# MODEL BUILDER

WORLD'S MOST COMPLETE MODEL AIRCRAFT PUBLICATION

NOVEMBER 1989

ICD 08545

U.S.A. $2.95

Canada $3.95

volume 19, number 213


## Reviews:

**Great Planes' Electro Streak**

**Astro Flight's Charger**

**Robbe's Vampir**

**GMP's Cricket**


## Construction:

**SEASPORT II R/C Flying Boat**

**PACER "C" Old Timer**

74820 08545 11

Aero Tiger Specifications:
#25000 Basic
#25100 Deluxe
Wingspan: 49½"
Wing area: 396 in.
Length: 31½"
Flying Weight: 38-44 oz.
Motor: .05 Direct Drive



Aero Sprint
Specifications:
#25500 A.R.F.
Wingspan: 50"
Wing Area: 450 sq. in.
Length: 36¾"
Flying Weight: 40-46 oz.

# Pair Of Aces


## AERO TIGER

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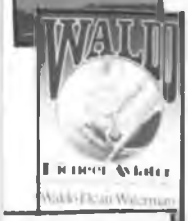

**WALDO: Pioneer Aviator.** Waterman. The true-to-life story of Waldo Waterman, Barnstormer, inventor, test pilot. His life as an early TWA pilot, Hollywood flying in the epic of "Hell's Angels" film, winning at the National Air Races and of his perfection of the only successful flying automobile. Captures the flavor, excitement, glory and heartbreak of American aviation 1910-1944. 300 photos, 502 pgs., 6" x 9", sfbd. 1440B **$18.95**

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# MODEL BUILDER

NOVEMBER 1989

volume 19, number 213

898 West Sixteenth St., Newport Beach, California 92663 Phone (714) 645-8830


## CONTENTS

### FEATURES



### CONSTRUCTION



COVER: Although the 1932 Thompson Trophy Race was won by Jimmy Doolittle in the Gee Bee R-1 (as portrayed on the June '88 *Model Builder* cover), the Wedell-Williams Model 44 airplanes, of which there were three, did quite well. Jimmy's No. 44 and No. 121, Roscoe Turner's Gilmore Red Lion, finished second and third respectively in the Thompson. Jimmy Haizlip, flying the third airplane, No. 92, won the 1932 Bendix Race. During the next several years, these airplanes ended up being the top winners themselves.

The 22"x30" watercolor original is available for purchase. As new catalogs will not be ready at the time this cover appears, it is suggested that you call for information on the original or about signed collector prints. Contact Robert A. Benjamin Aviation Art, 1222 26th Ave. NE, Olympia, WA 98506, (206) 352-2602.




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Mount the tail, join the wing, add landing gear, install the engine and radio - Just a few simple steps, all with concise complete instructions.

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High quality ply and balsa woods make a simple, repairable airframe.

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All hardware (wheels, covering, fuel tank, linkages, etc.) are products you can trust.

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All moveable surfaces come pre-hinged and sealed, right out of the box.

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The entire airframe comes pre-covered with Monokote®. No covering required!

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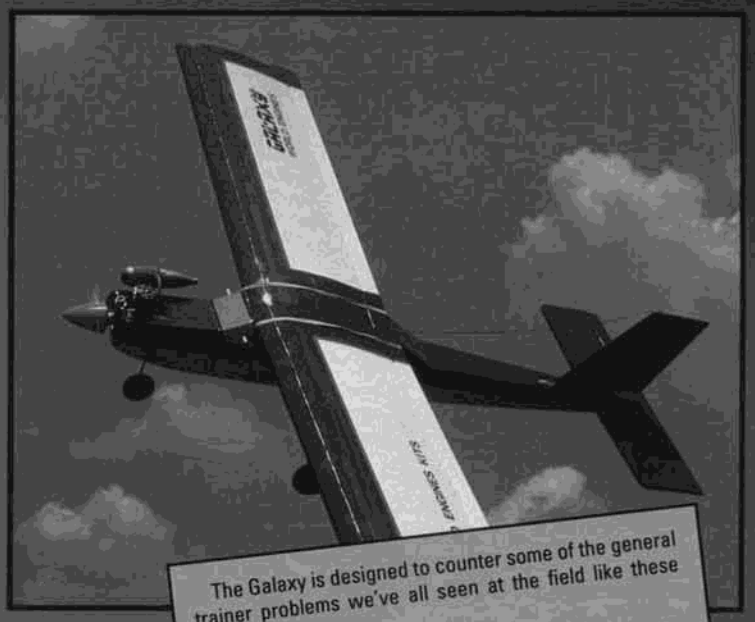
Large wing area for optimal take-off and landing performance, and a semi-symmetrical airfoil for transitional lift stability.

**A Simple-to-Follow Manual**
All basic control information and flying recommendations for beginning pilots, not rocket scientists.



The Galaxy is designed to counter some of the general trainer problems we've all seen at the field like these examples:

A. Airplane can't take off because the grass is too tall or the runway is too short, so a larger engine, larger wheels, or both are needed.

B. Once in the air, at full throttle the model over-powered and difficult for a new pilot to fly.

C. The plane balloons under power because the flat bottom wing is developing more lift as speed builds up.

In these scenarios, we can only hope the person flying is the local R/C Club Instructor. The owner is watching and wondering to himself if it is to late to buy back his old golf clubs he sold to get into R/C.

There is no conversation at this point, as the instructor is really busy (having spent the last 30 minutes adjusting linkages and possibly repositioning a pushrod or two to get in the air). We modelers have seen this event unfold more times than we ever dreamed possible.

Now if the airplane is still flying, the new R/C'er is watching all this, and acquiring a new-found respect for the instructor, who is flying and performing with the precision dexterity of a Blue Angel pilot to save the airplane and the day in general.

The Galaxy can't solve all the flying related problems, but can possibly make flying a little more fun and flat out that learning curve.

Happy Flying!

A .40-.45 sized engine and a radio system with a minimum of 4 channels are also required.
Monokote is a registered trademark of TopFlite Models Inc.

Wingspan; 66 inches
Wing Area; 742.6 square inches
Weight; 5.5-6.5 pounds
Radio; 4 channels
Engine; .40-.45 2 cycle, .61 4 cycle

WORLD ENGINES

## WORLD ENGINES INC.

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**55" wing span, 21" length. High start included. Two-channel rudder and elevator control.**

■ Until now, if you wanted a great flying sailplane you had to spend weeks, sometimes months, building . . .

■ Until now, when a sailplane crashed, (and eventually they all do), there would be parts everywhere, requiring days to repair . . .

■ Until now, if you wanted to be a model sailplane *pilot*, but had no desire to become a model sailplane *builder*, you were grounded . . .

But now, the new Cox Silhouette enables you to spend your time at the flying field, instead of at the workbench.

That's because the Silhouette is a unique sailplane. There's no cutting, carving or gluing. Instead, you use screws, nuts and wing tape to complete the entire assembly.

Convenience does not sacrifice performance. The Silhouette incorporates the best sailplane technology, including a high-lift Eppler 214 airfoil. Overall low weight of 19 oz. results in a very favorable wing loading of 7.9 oz./sq. ft. (with two-channel radio on board).

The Silhouette is durable. Its fuselage is a new, blow molded design. This material is so tough you would practically have to dive straight into pavement to cause damage. The high-density foam wing and empennage survive severe impacts. If the wing breaks, you won't need to head for the workbench. Repair the foam with five minute epoxy . . . right in the field!

