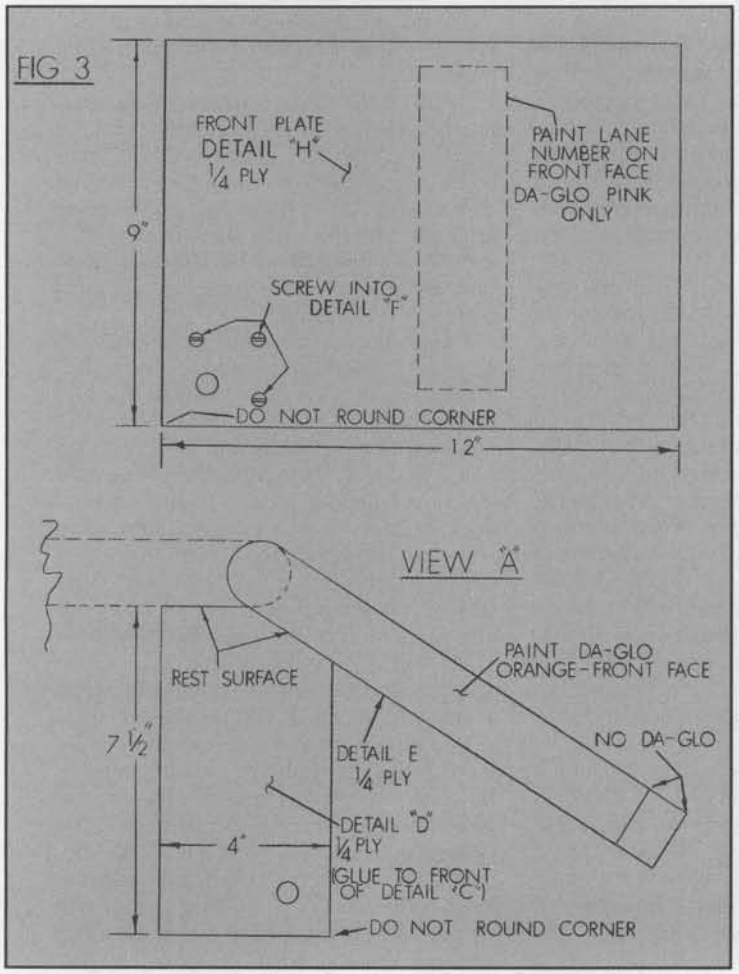


FIG 3
FRONT PLATE DETAIL "H" 1/4 PLY
PAINT LANE NUMBER ON FRONT FACE DA-GLO PINK ONLY
9"
SCREW INTO DETAIL "F"
DO NOT ROUND CORNER
12"
VIEW "A"
REST SURFACE
PAINT DA-GLO ORANGE-FRONT FACE
7 1/2"
DETAIL E 1/4 PLY
NO DA-GLO
DETAIL "D" 1/4 PLY
4"
(GLUE TO FRONT OF DETAIL "C")
DO NOT ROUND CORNER

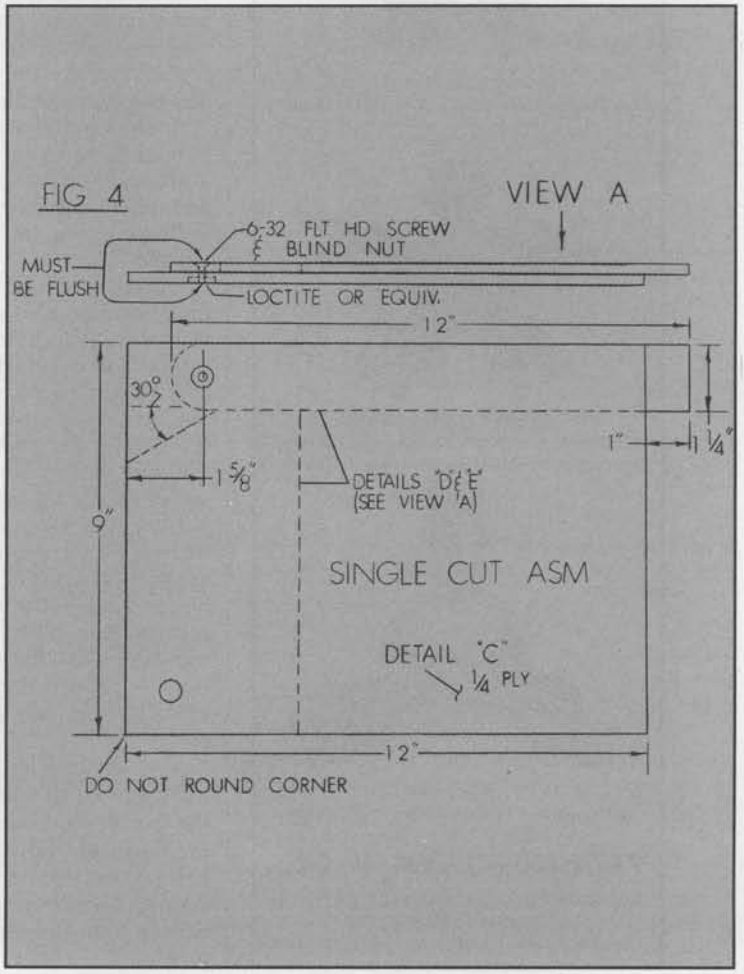


FIG 4
VIEW A
6-32 FLT HD SCREW & BLIND NUT
MUST BE FLUSH
LOCTITE OR EQUIV.
12"
30°
1"
1 1/4"
1 5/8"
DETAILS "D" & "E" (SEE VIEW "A")
9"
SINGLE CUT ASM
DETAIL "C" 1/4 PLY
12"
DO NOT ROUND CORNER

LAP CARDS

Several people have asked for copies of the lap card design we used at the Nats. We wanted something different, that eliminates some of the usual problems encountered with currently used systems.

The major problem as I saw it was that with the usual flip-cards-over-a-bar system, the lap counters have their hands full just keeping their eyes on their plane and in most cases cannot look down at the cards to see exactly what they are flipping over the top and therefore have to depend on feel to determine whether they have one or two cards in their hand. They keep it sorted out most of the time but occasionally do flip over two cards and someone ends up with a nine-lap time and some arguments.

Our system was designed to eliminate this problem, and if the lap counter uses it as designed, cannot flip two cards together.

Another problem is the difficulty in flipping cards over a bar or such when the cards are hanging on a set of large rings. They bind and require a very precise flipping method to keep a constant flow of cards with no glitches.

Our design can be operated with one little pinky, no matter how weak, and has been in use for six years at the Nats. My club has a similar system which has been in operation even longer and to my knowledge, has not failed in any way. Materials needed for each flip card set are: (Note! - Multiply by four for a 4-lane system) are: approximately nine square feet of 1/8-inch tempered Masonite; 5-1/2 x 28 x 3/4-inch pine board; fourteen inches of 2 x 4; approx. 2-1/2 square feet of 1/4-inch plywood; 5/16-inch by 6-inch stove bolt and nut; two 8-inch eye bolts and nuts; eight 2-1/2 inch #10 flat head wood screws; four 1-inch #10 flat head wood screws; one 6-32 x 1/2-inch flat head machine screw; one 6-32 blind nut; various paints and sealers.

Start with the lap cards. (Fig. 1) Cut the individual cards out (Detail "A"), rough cut the round corner where shown, and cut out the finger notches to suit. Be very careful here! Make certain you stagger the finger notches for every other card. This is needed to keep from flipping two cards at the same time!

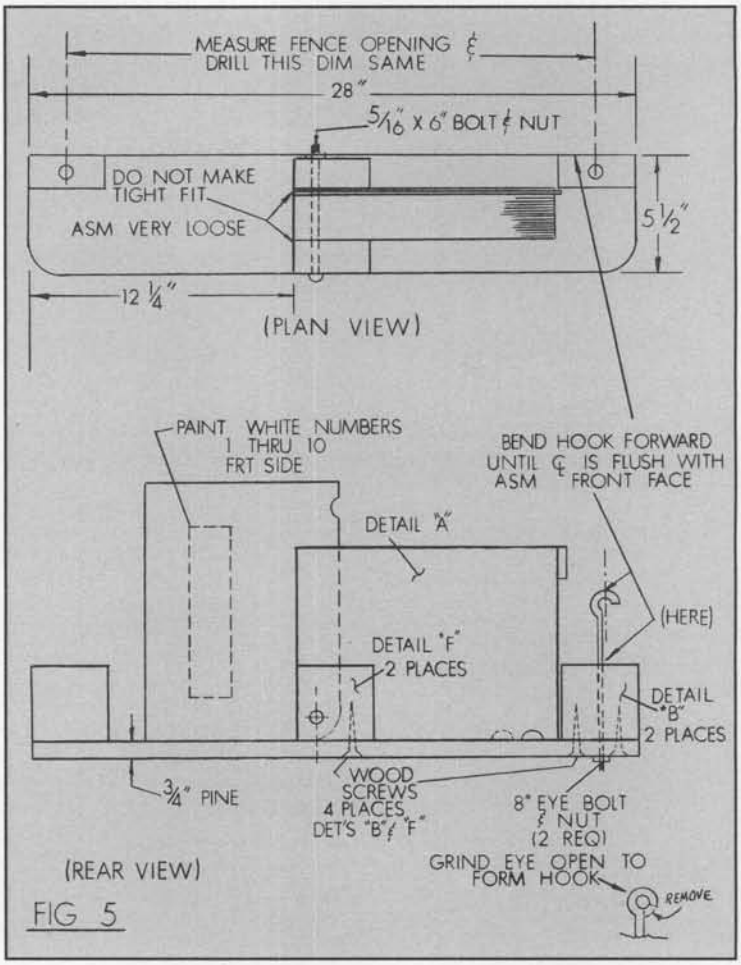


FIG 5

Cut out the double cut card (Detail "G," Fig. 2), round the corner, and cut out the finger notch.

Clean up the above cards by lightly sanding the edges, and then stack them with the rounded corner to your lower left. Clamp them all together and round them off on a disk sander. At this point, lay out the pivot hole and drill the entire stack as one. This should be a loose fit on the 5/16-inch pivot bolt. Be sure to allow extra clearance for paint in the pivot holes.

Finish sanding all cards, and since all cutting is finished, they should now be sealed. The Masonite is very stiff material that will take a beating, however, it will suck up moisture like a sponge and will swell up considerably. Lay the cards out somewhere (on newspaper maybe) and paint them with a good sealer. I used a regular paint roller to speed up the job. Make certain you cover the edges and inside the pivot hole. After drying, turn them over and paint the opposite side. When this is completed, paint both sides with a semi-gloss black. You will be able to see if the paint has covered them and if not satisfied, touch up the areas needed.

You also can paint the lap numbers on them at this time, making certain the numbers are horizontal as the assembly sits, and remembering they will be vertical when flipped up. (See rear view, Fig. 5) Do not center the numbers on the cards because there is some overlap and the numbers will be partially covered. Paint the numbers up towards the top edge as shown on the

1990 T.U.R.N. Q-500 Championship Results

Contestant	Hometown	Best Time	Plane/engine
1. Doug Whitaker	Mt. Juliet, TN	1:14.34	Viper/Webra
2. Paul Geders	Florissant, MO	1:22.93	Impersanator/Rossi
3. Craig Grunkemeyer	Columbus, OH	1:13.61	CG Special/Rossi
4. Bob Lamb	Bridgeton, MO	1:14.77	Outlaw/Webra
5. Dan Kane Sr.	Chicago, IL	1:22.48	Own/Rossi
6. Rex Knepper	Perrysburg, OH	1:22.42	Scat Cat/Rossi
7. Tom Scott	Cincinnati, OH	1:20.77	Own/Rossi
8. Joe Dodd	Columbus, OH	1:20.24	Own/Rossi
9. Ken Heatlie	Westland, MI	1:19.97	Own/Rossi
10. Mike Pewitt	Mt. Juliet, TN	1:21.38	Viper/Rossi
11. Al Grove	Wayne, PA	1:20.89	Scat Cat/Rossi
12. David Bowman	Nashville, TN	1:28.61	Viper/Webra
13. Steve Kovach	Powder Sprgs, GA	1:24.13	Scat Cat/Fox
14. Barry Anderson	Ft. Thomas, KY	1:23.87	Edge/Rossi
15. Cary Strickland	East Point, GA	1:32.52	Viper/Rossi
16. Bob Petrinec	Oak Park, IL	1:22.79	Scat Cat/Rossi
17. John Orell Jr.	Worthington, OH	1:37.19	Unknown
18. Rick Cromer	Toledo, OH	1:29.48	Unknown/Fox
19. Glenn Kendrick	Florissant,MO	1:31.47	Scat Cat/Rossi
20. Ed Spiker	Dublin, OH	1:35.87	Scat Cat/Rossi
21. Joe Ruh	Ft. Mitchell, KY	1:22.66	Scat Cat/Rossi
22. Ben Martin	Centerville, OH	1:28.57	Viper/Rossi
23. Chris Brown	Erlanger, KY	1:48.17	Scat Cat/Rossi
24. Fred Johanson	Westerville, OH	1:29.67	Scat Cat/Rossi
25. Jon Lemmons	Mt. Juliet, TN	1:18.74	Viper/Webra
26. Tony Speck	Nashville, TN	1:29.19	Viper/Rossi
27. Dan Kane Jr.	Chicago, IL	1:24.59	Own/Rossi
28. Bob Gaynor	Lakeside Park, KY	1:39.22	Own/Rossi

"Double Cut" card in Fig. 2. I used white paint for contrast. Do not use colors! They only confuse model identification. Some people are color blind and keeping the numbers white reduces the chance for color mix-ups between lanes and planes.

While the cards are drying, cut out Details "D" and "H" (Fig. 3), Details "F" (Fig. 2) and Detail "C" (Fig. 4). Clean them up by sanding, and precisely drill the pivot hole so they line up properly with the flip cards. Screw detail "H" to the front Detail "F" and make up the "single-cut" assembly (Fig. 4). Make certain that the 6-32 screw and nut are Loctited together and be sure that Detail "E" rotates freely on the screw for its entire rotation (Note: Put the pivot bolt through all details before screwing into place so that alignment is not lost). Glue the "single cut" assembly (Detail "D" only) to Detail "C." At this point the remaining sealing and painting should be finalized before the rear Detail "F" is screwed into place. This is to make certain all painting does not create any binds.

When dry, assemble all details onto the pivot bolt (Fig. 1) and screw one Detail "F" onto the bottom mounting board (Fig. 5). Screw the second Detail "F" onto the bottom board, making sure the entire assembly is fairly loose, front to back. This is needed in case the Masonite cards swell up with any moisture absorption. If any binds occur at

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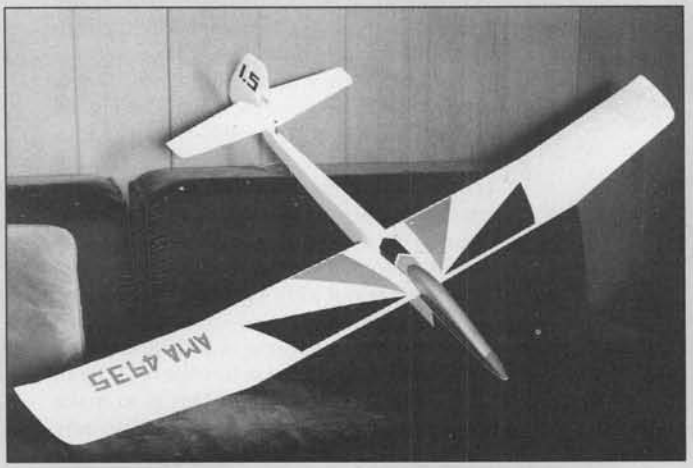
CONSTRUCTION



WIND SURFER BABY

BY JAMES N. MARTIN

Down the far pylon, a quick 180° turn at the drop of the flag and back to the near pylon. No! This is not a screaming pylon racer, but instead a 1-1/2 meter Class A hand launch glider. It was five hours into the slope soaring flight that Saturday in the middle of May when Dale Collier had completed more than five hours on the closed course. Earlier that day, 13-year-old Mathew, Dale's son, had completed more than four hours. The decision to discontinue these flights was made due to the possibility of low airborne batteries. Otherwise, the flights could have continued until dusk.

We call it Wind Surfer Baby, a scaled down version of Joe Bridi's two-meter Wind Surfer. The choice of using the Wind Surfer design was made for its simple construction and roomy interior for airborne equipment. The basic Wind Surfer design remained. Changes include an Eppler 205 airfoil and a decrease in rudder area. With these modifications and an adjustment in CG, the Wind Surfer Baby may be used for either thermaling or slope flight. Talk about versatility!

Three Wind Surfer Babies were built simultaneously for their separate tasks. All three flew well on their first flights. Number one is Dale's choice for the Class A Open, Duration and Closed Course Trials. This is a wide nose variant to hold an 800 mAH battery. Number two is Mathew's choice for the Class A Jr. Duration Trials. Again this is a wide nose variant to hold dry cells. Number three is Jim Martin's, a slim nose variant for thermal work. It is fast, agile and willing to thermal.

CONSTRUCTION

Construction is similar to the two-meter Wind Surfer. However, the following is my version of construction methods.

Jim Martin at the flying site, Poli Poli.

The choice of materials is important as to the final task of the air machine. For slope flying, an extra ounce is beneficial, but for thermal work keep it light, clean and with sufficient rudder and stabilator travel. The choice of adhesives is yours. The main construction material is balsa, other materials are called out.

RUDDER

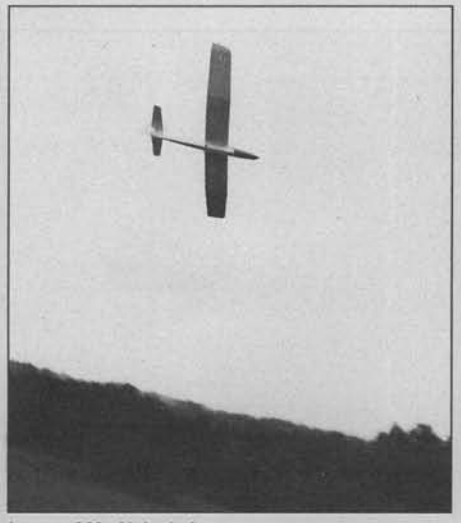
Pin the rudder post to the drawing and glue the top and bottom edges of the rudder to the rudder post. Next glue the upper and trailing edges as well as their gussets into position.

VERTICAL STABILIZER

Cut out vertical stabilizer sheet as shown on the drawing and pin it to the drawing. Glue in the leading edge and the upper and lower vertical stabilizer posts.

STABILATOR

Care must be taken in building up the center section of the stabilator for it is a three-ply laminate of cross grain 1/16-inch balsa sheets. The grain of the outer sheets run fore and aft, while the inner sheet grain runs spanwise. Both panels are built together. Pin the stabilator trailing edge, leading edge and tips to the drawing. Next fit and glue the tapered balsa filler block inboard and in back of the leading edge. Fit and glue the under sheet of the stabilator inner panels from the filler block to the trailing edge. Position the 1/16-inch brass tubing across both stabilator panels and



(Left and right) High speed fly-by at Poli Poli, on the slopes of Mt. Haleakala.

Thermal hunting, at Maui's south shore.

epoxy into position. Before the epoxy cures lay in the second ply of 1/16-inch sheet balsa between the tubing and trailing edge—remember that the grain runs perpendicular to the bottom sheet. Glue in the top sheet with the grain running in the same direction as the bottom sheet. Note that the top sheet will have to be grooved slightly to fit the brass tubing. The internal bracing and gussets can now be glued into place.

FUSELAGE

Start with the rear fuselage bottom. Cut pieces of 1/16-inch sheet balsa 2-3/4 inches wide and glue each on edge until the rear fuselage bottom measures 2 3/4 by 16 inches. Draw a center line down the rear fuselage bottom and at the bulkhead positions. Cut out all bulkheads as shown on drawing, and draw in the vertical center lines on all bulkheads. Glue bulkheads D, E, and F in position on the rear fuselage bottom by lining up the center lines.

Lay out the fuselage sides, left and right. Glue in 3/16-inch triangle stock from bulkhead F forward along the bottom edge, and also from bulkhead F to C on the top edge of the fuselage sides. Glue in the 1/32-inch ply doubler to the fuselage sides. Next glue in the spruce fuselage side stiffer between bulkheads A to C; note the 45° cut to receive bulkhead C.

Left to right, Dale and Matthew Collier's record holders, and Jim Martin's Wind Surfer Baby.

Fit, set, and glue the fuselage sides to the rear fuselage bottom starting at bulkhead F and working forward. Draw a center line on the forward fuselage bottom piece (1/16-inch ply). Line up the forward and rear fuselage bottom to center lines and glue. Note that bulkhead C is 1/8-inch ply; glue 1/4-inch triangle stock to the bottom edge of the bulkhead to aid in alignment (see drawing). Glue in bulkheads C, A and then B to the fuselage sides, then glue the fuselage bottom.

Install the nose block. Install the vertical stabilizer. Be sure to check for alignment. Glue 1/4-inch triangle stock at the junction of the fuselage sides and the vertical stabilizer, extending 1/4-inch ahead of the vertical stabilizer. Now glue the fuselage bottom aft of bulkhead F.

Rough sand the fuselage bottom flush with the fuselage sides. Contour sand the nose block with the fuselage on the sides and bottom only.

Install the push rods using flexible Sullivan Gold-N-Rod (red sheaths). Lightly sand the sheath for good glue adhesion. Drilling through bulkheads and fuselage sides can best be done using a 3/16-inch brass tubing as a drill bit chucked to an electric drill motor. Sharpen the cutting edge. Install the antenna sheathing at this time also.

Sheet the top rear fuselage from the vertical stabilizer to bulkhead D with cross grain 1/16-inch sheet balsa.

The fuselage wing rod block is made of two pieces of hardwood. Groove one face of each down the center. Glue the grooved faces together. Drill the grooved hole to 5/32-inch diameter. Shave one side to 45*0* to give more room in the radio compartment. The ends of the fuselage wing rod block are notched to fit around the stabilator and rudder control rod sheathing. Fit and glue the fuselage wing rod support to the upper front of bulkhead C.

To put the wing rod holes in the fuselage sides, use a pin to prick the fuselage side in a line with the hole in the fuselage wing rod block then ream with a #11 blade. In locating the hole on the other side of the fuselage, simply drill a 5/32-inch hole through the fuselage wing rod support into the other fuselage side. This completes the major construction of the fuselage until final finishing.

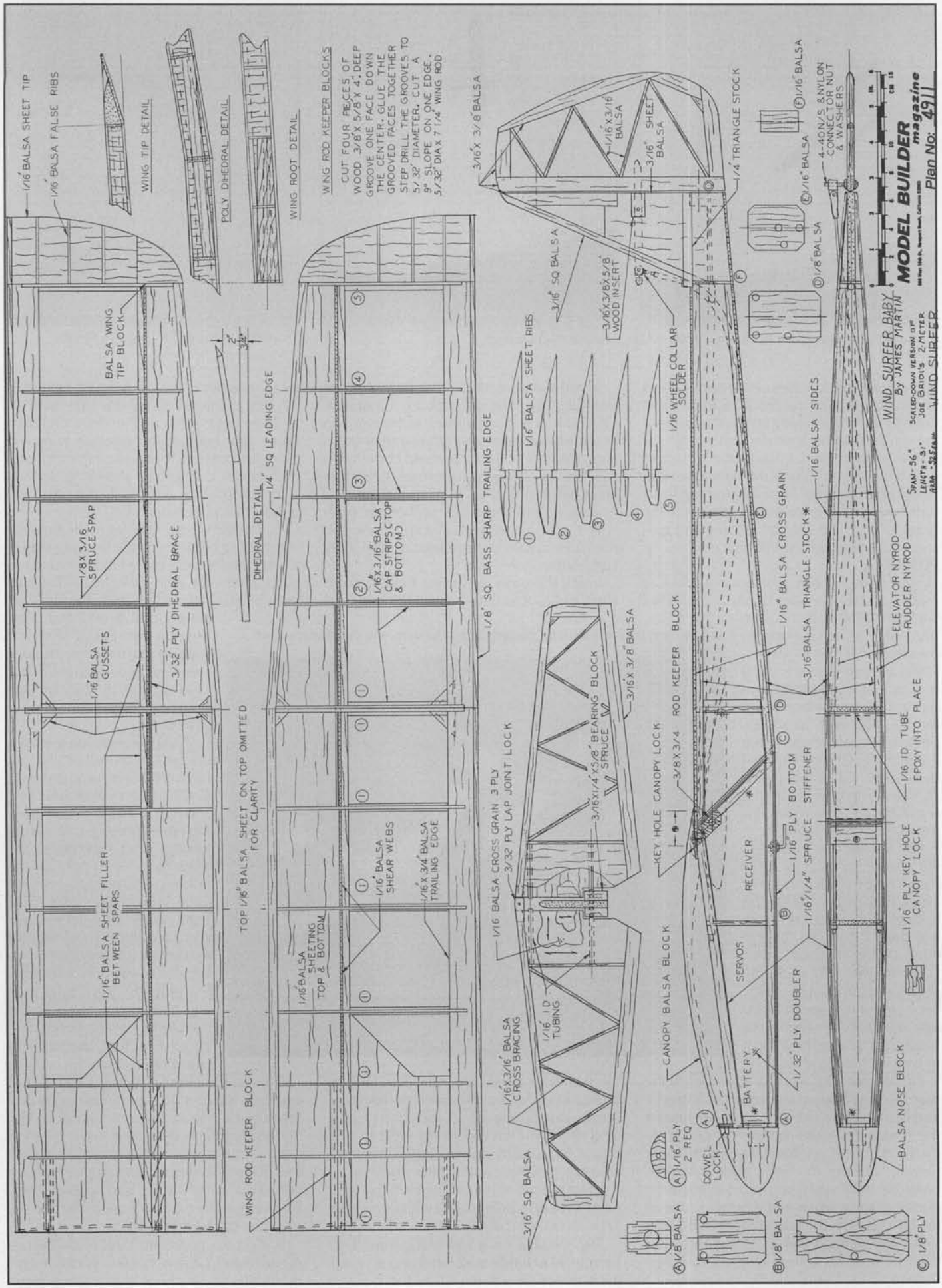
WING

Wing construction methods are typical, however, the following building sequence will facilitate wing assembly.

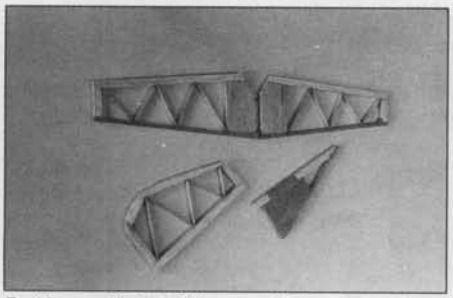
1. Pin down the bottom trailing edge sheeting and bottom leading edge sheeting to the drawing. Glue in position the bottom rib cap strips and wing under sheeting of the inner wing panels. Glue in the lower spar caps and the back edge of the bottom leading edge sheeting. Fit and glue ribs in position from the lower spar caps and back. Do not glue in the double ribs at the polyhedral joint, wing root, and first inboard rib.

Glue in the filler web on the lower spar cap from the root rib position to the second inboard rib. Shim the front edge of the bottom leading edge sheet with 1/8-inch balsa shims to bring the sheet in contact with the ribs for all wing panels then glue the front portions of the ribs to the leading edge sheet. Fit and glue the top spar caps to the ribs. Fit and glue the leading edge.

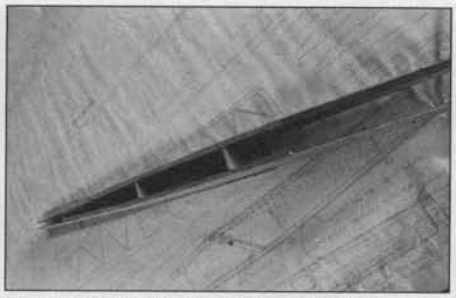
Wing rod supports are made of four pieces of hardwood. Groove one face the full length down the center. Glue the grooved faces



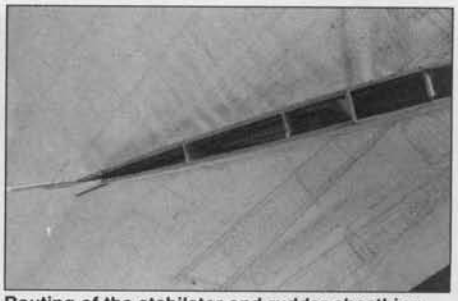
FULL SIZE PLANS AVAILABLE, SEE PAGE 106.



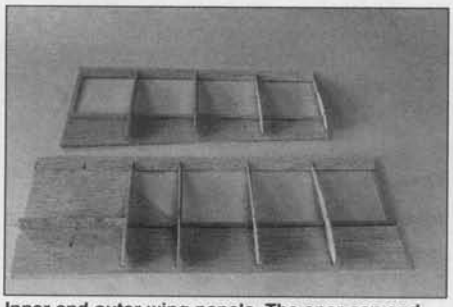
Rudder, vertical stabilizer, stabilator assemblies.



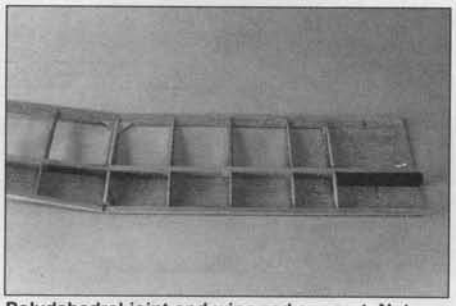
Fuselage sides glue to aft fuselage bottom.



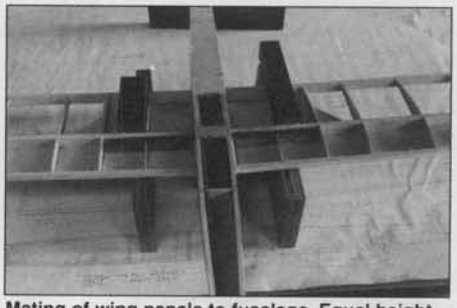
Routing of the stabilator and rudder sheathing. Note that the yellow rods are inserted to prevent buckling of red sheathing.



Inner and outer wing panels. The spar cap and ribs are glued to the under sheeting.

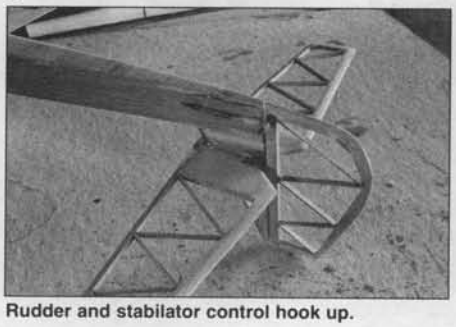


Polydehedral joint and wing rod support. Note the root rib and the first inner board ribs and not glued in.



Mating of wing panels to fuselage. Equal height blocks with weights to maintain equal wing panel incidence when gluing rear wing rods.

Stabilator alignment. Wing and stabilator on equal height blocks. Once in position, glue bearing blocks.



Rudder and stabilator control hook up.

Underside structure detail.

together. Drill the grooved hole to a 5/32-inch diameter. Cut a 90° slope on one side of each wing rod support block. Fit and glue the wing rod supports as shown. Double check that the large end of the wing rod support faces inboard.

Fit and glue in the spar shear webs—do not glue the spar shear webs at the polyhedral. Cut out of 3/16-inch sheet the filler block for the polyhedral joint. Take the dimension from the polyhedral detail on the drawing. Pin down the inner wing panels to the work board. Elevate the wing tips and butt-join the outer wing panel to the inner wing panel. Carefully fit the polyhedral by sanding the upper spar cap until a good fit is obtained with the polyhedral. Block into position, then glue. Glue the shear webs in place at the polyhedral joint and also glue the 1/16-inch ply polyhedral doubler in place. Fit and glue the double rib halves at the polyhedral joint at front and back.

Place the wing rod into the fuselage and insert the wing panels onto the wing rod. With wing panels and fuselage together place the wing on equal height parallel blocks under the second inboard rib. Shim the rear fuselage with blocks to set the wing incidence. Mark the position of the rear wing aligning tube on the wing and fuselage. This should be flush with the front face of bulkhead D. Make holes in the fuselage sides and insert the 1/16-inch I.D. brass tubing through the fuselage and 3/4-inch into each wing panel. Seal each end of the tubing to prevent epoxy from entering. Place weights on each wing panel above the equal height blocks, to insure equal incidence for

continued on page 94

Structure detail. Note the built-up wing tips.

KALT ENFORCER

BY JAMES WANG

This month, let's take a look at the new 30-size Kalt Enforcer helicopter. It's a pint-size helicopter aimed at the beginners, but with its superb aerobatic capabilities, intermediates and experts may like to have one for boring holes in the sky. It will loop, roll, fly inverted and perform any maneuver that the bigger 60 models do. It leaves me and my friends puzzled as to whether it is designed for the beginners or for experts? If it is designed for beginners, then why doesn't it come with smaller and heavier Hiller paddles, or include flybar weights? The huge paddles on the Enforcer allow the model to do three rolls in three seconds. On the other hand, the soft flapping hingeless main rotor head design makes the model very docile in hover. But, the soft flapping causes the model to pitch nose-up suddenly in fast forward flight. This annoying characteristic which also exists on the Concept in high speed flight is the consequence of the soft head. We will have more discussion on this paradox in the review.

Author's friend Mike Donnell flies the Enforcer so James can take the pictures. Mike assembled the mechanics in one evening while watching Monday Night Football. James installed the radio in one more evening. And that's all it took! Best leave the white canopy unpainted and simply install the decals that came with the kit. The canopy is pliable and resilient. Fuel level is easily seen.

The Enforcer was introduced last summer. Considering the abundance of ball bearings and kit engineering, it is an inexpensive kit. The kit version retails for $399.99, and the ready-to-fly version retails for $429.99. The price in the hobby shops is usually lower than the retail price. The other items needed are a helicopter radio (about $250), a gyro ($70-$150), and a 28 to 35-size helicopter engine (Webra 28H, O.S. 28H, O.S. 32H, Supre Tigre 34H, and Enya 35H will all fit). The sequence of this review is: examine the Enforcer's main rotor head design, look at kit engineering, then the flying qualities. Throughout the article we will be comparing the Enforcer to the Concept 30, because both were designed by the same person.

BACKGROUND

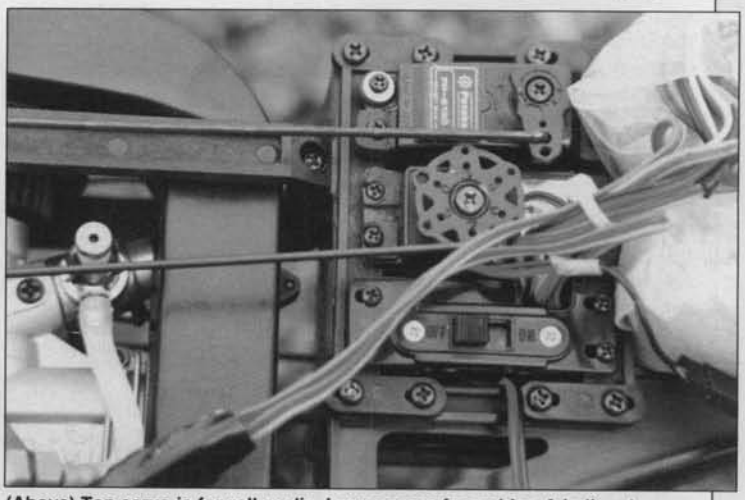
The Enforcer was designed by Mr. Shigetada Taya of Japan, who was the 1985 World Champion in F3C RC helicopters. He won that first World Championship with his Omega mechanics design. In 1987, Mr. Taya installed the Omega mechanics in his new Jet Ranger replica fuselage called the Jet Stream. With the Omega Jet Stream, Mr. Taya placed sixth at the 1987 World Championships in Switzerland. The Jet Stream has one of the most streamlined Jet Ranger fuselages. The mechanics have push-pull for all the controls, and every element is well engineered. Even though it is a five-year-old design, it is still one of the best kits available. Even though I have never built a Jet Stream, that would probably be one of my favorite designs in terms of engineering and aesthetic appeal. The Jet Stream is now available as a kit from Kalt,

distributed in the US exclusively by Hobby Dynamics.

Mr. Taya and Kyosho realized that many people may dream of flying a Jet Stream, but what the world needed was amodel helicopter that was inexpensive, easy to build, super docile to fly, and having some aerobatic capability. That would be more practical, and would be where the market lies. **Then** people can progress up to a Rolls-Royce model like the Jet Stream. Therefore, in 1988, Kyosho and Mr. Taya introduced the Concept 30. Almost instantly, the Concept became the best seller in RC helicopters. To date, more than 20,000 Concepts have been sold. I am still very impressed by the Concept 30. It is not a copy of any previous model. It has many innovative design features, such as rear cone start engine, almost indestructible canopy, quick release tail boom and tail rotor control assembly, in-plane flapping hinge rotor head that is very comfortable to the palm, 90% Bell-Hiller mixing ratio mixing assembly, and much more. The Concept DX is still one of the most stable models for beginners. The Concept SE is not only stable, but aerobatic, too.

The Enforcer in kit form. The canopy is one piece. Not too many parts. Average modeler can complete the model in less than five evenings. An almost ready to fly version is also available at about $30 more.

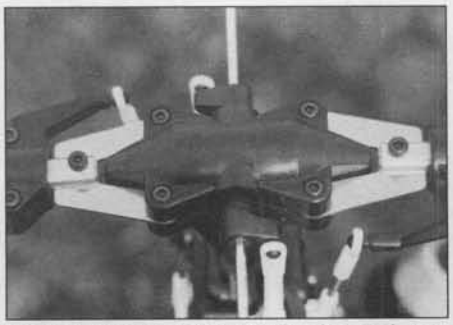
Forty-year-old Tom Knerr, from Philadelphia, PA flies his Enforcer inverted at the Raves Funfly. Tom uses the invert switch on his JR Century 7 radio. Even though his engine sounded sick on that day, it did not require brute horsepower to flip the model over and hover inverted. This month's Chopper Chatter explains how to set up pitch curve for switchless inverted flying.



(Above) Top servo is for roll cyclic. Lower servo for rudder. A helicopter radio is highly recommended for any collective pitch helicopter. The kit comes with a very nice radio switch mounting plate that mounts on the servo tray. JR 501 servos fits nicely. JR 506 or 507 servos will not, because they are deeper and will bump into the servo behind them. (Right) Engine starter cone is canted up and forward. A unique Bell-Hiller mixing arm design gives 90% Bell-Hiller mixing ratio. The author is impressed by how the designer came up with the nifty geometry for the mixer.

The only complaint I have about the Concept is in high speed forward flight. If the model's nose is pulled up slightly, it immedi-

ately pitches nose-up severely, and the flux of air rushing into the rotor disk slows down the rotor speed and makes the model seem like it ran into an invisible wall. The technical reason behind this is simple. It is due to the soft flapping rotor head design used by the Concept. A very soft flapping main rotor head reduces the vibration transmitted from the main rotor head down to the fuselage. This makes rotor blade, flybar, and head balancing less critical. A soft flapping rotor also makes the model extremely easy to hover or to fly around slowly, because a soft flapping rotor responds less to gust disturbance. When there is a gust of wind, the blades will simply flap, but since the blades are less rigidly attached to the rotor hub, the fuselage will not likely tilt much.



Enforcer uses a soft flapping hingeless main rotor head design to give very docile hover response. The spring steel plates flexe a bit too easily. The blades may hit the boom on a hard landing or bad autorotation. A slightly thicker steel plate may have been better. The single bolt holding the feathering spindle allows the spindle to swing a little. Two bolts would have been better.

This shows the 90% Bell-Hiller mixing ratio on Enforcer which helps attribute to the hover stability. Notice when the flybar tilts, the blade pitch angle follows the flybar tilt. For example, if the flybar tilts 10 degrees, the blade tilts 9 degrees.

The main frame, with servo tray, and engine installed. Conventional aircraft style muffler can be used. The entire structure is made from injection molded plastic parts. They are almost indestructible.

The drawback of a soft flapping rotor design is that it has significantly less cyclic control power than a "stiff" flapping rotor design. Thus, the Concept feels very mellow in flight. Even if you push the aileron or elevator cyclic sticks all the way over, the model does not respond rapidly. The other bigger problem is the one we mentioned before: the model will suddenly make pancake-stops in high speed forward flight. The reason is that when there is an uplift from the front of the rotor disk, the blades can flap back very easily due to the soft flapping design. The flapping back rotor disk sees very little resistance from the fuselage, thus the rotor is allowed to flap back too much by itself. After the rotor disk flaps all the way back, it reaches a stop, and by then so much air has tucked under the rotor disk, it just yanks the helicopter nose upward. This pancaking-to-a-stop phenomenon is extremely annoying when you are trucking along at 60 mph, ready to do a roll or loop, and suddenly the model tucks upward. A soft flapping rotor head may have this drawback, but Mr. Taya chose this design for the Concept because he understood very well that beginners need stability and docileness, rather than aerobatics. I think he made the correct choice. Twenty thousand buyers must have thought so, too. In fact, I know many non-beginners have bought the Concept 30 for its "enjoyable" handling characteristic. By now you may be wondering if this is an Enforcer review? You bet, keep on reading!

With the success of the Concept 30, Mr. Taya proceeded to design a follow-up like any successful Hollywood movie. Except this time, instead of designing one for Kyosho, he designed it under contract with Kalt. At first look, many parts on the Enforcer look identical to the Concept. For instance, the cooling fan, and the entire tail boom and tail rotor gear box look the same, but with the Kalt logo stamped on them. Small items like fins may be exchangeable, but most of the parts are modified slightly, making them non-interchangeable. The layout of the servo tray, engine, and transmission are drastically different.

Left side of the Enforcer. Top servo is fore/aft cyclic. Middle servo is collective pitch. Bottom servo is throttle. If you have an Enforcer, then you will notice the servo sequence that the author uses is different from the instruction. When you build one you will see why. Century Import's Mini Tuned Pipe was used.

The bottom line is, "Does the Enforcer fly better than the original Concept?" No, they fly very much alike! But, a key issue here is, do we compare the Enforcer to the Concept DX, SE, or SX? The Enforcer is priced comparable to the DX, but its quality is almost like the SE, because the Enforcer has ball bearings for the Bell-Hiller mixer and for the clutch.; I am very impressed. Furthermore, due to the humongous size of Hiller paddles on the Enforcer (about the same area as on SX), the Enforcer is just as aerobatic as the SX. The Concept 30 marketing is good, with three different models, the inexpensive DX with the SE for intermediates and the SX for great hot dogging. And the price goes from $300 for the DX to about $400 for the SX. The Enforcer, on the other hand, sort of like one design to fit all bills: inexpensively priced, stable enough for beginners, but

extremely snappy for hot dogging. Hence, we are really not sure what type of pilots Mr. Taya had in mind when he designed the Enforcer? But the price is certainly attractive.