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COX®

1525 E. Warner Avenue
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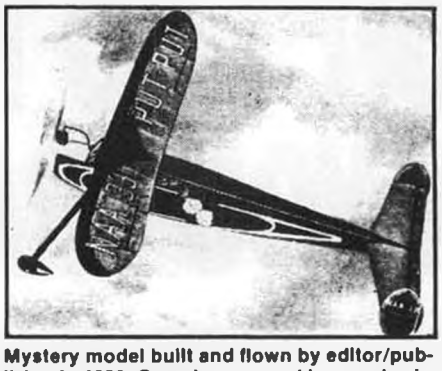
# from Bill Northrop's workbench

• . . .I've been sitting here in silence . . . looking at a blank monitor screen, but seeing in my mind's eye a whole bunch of vignettes that come forth as if the "computer" of my brain was pulling up specific bits of information . . . all in reference to one name . . . and with those vignettes there is a sound track (one up on the computer at this moment in time) with bits and pieces of conversation from the voice that went with that name . . . Lanzo . . . Chet Lanzo . . . Here comes that big rubber powered "scale" Puss Moth, with the folding prop and the rear wing strut that is fastened to the aileron . . . "I thought that looked kinda strange" . . . Sure, Chet . . . "We built multi-spar wings 'cause 1/16 square was about 15 cents a hundred . . . the word 'turbulator' hadn't even been invented yet, and sheet wood for leading edges was too expensive anyway!" . . . We're not sure if Chet "invented" the multi-spar wing, but it seemed to have come out of the Cleveland area, a hot spot of modeling in the 1930's, and he was right in the middle of it. I'd be willing to bet he




**Mystery model built and flown by editor/publisher in 1939. Our wire gear and larger wheels, without spats, looked better. Sorry, but we can't go along with Burd's misspelling of "Putt-Putt." You can't make "Put' sound like "Putt" without the extra "T." Well, doesn't everybody modify kits?**

at least tied for first on that one. None of Chet's airplanes were streamlined beauties, but if beauty was part of being functional, those boxy, multi-sticked Lanzo creations were, and still are, prize winners on the ground as well as in the air.

Well, the bad news is that Chet took off without setting his DT on August 13, 1989, and will not be returning. He went quietly and peacefully, as everyone who knew him will remember him . . . soft spoken, no unnecessay extra words, sincere, and yet

**Serious looking Dick Korda with his original '38-'39 "Diamond," standing by his favorite sailplane. Photo taken several years ago by Joe Elgin.**

with a sly sense of humor that could go right through you without rippling a hair if you weren't paying attention. If ever a history of the great model building era of the '30s through '50s . . . that will, sadly, never come back again . . . is ever written, Chet Lanzo's name will appear many times over as a pioneer, a designer, a competition flier, and a consistent winner. "You have to fly if you want to win."

It seems too much like a cliche, but how else can it be said, "Chet Lanzo is gone, but his memory will live on for many years . . . every time someone builds one of his designs in order to have a better chance to fly in competition . . . and win."

**KORDA REMEMBERED**

As mentioned in the September issue, Dick Korda and his famed Wakefield-winning single flight was celebrated on the exact date 50 years later, August 6, 1989, in various commemerative events around the country. Here in Southern California, John Oldenkamp put on the Western half of an

## CHET LANZO 1914-1989

**Photo by John Oldenkamp at Mile Square Park, August 6, 1989; Korda East-West Challenge. Editor Bill Northrop, holding his Korda framework, compares notes with Dick Munz, San Diego (Aeroneers and Scale Staffel member) who used pearlescent Micafilm on his red, white, and blue version. Bill's now has red silked fuse, red tissue on surfaces, KSB D/T timer, FAI tan rubber. Alfie Faulkner, left, looks on.**

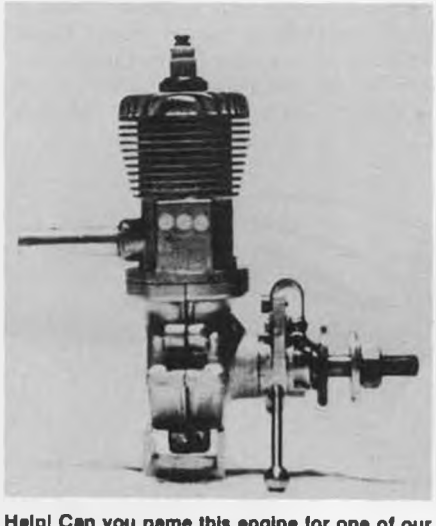
East-West Challenge for '39 Korda Wakes only, headed up in the East by Dave Platt. The results showed a clean sweep by the Florida-based easterners, with Wayne Trivins, George Jamiesan, and Ken Grubbs finishing one, two, three. All three maxed out in the three officials and the first round of the flyoff, then managed to settle their differences in the next flyoff round. The highest place by a westerner was R.J. Mikkelson's 7th spot.

**TWO OUT OF THREE AIN'T BAD**

In our September "Workbench" there were three requests for information, and thanks to our readers, we have answers to two of them. First of all, the mystery Burd kit that I built and flew back in the pre-war days turned out to be the "Putt-Putt." Obviously, the name came from what was considered to be the main feature of this model . . . it had a device built into the noseblock which produced a noise that was supposed to imitate the sound of a small gas engine as the rubber powered prop shaft turned in its bearings. Whether we had a premonition of the environmental problems that were to come up 50 years later, or were too lazy to bother with installing the device, or were concerned that it might rob a bit of the rubber's power, the putt-putter was not used. Anyhow, we thank all of you who took the trouble to try to put our alledged mind at ease by sending in answers, including copies of the early 1939 magazine ads that displayed the model. I say "tried to," because it turned out that in spite of John Pond's long list of old time model plans, the "Putt-Putt" is not among them. Oh woe is me! Perhaps one of you may have been crazy . . . whoops . . . clever enough to have saved that kit plan all these years. If so, we'd deeply appreciate the opportunity to obtain a copy of it.

The second response would most likely come from only one reader . . . the one who sent us the information about his setup for supplying clear strip basswood in sizes that would particularly appeal to one-quarter and one-third scale model builders. That reader is George McGinnis, 144

*Continued on page 108*



**Help! Can you name this engine for one of our West German readers? See text.**


**ADVICE FOR THE PROPWORN**
**—By Jake**

*Dear Jake:*

*Listen, you lower than a snake weasel! If you don't send those overdue alimony payments right now, little Lemuel won't be able to afford his protection payments for the bullies in the school cafeteria. Do you want to be responsible for your only son being mash potatoed to a Coke machine?*

*I also need the money for some new dresses. My old ones have all shrunk. Pay up now or I'll be forced to ask Mr. Machete's collection agency to visit you again.*

*Your Ex, Gloria*

Dear Gloria:

The check's in the mail. Use the leftover lunch money to buy Lemuel a backbone. And about those shrunken dresses; if you're still eating a pound of bonbons per soap opera like you did when we were married, then the dresses are fine, but you've expanded again.

One more thing, differential aileron can eliminate a tendency to yaw during a rolling maneuver. There, now I can charge the postage to RCMB.