The technical reason why they both handle similarly is because they both have the soft flapping main rotor head design. Main rotor head design is the single item that dominates any helicopter's handling behavior. Concept 30 achieves its soft flapping by using hinged articulated design. The blade feathering axle is hinged at the root. Then a rubber O-ring is used to provide some impedance to stiffen up the flapping motion. The O-ring functions as a spring. On the Enforcer, the soft flapping characteristic is achieved by mounting the blade on a thin piece of spring steel plate. (See the pictures.) The flexible steel plate allows the individual blades to flap up and down readily. The plate also acts like a spring to stiffen the flapping motion. Therefore, the familiar O-rings and rubber dampers on model helicopter rotor heads are there to function like a spring, not as a damper. The location where the Enforcer steel plate flexes is called the "effective flap hinge location." If you flap the Enforcer blade by hand and take a ruler to measure the location of this imaginary hinge distance from the rotor shaft, you will notice it is at about the same position as the pinned hinge on the Concept. This distance is called "flap hinge offset distance." This distance, combined with the spring stiffness, makes up the two most important design parameters on any helicopter; model or full-size, because they solely determine the handling qualities such as stability and control response. However, they have no effect on performance. When helicopter designers say performance, they mean rate of climb, top speed, turn radius, etc., and not handling qualities.

Cutaway view of the Enforcer planetary transmission. On the left is the engine and its clutch and drive gear. The planetary gear and the three small gears are on the right. The tail rotor drive pickup gear is the white bevel gear riding on top of the large black gear. Interesting design. Runs extremely smooth, and sealed away from dust.

Canopy is held in place with the two posts sticking out at the back of the frame. The tail boom can be pulled off by loosening two bolts and the two posts. Tail rotor control rod can be disconnected at the tail boom and frame junction.

Tail rotor gear box is almost identical to Concept's. The sliding bearing pitch control system is very smooth; just like the bigger 60-size machine. Tail rotor response is excellent.

The hinge offset distance is important because a larger distance from the rotor shaft is equivalent to having a stiffer flapping spring. And most model helicopter pilots know what it's like when you stiffen up the rubber damper: the model becomes more responsive. Most full-size helicopters have 5% flap hinge offset (5% offset means the flap hinge location distance is 5% of the blade radius). Concept 30 and Enforcer both have about 5% flap hinge offset and both have very soft spring stiffness. That's why on a hard landing or when stretching an autorotation too far the blade can flap down easily and hit the tail boom! I have done so on both Concept and Enforcer. Replacing the soft black rubber O-ring with the harder red O-ring for Concept only increases the flapping stiffness very little because there is so much slop in the plastic groove where the O-ring sits. Even though Enforcer's rotor head is also soft, it is a hingeless design, so at least it does not have any slop or deadband in the blade's flapping action.

Right side of the model. Enforcer features straight pushrods from all the servos to the control bellcranks. The GMP gyro fits directly underneath the main rotor shaft. The kit comes with a gyro tray and clear plastic cover to shield the gyro from exhaust. Kalt kits are the only ones that come with a fuel filter. Use thicker fuel line than the one supplied with the kit.

Because these two models handle very similarly, the decision on which one to buy could be based on the kit engineering. In terms of layout of the mechanics, they are quite different. The Enforcer has a planetary gear drive system for transmission. (See the picture.) This is very unique! There are three little planetary gears running inside the big ring gear. Unlike Concept and all the other models that have the gears out in the breeze, Enforcer's planetary gearing system is completely enclosed inside a plastic casing. This insulates the gears from dust and greasy exhaust. After the first flight, Enforcer's planetary transmission system became one of the "smoothest" gearing systems I have ever seen, even smoother than 60-size machines. In this respect, the Enforcer is an improvement over the Concept.

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Helicopter WORLD

CHOPPER CHATTER

BY JAMES WANG

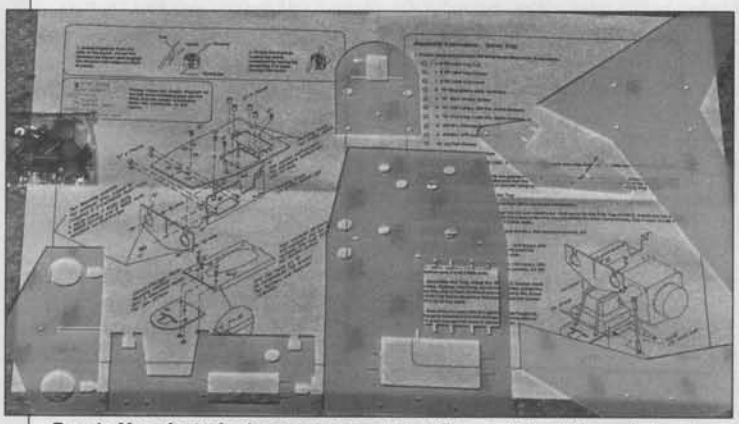
This month we will finish the article on forward flight aerobatics setup and techniques and close with a letter on diesels for RC helicopters. Last month we shared with you some enlightenments from top pilots like Cliff Hiatt. The bottom line was, "fly straight, level, and fast before entering the maneuver." We showed how to use the JR PCM-10 stunt trim and Futaba 9VH to help us trim the model for forward flight with idle-up. Line 1 and 2 of Figure 1 show the programming mix for Futaba 9VH again. It shows how to add in left aileron and forward cyclic when idle-up 1 or 2 is switched on. Last month we also explained how to do a round loop. Here we will continue with rolls.

After you have done a few barrel rolls, try it with the idle-up and reduce the throttle/collective to 1/3 stick when the model is inverted. When doing an advanced axial roll with the idle-up on, do not pull the nose up before the roll. Figure 2a illustrates why not. Just before you enter the roll, reduce the collective to near zero degree. In the inverted portion, it should be about -1 degree. For a fast-flying helicopter, 60 mph or better, you do not need very much negative pitch. It will not fall out of the sky. Only for a slow-flying helicopter, you need -3 or -4 degree negative pitch to prevent it from loosing altitude. The biggest problem with using negative pitch to maintain altitude is that it is VERY difficult to keep the roll axial and at constant altitude. What would happen is, the extra negative pitch prevents the model from falling, but the model also pitches upward and the second half of the roll slows down tremendously. It looks more like a "wallow" than an axial roll. This is why there is no substitute for speed. It's more difficult to do a beautiful axial roll with a slow flying helicopter.

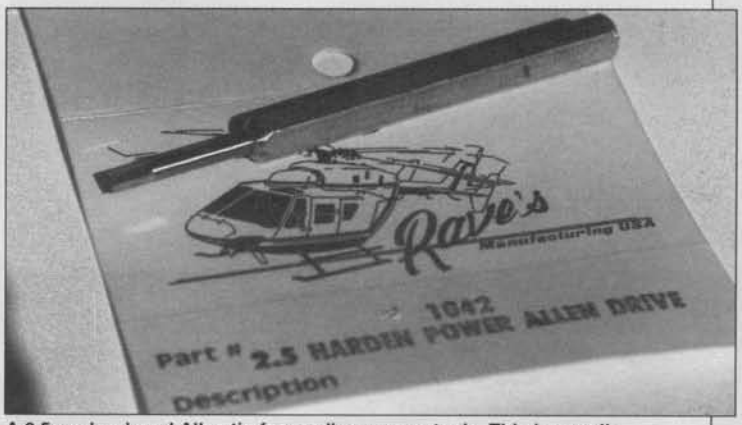
The attendees at the September 1990 Rave's Funfly at Centreville, Virginia. We counted 70 models. It's a two-day event. The second day, James and three other pilots were having a ball doing helicopter pylon races, drag races, and vertical peel out races. Great fun had by all!

A roll is very easy, too. Again, no idle-up is needed for the first few times. Just fly forward as fast and straight as possible. Right before the roll, pull the nose up slightly. Then move the aileron stick all the way to the right smoothly, but not slowly. You will need full aileron. The model will complete the roll by itself in two seconds. Just relax and watch. It will look more like a barrel roll than an axial roll. Do the roll while flying downwind because this makes the model travel faster relative to the ground and thus stretching out the roll, making it look prettier. For a clockwise rotation main rotor, it is easier to roll the helicopter to the right. The reason has to do with the advancing blade lift problem that we discussed last month.

What keeps a model moving forward in the roll is momentum. Momentum depends on two parameters; speed and mass. Besides speed, a heavier helicopter will also have more momentum to help carry it through the roll. Therefore, we do not really want a feather weight helicopter. Figure 3 shows the effect of speed and roll rate on



Rave's Manufacturing's epoxy servo trays, fins, switch plate, and elevator mounting plate for the X-Cell. These epoxy plates are similar to those used on electronic printed circuit boards. Rave guarantees these for life. Even if they break in a crash, just send them back for free replacement. Rave's number is (407) 649-8984.



A 2.5mm hardened Allen tip for cordless power tools. This is a really convenient tool when working with RC helicopters, because over half of the bolts on any model helicopter are 2.5mm. This one is made by Rave's Mfg.

The event for beginners and intermediates at the Funfly was bottle knocking. For experts, it was to see who can do one loop, one roll, one loop and land as quickly as possible.

Can you believe this? On the way to the flying field, a bird came into contact with the Keim model mounted on Jonathan's trunk rack. It knocked the tail out of the fin!

the amount of negative pitch needed. To do a hovering roll you need almost -4 degrees to sustain the inverted position. To do a very slow roll, you also need negative pitch to "fly" the model inverted during the inverted portion. For a slow roll, three seconds or longer, up elevator is needed during the inverted portion to keep rotor tilted forward for forward thrust.

A helicopter set up for hot dogging type of aerobatics is not the best for FAI aerobatics. Hot dogging demands maximum pitch and roll rate, and the gyro should be set not too high (about 50%). For hot dogging, we want about 1600 rpm, light paddles, and not too much flybar weight; just enough to have a nice hover. FAI helicopters need to perform the aerobatics gracefully. There is no need for maximum pitch and roll rate because the roll is supposed to be slow, and the loop big. Too sensitive controls make the model jerky. I suggest using exponential on cyclic and tail rotor for any type of helicopter flying. I use about 10 to 15% exponential.

Let's look at some of the helicopter setups that Cliff suggests would be ideal for a smooth FAI machine. For 60-size helicopters, Cliff says to use blades with 180 gram weight, semi-symmetrical airfoil, 15% thick at the root and maybe tapered down to 10% thick at the tip. He uses Kalt's long flybar (600mm from paddle tip to paddle tip), and eight to ten percent exponential on pitch and roll cyclics, low rate for all the hover maneuvers, and very soft set-up for all the controls to reduce P.I.O.,(pilot induced oscillation). Gyro should be set to 70 to 80% for all maneuvers, except switched to the reduced rate, 50 to 60% during the 540 stall turn. Cliff likes to flip those switches! As Cliff does not do inverted hot dogging with his FAI machine, there is no need for full throttle opening and -8 degrees on the low end of his idle-up 2. He does his forward flight on idle-up 2, but in the rolling stall turn maneuver and the 540 stall turn, he switches to idle-up 1 right before the stall turn to prevent over revving the engine. When Cliff flies, he says it's like playing the piano, with switches clicking everywhere. (Note, this is where the modern programmable radios become useful. By storing two different sets of programs for the same helicopter, the same model can be FAI smooth on program 1 and a real hot dogger on program 2.)

What's an ideal weight for an FAI machine? Cliff says not too heavy and not too light. The weight is good for hover stability, and forward flight penetration. Lightness is needed for acceleration and control responsiveness. Slow rpm, like 1350, is used for hover to reduce collective sensitivity, unfortunately, slow rpm reduces the helicopter pitch and roll mode stability. The cyclic controls also become mushy. To regain the control effectiveness at such low rpm, Cliff says we need large main rotor diameter. In the May 1990 issue

Helicopter WORLD

Jonathan Jordan came to the Funfly with a trunk-load of helicopters! He devised this original helicopter rack that carries four models.

we showed that the average main rotor diameter at the last World Championship was 59 inches. The winning Japanese team members all used 61.4 inches. Most 60-size pod-and-boom models on the market only have 57 to 58 inch rotor diameter. Cliff extended his X-Cell pod-and-boom FAI machine by about two inches. For forward flight, Cliff uses 1550 to 1650 rpm, and only seven degree pitch at the top end. High rpm gives good top speed and improves gyroscopic stability. For general sport flying and hot dogging, we need more than seven degrees at the top for rocketing acceleration.

I have said many times that a larger horizontal stabilizer is better because it makes the unstable helicopter become dynamically stable in forward flight. Cliff says the larger and the farther aft the horizontal tail the better. The large tail surface improves the entry into loops and roll. (This is the traditional pattern flier's thinking. That's why all the pattern planes have very long tail moments . . . the fins are about two feet away from the wing!) But Cliff says he did not notice that the large stabilizer improves the level cruise that much.

Tom Dooley added that when doing the 540 stall turn, do it when flying downwind. This way, when the model is pulled up into the vertical, you do not have to reduce the collective pitch as much because the rotor thrust will be balanced by the wind. However, a rolling stall turn is done while flying into the wind because the wind helps push the model upward to give a gentle pull up. The push is needed on the rolling stall turn because the half-roll bleeds off a lot of the kinetic energy, therefore we want the push to help conserve some energy for the vertical climb after the half roll. The German Heim helicopter does beautiful rolling stall turns. And very few helicopters can do a complete 180 degree roll while going vertically up. The Heim is one of the few that can. Practice flying the model fast, level and straight at a 100 feet altitude. The maneuver will only look as good as the entry you give it.

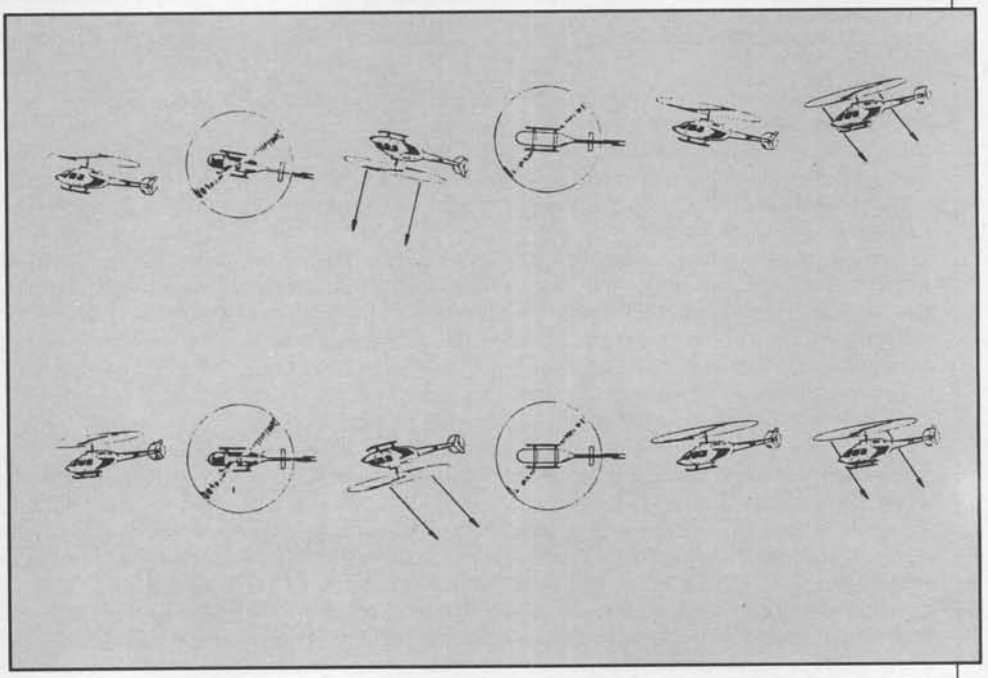
For the 180 autorotation, keep the turn smooth and gentle. Start the 180 auto while flying downwind, and then turn into the wind. Do not bank the model steeply. Most pilots do a spiral dive, or peel out type of turn that exposes the top of the rotor disk to the wind which slows down the rotor immediately. In autorotation, we want the inflow to come from below the rotor to drive the blades. Finally, remember to line up the flight path parallel to the flight line.

Many people have asked me about tail rotor mixing on the Futaba 9VH and JR PCM-10. Line Four of Figure 1 shows my tail rotor mixing on the Futaba 1094. This represents a good starting point for your X-Cell 60 or Legend or most machines. Figure 4 is the tail rotor mixing for the JR PCM-10. The corresponding throttle and collective pitch curves are shown in Figure 5. More details of these pitch curves can be found in our PCM-10 review in October 1990 *Model Builder*.

PROGRAMMABLE MIX **PCM 1** **X-Cell**

	mas	slv	Inh	R/V	L/D	SW	TRM	OFS	
Mx1	AU2	AIL	ON	-3%	+3%	4	Off	+	0%
Mx2	AU2	ELV	ON	-2%	+2%	4	Off	+	0%
Mx3	THR	AIL	ON	+10%	-0%	4	Off	+	0%
Mx4	THR	RUD	ON	+25%	-10%	4	Off	-	25%

Figure 1. Programmable mix for Futaba 9VH radio. Line 1: automatically feed in 3% left cyclic when idle-up 1 or 2 is turned on. Line 2: feed in forward cycle. Line 3: couples aileron with throttle. When the throttle stick is all the way back for switchless inverted flight, 10% right cyclic is fed in to keep the model level. Last month we emphasized why we need it. Line 4 gives the U-shape tail rotor mixing for idle-up.



Note, the tail rotor mixing, commonly called ATS, is used only during normal throttle/pitch curve setting. Many people have the tail rotor mixing switched off when the idle-ups are turned on, because they are concerned that when the main rotor blades go into negative pitch the tail rotor mixing can not give proper mixing to compensate for the increasing torque. JR PCM-10 has the provision for U-shaped tail mixing. The programming is shown in Figure 4. The instruction on the PCM-10 U-shaped mixing is not that great; it's very confusing! PCM-10 is the only radio that has it. However, on the Futaba 9VH, a program mix channel can be used to implement the same U-shaped tail rotor mixing. It is shown in Figure 1. The 25% offset represents where 0 degree pitch is on the main rotor blade. Try inputting these settings to your 9VH and play around with the numbers to find the best settings for your helicopter. All the settings that I gave are suitable for X-Cell, Legend, Excalibur and Magic. But depending on your rotor rpm, pitch curve, helicopter weight, and engine, the numbers will change.

For the cyclic and tail rotor dual rates, my low rates are set at 80% of the high rate. The tail rotor acceleration mix is set to have 5 to 10% volume and the delay is set anywhere from 20 to 50. After a new model is trimmed out and landed, I always adjust the clevises so the trim levers can be returned to center. The electronic subtrims are never used. The reason is that we would like the servo arms to return to the original 90 degree position. If the servo arms are not perpendicular to the servo case, then differential control inputs are introduced, which means you may get more left cyclic than right cyclic, or vice versa. I think that about covers all the important programming for the Futaba 9VH and JR PCM-10. If you have found more

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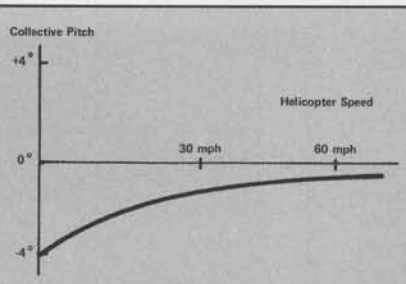


Figure 3a. Effect of forward speed on the amount of negative collective pitch needed for axial roll. Note, to do a hovering roll, almost -4 degrees is needed.

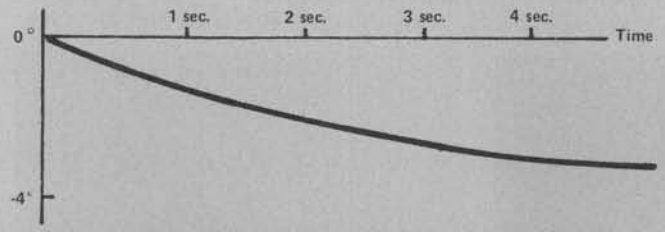


Figure 3b. Effect of roll rate on the amount of negative pitch needed. For a quick roll, very little negative pitch is needed during the inverted portion. For an extended slow roll, up to -4 degree negative pitch is needed to sustain the inverted portion to prevent the model from dropping.

(ATS REV-MIX)		SEL	PAGE	ENTER
NORM		DIR-RIGHT	-POS-	
UP	DN	-P	HOV	ZERO
21%	21%	0%	65	43
+CL-	+CL-	+CL-	STORE	STORE
(ATS REV-MIX)			PAGE	ENTER
STNT		DIR-RIGHT	-POS-	
+P		-P		ZERO
8%		16%		43
+CL-		+CL-		

Figure 4. Tail rotor mixing for JR PCM-10 radio. This setting would be a good start point for most helicopters.

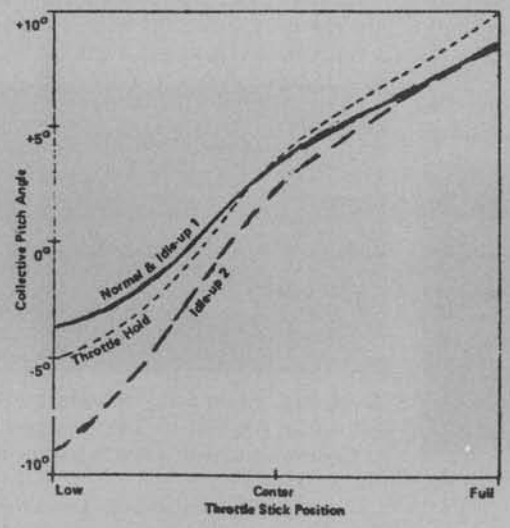


Figure 5. Suggested collective pitch curves for most helicopters.

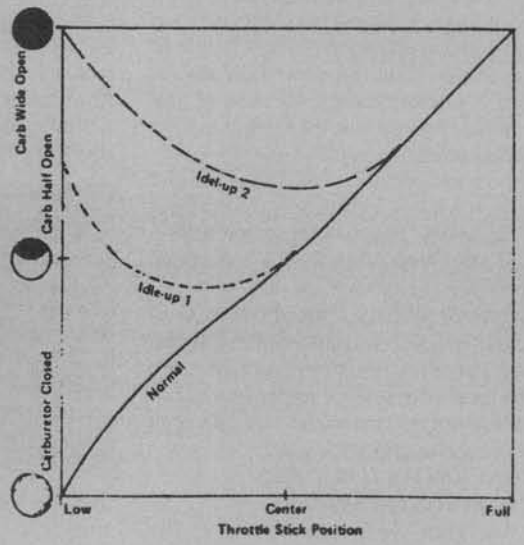


Figure 6. Suggested throttle curves for most helicopters.

BY BILL FORREY

KNOT TYING FOR SAILPLANERS

At a recent F3J-type RC hand tow glider contest, tow line pull testing and subsequent line shortening was required. I was amazed to see that a few experienced sailplaners didn't know how to tie a good knot, or at least had forgotten that fine skill.

Tying proper knots in winch and high start lines is an important skill for both safety considerations and expeditious club flying operations. Evidently, not enough press has been given this subject over the years, and I feel it is high time to correct the situation.

Seeing granny knots, square knots, and "accidental" knots in winch lines and on tow rings just makes me want to cringe. Sometimes modelers will assemble a brand-new winch or high start using these inferior knots. Sometimes these knots are tied in haste by well meaning but inexperienced fliers. This scenario frequently involves a broken winch line or retriever line during a club contest or busy fun fly. Typically, the line tier doesn't wish to be the one guy who holds up everybody else. Those other guys are usually standing (and gesturing, and shouting) impatiently waiting to launch into the cycling lift.

While retrieving winch lines I have even found (on rare occasions) two or three such poor knots in a single 30 to 50-foot length of tow line. I stop in amazement, then always whip out a pocket knife and remove the entire section of bad line, retying it with a single good knot.

One has to wonder how many model sailplanes have been lost due to improper knot tying, or how many contests have been needlessly delayed while bad knots break over and over again.

If you don't already know how to tie a good knot in a tow line, pay attention. If you are rusty, practice, practice, practice. I am going to give you several knots to choose from for each application, so you can pick out your favorite and stick with it.

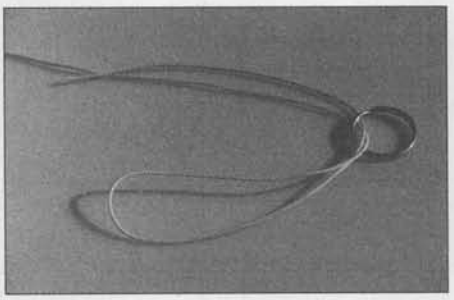
TERMINAL KNOTS FOR TYING TO TOW RINGS OR SWIVELS

The first knot we'll demonstrate is the Palomar knot. (We'll call it Knot No. 1.) It is by far the simplest and fastest to tie and it yields up to 90% of the line strength when done. It has the advantage of having two lines passing around the ring for extra wear strength. This is the knot I use most often when tying high start or hand tow monofilament, and when I fish with lures or bait hooks.

The Palomar knot is strong, it can be tied in the dark, and it is least likely to cause frustration or consume time by unravelling on you in the process of tying it. However, it is not easily tied to a ring on the end of a parachute. It is best suited for rings.

Knot No. 1, Step A.

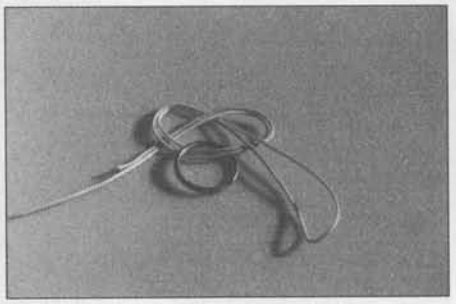
Double over the end of your tow line about eight to ten inches, then pass this



eight-inch loop halfway through the tow ring or swivel ring. When using swivel rings, use the largest ball bearing swivels you can find with welded closed rings. These are found wherever big game salt water fishing tackle is sold.

Knot No. 1, Step B.

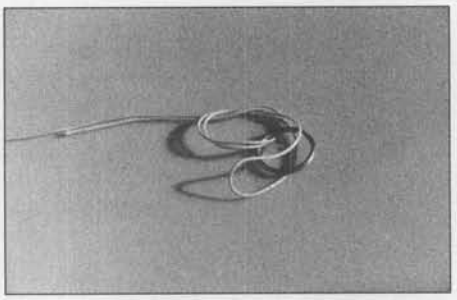
Make a simple, overhand knot. Leave the ring hanging down from the loop just formed



and the loop long enough to pass over the ring.

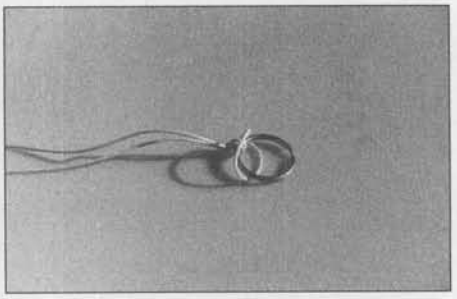
Knot No. 1, Step C.

Pass the tow ring through the end loop. Pull and hold the loop back against the tow line.



Knot No. 1, Step D.

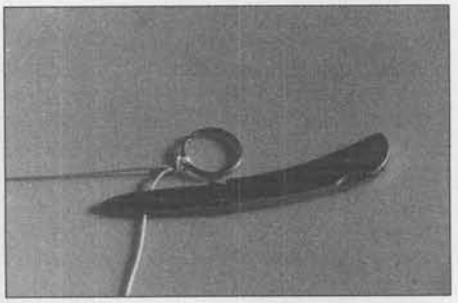
Begin to pull the tow line and end line



tight making sure the loop doesn't flip back over the ring.

Knot No. 1, Step E.

Pull the knot tightly and trim off the end line about 1/4-inch from the knot. No further work is needed to assure a worry-free knot.



If you like, when using braided or twisted nylon line, you may melt the exposed fibers of the line's end with a match to prevent the "fuzzy-frays."

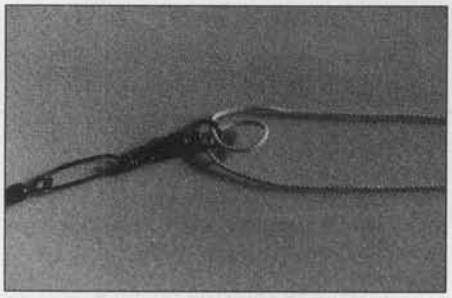
The second knot we will demonstrate is called the Berkeley knot after the fishing line manufacturer of the same name. Like the Palomar knot, the Berkeley knot has two lines passing around the tow ring for extra

wear resistance and knot strength. Also, like the Palomar, this knot is said to be 90% as strong as the line itself.

The advantage of this knot over the Palomar is it can be easily tied onto any ring (parachute or not) because there is no need to pass a the parachute and ring through a loop in the line.

Knot No. 2, Step A.

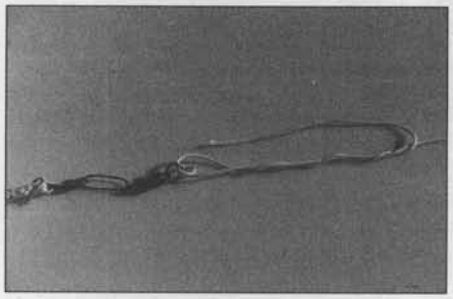
Pass the end line through the tow ring about ten inches. Pass the line around the



ring a second time. This is the most important step and the biggest difference between the Berkeley knot and any other knot.

Knot No. 2, Step B.

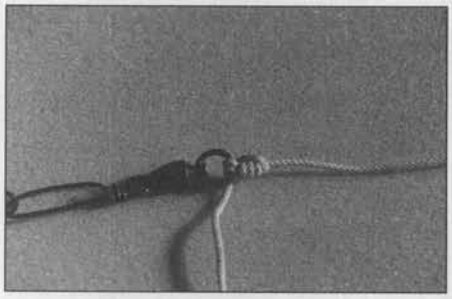
If you are using line that is 150-pound braided nylon (as in photo) you need only to



pass the end line around the tow line about four times. If you are using monofilament, pass it around a fifth time.

Knot No. 2, Step C.

Pass the end line through the circle of line around the tow ring. Begin to pull the knot

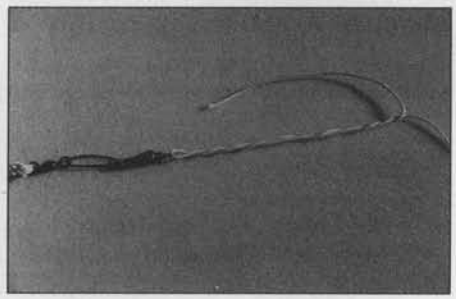


tight, working all the coils down, pulling on the tow line and end line together. Once the knot has been pulled as tightly as possible against the tow ring, the line's end may be cut off 1/4-inch from the knot and the end melted. As a step of extra security with this knot, you may wish to put a small drop of CA glue where the end pulls through the knot. If you have pulled the knot really tight, this should not be necessary.

The next knot is called the improved cinch knot. It is normally used with light monofilament fishing line, but I have used it with heavy braided nylon with success. Unlike the Berkeley or Palomar knots, this knot has only a single wrap of line around the ring. I doubt that this knot is as strong as either of the two above, but it has the advantage of being fast and simple to tie.

Knot No. 3, Step A.

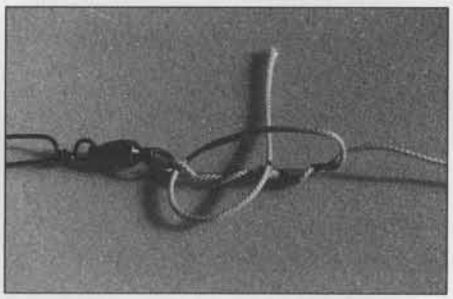
Pass about eight inches of line through the



tow ring, double back on the tow line, and then twist the line five times around.

Knot No. 3, Step B.

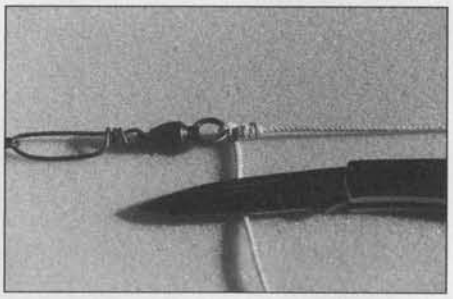
Pass the end line through the small teardrop shaped loop in the base of the coils



next to the ring. Thread the end line around and pass it through the big loop just formed in the previous step.

Knot No. 3, Step C.

Pull the knot really tight using both lines. Cut off the end line 3/8-inch from the knot

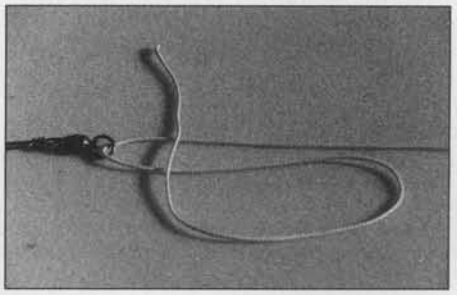


and melt the end fibers if using braided nylon. As a step of extra security when using braided line, add a small drop of CA glue to the knot. I have never experienced slippage using this knot, but I don't trust it as much as the Berkeley knot.

The next knot is yet another one used in fishing called the Uni-Knot. I saw this knot recently in the S.O.A.R. newsletter which in turn thanked Wayne Fredette for "passing it along." It would be an excellent choice for heavy monofilament line. I have also found it quite satisfactory on heavy braided nylon tow line. Like the improved cinch and Berkeley knots, this one involves coiling the line like a hangman's noose.

Knot No. 4, Step A.

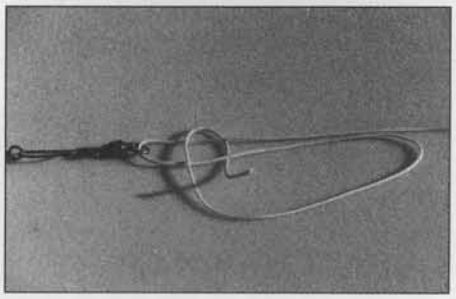
Begin this knot by passing about ten inches of line through the tow ring or swivel ring.



Double back about five inches parallel to the tow line. Make a loop almost back to the ring and lay the end line over the parallel lines.

Knot No. 4, Step B.

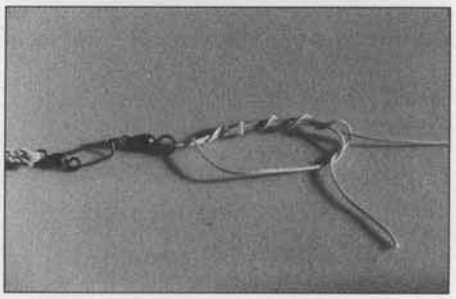
Begin coiling the end line around the



parallel lines closest to the ring and work away from the ring.

Knot No. 4, Step C.

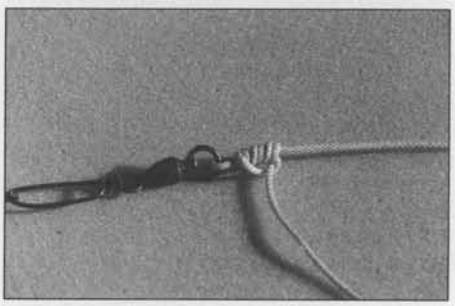
When you have five coils, begin tightening the knot by pulling on the end line. Hold



the coils neatly in a row to prevent them from going loose and overlapping each other. Pull the coil fairly tight. Begin to slide the knot up against the ring.

Knot No. 4, Step D.

Pull the knot very tightly on all lines. Clip



off the end line 1/4-inch from the knot. You are finished.

LINE SPLICING KNOT FOR REPAIRING BROKEN TOW LINES

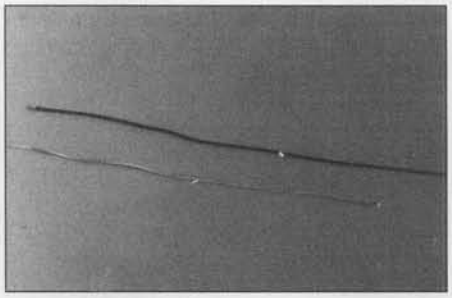
If you fly regularly with a club, or if you

happen to own your own winch, you will eventually come across a broken winch line. The following, called a fisherman's knot, blood knot, or barrel knot, will be invaluable to you in repairing such a line.

With this knot you can cut away any frayed or worn areas of a tow line and then splice the line back together without weakening it. The resulting knot is small enough to pass through any turnaround without difficulty, and is not likely to add any significant drag to the tow line whether on the ground or in the air.

Knot No. 5, Step A.

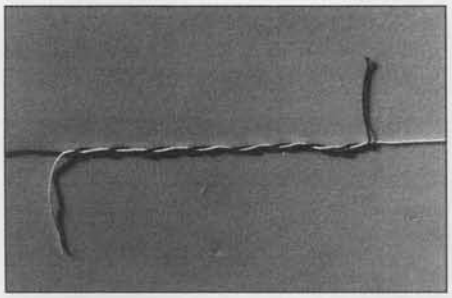
Notice in this picture that I have dyed one line a dark color to help you see how this



knot is formed. Begin by overlapping the two lines at least a foot if not 18 inches. The extra length of line makes it easier to handle this knot in the field with only two hands. The extra line won't be missed, and you will tie faster with it.

Knot No. 5, Step B.

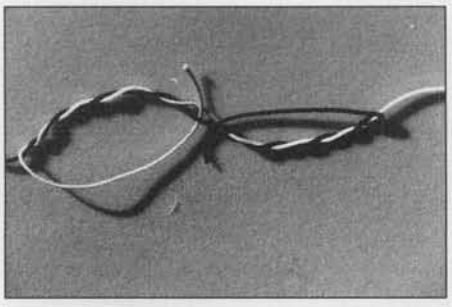
Make eight twists in the two lines. Each line must go around the other eight times



leaving a loose end to work with. Find the mid point of the twists (counting four over from either end) and mark it mentally.

Knot No. 5, Step C.

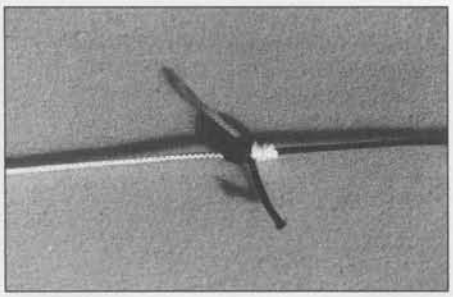
Open up a hole at the mid point of the twists and insert each loose end through the



hole in opposing directions so that no twists are gained or lost.

Knot No. 5, Step D.

Carefully, slowly, and alternately pull on the tow line and loose ends until the knot tightens up completely. When finished, your knot will look like this one. Cut off the two



loose ends 1/8 to 1/4-inch from the knot and melt the ends with a match if you are using braided or twisted nylon.

Armed with these five basic knots (there are probably others), you are now equipped to handle any tow line emergency on the field.

KNIFE EDGE TRAILING EDGES MADE FAST AND EASY

Pete Young of Garden Grove, California, sends in a handy tip for making those aerodynamically superior, thin trailing edges. He claims the method is easy and fast, and is nearly foolproof and dust-free.

The method involves using K&S music wire of .030-inch or finer as a guide for a razor plane. Simply use masking tape to hold the music wire up tightly against the aft edge of the T.E. Replace your razor in your razor plane with a fresh one, then plane the balsa or spruce T.E. stock down to the wire. The wire provides a hard point that you can't cut past. The TE comes out very uniformly shaped and as thin as the wire itself. Finish sanding is all that remains followed by a thin coating of thin CA glue to harden the soft balsa against minor bumps and hangar rash.

BACK TO KITTY HAWK...ALMOST

It's always nice to hear from eastern states fliers and to read about faraway flying sites and conditions. Terry Lisansky of Wilmington, Delaware, writes to tell of a recent trip down to North Carolina to enjoy some slope soaring. His tale of fun follows.

"Dear Bill, I've recently been to North Carolina's Outer Banks, and I thought I would share some pictures and describe the flying there.

AIRFOIL HQ-1,5/9

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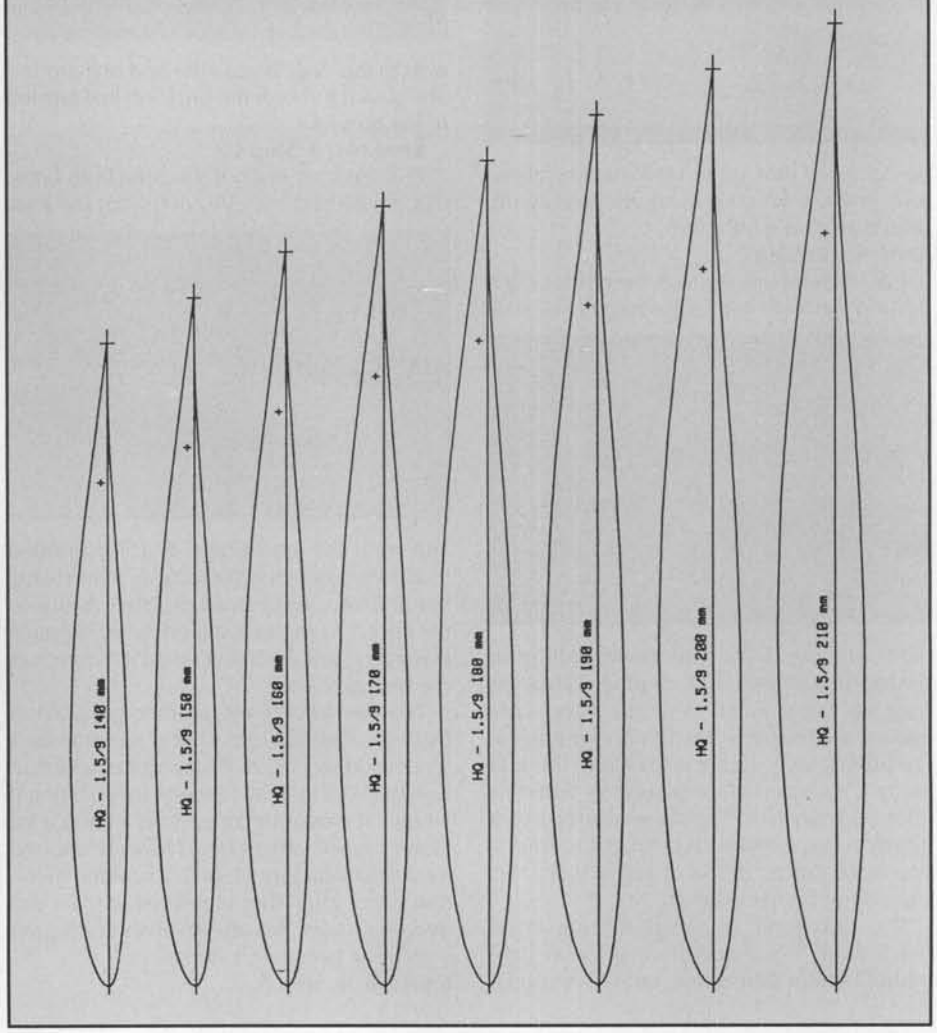
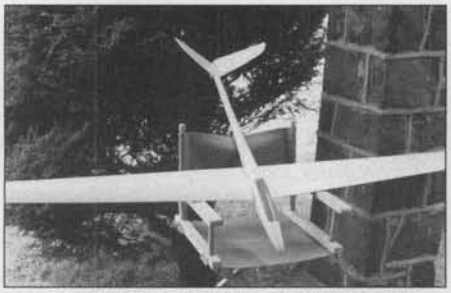
1	0.0000	0.0000	0.0000	7	.1500	.0493	-.0272	14	.6000	.0488	-.0197
2	.0050	.0090	-.0056	8	.2000	.0535	-.0288	15	.7000	.0384	-.0120
3	.0125	.0144	-.0094	9	.2500	.0565	-.0301	16	.8000	.0260	-.0052
4	.0250	.0208	-.0134	10	.3000	.0583	-.0305	17	.8500	.0193	-.0026
5	.0500	.0300	-.0182	11	.3500	.0594	-.0306	18	.9000	.0129	-.0009
6	.1000	.0415	-.0235	12	.4000	.0588	-.0295	19	.9500	.0061	-.0001
				13	.5000	.0558	-.0258	20	1.0000	0.0000	0.0000





Terry Lisansky's new Bridgeman Snipe "taking five" on the director's chair. H. Quabeck 1.5/9 airfoil makes it go FAST! Pivoting wings makes it roll FAST!