Jake

* * *

*Dear Jake:*

*Our seaplane club shares a nearby lake with the fishing contingent from a local rod and gun club. We don't fly early in the morning when they do most of their worm drowning, so conflicts seldom arise. There have been isolated episodes, however, when an angler and a modeler have had a disagreement over water rights. One of these episodes occurred this past weekend, and that's why I'm seeking your advice.*

*One of the fisherman stayed late because the fish were biting. So he was still there when some of our club members arrived. Bill Putnam fired up his .90 sized Curtis Robin on floats and taxied out to start his takeoff run. About this same time the leftover fisherman hooks a bass and*

*Continued on page 106*

# OVER THE COUNTER

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

• In the air "as soon as possible" is the theme behind the new ASAP line of fast building ARF sport R/C models being introduced by Hobbico and distributed by Great Planes Model Distributors. These .25 and .40 size airplanes are 90% factory assembled from foam and plywood and require no sanding, covering, painting, or control surface hinging—it's all done for you. What little assembly is required can be done in a couple of hours, which makes it possible to start work in the morning and be flying that afternoon.

Seven ASAP kits are presently available: the Diablo .40, Super Chipmunk .40, Telstar .40, Cessna .40, Super Chipmunk .25, Telstar .25, and Cherokee .25. The Super Chipmunk .40 and Telstar .40 offer the use of retracts if desired. Suggested retail on these kits ranges from $159.95 to $229.95.

Also new from Great Planes is a nicely designed field box, the Hobbico Ultra Tote. Built of 3/8-inch mahogany with tongue-and-groove joints, the box features a 12-volt battery compartment with a removable vented front panel, a large, full-depth double compartment drawer, and divided compartments on top for your transmitter, starter, etc. Storage for a one-gallon fuel


**Hobbico's "ASAP" line of ARF R/C sport models (above) and "Ultra Tote" field box (left), both distributed by Great Planes.**

can or plastic bottle is provided opposite the battery for good balance; the foam padded fuselage cradle shown in the photo is included as well. Suggested retail price for the Ultra Tote is $34.95.

From Great Planes Model Distributors, P.O. Box 4021, Champaign, Illinois 61820.

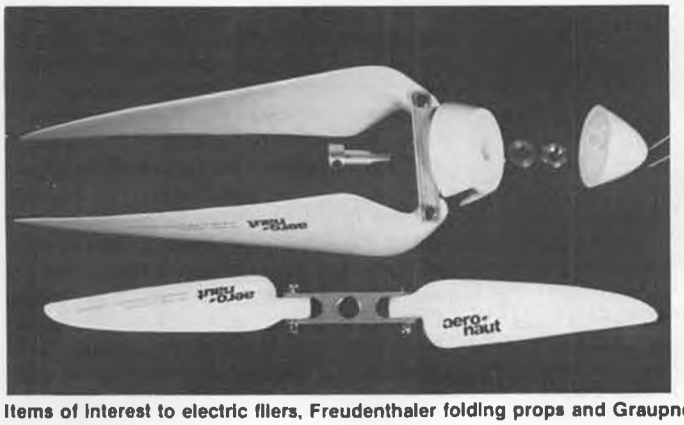
* * *

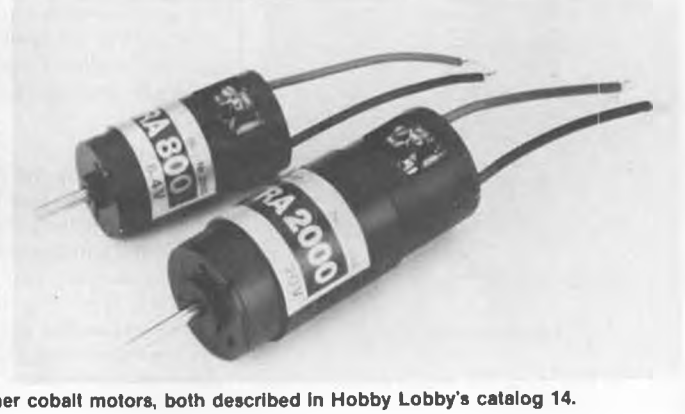
Hobby Lobby's catalog #14 is chock full of items that will be of special interest to electric fliers. As an example, pictured this month are two sizes of Graupner samarium cobalt motors, the Ultra 800 being designed for seven or eight cells and the Ultra 2000 for sixteen or more cells. Also shown is an illustration of the high-tech folding prop designed by Electric Flight World Champion Rudolph Freudenthaler and manufactured in Germany by Aero-Naut. These feature glass-filled white polyamid blades, aluminum hubs, and 40mm (1-9/16 inch) spinners.

The full range of Graupner motors and Freudenthaler props is described in Hobby Lobby's catalog #14, which is available free by writing to Hobby Lobby International, 5614 Franklin Pike Circle, Brentwood, Tennessee 37027, or by calling (615) 373-1444.

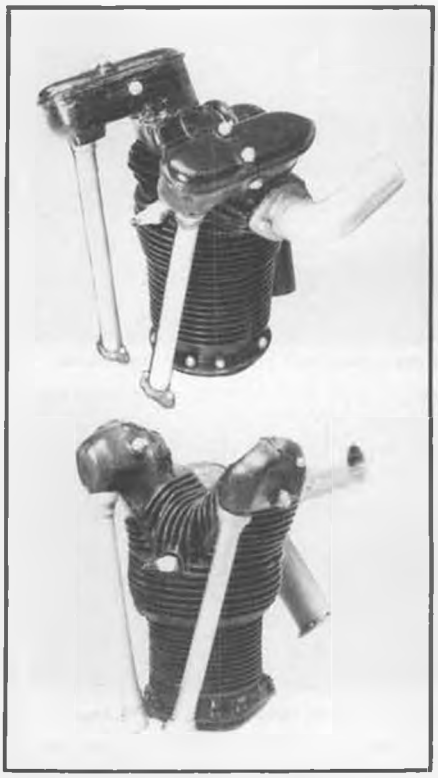
* * *

Fox Mfg. Co. has announced the availability of the #24097 Quickee 500 racing engine, an incredibly powerful .40 designed especially for that very event. This is definitely *not* an engine for the casual sport flier! The people at Fox admit that while the engine is very powerful and fast, it is




**Items of interest to electric fliers, Freudenthaler folding props and Graupner cobalt motors, both described in Hobby Lobby's catalog 14.**



Williams Bros. has two new sizes of the Wright J-5 (top) and P&W Wasp dummy cylinders.

also a bit on the cranky side, and for this reason is not recommended for those inexperienced with running high-performance engines. A better choice for sport flying would be the Fox #24197 Quickee 500 Sport .40, which coincidentally is reviewed on page 26 of this month's issue by our resident engine expert, Stu Richmond.

The #24097 racing .40 is supplied with spinner and muffler and sells for $175.00. A radial firewall engine mount is also available as an option for $19.95. From Fox Mfg. Co., 5305 Towson Ave., Fort Smith, Arkansas 72901, phone (501)646-1656.

* * *

The Stampe is back! Ted Davey reports


Davey Systems' re-released kit of the Stampe SV4 French primary trainer.

that the Davey Systems sport scale Stampe SV4 kit, which has been off the market for the last four or five years, is back in production at last. For $139.95 you get an extensively prefabricated kit that includes a completely preformed and brazed wire wing strut cabane assembly, preformed wire landing gear, die-cut and machine-cut balsa and hardwood parts, hardware, a three-piece molded ABS plastic cowl, two rolled sheets of plans, and detailed instructions.