Brian Smith of Ohio mounts his winch and retriever to a small trailer. Easy transport, no lifting (bad back, you know), perfect alignment on setup, and easy maintenance (no bending over to work on it). That's pretty neat, agree?

Brian Smith again, collecting the hardware with his original design 2-Meter Class ship with which he regularly cleans Unlimited Class clocks. Gentle Lady wing planform with Eppler 205 section. He says he loves it. No wonder, it works!

"Just south of Kitty Hawk (yes, that Kitty Hawk) in Jockey's Ridge State Park there is what I think is the largest sand dune on the east coast. It is one hundred and forty feet high and a quarter mile long. This thing is big! It's about a half mile from the ocean and has nothing in front to stop the prevailing onshore breeze. The natural shape of the dune makes for some fantastic lift.

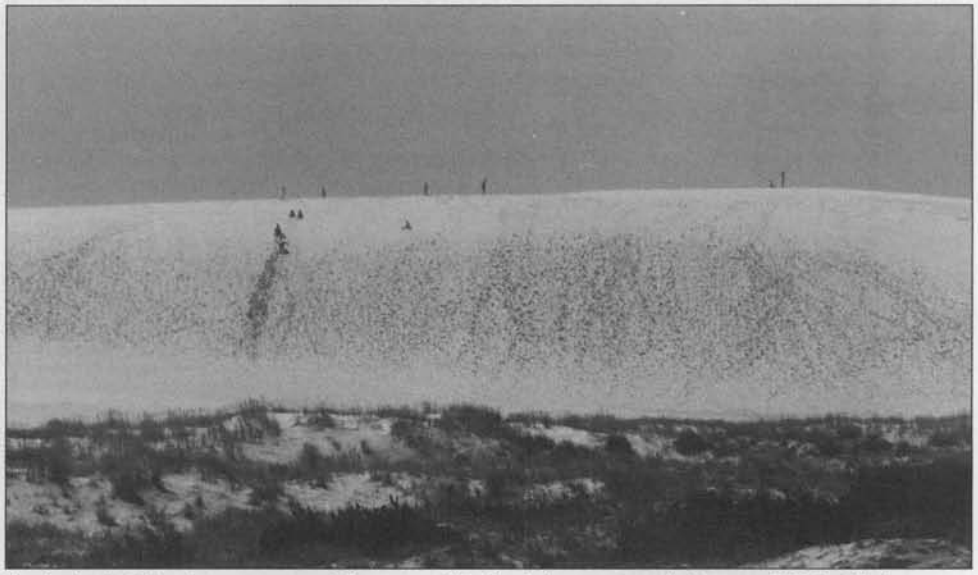
"I met a couple of guys from Virginia, Andy and Chip, who brought a whole arsenal of planes with them. I brought my Jerry Bridgeman Snipe with me (my not-yet-flown Snipe). Well, the first day the wind wasn't blowing quite enough for any successful flights, just long trips down the dune with even longer trips back up!

"The second day, after a little CG change the night before, the wind still wasn't strong enough. Let me define `strong enough.' The Snipe has a fifteen ounce wing loading and needs at least a 12 to 15 mph breeze. My Dodgson Pivot flew great here last year in the 10 mph breeze, which seems to be about normal.

"While we were waiting for the breeze to pick up, Chip and Andy were flying their planes. I got a chance to fly a (Bob Martin) Coyote which I thought flew great.

"Well, the breeze picked up, and with Andy at the controls, off went the Snipe. Boy, this plane is fast! I wrestled the transmitter from Andy and very shortly all three of

Terry and the Snipe at the Outer Bank of North Carolina not far from Kitty Hawk.



The Jockey's Ridge humongous sand dune near Kitty Hawk is a quarter mile long and 140 feet high, and has a straight shot at the prevailing ocean breeze! Slope race anyone? Photo taken from quarter mile away shows only 1/3 of total slope available.

us were in the air, making speed runs, floating up high, and passing low enough to scrape the sand in front of us.

"It was on one of those sand-scraping passes that Andy's Coyote slowed down just a little too much, and we thought it wouldn't take back off. Well, he pointed it downhill and after about a ten foot slide (plus a little body English) off it went, back into the air!

Terry Lisansky and his Dodgson Pivot flying over the mondo-dune at Jockey's Ridge State Park. Terry stands at edge of the 140-foot high dune, not easily distinguished due to sandy

Touch-and-goes were the game to play over North Carolina's mondo-dune. Here is Andy the Virginian's Coyote about to eat sand.

Andy the Virginian streakin' past with his Bob Martin SR-7 sloper. Full-size hang gliders at the bottom of the dune look mighty puny. One actually tagged Terry's Snipe when a head-on midair became unavoidable. Nobody was hurt.

Are we having fun yet? You bet!

"Touch-and-goes became the thing to do for the rest of the afternoon. Were we successful? A couple more times, yes, but the planes got really sandy.

"My Snipe really flies great. It has a roll rate you wouldn't believe!

"Now enters a villain into this story. The hang glider guys are at their end of the hill, and we are at ours. There is a lot of space in between. The three of us are up and minding our own business, when all of a sudden, out

continued on page 106

JAKE *Continued from page 5*

This year's winner of the Hanno Prettner Stand-Way-Off Scale Award is Avery Lippincott of Shawmut, Massachusetts. Avery Clinched the honor at a free flight scale contest in Connecticut. While blowing his nose in front of the timers, Avery's tissue was snatched by a gust of wind and flew away in a thermal. Avery convinced the officials to time his model of the Gossamer Kleenex, a little known man-powered design by Paul McCready, and recived a max for his tissue's flight.

Well done, Avery! Please accept this cracked and slightly tilted plastic loving cup, which I claim is actually an exact replica of the Thompson Trophy. ***MB***

CORNER *Continued from page 10*

as does a servo. That is, a control pulse, originated at the transmitter and ultimately available at the receiver socket, will command a servo to go left or right, or a speed control to go high or low. Then, the ESC, being an electronic device, requires electrical power—in all cases derived from the large battery in the model intended to power the motor. The ESC On-Off switch, when actuated, turns on this voltage to the ESC electronics. See Sketch A.

Now, inside the ESC, there is a voltage regulator, a device which sets the input voltage to a definite level, usually five or six volts. It's output is first used to power the ESC, and sometimes, to power the model's receiver and servo(s). In this latter case, it is now called a BEC (Battery Eliminator Circuit), having been renamed only to confuse us, as far as I am concerned, a voltage regulator being a voltage regulator. This voltage is available at the connector that plugs into the receiver, and its wiring sequence is important, and critical!

The three wires used are a battery positive, usually red in color, battery negative (black>, and signal input, most often white. Some exceptions are JR, which uses brown wire for the battery negative and orange for the input signal, and Airtronics, on which two wires are black but the plug is numbered (1) for signal and (2) for negative. Please refer to the November column for information on a foolproof plug system adaptable for to brands of receivers.

Now, when mixing different brands of receivers and ESC's, this harness must be changed to match exactly the receiver wiring, as found on one of the companion servos At best, any mis-wiring will cause the system not to function, at worst it will do damage to the receiver and ESC.

Now, there is one important point here. If you are going to power the receiver and servo(s) from the single main airplane ~battery, all three connections described above must be made, see Sketch 2. In that case, you also want to check that the current capacity of the ESC's voltage regulator is capable of handling all the different compo-

READER SURVEY: We want your help in making *Model Builder* a better magazine. By answering the questions on this survey, we'll have a better idea of what you like or dislike about the magazine and how we can improve it. In appreciation of your efforts, we will award 25 one-year subscriptions, by drawing names from the survey responses received by March 31, 1991. *If you don't want to cut this survey from your magazine, it's OK to make machine copies.*

1. Age: Under 10 [ ] 10-14 [ ] 15-20 [ ] 21-30 [ ] 31-40 [ ] 41-50 [ ] 51-65 [ ] Over 65 [ ]

2. Sex: Male [ ] Female [ ]

3. Married [ ] Single [ ]

4. Education: In school [ ] High School Diploma [ ] In college [ ] College degree [ ] Some college [ ] Graduate Degree [ ] Trade School [ ]

5. Occupation: Student [ ] Professional [ ] Sales [ ] Service [ ] Laborer [ ] Other [ ] _____

6. Occupation of head of household: Student [ ] Professional [ ] Sales [ ] Service [ ] Laborer [ ] Other [ ] _____

7. Head of household income: Under $15,000 [ ] $15,000-$24,000 [ ] $25,000-$34,000 [ ] $35,000-$49,000 [ ] $50,000-$74,000 [ ] $75,000-$99,000 [ ] Over $100,000 [ ]

8. In which model aircraft category are you interested? If more than one, indicate preferences in numerical order (1 thru 4): RC_____ FF_____ CL_____ Static_____

9. In which categories are you currently active? RC [ ] FF [ ] CL [ ] Static [ ]

10. How long have you been active in your categories?

	RC	FF	CL	Static
Less than a year	[ ]	[ ]	[ ]	[ ]
1-2 years	[ ]	[ ]	[ ]	[ ]
2-5 years	[ ]	[ ]	[ ]	[ ]
5-10 years	[ ]	[ ]	[ ]	[ ]
Over 10 years	[ ]	[ ]	[ ]	[ ]

11. Do you build your own models (not including ARFs)? All [ ] Most [ ] A few [ ] None [ ]

12. Do you design and build from scratch? All [ ] Most [ ] A few [ ] None [ ]

13. Do you scratch-build from plans? All [ ] Most [ ] A few [ ] None [ ]

14. Do you build from kits? All [ ] Most [ ] A few [ ] None [ ]

15. Do you assemble and fly ARFs? All [ ] Most [ ] A few [ ] None [ ]

16. How many model aircraft have you built since you began the hobby (Rough estimate)? RC_____ FF_____ CL_____ Static_____

17. If you build and fly RC, what types? Sport [ ] Scale [ ] Pattern [ ] Helicopter [ ] Glider [ ] Pylon [ ] Old Timer [ ] Other_____

18. If you build and fly FF, what types? Sport [ ] Scale [ ] Peanuts [ ] Gas [ ] Rubber [ ] Nordic [ ] HLG [ ] Indoor [ ] Other_____

19. If you build and fly CL, what types? Sport [ ] Scale [ ] Stunt [ ] Combat [ ] Speed [ ] Racing [ ] Carrier [ ] Other_____

20. How many model aircraft do you have that are entirely or nearly flyable? RC_____ FF_____ CL_____

21. How many 1991 RC transmitters do you own? _____

22. How many 1991 receiver packs (with servos, battery, switch harness) do you own?__

23. How many pre-1991 radio systems do you own? _____

24. How many of your pre-'91 sets do you plan to upgrade? _____

25. How often do you fly? _____ days per week _____ days per month

26. How many hours a week do you spend on your model aircraft hobby? _____

27. To what model aircraft organizations do you belong? Include National, regional, local (club), special interest. (Initials, i.e., AMA, are OK)_____

28. Do you plan on joining any organizations this year? Yes [ ] No [ ]

29. If so, what organizations? _____

30. In what organized model flying activities do you participate? Competition [ ] Fun-Flys [ ] Both [ ] Club [ ] None [ ]

31. If competition, at what levels? Club [ ] Local [ ] Regional [ ] National [ ] International [ ]

32. Are you a subscriber to Model Builder Yes [ ] No [ ]

33. How long have you been a subscriber? _____ years.

34. If not a subscriber, how many copies of Model Builder do you buy a year? _____

35. Where do you obtain your copies of Model Builder? Subscription [ ] Hobby shop [ ] Newsstand [ ]

36. How many hours do you spend reading an issue of Model Builder? _____

37. How many friends also read your copy of Model Builder? _____

38. Do you save back issues of Model Builder? Yes [ ] No [ ]

39. If so, how far back? _____ years.

40. How often do you refer to a back issue? Weekly [ ] Monthly [ ] Yearly [ ]

41. What other hobby magazines do you read? Flying Models [ ] Model Airplane News [ ] Model Aviation [ ] Radio Control Modeler [ ] RC Report [ ] Other [ ] _____

42. How does Model Builder compare with:

	Better	Same	Worse
Flying Models	[ ]	[ ]	[ ]
Model Airplane News	[ ]	[ ]	[ ]
Model Aviation	[ ]	[ ]	[ ]
Radio Control Modeler	[ ]	[ ]	[ ]
RC Report	[ ]	[ ]	[ ]

43. What percentage of the advertising in an issue do you read in its entirety? _____

44. What influences your decision on what to buy for your model aircraft hobby? Advertising [ ] Articles [ ] Fellow modelers [ ]

45. Does the information in Model Builder help your decision on what products to buy? Yes [ ] No [ ]

46. How much do you spend on your model aircraft hobby each year? _____

47. What major RC related products do you plan on purchasing this year?

48. Where do you purchase most of your model aircraft supplies?

	Most	Some	Very little
Hobby shop	[ ]	[ ]	[ ]
Mail Order	[ ]	[ ]	[ ]
Mail Order Discount	[ ]	[ ]	[ ]

49. Do you own a personal computer Yes [ ] No [ ]

50. Model Builder wants to know which of its regular columns and special features you like or dislike. Put an 'X' in one box for each item listed.

	Like a lot	OK	Don't like
All About ARFs	[ ]	[ ]	[ ]
Big Birds	[ ]	[ ]	[ ]
Chopper Chatter	[ ]	[ ]	[ ]
Control Line	[ ]	[ ]	[ ]
Dear Jake	[ ]	[ ]	[ ]
Electronics Corner	[ ]	[ ]	[ ]
Electric Power	[ ]	[ ]	[ ]
Free Flight	[ ]	[ ]	[ ]
Hannan's Hangar	[ ]	[ ]	[ ]
Indoor	[ ]	[ ]	[ ]
Jet Trails	[ ]	[ ]	[ ]
Model Design & Technical Stuff	[ ]	[ ]	[ ]
Over the Counter	[ ]	[ ]	[ ]
Plug Sparks	[ ]	[ ]	[ ]
Precision Aerobatics	[ ]	[ ]	[ ]
RC Pylon	[ ]	[ ]	[ ]
RC Soaring	[ ]	[ ]	[ ]
Strictly Scale	[ ]	[ ]	[ ]
Workbench	[ ]	[ ]	[ ]
Products in Use	[ ]	[ ]	[ ]
RC Construction	[ ]	[ ]	[ ]
FF Construction	[ ]	[ ]	[ ]
CL Construction	[ ]	[ ]	[ ]
Peanut Construction Plans	[ ]	[ ]	[ ]
Full-size aircraft 3-views	[ ]	[ ]	[ ]
Other_____	[ ]	[ ]	[ ]
Other_____	[ ]	[ ]	[ ]

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nents. You can check this with everything plugged in, motor running (prop off!) and working all servos simultaneously looking for any to hesitate or work slowly.

However, if you intend to operate the radio system from a separate battery (the normal four-cell unit furnished), then the red (positive) wire in the harness from the ESC to the receiver must remain disconnected. In some plugs, you can simply slip it out of the plastic housing and protect it with a piece of shrink tubing, in other plugs you may have to actually cut the wire and insulate the exposed ends. See Sketch 2A. The remaining two wires are used to bring the control signal from the receiver into the ESC.

So far we have discussed what we can refer to as the self-power and control section of the ESC; it operates independently of the motor current section. Refer to Sketch 3, the basic battery-to-ESC-to-motor connections. In this illustration, the ESC is shown simply as a variable device which allows more or less current to flow, adjusting the motor speed accordingly. That is exactly what is happening!

The connections here are critical also, at least the battery-to-ESC ones are. Generally they are color coded red for positive and black for negative, and are often provided with a popular type of battery plug. Even with pre-wired equipment, double check that the connections being made are red to red and black to black, as a reversed battery connection, even for a second, is fatal.

You might ask why some sort of reverse voltage protection is not included. The answer is that while it is feasible it introduces a battery-to-motor loss too high to be acceptable to most ESC users.

Up to now, all ESC's are basically alike, however, there are some physical differences in the battery-to-ESC and ESC-to-motor wiring. Physical only, as the electrical connections are the' same. The differences are that some ESC's will have three large wires for these connections, while some will have four. Both have the battery red and black input wires; the four wire versions will have a separate pair, usually red and blue for the motor connections, while the three wire versions will only have the blue motor wire and share the positive red wire connection to the battery.

In either case, the positive red wires connected to the battery are common. There may be the two of them, connected to the same place on the ESC printed circuit board, or' just the one to the ESC, but it will have a common connection at the battery or plug, going from there to the motor. See Sketches 4 and 4A for these connections. Again, the battery positive is common to both ESC and motor; all variable current control to the motor is done through the negative ESC output lead. There you have it. It wasn't that much of a mystery after all, now was it?

Now for the fuse Mr. D. asks about. I can guess where he read that, and it wasn't in MB! The truth is that it is a completely incorrect statement. Neither the fuse nor a properly wired ESC can damage your motor in any manner. Think basics: there is a lot of electrical energy in the battery, but it is limited, and it cannot be increased or forced through the motor in any manner. We know that it is perfectly safe to connect the motor directly to the battery without any ill effects, except possibly heat build-up from prolonged running without proper cooling. Therefore, if the motor can withstand the total battery voltage, how can this voltage then hurt it?

Incorrect wiring can and does damage components—lots of them. The energy in the battery is enough to burn the wire and destroy the battery itself under short circuit conditions, and all recommended safety procedures should be followed in the installation and handling of all electric power components.

As for the fuse, which is a must in my opinion, the only consideration is where it is to be installed. This is determined by whether or not you are using a separate receiver/servo battery. If you are, you are not dependent on the motor battery for radio electrical power, and it is best to place the fuse in one of the lines between the battery and the ESC. That way, it offers protection to both the motor and the ESC. On the other hand, if you are running everything from the one battery,

you want the fuse between the ESC and the motor. That way, should it go, the ESC, and subsequently the radio are still receiving power. It is something of a gamble in case of ESC failure, but so is trying to fly without a working radio. ***MB***

AEROBATICS *Continued from page 14*

was even true of a "light-winged" Eclipse which weighed 8.5 pounds against a solid winged Eclipse weighing 7.75 pounds.

2. In my opinion, the extra work is well worth the improvement. It amounts to a few extra hours work on a plane you may use for several seasons.

3. The original Cursor prototype with honeycomb wings has over 1200 flights on it, most off rough grass fields of the Northwest. It has earned over 25 trophies for six different pilots in four different classes. It has been crashed twice, with both crashes resulting in minor repairs to the fuselage. A later glass version with honeycomb went in when someone turned on accidentally and shot me down. The fuselage was a total loss, but the wing and stab were undamaged and are now flying with a new fuselage. A solid wing may well be stronger, but just how strong does this stuff have to be?

4. See #3, above. Besides, pattern is definitely the wrong event for those who build to survive crashes.

Come to think of it, I'm not sure there is a right event for those who build to survive crashes!

I've got more, but time and tide wait for no man. Remember that light is good, and overpowered is even better. Light and overpowered have been winning trophies since way before Radio Control. We'll talk more next month. See ya at the field. ***MB***

TECHNICAL *Continued from page 18*

non-piped sport engine at low rpm. Without a landing gear the task is much easier.

I proved I could build a model that could take off when I was a kid. I feel no need to reprove that point on every flight I make or with every plane I build. The advantages of going gearless are too great. Many of my models are now designed without gear for hand launch only.

"What about landing?" you shyly inquire. "No problem," I confidently reply. If you must land on gravel or concrete you need to provide a rub strip on the bottom of the fuselage, but on grass, soft dirt, or in weeds etc., belly landings may be safer than wheel landings. I've found much less of a propeller breakage problem than one might expect with belly landings.

One, of course, installs the prop so that it is horizontal as the engine comes up against compression, and one kills the engine completely with the throttle trim lever just before touchdown. Once in a great while I will catch a prop blade in the sod and pivot the plane around, but usually with no damage

to prop, engine, or model. With modern fiber-reinforced props, I think my prop breakage with belly-landing models is fully as low as it is with landing-gear models; negligible.

But back to hand launching. All old-timers in modeling know how to hand launch light or small airplanes and gliders with no problems, but let's review the fundamentals for the youngsters among us who haven't tried hand launching yet.

It is important to hold the model under its center of gravity during hand launch. If the model is held aft of the cg, there is a big danger that the ship will pitch nose down during release, which will almost ensure that it will fly into the ground. This tells us something about the types of models we can safely hand launch. The wing is under the cg of low-wing models, which makes it essentially impossible to securely hold a low-wing model over one's head at the center of gravity. For this reason I always design planes I intend to hand launch as shoulder, or high-wingers.

There is another reason why low-wing planes are not good to be flown without landing gear. The low wing will probably contact the ground first in landing, and the plane is apt to snag something and spin around, and is subject to damage.

I have designed, built, and flown a number of pure flying wing models without landing gear. Having no fuselage, these had the launching disadvantage of low-wingers, as discussed above. There I solved the problem by building a plywood skid/handle under the center of the wing. This not only gave me something to grab at the cg, but helped the model smoothly skid to a stop in landings, and it kept the prop shaft a little higher off the ground.