A semi-symmetrical wing airfoil makes the model Stampe quite an aerobatic machine, as is the full-size aircraft. The model spans 56 inches, sports a total of 1003 square inches of wing area and will weigh in at somewhere around six and a half to seven pounds, depending on the equipment used. Recommended engine size range is .45 to .60 two-stroke, or .60 to .80 four-stroke.

From Davey Systems, 675 Tower Lane, West Chester, Pennsylvania 19380.

* * *

Astro Flight is breaking new ground with the new Mini-Challenger, in that it is the first kit produced by the 20-year-old company that is complete with motor and prop. That's right, the $129.95 kit includes the

The Fox #24097 Quickee 500 racing .40.

familiar Astro 035 Cobalt motor and a scimitar-shaped folding prop. The only things left up to the builder to supply are the radio (minimum of three channels) and a 900 mAH motor battery, which is good for three or four power climbs up into thermal territory on a single charge.

The Mini-Challenger itself is basically a scaled down version of the larger Challenger that Astro has had on the market for a while now. Span on the Mini is just 60 inches, wing area is 400 square inches, and the ready-to-fly weight comes out at around 30 ounces. Bare airframe weight is a scant 11 ounces. She may be small, but you can bet this new Mini-Challenger is no slouch when it comes to flight performance!

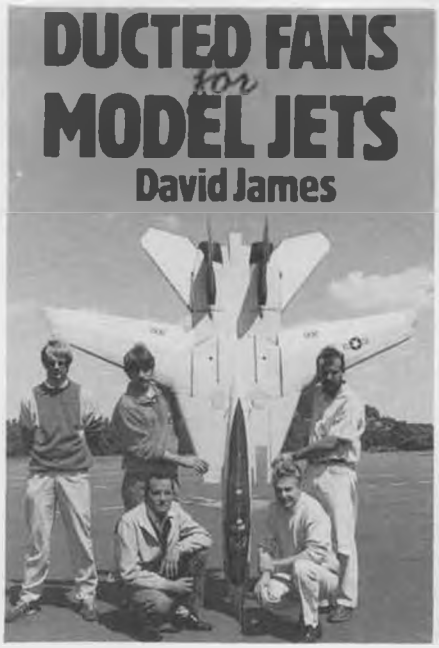
From Astro Flight, Inc., 13311 Beach Ave., Marina Del Rey, California 90292, phone (213)821-0291.

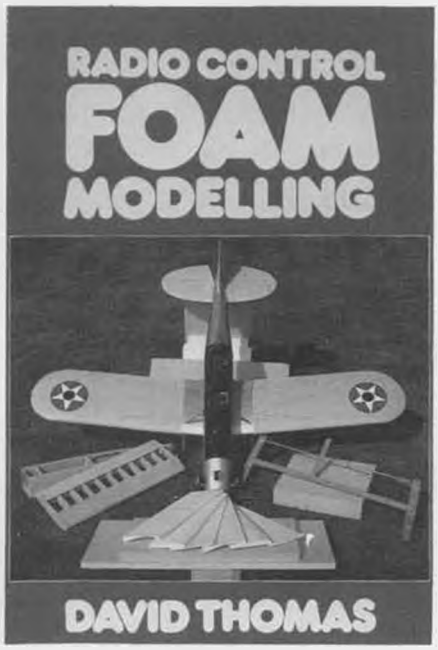
* * *

Bob Holman advises that he has the latest plans catalog put out by Argus Specialist Publications, publishers of *Aeromodeller*, *Radio Modeller*, and *RCM&E*. The new catalog lists *all* of the construction plans—R/C, F/F, and C/L—published in those three magazines. That's one heck of a lot of plans! The 100-page catalog sells for $4.00 and includes an insert sheet giving plan prices in American dollars (the catalog lists them in English pounds), as well as postage and shipping information.

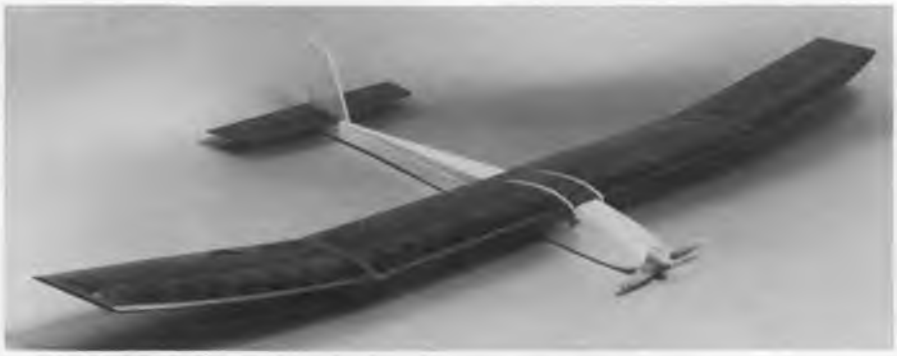
From Bob Holman Plans, P.O. Box 741, San Bernardino, California 92404.

* * *




Two new model technical books from England, distributed in the U.S. by Zenith Aviation Books.



**Astro Flight's new "Mini-Challenger" kit includes an 035 cobalt motor and folding prop.**

Williams Brothers has expanded its excellent line of scale dummy engine cylinders by adding 2-1/2"=1' and 3"=1' sizes to both the Wright J-5 Whirlwind and Pratt & Whitney Wasp series. This brings to five the number of sizes available for each type. The 2-1/2 inch sizes sell for $4.99 each, the 3 inchers are priced at $5.99 each. All are molded of high-impact styrene plastic and can be painted as desired.

An SASE will bring you an order form listing all of the Williams Brothers products. Write to them at 181 Pawnee St., San Marcos, California 92069.

* * *

Airplane books! If you don't instantly associate those two words with Zenith Aviation Books, then you're obviously not familiar with what has to be the largest aviation book distributor in the U.S. Zenith's new 1990 catalog lists over 2,000 titles and can be obtained free for the asking by calling toll free 1-800-826-6600.

Two of the latest modeling books offered by Zenith are *Ducted Fans for Model Jets*, by David James, and *Radio Control Foam Modelling*, by David Thomas. Both books are very complete technical how-to guides illustrated with lots of great drawings and detail photographs. We haven't yet had the opportunity to spend more than a few minutes with each one, but it looks to us like both Davids really know their respective subjects well. If you have any interest at all in either of these two areas, we think you'll find the books to be worthwhile additions to your modeling library. Both books are published in England by Argus Books, are both priced at $15.95, and are both listed in the new 1990 Zenith catalog.

From Zenith Aviation Books, P.O. Box 2, 729 Prospect Ave., Osceola, Wisconsin 54020.

* * *

Need a wooden field box, but don't want to assemble one from a kit? Check out the FB-2D pre-assembled but unfinished field box from BP Industries. It's built of plywood and features a sloping power panel mounting area, vented battery compartment, two drawers for tools and spare parts, an end compartment that holds a one-gallon fuel can, and an open area for frequently used items. The overall box size is 21-1/2x8-1/2x12 inches high. Suggested retail is $59.95. Fuselage cradles are also available. Send an SASE for full particulars to BP Industries, P.O. Box 521, Hubbard, Oregon 97032.