The model should leave the launching hand at cruising speed. Launched too slowly, it may strike the ground before it achieves flying speed. On the other hand, an excessive-speed launch of a low-powered model may cause it to zoom, stall, and crash. Likewise, launching a low- powered model at an upward angle can cause it to stall and crash.

Powerful models, on the other hand, such as competition free flights, are usually launched at the high angle of their climb. Slope soarers are usually launched nose down, because the updraft would cause an excessive angle of attack if the model were launched level.

In general, the lighter the ship, the lower the cube loading and the lower the power loading, the easier it will be to hand launch (and the better will be its vertical performance). With light models we can usually get the required flying speed for hand launch by simply standing still and carefully throwing the model. But as the size and weight of the model go up, we need to run, because we are unable to attain the higher flying speed with the higher weight by a simple arm pitch.

Actually, running without throwing, letting the model lift out of a "still" hand, is a very safe method, if we can run faster than

the flying speed needed. That is safer because running speed is more easily controlled than throwing speed, and we run horizontally, so we eliminate the possibility of an excessive launch angle either up or down.

When the model weight exceeds what we can throw rapidly, and its stall speed exceeds the speed at which we can run, we still may be able to hand launch it by running and throwing it simultaneously. I have done this safely with an RC power model of 8-foot wingspan which weighed 6 1/2 pounds. That model had a wing cube loading of 5.6 oz./cu. ft. and a wing loading of 14.4 oz./sq. ft. That is near the limit of what this over-the-hill modeler cares to hand launch. Some of you young athletes could hand launch a somewhat more heavily loaded ship.

For the first hand-launched test flights of your airplane, it is safest to get someone else to hand launch it while you man the transmitter. Make sure the person you trust with your model knows what he is doing, however. If he or she is inexperienced in hand launching, review the above ground rules, and go through a few dry runs to see how the model feels as it is about to be released. If it doesn't seem like the model is reaching flying speed, don't let go.

After you have a few test flights launched by a helper, and have the model well trimmed out, it is possible for you, the RC pilot, to hand launch it yourself. I fly alone a lot, and routinely hand launch my own RC models. It is always safer to fly with others, but others are not always available.

For the solo act, hold the plane in your right hand (if you are right handed) and the transmitter in your left.

I grip the transmitter at its side with the fingers behind it and the palm of my hand wrapping around the edge to the front. My thumb sort of hangs in mid air. A split second after launch, the hand that held the plane swings down and grabs the other edge of the transmitter, and the dangling thumb is able to engage its stick tip.

The most important requirement is to get both thumbs on their sticks rapidly, especially the elevator thumb. The transmitter must be pretrimmed so the plane will be in a straight slight climb, therefore it should not be necessary to make any corrections immediately upon launch. Don't be in such a rush to grab the sticks that you bump and move them unintentionally. That would invite a crash. Practice pretending to throw the airplane and get the throwing hand onto the transmitter many times before you do it for real. And remember, you can't look at the transmitter. That transfer must be blind. You can't afford to take your eyes off the plane, even for a split second.

Now that I've got this written, it sounds quite hairy, and it is while you are learning it, but it becomes second nature. Once I damaged an underpowered model by launching it too fast, causing it to stall. With that exception, I've successfully hand launched my own RC models a great many times.

continued on page 90

COUNTER *Continued from page 9*

Aeroloft Designs, 8617 South Roberts Road, Hickory Hills, IL 60457, phone (708) 430-7666, is offering a new line of fiberglass finishing products. Called Glass-Ez, the product line features a roller assembly which provides what is said to be a much better way of applying epoxy resin and fiberglass cloth products. The roller replaces the usual playing card squeegees and toilet paper mop up; making it easier to apply a smooth and consistent epoxy glass finish.

The Glass-Ez products include roller assemblies, replacement rollers, epoxy resin, and .06 oz. glass cloth. Each item can be purchased separately, or "Builder's Special" kits are available; the Economy for $49.95 or the Deluxe for $79.95. Contact Aeroloft Designs for any further information.

• • •

Altech Marketing, P.O. Box 391, Edison, NJ 08818, phone (201) 248-8738, is announcing two new products.

For modelers of gas powered aircraft, boats, or cars, Altech's SureStart 100 Power Panel provides power for a 12-volt electric starter, a 12-volt electric fuel pump, and 1.5-volt glow plug power, plus a charging outlet for portable, lock-on type starting batteries. Also, there is a meter to monitor current to the glow plug, an LED to indicate proper contact, and an On-Off switch for the plug driver and charging circuit.

The panel measures six inches wide by 3-11/16 inches high, and requires a one inch mounting depth clearance. Alligator clips prewired for 12-volt DC input, and banana plugs are also included.

The Acoms Technisport AW-75 MK-III, two-channel, pistol-grip radio on surface frequencies for cars and boats, is Altech's other new offering. The transmitter features a steering rate adjuster, trims for steering and throttle which are recessed to avoid accidental bumping, as are the On-Off and servo reversing switches, a large battery condition meter, and built-in charging jack for easy conversion to NiCd power.

The BEC receiver is compact and light, yet features excellent sensitivity and selectivity. The new, smaller AS-11 servos are slightly smaller than most others, yet are still rated at 42 ounce-inches of torque. The BEC switch harness is included with the system.

For more information on these and other items handled by Altech Marketing, contact Gabe Mastriano at the above address or phone, and be sure to tell him we sent you.

• • •

The "Electric Breeze" is the name Douglas Aircraft, P.O. Box 92472, Long Beach, CA 90809, phone (213) 498-1737, has given its latest RC model airplane. Obviously enough, it's an electric powered model, which is the first from this company that has specialized in aerobatic slope glider kits, the "Silhouette" and "Quicksilver."

The aerobatic qualities of the slope gliders provided a natural direction to take in developing an aerobatic electric model, to the extent that the Breeze incorporates the exact same wing and tail as used on the Quicksilver. With a seven-cell power pack and a good ferrite motor, the Breeze is said to do all kinds of aerobatics, including outside loops. Installing a cobalt motor takes the maneuver schedule to the top end of the pilot's flying capabilities. It can be flown with basic two-channel aileron/elevator control, or you can go all-out with the addition of rudder and speed control. There's a removable landing gear in case your flying site permits takeoffs and wheel landings.

The Breeze is recommended for intermediate and advanced fliers. Contact Doug Hertzog for further information, and tell him you read about it in *Model Builder.*

• • •

The military's workhorse A-1H "Skyraider" is now available as a partial kit for a big 90-inch span model from George Miller's Kits, 1140 Civic Center Drive, Rohnert Park, CA 94928, phone (707) 584-9446. Designed for the ST 2500-3000 size of engine and the Robart retracts, the Skyraider has the right proportions for easy flying. The kit includes fiberglass fuselage, cowl, rudder, and wheel housings; foam core wing and stab with all sheeting; pre-cut wood and canopy, and the price tag is $400. Contact George for more information.

• • •

This is not a new item from Airtronics, but it seems that many RCers, whether using Airtronics radios or any other brand, consciously or otherwise, badly mistreat their radio system's transmitter. Now it just so happens that Airtronics Inc., 11 Autry, Irvine, CA 92718, phone (714) 830-8769, has both single and twin cases that fit most all of its radio transmitters (not the pistol-grip types for cars and boats). Use of a storage/carrying case keeps dirt and curious fingers off of the transmitters, and also prevents casual an unnoticed bumps of the various toggle switches with which so many modern transmitters are equipped. When it is realized that keeping a transmitter in a protective case not only prevents damage to the transmitter itself, but also protects the one or more aircraft to which it may be called upon to transmit signals, the value of that protection far exceeds the cost of the case. If you need further convincing, attend a top level RC competition, such as the TOC, the Nationals, World Championship events, and major regionals, and notice how many of the world class competitors remove their transmitter from its protective case just before they fly, and return it to the case immediately after they fly. Some are almost fanatical about it, keeping the case padlocked while it's in the impound.

• • •

B.C. Air Originals, known for its cleverly designed plans and instructions for converting empty aluminum beverage cans into static display scale-like model aircraft, has now taken the idea one big step farther . . . flying them by control line! An additional modification plan sheet is now offered at $5.00 for making this change. Obviously, if you don't have any of the 16 different airplane plans, you'll need to purchase those also.

For further information on the whole line from B.C. Air Originals, contact the company at 725 S. 12th St., #114, Bismarck, ND 58504, phone (701) 258-7423. "They really CAN fly!"

• • •

Jomar Products, 2028 Knightsbridge Drive, Cincinnati, Ohio 45244, phone (513) 474-0985, announces the latest addition to its line of electric motor speed controls for aircraft. It's the "SM-4" unit, but now it is prepackaged with sheet aluminum heatsink, see-through polycarbonate plastic protective cover, Sermos connectors, and servo lead with Futaba "J" connector as standard equipment. The SM-4 is a "High-Rate" speed control for minimum motor heating and features "Up-Front" optical isolation to reduce radio interference from the motor control system. It handles seven to 21 cells at currents up to 50 amps continuous and 200 amps surge, and is designed for motors from 05 to 40 in size. All Jomar units are available direct or at better hobby shops across the country. For more information, contact Joe Utasi at the above location . . . and tell him we sent you!

• • •

The "Finger Saver Safety Starter" sounds like it might be another version of the old stand-by "Chicken Stick," for safely flipping the prop. Actually, it has to do with the *other* end of the airplane. With its pointed frames driven into the ground, the hinged portion swings up to hold the airplane steady as the pilot adjusts the needle valve while standing behind the engine and the wing. It is said to hold the airplane even at full throttle. The whole idea, of course, is to provide a holding force on the airplane when no one else is there to help. Unfortunately, it cannot be used on a paved surface, such as a flight strip, unless there is unpaved ground along side the strip. With slight modification, however, it would seem to be possible to use it by driving a sturdy nail into a macadam surface or into an expansion joint or crack in a concrete surface.

For more information on the Safety Starter, contact Finger Saver, Inc., P.O. Box 1416, St. Petersburg, FL 33731. To order one, send $19.95 plus $5.00 S/H.

• • •

Wanna get your young three to six-year-old hooked on airplanes at that early age, and at the same time make some points toward flying time on the weekends with no strings attached? Fantasy Toys, 7958 Pines Blvd., Suite 188, Pembroke Pines, FL 33024, phone (305) 432-5196, offers plans and instructions for building World War I Pedal Plane Fighters. Construction materials are available at lumber and hardware outlets, with some parts available ready-made if desired. Plan-Sets retail for $14.95 each (specify the Spad or Red Baron) plus $3.00 postage and handling. Each Plan Set includes full-size patterns of all parts, material list, detailed step-by-step assembly instructions, and color photographs. ***MB***

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TECHNICAL *Continued from page 87*

PARTING WORDS

A superior pilot may be defined as one who uses his superior judgement to keep out of situations which would require the use of his superior piloting skills.

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

HANNAN'S *Continued from page 34*

years ago, Fred lived until 1978 and thus was able to witness and appreciate the Old Timer movement and the resurgence of interest in his kits. Certainly this must have been a source of satisfaction for him.

Bob Megow, now retired, has been assembling a small collection of memorabilia such as old Megow kits and plans. He still lacks a Megow engine, and would also like to hear from any former firm members. Bob may be reached at: Rt. 1, Box 1960, Hahira, GA 31632.

And oh yes, that name. The original pronunciation, as spoken by grandfather Megow was "May-go." However, over the years younger family members began to accept the fact that few people would say it correctly, and are apparently used to using "May-gow."

SIGN-OFF TIME

Famed aeromodeler and publisher Frank Zaic is taking water color painting classes, and finds it very frustrating: "I guess there is nothing like water color to set you back on your ego. Sometimes I feel like bringing some of my model drawings to the class to show them what I *really* can do." ***MB***

CHAMPIONSHIP *Cont. from page 43*

exactly the power and efficiency of the competition motors.

The biggest surprise came undoubtedly from Jason Perrin's well-deserved silver medal. This 19-year-old American pilot showed that he had fully mastered his model, more so than many experienced pilots. Other new (or fairly new) young and convincing competitors were Swiss Jean-Pierre Schiltknecht (not a youngster, but new to F3E), Austrian Michael Geringer, French Frank Legou, Belgian Benny Peeters and Briton Nigel Bathe. With all of them, the next World Championship may well run into a battle and end with some interesting surprises.

MODELS

We knew from last year that some competitors were experimenting with smaller and lighter motors, even at the expense of some power, so as to save weight and increase the climb rate. At the World Championship only four pilots showed with such motors, two of them (Schiltknecht and Leodolter, both from Switzerland) being really competitive. It is estimated that the bigger motors still have approximately 10% more power, for a three to four ounce weight penalty.

Urs Leodolter received his Geist 90 motor only days before the championship, so he put it in his reserve model without any change. In fact, the model was competitive enough so that he used it during the second half of the competition.

Jean-Pierre Schiltknecht, who flew in 7-cells FAI at St Louis, was competing up to now almost exclusively in duration classes. He is a true master of light building. His model was the smallest of all competitors, with a motor made out of standard parts, but lightened to the limit. The result: a record climb rate of 103 ft/s, 6200 ft/mn!

Most models had Hecktoplett motors, mostly because the new Keller 234 was available only very late. It was almost the same story with the American team, which received specially prepared Astro 60s only days before departing for Europe. Actually, all present motors can deliver similar performances and there are only very little possibilities of reworking. Differences come mostly from a more or less perfect adaptation of a particular motor to a specific model and propeller. Weight is of prime importance.

Technology is constantly improving, speed controllers are always smaller, lighter and better. The new generation Schulze and Sommerauer have microprocessors and fantastic performances.

The most critical part of a competition speed controller is the brake, as the energy derived from the large propeller turning at up to 15,000 rpm is enormous.

Present models span, on average, about two meters, for a wing area of 11 sq ft. Such small and thin wings do not gain much, weight-wise, from a fully-molded construction; traditional and molded methods were rather evenly matched between competitors.

No serious competitors had rudder control, so as to save some weight, and relying exclusively on ailerons. However, there is not such agreement on the relative merits of flaps-plus-ailerons vs. plain aileron wings. The slow landing and sharp turning ability of flapped wings are balanced by the weight penalty of additional servos and the resulting lower rate of climb. ***MB***

FLIGHT *Continued from page 45*

winning the Plymouth Internats Jet Speed event, setting a new record.

"Shortly after his first attempt at indoor rubber (built to pass the time after HLG flying at the indoor site) Jim and his son set Paper Stick records with EZBs. The scaled up EZB design, plus the Richmond touch, led to the Indoor FAI Internationals and a World Championship on his first try.

"Following this trend of events, perhaps we can look forward to an aluminum covered stretch version of Lazy Bones at Livno in years ahead. But that's getting ahead of our story. It is mindboggling to think of how

many indoor models could have been built from the wood in this model. It is also hard to imagine a simpler, more effective P-3O.

"As you take a look at the three-view, note that the entire ship is solid balsa. The wing has the undercamber warped into it and uses a standard indoor 4% arc airfoil. The fuselage is built of solid balsa and looks a bit like a large Pennyplane. The motor is mounted below the fuselage, and the flat stabilizer is dethermalizer-eguipped.

Nothing is mentioned about covering the model, but I presume that it is not covered with tissue, except for trim. The surfaces probably have a couple of coats of clear dope to seal them off.

One of the nice things about this model is that it could be built in a couple of evenings, and it should fly great. And if it gets lost, the second and third ones should be easier to build than the first.

AMERICA'S CUP 1990

I received an update on the America's Cup Competition from Al Hotard. The America's Cup is a year-long event that intends to give FAI fliers a high level competition so that the USA will do well at the International events. With one contest to go, the following competitors were leading the pack:

FIA Nordic: Jim Parker, 103 points, Pierre Brun, 87 points; and Bob Sifleet, 84 points.

FIB Wakefield: J.McGlashan 68, Jim Quinn 67, F.Blom and Walt Ghio tied with 65.

FIC Power: Bob Gutai 99, Randy Archer 95, Dale Mateer and Ed Keck tied with 78.

Scoring Notes: Scoring to five places at each of the sites = 25, 20, 15, 10 and 5 points. Bonus points are earned based upon entries. An entry = one official flight.

America's Cup events are scheduled around the USA, usually in conjunction with major free flight contests. For further information on how you might get involved, contact Al Hotard, 1012 Damato Drive, Covina, CA 91724. Since this program runs on a calendar year basis, it is not too late to get yourself situated for 1991.

U.S.FAI TEAM SUPPORT

While on the subject of international FAI competition, any free flighter who so desires can help support our team's expenses at the World Champs in1991, to be held in Yugoslavia. Walt Ghio, who was recently elected as the Free Flight Team Manager, notes that any individual or club that will donate $100 will receive a team picture and 15 team decals. For donations of under a hundred, you will receive 10 team decals. Your name or the name of your club will be used in the World Champs Report that will be featured in *Model Aviation* magazine. Uncovered expenses are estimated to be approximately $1500. Walt also notes that team T-shirts will be available, with proceeds going to offset the team costs. Any help for the team would be appreciated. Send to Walt Ghio, 1380 Elkhorn Drive, Stockton, CA 95209.

The assistant team manager for 1991 will be Martyn Cowley. Wakefield team members are Roger Mavis, Norm Furutani and George Xenakis. Nordic team members are Randy Weller, Jim Parker and Bob Isaacson. Power team members are Ken Oliver, Randy Archer and Ken Phair.

ALDRICH IS ARE BACK IN BUSINESS

George Aldrich is a name that many control line and free flight types from the

1960s remember quite well. George designed the classic C/L stunt model and set the stage for practically all designs that were to follow. This ship, The Nobler, was the one that all of the winners flew in the 1960s. George also got interested in the engine rework business and built one of the fastest Super Tigre .15s that I ever owned. The engine was still competitive with the early Rossi mills. Some time ago, George dropped from the engine rework scene, but he has now resurfaced. George noted in a recent letter that he has developed a heat treat process for cast iron piston engines that allows restoration of most any such mill that has seen better days. In fact, George continues, the compression is better than new as he hand laps the pistons and custom fits them to the cylinders. Along with this, he has done some rework on O.T. engines that has added up to 35i% increase. He's hoping to open some eyes at the next SAM Champs by showing those who changed SAM to alky fuel, pressure, etc., and thus "advanced the state of the art," as the SAM constitution forbids.

George also does full service chrome plating and restores various K&B Schnuerles, including those that are no longer manufactured.

George did quality work in the past, and I am certain that you would not be disappointed if you entrusted him to make your "dog" engine into a winner again. Contact George at 12822 Tarrytown, San Antonio, TX 78233. Call (512) 656-2021

CARE AND FEEDING OF TIMERS, PART II

I received a letter from Sal Fruciano shortly after my article on caring for old Tatone timers. Sal noted several suggestions for improving how you care for your timer:

"Very little lubricant on any part and none on any gears except the main drive gear. No lube at all on the mainspring. The oiler device (noted in my article) is good, but a .015 wire dipped in oil will make a smaller, neater drop. Oil attracts dust and can create drag on gears when used excessively, especially on cold mornings. If very little oil is good, a lot more oil is NOT better."

Sal notes that he has a line of power timers coming to market shortly. They will include a three-function l/2A power timer with remote fuel cutoff and a pinch-off timer with a more positive fuel cutoff action than those available in the past.

I am arranging with Sal to obtain samples of his timers, to conduct some tests and report the results in a future issue.

FIRST FLIGHTS

Several months ago, I asked free flighters to send in a brief story about how they got started in the hobby. I have received numerous letters, and will include some of them in future columns, as space permits. This month's story comes from Tom Cope, who lives in the Seattle area, but spends winters in Arizona. Tom writes:

"My first thrills with free flight began back in the late 1930s and early 1940s in a small town in South Dakota. After `breaking in' with the then-common balsa solid scale models, I moved on to rubber powered free flight. First attempts were not too good. One event that shook me good happened during a trip to the `big city' (Minneapolis, Minnesota). There was a kid playing in the street with an A.J. Hornet, and it was making the prettiest takeoffs and circling flights that I'd ever seen. Another event that still gives me the chills happened when I decided that a rubber powered scale Puss Moth had outlived its days and deserved a glorious finish. So, I wound it up, then doused it with kerosene from a barrel at a gas station, then stood on top of the barrel, lit a match to the plane and cave it a toss!

"It was right after that I decided to move on to the big time—gas engines! I saved and saved and finally ordered a kit for a GHQ that cost me $4.95, postage included. Now here's the part that was far out. I put it together and got it started! In fact, I was able to start it regularly. That may have been my crowning achievement in modeling. I had to have a ship too put it in,, and not having any

more money, I installed it in a rubber-powered Comet Aeronca of about three or four foot wing span. While starting the engine in our driveway, the engine backfired and the model caught fire. Even though my buddies and I blew our lungs out, the model was soon a heap of ashes with a glob of metal at the front.

"My next ship resulted from a more scientific approach;,I scratch-built a Red Ripper from *Flying Aces* magazine. My godparents footed the bill for this project. Although I could still get the GHQ to run, the power output was so low that the best I could achieve was a powered glide. Incidentally, I still have the wing and (broken) prop from that model—they're over 50 years old.

"And now the time approached for the big event—my first successful gas powered free flight. I had gotten a kit for a Modelcraft Spook and bought a used Madewell 14 from a hobby shop in the big city. It was in the middle of winter when I finished the Spook, so I made some skis and put them on it. And one sunny winter day, I started the engine, aimed the model down the center of a country road, and gave it a shove. There followed the prettiest R.O.S. (Rise Off Snow) takeoff and a gentle climb until the engine quit. And then a nice glide down to an equally nice landing. The whole flight probably only lasted a minute or two, but I was so excited that I was yelling and pointing and jumping around in the snow. My buddies were equally thrilled, but they also managed some laughs at my antics. And my life hasn't been the same since."

That wraps and ties it for another month. As I write this, a layer of snow covers the ground, and the temperature hasn't been above freezing for nearly a week. Obviously, not much outdoor flying is taking place in my area. But that doesn't stop the building projects—even though the shop is cold enough to be unpleasant. At least the humidity is down. For those of you who live in sunnier and warmer places, catch a thermal for me. ***MB***

CONTROL LINE *Cont. from page 51*

interesting is the Twin Terror, a 52-inch span flying wing designed for two .15-.29 engines. The Trident was a nice-looking twin-rudder stunt plane.

At this writing in November, Tony's remaining stock included: Mew Gus, Sonic Stars, Corsairs, Spitfires, Zeros, Typhoons, Giant Killers, Bandits, Twin Terrors, Wows, Wowees, 1/2A and B/C Hell Razors, Jubilees, Lil Spirits, Dark Sharks, Tridents, Manx Cats, Starlets, float kits and MPC-7.

For a current list, write to Tony at Control Line Classics, 24981 Nogal St., Moreno Valley, CA 92388, or call at (714) 242-5077. Don't forget that Tony already has a full line of stunt, Old-Time Stunt and sport plane kits.

• • •

For those of you who are into high-tech construction and are interested in vacuum-

forming materials, it might be worth writing to Composite Structures Technology for their product list. They have vacuum equipment and all manner of materials such as carbon fiber, kevlar, glass cloth, epoxies and related supplies. Write them at P.O. Box 4615, Lancaster, CA 93539.

• • •

A listing of product news wouldn't seem to be complete without some news from Tom Dixon, the ever-busy supplier of stunt and other CL products. Tom says he is now shipping kits of his Charisma stunter, and he provided a three-view sketch prepared by Steve Buso. At the same time, he is now producing a replica of the 1957 "green box" Nobler with some updating of construction techniques. Tom also sent along a photo of the Black Tiger kit prototype, which came out weighing 33 ounces with a Fox 35 engine. It has won the Nostalgia stunt divisions at its first two outings, in Anniston, Alabama and Marietta, Georgia. Decals on the plane are by Major Decals and the numbers are by Vinylwrite. The wing is covered with Japanese tissue and Sig dope; the fuselage with fiberglass cloth and epoxy.

Just to show that it's not all SSF (serious stunt flying) for Tom, he passes along the Sig Deweybird flown by his six-year-old son, Steven. It's powered by a Cox Black Widow and is very quick on 35-foot lines so they fly it on 42-footers. The plane is covered with nitrate dope and Formula U, with lettering by Vinylwrite.

Then again, stunt is never far away for the SSF (serious stunt flier). Tom says the Deweybird does the entire AMA pattern. Tom has built in a little dihedral to get the leadouts to the proper height. Coming next for Steven is a Sig Skyray (1/2A version), and a sheet-wing Tomahawk with a K&B .20 engine.

Sounds like a logical progression of planes for a young flier. We won't be surprised if we see young Steven winning the junior Nats in a few years. People interested in more information about Tom's product line should write for his brochure: Tom Dixon, Ste. 401, 1938 Peachtree Road, Atlanta, GA 30309.

• • •

There's even more CL news in the "in" basket but space is running out, so we'll finish with one serious and important note, which comes to us via Mike Keville, editor of the Precision Aerobatics Model Pilots Association's *Stunt News:*

"You all know Doug Taffinder (owner of the Carolina-Taffinder fuel and fuel tank business). He gives freely of his time and income as a Nats judge and contest sponsor. Now he has a need, and I think you'll agree that it's far more important than any model airplane.

"Doug and Mick's youngest son, David, a victim of cystic fibrosis, is a candidate for double lung transplant. Unfortunately, the Taffinders' insurance won't cover the expense, currently to be $350,000.

"Some folks have sent `extra payment' with fuel and tank orders but this becomes taxable income to Doug. Here is an address that will accept and mark your tax-deductible contribution for Taff's son: Sprayberry Lung Fund, 4 Carriage Lane, Suite 304, Charleston, SC 29407. Annotate your checks for David Taffinder.'

"Expect to hear and read more on this. We would like to help ease the burden by soliciting donations to this fund in David Taffinder's name. Please help spread the word in your newsletter, on ModelNet, at club meetings, contests, etc. There will be a special Taffinder fund-raising effort throughout the weekend of Vintage Stunt Championships III in Arizona in March. Let's see if we can put a dent in that total, and show the Taffinders we care."

As always, club and contest news, photos, technical tips and other control line news is welcomed. Write John Thompson, 326 No. K St., Cottage Grove, OR 97424. ***MB***

PYLON *Continued from page 63*

this point, or after use, loosen up one Detail "F" and move it over slightly to remove the bind. This is important to keep more than one card from being flipped at a time.

The remaining assembly is fairly simple. Cut out Details "B," and screw them into place and drill a clearance hole for the eye bolt. The modification shown to the eye bolt is necessary for hanging this system on Cyclone-type fencing. If this system is not to be used on this type fencing, other mounting methods can be utilized. The bolt through Detail "B" will keep the assembly upright and the bolt needs to be either bent outward so the center of the hook is outside of the assembly or the mounting hole through Detail "B" can be drilled on an angle so that the hook ends up outside the assembly. Your choice.

Paint lane numbers on the front of Detail "H" plus any other painting needed on the rest of the assembly.

This entire assembly takes some time to complete, however, when finished, will service you well for many years. It is very easy to use and setup is quick. Just hang them on your lap cage and you're ready to go. ***MB***

SURFER *Continued from page 67*

each wing panel.

Glue in the front and back parts of the first inboard ribs. Fit the root ribs against the fuselage sides and glue the root ribs to the wing panel undersheeting only. Add false spars between the root rib and first inboard rib on each side of the brass tubing. Epoxy the brass tubing to the wing panels between the false spars.

Remove the fuselage and wing from the blocks. Cut the brass tubing between the root ribs and fuselage sides. Sand the wing panels to receive the trailing and leading edge sheeting. Glue in the trailing edge sheet. Fit the leading edge sheet and glue from the leading edge back to the spar. Glue

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Void where prohibited

in the wing top sheet and also the rib caps in place.

The wing tips are built up. Glue the wing tip block to the wing tip sheet—make sure that there is a right and left wing tip. Attach the wing tips to the wing panels. Add the three false ribs as shown. Sand the wing tips to shape. Glue a strip of 1/8 x 3/16-inch bass or other soft wood to the trailing edge of the wing panels. Sand to a sharp trailing edge from root rib to wing tip. Sand the leading edge to the contour shown on the drawing.

STABILATOR ALIGNMENT

Cut out the notch in the vertical stabilizer for the hardwood insert. Drill a 3/32-inch hole in the insert as shown on the drawing. Fit and glue the insert to the vertical stabilizer.

Assemble the wing panels to the fuselage and set the model on equal height parallel under each wing panel. Fit a 3/4-inch long piece of 1/16-inch I.D. brass tubing into the hardwood insert. Assemble the stabilator panels to the vertical stabilizer. Place equal height parallel blocks under each stabilator panel. Once the stabilator is level and in line with the wing and perpendicular to the vertical stabilizer, glue the bearing blocks to the hardwood insert.

STABILATOR LAP JOINT LOCK

The purpose of the stabilator lap joint lock is to keep the stabilator halves from sliding off in flight. Make identical step cuts into both stabilator panels at the inner ends of the leading edge 3/32-inch deep and 1/4-inch long. Glue a 1/4 x 3/8 inch piece of 3/32-inch ply into the step cutout. Set the stabilator panels together with the 1/16-inch wire inserted. Shape the ply lap joint to contour with the leading edge of the stabilator. Drill a small hole through the lap joint. Use a fine wire through the hole, bend over to lock.

CANOPY

The canopy can be fabricated by using a solid or a laminated balsa block. Shape two A1 formers of 1/16-inch ply and drill a 1/8-inch hole as shown on the drawing. Glue one former on the back of the nose block and the other to one end of the canopy block. Using the 1/8-inch hole as a guide, drill a 1/8-inch hole in the canopy block. Glue a 1/8-inch dowel into the 1/8-inch hole in the canopy block. Next glue a pine block to the top of the fuselage wing rod support. Trim the pine block flush with the fuselage top. In the center position drill a 1/16-inch hole and screw in a #2 sheet metal screw. On the underside of the canopy block in respective position of the #2 sheet metal screw recess the canopy to receive the 1/16-inch ply key hole canopy block. Glue in the canopy lock such that the large hole faces forward. Install the canopy on the fuselage and check for fit. Shape and contour the canopy and nose block top to the fuselage.

SANDING AND COVERING

Sanding is an important phase in model building. Care and time are the key words here. Sanding files such as Perma Grit can speed up the operation along with 120-grit production paper and the finer sandpaper

grits. The filling of cracks and depressions can be done with vinyl spackling.

Be sure the structure is dust free before covering with your favorite covering material.

FLYING

The Wind Surfer Baby has a wide CG range. If there is a yawing tendency the CG is too far back. Keep the flying speed up and go looking for thermals. For slope soaring, load it up with weight to move the CG forward. In light slope, it performs like a fighter aircraft.

I would like to thank Joe Bridi for his support. I'll say no more. It is your turn to fly one of these Babies.

By the way, we just got the word from AMA Headquarters of these new records:

- Dale Collier: Class A Open, Duration Slope: 5 hrs. 5 min. 40 sec. Distance: Closed Course: 120 km (74.6 mi).
- Matthew Collier: Class A Jr, Duration Slope: 4 hrs. 2 min. 49 sec. ***MB***

ENFORCER *Continued from page 71*

The canted engine on the Enforcer is very strange. It easily allows the electric starter to engage the starter cone. Like the Concept, Enforcer still has a large diameter starter cone. It works fine with starters that have a starter cup that fits aircraft spinners. But it could be improved by tapering the cone so modelers can use those long starting shafts with smaller cups for starting 60-size helicopters. With the long starting extension, it's easier to start the engine without needing to remove the canopy. I removed the plastic starting cone that came with the kit and replaced it with an aluminum cone from Century Import for the Enforcer ($12.95). Their phone number is (406) 436-1025. This metal cone fits both Enforcer and Concept, but when ordering, make sure you ask for the one that fits the Enforcer because that's the one which fits the 60-size heli starters and regular aircraft starters. Vortex Precision in Anaheim, California, (714) 220-2112, also sells a turned-down aluminum cone that fits the Concept and Enforcer.

The Enforcer's engine location with the cooling fan facing up and forward makes it very easy to draw in air. Concept has its cooling air intake from the back. In forward flight the region behind the fuselage is a low pressure region. Hence, it is not optimal to have the cooling fan opening to the back. As not too many Concept owners reported overheating problems, the centrifugal cooling fan is probably adequate for the job. However, the Enforcer cooling system seems more efficient because the same Century Import Mini Tuned Pipe had more discoloring on the Concept than on the Enforcer.

The Enforcer engine location does make the glow plug very difficult to reach. You need an 8mm socket wrench with long handle. A conventional Ni-Starter cannot reach the glow plug on the Enforcer. A power panel with a twist-and-lock type of glow plug connector is useful. But the canopy must be removed to connect the glow driver. Surprisingly, the kit does not include a remote glow plug connector, either. I bought a McDaniel remote connector and fixed it to the side of the frame. Now the engine can be started without removing the canopy. This remote extension is highly recommended. But the Enforcer kit did come with a nice fuel line filter and a fuel cut-off "squeezy."

FUEL SYSTEM

The fuel tank fitting on the Enforcer is kind of wimpy. It uses a rubber grommet to seal the fuel vent and pick up nipples. This is a very convenient invention, and works flawlessly, too. But it just looks gimmicky. The tank location is definitely better than Concept's. The tank is located close to the model's center of gravity and the fuel level can be seen easily from either side or behind at ten feet away. This tank location is excellent! There is enough fuel to hover for 15 minutes. Very nice. But the tank is just a tad low. The top of the tank is not quite at the same level as the carburetor opening. On a full tank, the engine tends to run rich. When the tank is 2/3 empty, the engine becomes lean. If you had set the engine close to the lean side when the tank was full, you might risk having the engine lean out, overheat and quit! Enforcer is not the type of helicopter with which you would want to have a surprise autorotation because the blades are relatively lightweight for you to stretch a glide. Furthermore, the soft flapping head design is prone to allow a tail boom strike on autos. To prevent the engine from leaning out toward the end, adding a one or two ounce feeder tank may be a good idea. Because of the higher oil content in the 30% Magna fuel, the flight time is shorter as compared to typical lower nitro fuel on the market.

EQUIPMENT

The servo tray and servo pushrod linkage design set this model apart from others. As the pictures show, all the pushrods on Enforcer are straight. This is quite a design achievement. Some of the molded plastic bellcranks are custom designed to have non-90-degree bellcrank arm angle so the pushrod will be perpendicular to the bellcrank arm. Nice job. The entire servo tray can be removed as a module by loosening just four screws. This provides access to the engine and makes the Enforcer engine just as easy to service as Concept (As an exercise, it took me 25 minutes to remove the engine from the Enforcer.) A conventional aircraft style muffler works very well on the Enforcer. The exhaust exits cleanly away down the bottom. The pictures show that we used a Century Import (408-436-

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1025) Mini Tuned Pipe system designed for the Enforcer. It's black when new, but after the first flight, the header will turn into a beautiful glowing gold color. Century also makes Mini Tuned Pipes for Concept and Shuttle. A fellow modeler in Frederick, Maryland reported that the Mini Tuned Pipe boosts the power by 5 to 10% on his Shuttle. With 30% Magna fuel and Mini Tuned Pipe, the Enforcer was like a rocket. It climbed inverted almost as quickly as climbing right side up. If you will be using the Mini Pipe, we have found that leaving a 1/4-inch gap between the header and pipe gives the best tuning result.

The clutch design on the Enforcer is a scaled-down version of Kalt's 60-size helicopters. There are two clutch shoes, and they are bolted onto the bottom of the cooling fan. I must have one of the good clutches because after fifty flights, it still works great. That includes two accidental start-ups with idle-up engaged. However, my fellow fliers complain that their clutch fails frequently. Well, I don't know what to say. The drive gear on the Enforcer looks just like the Concept's, except it's thicker and thus looks stronger. It is very nice to see that two ball bearings are included in the drive gear, while Concept DX uses bushings. But the SE and SX both come with bearings.

The best feature on the Enforcer is its abundance of collective travel. Without any modification, we are getting +10 to -7 degrees of collective travel. This is not possible on the Concept DX and SE. The SX can get +10 to -7 because it has different blade grips than DX and SE. Main and tail rotor blades are completely interchangeable between the Enforcer and Concept. The blades are the same length and both use 8mm blade grip. Stock blades on Concept and Enforcer are both around 75 grams. We feel 85 to 90 grams would be ideal for even greater stability, and autorotation. These helicopters are very stable already, but with more weight near the leading edge, there is less tendency to pitch nose up in forward flight. Tech Specialty, which makes the blades for Enforcer, has now reduced the leading edge hardwood by 1/4 inch and replaced it with more balsa to shift the chordwise center of gravity toward the leading edge. This stabilizes the blade and reduces the pitch-up.

My Enforcer with the original lightweight blades experienced flutter in certain harsh aerobatic maneuvers, such as Split-S. By lowering the main rotor rpm, the flutter tendency was significantly reduced, but pitch-up tendency increased. The new 30 size Ninja blades from Century were tried on both Concept and Enforcer with excellent results. The Ninja blades weigh 80 grams each and have slightly curved blade tip. They are available as unfinished or prefinished. The Ninja blade has two laminations of hardwood and three laminations of balsawood. Between the hardwoods is a 1/16-inch thick lamination of carbon graphite for strength. Transparent shrink tubing is included. After covering you can see a black line from the carbon graphite. This is high-tech, though I am not sure this carbon graphite is really needed. But, the airfoil is what makes the blades fly fine. The Ninja blades are $29 from Century. I don't have any Concept Expert main blades on hand, but these will probably work well on the Enforcer because they work great on the Concept.

The landing gear struts are four separate pieces bolted onto the side frame. Personally, I prefer the single strut as on the Concept, because there is less slop. However, Enforcer's strut has more meat and is thicker than Concept's. Just add a few drops of Flex Zap where the strut joins the side frame. That will remove the slop at the joint. I avoid taking off and landing my Concept or Enforcer on concrete now because that wears away the plastic landing gear strut bottom very fast. Many modelers slip some urethane tubing on the skid to protect the strut. When taking off or landing, be careful, the thin skids may get caught in the grass. Beginners should always buy or build a set of training skids to prevent tip over. To prevent the struts from becoming squashed after prolonging sitting on the ground at home, simply form a wire loop from coat hangar wire and wrap it around the skids to prevent them from spreading.

The white Kalt ball links fit the balls quite tightly at the beginning, but they break-in very nicely, and they do not wear out very rapidly. Kyosho ball links are also tight in the beginning, but they wear out quicker. Concept owners can replace the Kyosho ball link with Rocket City ball links after 50 or so flights.

Enforcer is just as easy to construct as the Concept. The parts are packed in 12 plastic bags. For an extra $30, the ready-to-fly Enforcer may be worth it to the total beginner. It only took us two evenings to complete the entire model. My friend, Mike Donnell, assembled the mechanics while watching Monday Night Football. Then I spent seven hours to install the radio, mount the linkages, add the decals, and give the complete inspection and setup check. The instruction manual is okay, not the greatest, but it has plenty of drawings and the model is simple enough that anyone who has assembled an RC car should have no problem. It would have been better if the instruction manual gave suggested pushrod length, that would really help the beginners. In this respect, the X-Cell manual is very nice. It shows drawing and length for all the required pushrods. Like the Concept, the Enforcer is made of almost 80% injection molded plastic parts. It's really like assembling a plastic toy. Nothing needs painting. If you buy the kit on Monday, it should definitely be flying by

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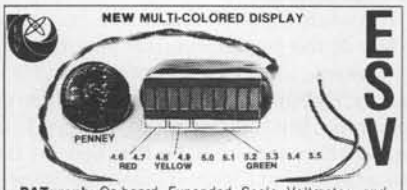

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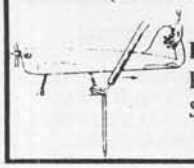

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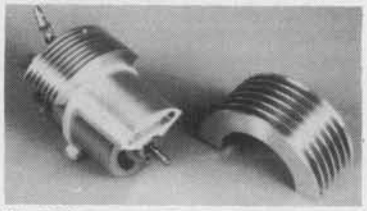

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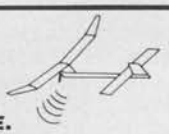

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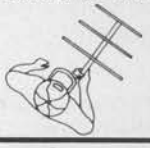

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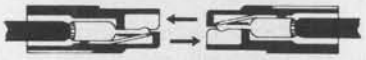

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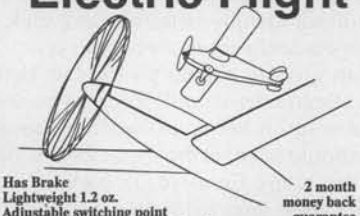

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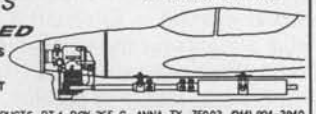

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Saturday morning! If you want the decals to last a long time, add some Flex Zap glue along the edges of the decals so they will not peel.

FLYING

Now, let's go over the flying impression. Hover is a piece of cake for people who know how to fly. The model is very stable in hover. In the wind the Enforcer gets bounced quite a bit simply because it's a small and light helicopter. Slow forward flight on calm days is beautiful. In high speed forward flight the model balloons upward horribly. It balloons up slightly more than Concept SE and DX. But the new SX also balloons up. This is due to the soft flapping rotor head and the huge paddles on these two models. The Shuttle ZX does not have this tendency. To cure this problem, simply replace the plastic paddles on the Enforcer with a pair of aluminum paddles from Concept DX (this suggestion is for beginners only). The heavier metal paddles accentuate the effectiveness of the flybar stabilizing action to prevent any sudden change of vehicle attitude.

For any RC model, the flybar is there for two purposes: to act like an autopilot to help stabilize the model, and to give extra control to help tilt the main rotor disk. (August 1989, Sept. 1990 and Oct. 1990 *Model Builder* explained the flybar principle in detail.) The second method is to install a set of GMP flybar weights for the Cricket (GMP #670). Vortex Precision also sells 30-size flybar weights and K&S FAI paddles. By making the flybar heavier, the Enforcer handles even better in hover, almost hands off! In forward flight, the model does not pitch up as much. Enforcer and Concept 30 SX both have a very large paddle area; that's what makes them so sensitive and pitchy. The paddles were purposely made huge so the paddle control power can replace the loss in cyclic control power due to the soft flapping head. The Enforcer kit should have included a set of flybar weights so the modeler can move them inward for more aerobatic, or slide them all the way out to improve stability for the beginner.

Because of the big control paddle area, cyclic controls (means fore/aft or left/right tilting of the main rotor disk) are very responsive. Installing the flybar weight or cutting a 1/4 inch off the paddle tip will reduce the control sensitivity, but the model will still loop and roll. Looping is a breeze with the Enforcer. You don't even need idle-up, simply pull back gently on the elevator stick. For beginners and experts, set both cyclic controls to give maximum swashplate deflection. Beginners would not have to worry about controls being too sensitive because they should have set the flybar weight all the way out or use Concept DX paddles.

Switchless inverted flight is very easy, too. All the 30-size collective pitch helicopters on the market will fly inverted. Our picture shows Tom Knerr flying his Enforcer inverted using the invert switch on his Century 7 radio. We recommend that if you want to learn inverted flight, the proper way to do so is not to use an invert switch. It's better to mentally reverse all the controls in your head, like flying RC airplanes inverted. Using a switch can be confusing because you have to remember to toggle the invert switch during roll over. In an emergency, you can get confused.