**"Quarter Pounder" bottles of Zap glue (above) and "Mighty Lite" plywood (right), both from Frank Tiano Enterprises.**

* * *

For those modelers who do a *lot* of building, Pacer Technology has come out with a large four-ounce "Quarter Pounder" size of the excellent Zap CA (thin) and Zap-A-Gap (thick) cyanoacrylate glues. Both feature the familiar Pacer break away tip for easy application and less clogging. Suggested retail price is $18.95 each. The new Quarter Pounders are available in hobby shops everywhere, or can be purchased direct from Frank Tiano Enterprises, 2460 S.W. 85th Terrace, Davie, Florida 33324.

* * *

Frank Tiano is also handling "Mighty Lite," a premium grade of lightweight plywood now available in the U.S. We received a few sample sheets here at the *MB* office and they are just as the press release said: very smooth and clear grain, very flat, and considerably lighter than the typical five-ply birch aircraft plywood found in hobby shops. It also cuts easily with a #11 blade and bonds well with CA glue. Probably the best advertisement for Mighty Lite is that Bob Violett uses it in all of his prestigious ducted fan kits, and knowing what a perfectionist Bob is, this alone should be testimony enough as to Mighty Lite's excellent quality. Three sizes are currently available: 1/8x6x12, 1/8x12x24, and 1/8x12x48.

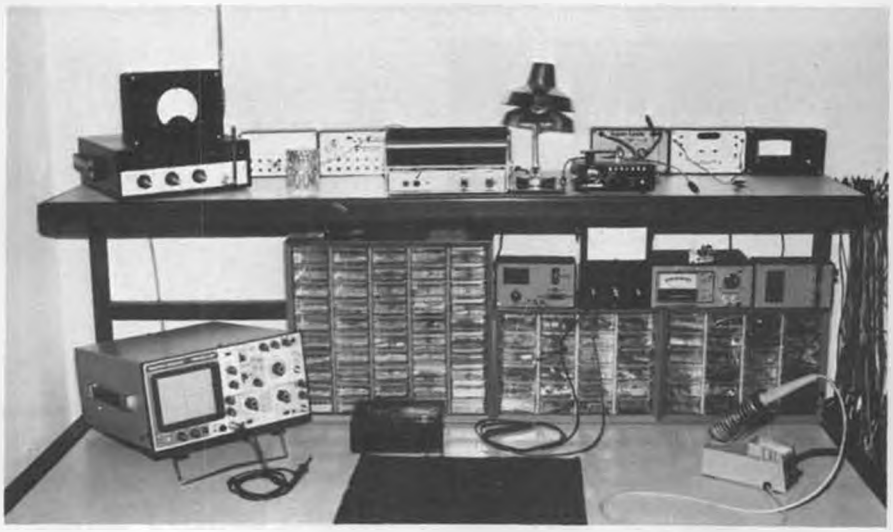
As with the new Quarter Pounder Zap glues, Mighty Lite plywood is available

*Continued on page 107*

**Pre-assembled field box from BP Associates.**


**Latest ASP plans catalog from Bob Holman.**


**New Gee Bee book by Henry Haffke.**



The "Frequency Sniffer," a super small, super light device which emits a high frequency audio tone to help locate models down in wooded areas or other unclear areas. The unit is actuated by turning the transmitter off. Described in text.

# Electronics Corner

By ELOY MAREZ

### MAN ON THE MOVE!

The name McDaniel R/C, maker of the popular "Ni-Starter" glow plug battery, should not need much of an introduction. What does need an introduction is the new address for Bob McDaniel's operation, which by the time you read this will be running at full rpm in its new location at 1654 Crofton Blvd., Suite 4, Crofton, Maryland 21114. Even the phone and Fax numbers are new: (3O1)721-6303 and (3O1) 721-6306 respectively.

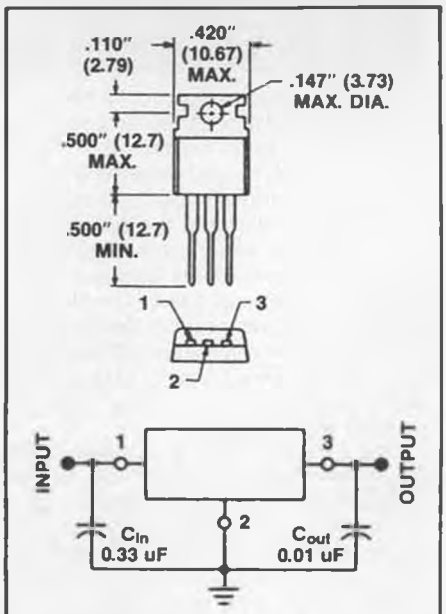
In addition to the original push-on Ni-Starter which seems to be part of everyone's flight kit, McDaniel R/C also has a self contained glow plug driver for multi-cylinder engines that should take all the pain out of having to light two or more plugs all at the same time. The unit is designed to ride along in the airplane, and can be adjusted to provide glow plug power at a designed idle throttle position as well as for initial starting. If you are into any of those fantastic engines with two or more cylinders that are now available, you need to check into one of McDaniel's devices.

I happen to know that the many new receiver designs now available increase the complexity of designing such devices to work with all radio systems, and a lot of research has been done by McDaniel to insure that add-on's such as this will operate properly with your favorite R/C system. Be sure to mention what radio you are using when placing your order. Also, if you are having problems getting other similar auxiliary equipment to operate reliably, especially if operated through a "Y' harness from a channel also operating in its normal mode, check with Bob, the answer might be only as far as your telephone. Also remind him where you got the new phone number. . . .

### SUPER SIX METERS

I recently had a letter from a reader who is looking for an RF amplifier with which to boost the output of his six-meter transmitter to five watts, as a deterrent to the interference-prone conditions we all face. At first it sounded like a not too bad and not impossible idea, though the DC power requirements would require a husky set of NiCds. I even started researching my files and ham material for suitable information, but then I begin to have second thoughts. Sure, the additional power would probably help the flier using it, but what was it going to do to the guy on the same frequency flying at the field on the other side of town?

I am not sure of the possible effects of such high power on any of the R/C frequencies, and there are too many variables to be able to make any predictions with any degree of accuracy. The only thing that is certain is that under a given set of conditions, increased power is going to result in increased range, with the same question still existing: What is it going to do to the guy on the other side of town? I have decided to steer clear of this one, not being judgmental, but due to lack of data.



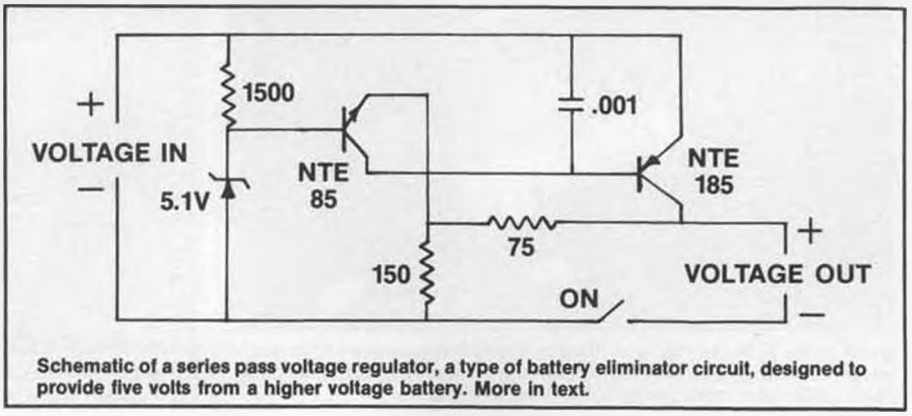

Full-size drawing (top) and basic hookup (bottom) for the TO-220 integrated circuit voltage regulator. Though available for a number of common voltages, the one most useful for R/C applications is the five-volt unit, further described in the text.