The tail rotor control is excellent on the Enforcer. Last month, we said that the Shuttle has excellent tail rotor control, but that's only if you rev the Shuttle main rotor head up to 1700 rpm. The Enforcer has even more tail rotor control power than the Shuttle. A GMP gyro is used on our machine. Even at full gyro setting, the Enforcer will do better than one pirouette per second. We suggest a gyro setting around 80%, and connect the tail rotor pushrod to the innermost hole on the tail rotor servo. At this setting, our Enforcer still spins on a dime.

Check the collective control bellcrank arm periodically. Some modelers tell me theirs have loosened after a while. Our Enforcer hovers at about six degrees, full collective is about ten degrees, and low end should be set at -2 degrees for beginners and -7 for switchless inverted flying and autos. In hover, the main rotor is around 1700 rpm. You should hear the engine sing. We noticed the Enforcer becomes more stable in hover at high rpm. But don't wind up the rpm too high because there is no thrust bearing in the main rotor head. We have not heard of any blades flying off in the air, and we don't want you to be the first to experience it. An indication that your main rotor rpm is too low is the model wallowing forward and back slowly. When the rpm is right, the model quickly settles into a stable hover. To test the rpm setting while you are

ADVERTISER INDEX

in a hover, try giving a quick blip of forward or aft cyclic input. The model should zing slightly and immediately stabilize. I put a drop of slow cyano glue on all the self-tapping screws to make sure they would not vibrate loose. This is especially important on the screws for the control bellcranks!

Like the Concept, the plastic main rotor blade grip can wobble side-to-side (lead-lagging). Part of the slop is from the bearings, and part is from the feathering spindle being held onto the steel flex plate by only one bolt. No matter how much the bolt is tightened, the spindle can still lead lag. Maybe two bolts should have been used.

In certain areas, Mr. Taya has improved the Enforcer over his first 30-size helicopter design. But his first design was so good, either by luck or not, it doesn't need many improvements. Thus, the Enforcer is more like an interior decoration exercise; where the house is untouched, but the guts rearranged. The result is another 30-size helicopter that's extremely docile to handle, but mechanically different. A good example of design improvement that has nothing to do with flight characteristic is the servo hold-down method. On the Concept, the servo mounting screws are screwed into a small plastic plate behind the servo. These small plates are hard to work with. On the Enforcer, the servo screws are simply screwed into the servo tray.

If your objective is buying a first helicopter that's easy to learn on, then either the Concept or Enforcer will do equally well. As I don't own stock in either company, it doesn't matter to me which one you buy. In this case, the sequel is just as good as the first . . . unlike Hollywood movies, it did not get worse! What separates them is the different theme in the mechanical layout. They are vastly different in approach, depending on your preference: top start or rear start engines, round canopy or sleek shape canopy, gears outside or internal, offset hinge articulated rotor or soft hingeless rotor, etc. One distinct advantage of these pint-sized rocket ships is that they are less expensive than the big machines, almost indestructible, and less intimidating. When I fly them, I really bang them around all over the sky, and you don't need big spaces to have fun. Flying them is like driving a go cart; you get crazy and just want to have fun. Flying the 60-size machine is like driving a real car; you are more diligent. Maybe that's why even non-beginners are buying these 30-size models, just to have fun. My friend and I wrung out our Enforcer to the limit; vertical dives with negative pullout, looping it ten feet off the deck, and he was doing rolling circles and hovering rolls three feet off the deck (with my Enforcer)! We flew it like there was no tomorrow. This is what we would not have done to our more expensive 60 machines. One thing we noticed is that the Enforcer only pitches upward in high speed forward while flying rightside up, it was more stable flying inverted . . . no pitch-up. Another thing we definitely would like to see on newer Enforcers is to make the flexible spring steel plate thicker and reduce the area of the paddles! This would prevent tail boom strike, alleviate flutter, add more pitch and roll motion damping, more cyclic control power without the need of using huge paddles which make the model pitchy, and in general simply improve the handling.

Stay tuned, next month we will take a closer look at the Concept SX. ***MB***

CHATTER *Continued from page 75*

uses for the programming mix, please write in and we will let the other readers try them, too.

Before we end this month's column, another interesting paragraph from the Florida TORCHS newsletter was written by Cliff regarding his X-Cell rotor head mod. Here is what he said, "As many of you know, I've been using pinned axles in my rotor heads. This allows the damper 0-ring to work evenly on both sides of the head. Without pinning, the damper 0-rings are compressed on the top side of the head block as the blades pull upward due to lift. When a gust of wind comes along, or you put a command into the head, the blade that moves up actually causes the axle to bottom (top?) out against the head block, while the opposite side has plenty of room to move. If the center of the axle is located in the center of the head

block, the 0-rings are allowed to work evenly on each side. The way to pin the axle is complicated and requires a milling machine to do it right. But there is a way to "fake" it! Put a 10mm piece of extra large fuel tubing on the center of the axle. Lube it with silicone grease and slide it onto the head block. Now install the 0-rings lubed with a very small amount of silicone grease (smear it on your fingers, wipe off the excess and then rub the 0-rings). This will take some of the lifting load off the 0-rings and will act like a soft pinned head block. Don't forget to change your 0-rings about every four gallons of fuel!"

Whew, every four gallons of fuel, Cliff? This pinned rotor and faked soft pinned rotor sounds like a really good idea for X-Cell and Schluter helicopters. So far the K-5 rotor head on the Kalt Excalibur and Cyclone II is the only rotor head that has 0-rings and also a pin already installed by the factory. We showed the exploded view of the K-5 design in our Cyclone II review in the May 1990 issue. Yes, the K-5 head works very well on the Excalibur. Note, the GMP Elite rotor head does not have this 0-ring phenomenon because it uses underslung teetering design. Good suggestion, Cliff. No wonder this guy is the 1990 National Champ! Congratulations.

Finally, in the September 1990 issue we published two letters from Ian Mc-Queen of Tokyo regarding the use of diesel engines for RC model helicopters. He pointed out the advantages, such as lower fuel consumption, and gave initial results from his friend's test on a Concept 30. We conclude this month by showing a letter from a reader in New York with his reasons for not using a diesel engine for RC model helicopters. Here is the letter:

"In the 9/90 *Model Builder* you requested comments on diesels in helicopters. I considered trying this at one time, but decided to try the diesel in an airplane first for experience, learning, etc. Based on what I have learned, my advice would be: if you like to tinker, try a diesel, if you want to fly a lot reliably, don't! There have been a lot of statements made about diesels by advocates . . . some are true and some aren't. My conclusions from two seasons of airplane flying on O.S. 40 FSR with Davis diesel heads are as follows:

"1. The diesel turned a normal glow propeller (10-6) at the same or slightly better rpm. The power is there.

"2. Running the small prop at the higher rpm, fuel consumption was not much less than running glow. But diesel fuel is twice the price. Claims of low fuel consumption seem to be based on running larger props at lower rpm, hence better appeared fuel economy.

"3. The diesel idle was excellent . . . hardly ever quit. Transition from idle was a problem. Mid-range carburetion problems are tough enough in glow, diesels are worse.

"4. The major problem with the diesel was getting correct compression settings. The ranges of these are narrow and critical.

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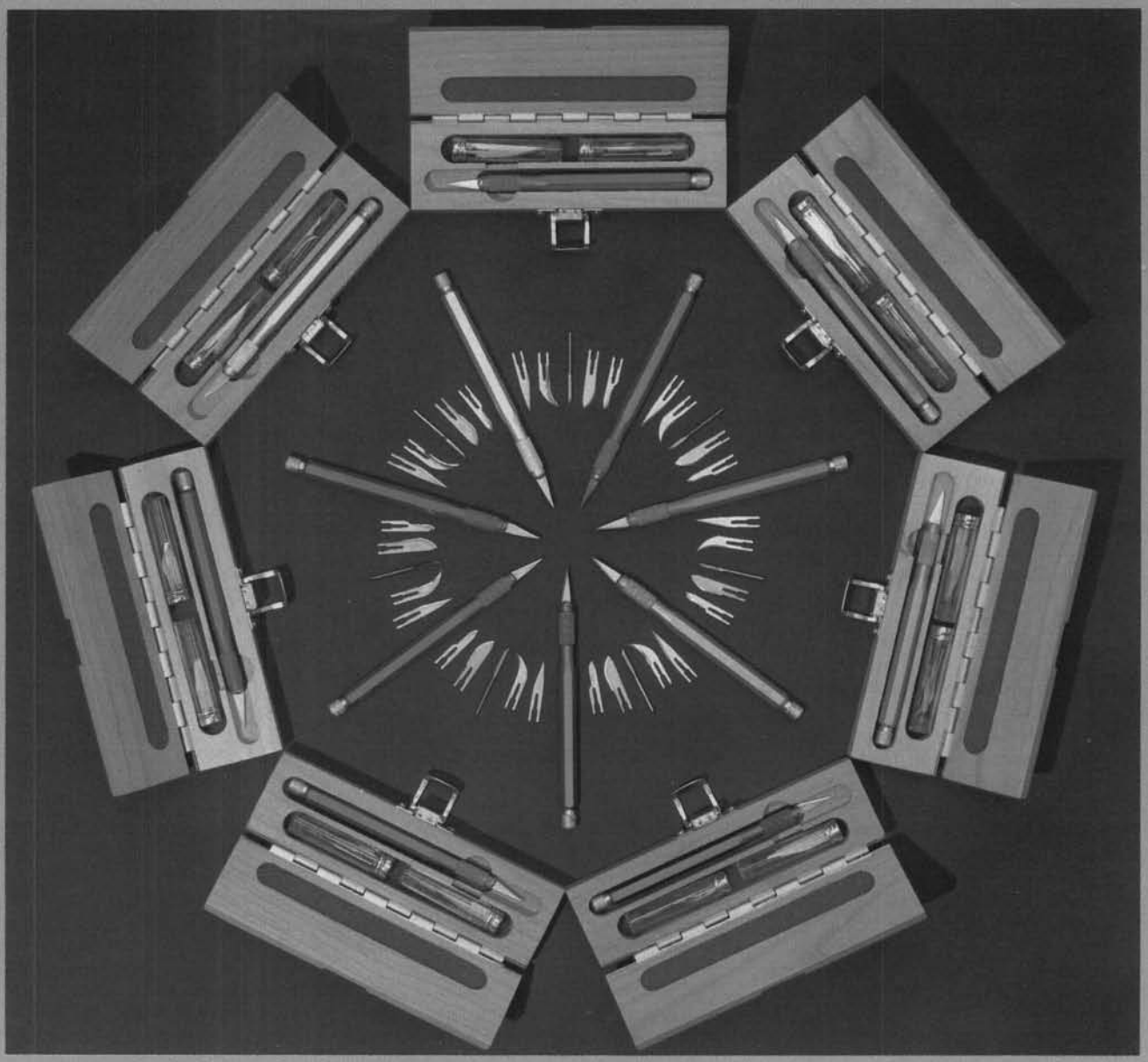

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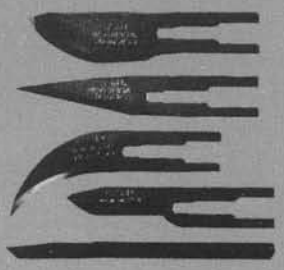

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If set right, the diesel runs well. If a little off, it runs ragged. And the correct settings are highly dependent on atmospheric conditions: pressure, temperature, and humidity. My glow-powered helis go for weeks at a time with the needle untouched. You could never do this with a diesel . . . every day it needs to be reset. In a heli you'd have to start every flying day by tuning up on a test stand. The settings have to be made at full throttle . . . inconvenient!

"5. The diesel sound level really isn't much lower than glow if running the same prop, muffler, and rpm. Lower sound claims by diesel lovers seem to be based on running a larger prop at lower rpm.

"6. Diesels have a serious carboning problem. Every few hours they need to be stripped and cleaned of carbon deposits. This is bad enough in an airplane, but in a heli, it isn't so easy to remove and service the engine. My dieselized 0.S. 40 eventually went sick. I found the piston ring carbonned into the groove so tightly that it couldn't be removed without breaking.

All these points, based on airplane experience, killed my interest in diesels. I never did try one in a heli, concluding that it would be a serious reliability and maintenance problem. I want to fly and not mess around. Perhaps others will have better luck. I'd like to hear about some trials in helis. But I think people will run into problems I have cited, and I doubt that diesels will ever become popular in helis. In spite of a lot of publicity, they are still a rarity, even in airplanes."

(Editor's Note: We'll offer Bob Davis space for a rebuttal to the above comments.) **MB**

SOARING *Continued from page 80*

of the blue, here comes a hang glider working across the slope. With the ever-present crowd around us and without an easy place to land, things got hectic fast. I saw Andy's plane hit the sand. I didn't know where Chip was, and here I was flying a rocket twenty to thirty mph faster than the hang glider in the same airspace. Going in the opposite direction, I turned short to land. The hang glider must have turned also because all of a sudden we were on a collision course. My wing tip hit his leading edge sending my plane spinning into the sand. He kept going while hollering back, 'I'm sorry." No damage was done to either of us, luckily!

"Jockey's Ridge State Park is on Route 158 in Nags Head, NC, on the Outer Banks. It's a fantastic place to fly! Sincerely, Terry Lisansky."

Thank you for the flying site directions, Terry. Although I'm not likely to use the site anytime soon, perhaps a few easterners will get the chance! With a dune like that to fly from, the lift ought to be outrageous most of the time, and the landings relatively soft and easy.

Anyone else got a favorite site to share? I welcome them, and we all enjoy hearing about faraway "dream slopes" for armchair flying or planning vacations.

AIRFOIL OF THE MONTH: HQ-1,5/9

Here is Jerry Bridgeman's airfoil of choice for the Snipe which you just read about flying the slopes near Kitty Hawk.

In the German language book MTB 7, HQ Profile I read that it is recommended for: (1) fast slope gliders up to three-meter span for all-around use, or (2) F3B models with sufficient wingspan (3-meters) and aspect ratio of about 14:1, and (3) it can be used in combination outside (at the wing tips) with the HQ 1.5/8 at the root. These are the two airfoils which Helmut Quabeck used on his Dohle '83 F3B ship which he flew at the World Championships that year at York, England. The wings taper slightly on the Dohle '83 so that spar depth and flap and aileron hinge depth remain constant. Trimmable trailing edge is a must if you plan on a wide speed range for multi-task flying.

TH-THAT'S ALL FOLKS!

Keep your eyes to the skies, and your thumb on the sticks! Thermals to all: Bill Forrey, 3610 Amberwood Ct., Lake Elsinore, CA 92330; (714) 245-1702 (after 6:30 p.m. PST but before 9:30 p.m.). **MB**

WORKBENCH *Continued from page 5*

it's high time we brought you up to date on results of the first IMS Milwaukee show at the MECCA Center, the weekend of October 5, 6, and 7, 1990. As advertised, the Milwaukee show was opened in order to fill the void left when the former show put on by Chicago-area model clubs was taken over by RCHTA, the Radio Control Hobby Trade Association. Although this show has grown quite large, it is not quite the same as the long-established RC model shows such as those put on by the Toledo Weak Signals, the Westchester County WRAMS club, and the IMS shows, in that it does not allow selling by exhibitors, there is no swap shop, no static model competition, and the largest percentage of the exhibitors are non-RC, such as model railroad, games, and major model plastic companies.

While spectator attendance was very good for a brand new, first-time show, the exhibitor turnout in Milwaukee was a little weak. This was mainly attributed to the fact that we were unable to obtain a better date. As the Chicago RCHTA show opened only 11 days after the Milwaukee show closed . . . and that's not counting two days for setup . . . many exhibitors were simply unable to take so many days away from their business in such a short time frame. This problem will not occur in 1991, as the IMS Milwaukee show will be on the same first weekend of October (4th, 5th, and 6th), while the RCHTA show will not start until October 31st and close November 3rd. Exhibitors who could not handle it last year, have already started signing up for Milwaukee in 1991.

By the way, a new idea for involving spectator participation in judging the static model competition was inaugurated at the 1990 Milwaukee show. As they entered, spectators were offered a "People's Choice" ballot. On the ballot, the spectator printed his or her choice for the best static model on display, be it airplane, boat, or car, and included their name, address, and phone number. The ballot was dropped into a box as they exited. On Sunday afternoon, *after* the IMS judges had made their selections for category winners and "Best of Show," the ballots were counted and the "People's Choice" winner determined. Now here's the best part . . . *all of those who happened to vote for the model that won "People's Choice" will receive a FREE ticket to the 1991 show!*

In case you think we're just blowing smoke, here are the names of the spectators who voted Bob Gialdini's "Extra 230" as the "People's Choice" and will be receiving a free admission ticket for IMS Milwaukee 1991. From Wisconsin; Sandy Doeren, Ralph Henrichs, Charles Knutson Jr. and Sr., Andrew Moulik, John Preiser, Dave Root, Kandee Rutledge, and Lynn Sidabras. From Illinois; Ron Burke, Ed Bywalec, Glenn Immekus, Glenn LaRocco, Rudy Moulik, James Schahill, Gary Stephens, and Ann Zettel. And from Minnesota; Tom Severson. Congratulations to all. Hope to see you in

October!

In talking about Pasadena and then Milwaukee 1990 and 1991, we kinda skipped over the fourth annual IMS Atlanta show in 1991. Yes, it will take place on the first weekend of May, the 3rd, 4th, and 5th. But there one very big change that potential attendees should note . . . with this year's show we're moving from the World Congress Center in downtown Atlanta, to the Georgia International Convention & Trade Center in College Park, just a short shuttle ride from Atlanta's Hartsfield Airport. The Center is attached to an excellent Hyatt Hotel . . . even closer together than the Holiday Inn and Pasadena Center in Pasadena, or the Hyatt Regency and the Convention Center in Rosemont at O'Hare Airport, Chicago! You don't even need to rent a car unless you intend to go sightseeing in your spare (?) time. Incidentally, there is a large amount of parking space for exhibitors and spectators, and it's all FREE!

Modelers intending to enter the static competition should note that there are some changes in the categories to enter. In addition to the "People's Choice" and "Best of Show" awards, both of which apply to any category of model entered, the individual categories are: RC Race Boat, RC Scale Boat/Ship-Military, RC Scale Boat/Ship-Pleasure, RC Scale Boat/Ship-Work, RC Car/Truck-Electric, RC Car/Truck-Gas, RC Glider, RC Old Timer, RC Pylon, RC Scale-Sport-Military, RC Scale-Sport-Non-Military, RC Scale-Precision, RC Helicopter, RC Precision Aerobatics, RC Sport, RC Sport Biplane, Control Line, FF Endurance, and FF Scale. Note that where the kind of power is not specified in RC, that gas or electric power is OK. And in Free Flight, the power can be gas, electric, rubber, Jetex, CO_2, compressed air, or even hand launch!

SPACE SHIP READY

By the way, 1991 Pasadena IMS visitors may have noticed the large, radio controlled Martian Space Ship in the RCMB Publications booth. Skip Ruff, of Taft, California, who has been in regular communication with the folks an Mars, through their interpreter, Roy Clough, has perfected the design for RC through numerous test vehicles, to the extent that it is ready to be revealed to the model building public (It's definitely not a Buy-and-Fly project). Final plans are being inked and checked, and it is expected that the plans and construction article will appear in the June or July issue of *Model Builder*.

If you don't recall what the space ship looks like, or haven't seen it at all, check with someone who has an April 1990 issue of *MB*. We featured pictures in the "Workbench" column of one of the prototypes as it was returning to Earth after being flight tested by our friends from the red planet. **MB**

BOB PECK *Continued from page 4*

Blimp, and particularly the line of rarely-found accessories for traditional stick 'n' tissue modeling, such as thrust bearings, washers, lube, winders, plastic props, tissue, prop shafts, light molded plastic wheels, etc., was kind enough to provide the following information.

Bob struggled, or had to contend with physical problems most of his life (For many of his last years he was confined to an electric powered wheelchair, the way many people in the industry and hobby had only seen him-wcn). *He was diagnosed as having rheumatoid arthritis in his early years of highschool. He was born in Salt Lake City, raised in the Chicago area, then moved to San Diego with his mother and brother, Jerry, in the early 1950's. His mother had two sisters in San Diego, and she moved there to be close to them.*

Bob and his brother were raised by his mother alone, one who must have been a very strong and wise, yet gentle woman. She died of cancer when Bob was 20 and Jerry had been away for the first year of his full scholarship at Cal Tech in Pasadena, so now they were on their own. Although he had no college degree, Bob was working in Aero Space and doing well. He was soon working as an engineer in packaging electronic equipment.

Bob worked in Aero Space until 1973, when he broke his leg. (Bob and Sandy met in 1956 and were married in January of 1958. While dating, they used to build model airplanes together at Sandy's house!). *The broken leg put Bob in a wheelchair. After two years and many surgeries, he went back to work for a short time, but it was difficult.*

As Peck-Polymers had already been started in spare time, two kits were being produced, and Bill Hannan had been contracted to design the Druine Turbulent, the decision was made to go for it and devote all time and effort to make Peck-Polymers a full-time business that we could live on. (Their two daughters, Vera and Jill, were an important part of the manufacturing team, helping to produce kits and packaging materials on evenings and weekends. Jill often attended meets with her father, and was a very good modeler in her own right). *Bob always had a drive you just could not stifle, which allowed him to do all the things he did. As a child, he was always the leader, and his projects sometimes got him in trouble. He was always very interested in anything that worked. He had model trains, rockets, and boats, but planes were always his main interest.*

I believe that those who knew him did not see the wheelchair or twisted hands as part of him. He was a strong person and did not meet an obstacle that he could not design his way around. *He was good at giving instructions and analyzing and could have others do the things he could not physically do himself. He expected things to be done right, and did not have patience with second-rate work.*

Bob's ability to make physical handicap nothing more than a nuisance instead of a total deterrent to living, should be an inspiration to all of us. **MB**

"ARF PLANE OF THE YEAR"
–Model Builder Magazine, 1989

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