If any of you have experience with anything like this I'd like to hear about it.

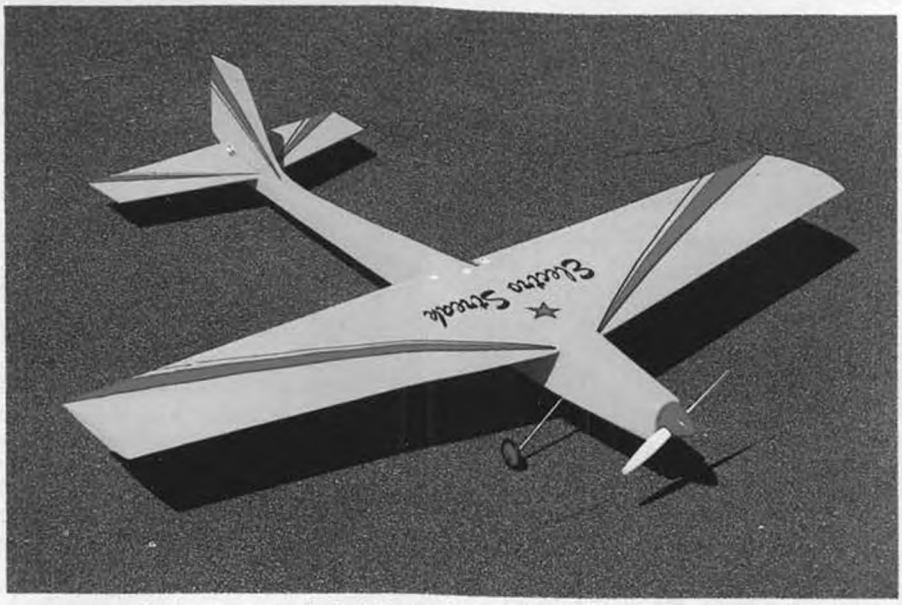
### SOS

This one I can't field either, and it is going out to you readers to see if one of

*Continued on page 83*




Schematic of a series pass voltage regulator, a type of battery eliminator circuit, designed to provide five volts from a higher voltage battery. More in text.




# Electro Streak

**A high performance four-channel electric from Great Planes Model Manufacturing. It's a hot performer!**

## By DICK MASON

• Being involved in a particular hobby for a long period of time can sometimes create a ho-hum attitude. To take this attitude away you need to find something new or different to stimulate your enthusiasm.

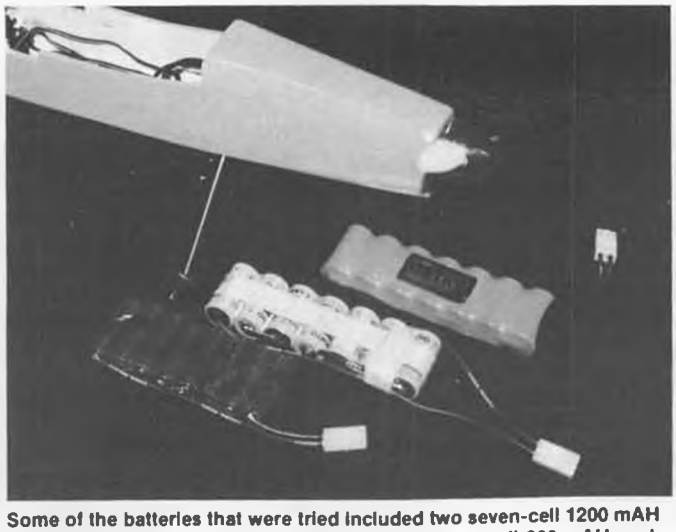
I must admit that over the last few years I have looked at electric powered models but was disappointed by their lack of performance in general. Most examples were gliders or basic trainers with electric motors installed and were very limited because of the weight involved. Yet the idea of a flight without the messy cleanup later still seemed the way to go.

Great Planes Model Manufacturing Company has taken a giant step into the electric powered radio controlled market with a kit which is the subject of this month's review. The "Electro Streak" is a state of the art design capable of aerobatic performance. Great Planes describes it as "a very smooth and stable flyer," yet it will perform all basic pattern maneuvers such as rolls, inside and outside loops, snap rolls, spins, inverted flight, Immelmans, hammer heads, Cuban 8's, and many others!! This looks like the plane I have been waiting for. My enthusiasm has just been stimulated!

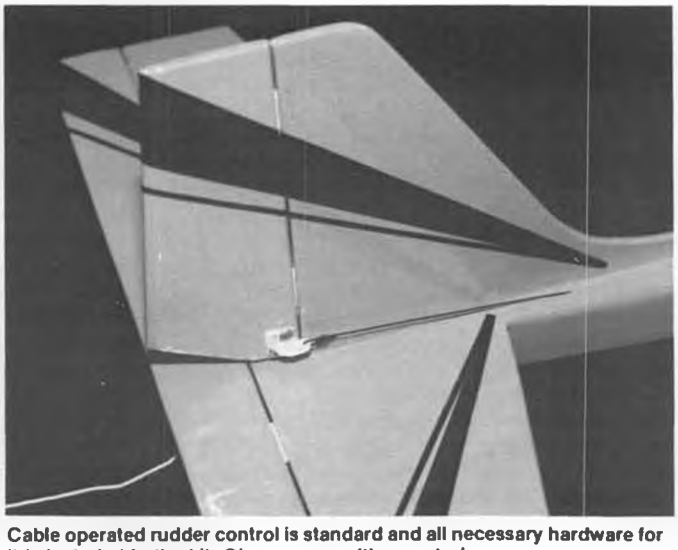
**KIT**

Everything was packaged well. Sheet material was rubber banded together and all small pieces, both wood and metal, were sealed in plastic bags. The "Goldfire" motor was packaged in its own box and glued to the far inside left of the box to protect the fragile wood next to it. I understand from talking to others that this kind of quality and care is typical of a Great Planes kit. Also included is the 1988-1989 catalog and information about the Robart Speed Control. The plans are full size and very descriptive. They are all that is really necessary to build the model, but the manufacturer has included the most in-depth, complete building manual I have ever seen. From the first page to the last it contains a wealth of information about the Electro Streak and electric flying in general.

After reading the manual through you realize this model is something different. All balsa wood selected was as light as possible to obtain maximum performance. All through the building process light weight is emphasized. You are looking for a finished flying weight of 40.5 ounces without landing gear and 42 ounces with the 1/8 inch spring steel gear with wheels. This sounds like it might be fairly easy, but it



Some of the batteries that were tried included two seven-cell 1200 mAH packs with Sanyo SCE and SCR cells, and an eight-cell 800 mAH pack (left). Latter gave more power but very short flights.



Cable operated rudder control is standard and all necessary hardware for it is included in the kit. Gives very positive control.

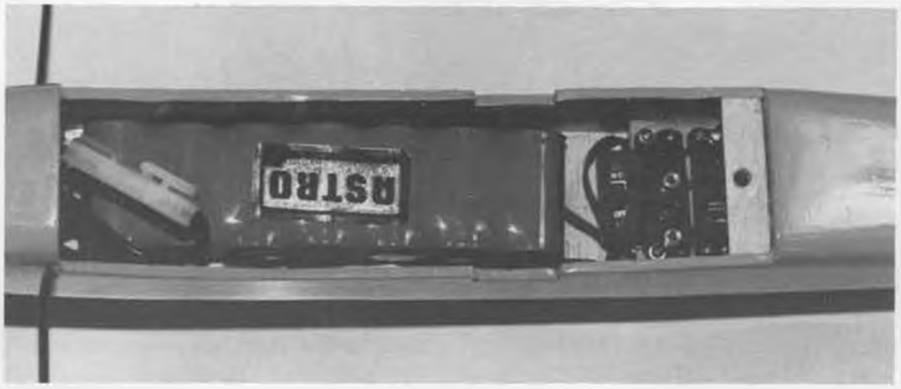
takes care throughout the whole project to achieve this.

I decided to follow the instruction book step-by-step and see what happened. The first thing you must do is read the manual from cover to cover. An electric airplane is a whole new breed of animal. Even though the basic airframe is the same as gas powered models, you must learn different building procedures and terminology. Things like electric speed controllers, battery selections, and battery chargers begin to surface. As you read through the first five pages you receive all the information necessary to build, finish, and fly your electric plane. All die-cut pieces are punched out perfectly and in case you forget which piece is which, they are all identified on page 5 of the manual. On to the "good stuff." On page 6 we start building.

Front view with the prop and spinner removed shows the aluminum prop adapter mounted on the "Goldfire" electric motor, which is included as part of the Electro Streak kit. The bottom hole is an inlet for battery cooling air.

A landing gear on this model is optional, however, the gear struts are included in the kit for those (like our reviewer) who fly off of hard surfaces. Nylon straps hold the gear in place.

Our reviewer also chose to install a steerable tail wheel, controlled by cables from the rudder servo. Light, clean installation.




The finished fuselage, with all of the radio and electric power system components installed, including an Astro Flight seven-cell 1200 mAH pack.

**BUILDING**

If you follow the manual step-by-step, you will have no problem with the construction. However, I would like to mention an area in which you might experience a problem. As you start putting the fuselage together around the four formers, you must use extreme care. The construction is so light it is possible to warp the fuselage. Mine did slightly but I was able to correct this when the top and bottom sheeting was attached. A quick trial fit of the electric motor in former #1 and former #2 found the right thrust perfect and just a little sanding of the top of former #2 made the down thrust correct also. Everything else went according to plan. I chose to install the landing gear and a steerable tail wheel because I fly off of a paved runway. Because the push rod for the elevator runs through the narrow rear of the fuselage, I used a free pivoting tail wheel mounted on a 1/16 plywood base. An extra set of cables were then attached to steer it. Page 13 has you stop and weigh the basic fuselage. It must weigh 2-1/2 ounces at this point. Mine was right on the money.

With the fuselage now complete, the next step is the tail feathers. They are quickly built up over the plans from 3/16 x 3/8 balsa. The lightweight framework is then attached to the fuselage. The wing is even easier to build. All pieces fit together as if they were custom made. I have never built a quicker wing. Each rib has "alignment feet" which allows the rib to sit flat on the building board. After the wing is 99% complete, they are removed. Between the ribs, horizontal and vertical webbing is glued in place. This makes a strong but extremely light wing. The two halves are joined together, then 2-inch wide fiberglass cloth is applied to the center section. I used thin CA glue as per instructions and it worked out well. That completes the basic building section.

All servos, pushrods, and electronic components are now test fitted and then

*Continued on page 66*

Above: The ultra-clean lines of the Electro Streak show up well in this photo. The airplane has a fast, flat glide, so plan your landing approaches accordingly.

Dick Mason and Electro Streak, his first electric.

# ALL ABOUT ARFS

By ART STEINBERG

• In a previous column we touched on the steadily increasing popularity of small electric powered ARFs. A significant reason for this increased interest in electric flight seems to be due to the fact that so many youngsters have been cutting their teeth on electric powered cars for so many years, and now this rather formidable group is looking to expand its horizons. These folks are more into the sport end of the hobby rather than the building end, and they like to buy models that are ready to fly with a minimum investment of time and labor. Perhaps this is a reflection of the "now" generation, but unless one has a love for spending many hours slaving over a workbench project, ARFs as we have come to know them, are tailor-made for today's fast moving society.

As is to be expected, manufacturers are flocking to fill this new demand, and a whole generation of electric powered models has appeared on the R/C scene in a relatively short period of time. One notable entrant in this exciting field is Parma International, Inc., a firm with vast experience in model race car circles. Parma has garnered an enviable reputation among those who like fast and competitive racing machines, but those of us who are involved exclusively with R/C flying may be unfamiliar with Parma and its line of products.

In any event, their first offering to the model flying public is called the Aero Sprint, a cute little high-wing sport model. The designation "sport model" is strictly mine, as Parma has refrained from the temptation of labelling the Aero Sprint as a trainer, or anything else for that matter. They refer to it only as "an A.R.F electric airplane kit." As a welcome departure from the usual run-of-the-mill pocket-sized electrics, this one is entirely built up of balsa and ply, and does not resort to the blow-molded type of fuselage. The model is in all respects identical to one built from a conventional kit, with one important exception, all the tedious work is done for you. The finished product sports a beautiful red, yellow, and blue trim design on a background of basic white, very much in keeping with the need for high visibility. The general specifications are a wingspan of 50 inches, length of 36-3/4 inches, wing area 450 square inches, and the all-up ready-to fly weight is listed as 40 to 46 ounces.

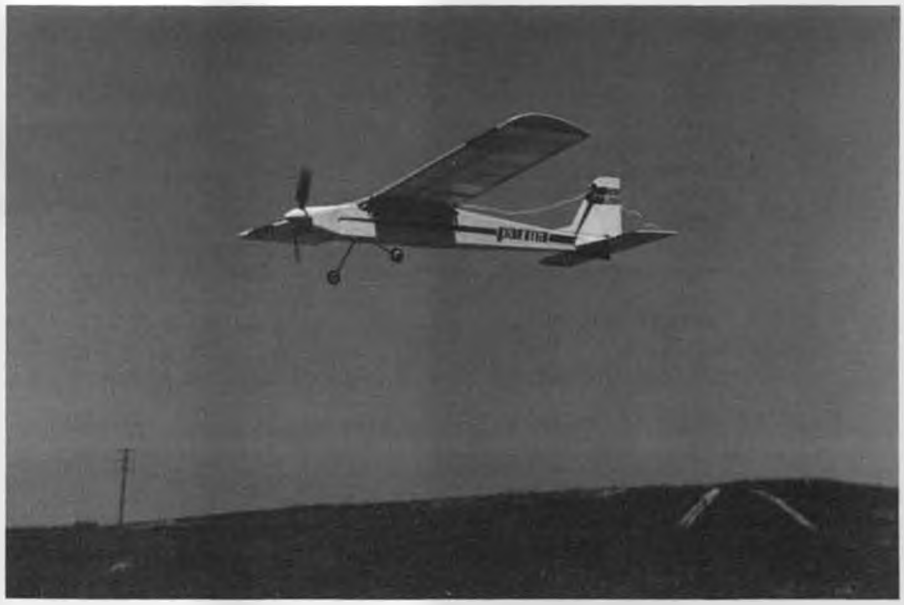
The instructions consist of a great many well done and highly detailed drawings, all accompanied by readily understandable text. Unfortunately, we once again encountered a case in which it is obvious that the instructions were written by an individual to whom English is an acquired language. For example, in the flying direc-


**Above: The "Aero Sprint" is the first electric ARF offered by Parma International, a longtime manufacturer of R/C car goodies. It's the review subject of this month's column.**

**Right: Jim Shaver sends the Aero Sprint off on its maiden flight. Stock wheels are too small for the site's dirt runway, so hand launches were mandatory.**

tions section it says, "In order to effectively utilize the power, it is better that you throw out your airplane by hand." Now nobody is going to follow this advice literally and throw the model into the trash can, because we all know they were referring to hand launching the model. However, it is time all such instructions were written by experienced English-speaking modelers (I still offer my humble services at no charge, just pay my travel expenses). While on the subject of instructions, I must compliment Parma on wisely insisting that novice R/C flyers do not attempt to operate this model without the assistance of an experienced pilot. Even the box top proclaims that "Failure to do so can result in serious injury and damage to property as well as damage to this model." This warning is placed in four locations on the box, as well as in the instructions. Taking the time to warn beginners in such a manner is really commendable and certainly a wise move on the part of the manufacturer.

Assembly is estimated to be about eight hours in the instructions, but it seemed to be more time than was needed. I feel the job can be done properly in as little as half that time. All control surfaces are prehinged, and the biggest assembly job is gluing the two wing halves together, using epoxy glue (not supplied). It only takes minutes to mount the tail surfaces, and the landing gear simply attaches with four screws. Another purely mechanical task is putting together the folding prop and spinner assembly, mounting the 05 electric motor, and attaching the sturdy little plastic cowl to the fuselage with a few screws. Aside from epoxy and cyanoacrylate glues, all required hardware and supplies were included in the kit.

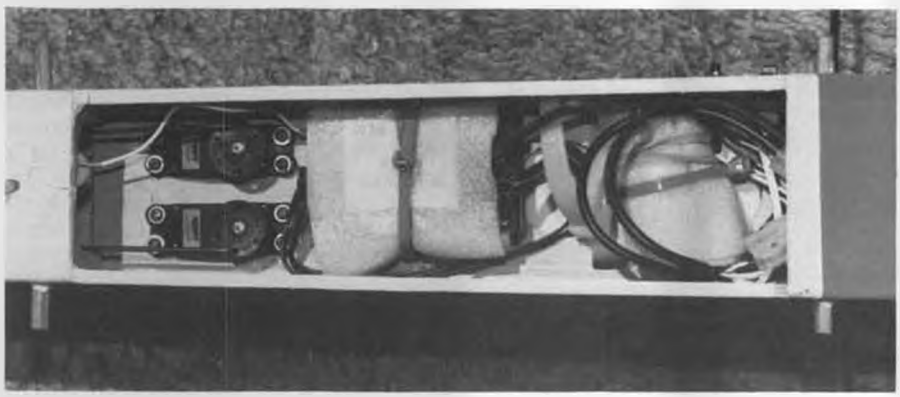


The Aero Sprint displays a clean, efficient-looking profile as test pilot Bill Hicswa brings it by for a low pass. The model proved to be exceptionally stable and virtually stall-proof.

The Aero Sprint is designed for two channels, without motor speed control, or three channels if the speed control is desired. I will be the first to admit I am not an expert in the field of electric powered models, but we chose to go with two servos for two important reasons. Firstly, and most obviously, weight can quickly become a critical performance factor in these little airplanes, and one less servo helps a great deal. Secondly, with a limited motor run of perhaps five to seven minutes at most, variable speed control is really unnecessary. All that is needed is a reliable on/off switch, and the flying technique is to use a 30 second motor run to attain altitude, then extend the glide as long as possible before the next power climb. Besides, for good battery health, the experts advise me to limit electric motor runs to 30 second bursts.

Consequently, it was decided to install a Kraft three-channel receiver using two Kraft mini-servos to operate the rudder and elevator, reserving the third channel for motor control. To this channel was connected a Kyosho on/off motor switch which incorporates an automatic cutoff, also known as a battery eliminator circuit. The advantage of this is that the receiver draws its current from the battery pack

*Continued on page 75*



It's surprising how much can be crammed into such a compact fuselage with room to spare. The Kyosho electronic on/off motor switch, which incorporates a battery eliminator circuit, really helps in this regard because no separate radio battery is required, saving both weight and space.

Bill Hicswa displays the Aero Sprint with the Cox .074 Queen Bee conversion performed by our columnist. See text for comments.

Close-up of the Queen Bee on a Hayes mount. This engine was thoroughly reviewed by Stu Richmond in our May '89 issue.

# MODEL DESIGN & TECHNICAL STUFF

By FRANCIS REYNOLDS

• Last night I attended a dinner meeting of the American Institute of Aeronautics and Astronautics, a professional organization I have belonged to since 1941. The speaker was Arvel Gentry, an internationally known aerodynamicist. His subject was, "The Application of Computational Fluid Dynamics to Sailing Problems." If that is just a lot of big words to some of you, CFD is the technical study of aerodynamics and hydrodynamics by means of computers. In addition to working full time in aerospace aerodynamics, for the past 20 years, Gentry has been privately applying CFD to sailboats. He is a sailor himself, having been involved with the America's Cup 12-meter yachts, and has applied CFD to the wing sail of the 1988 winner, Stars & Stripes.

### THE THEORY OF LIFT

As an aside, Mr. Gentry concluded from his studies that some of the accepted theory for aerodynamic lift was wrong! Ken Runestrand spoke of the same thing in his "Big is Beautiful" column in RCM for December 1988. This is not the place for details on that upset, but suffice it to say that it was fun watching top notch aerodynamicists argue about it last night, quoting Bernoulli, Kutta, and Prandtl, in defense of their positions.

This report on the AIAA lecture will serve to introduce some work your columnist did on sailboat design years ago; R/C model sailboats of course. I don't know if I need to defend talking about boats in this column or not, but if I do, the justification is that this is model design, it is technical stuff, and it is aerodynamics.

Left: Model aircraft design is not our columnist's sole interest. Shown here is "CD Min," the second of his two winged sailboats, designed and built 35 years before the 'Stars & Stripes' winged catamaran of America's Cup fame. The wing sail features multiple or cascaded slotted trailing edge flaps (see diagram below). The small weather vane at the top feeds wind direction information to the sail control servo, which automatically compensates to keep the wing in optimum trim at all times. Described in detail in text.

In 1950 I decided to take a crack at radio controlled model yacht racing. I put a single-tube receiver in a conventional model racing yacht and developed a feedback servo system so that the sails were set automatically from wind direction information provided by an on-board weather vane. It worked. I won the national trophy in 1952.

### WING SAILS

My "first mate" that year was a fellow Boeing engineer, Coe Wescott. He then decided to race a boat of his own, and the next year he took the national cup away from me. That aroused my competitive spirit. I decided I would probably never be an expert tactical sailor, but I was an engineer and a creative person, so I should go with what I had and design a better boat. How about an airplane wing for a sail? The logic behind that question was quite simple. Airplanes and sailboats both operate by forces developed on a surface moving through the air, one developing a vertical force and the other a horizontal force. The art of sailboat design is thousands of years old, and has changed relatively little over the years. On the other hand, the science of aeronautics is less than a hundred years old, and has seen tremendous progress. Since airplane wings are high tech, they might make better sails than traditional sails.

A little study showed me that a racing sailboat (with a limit on sail area), must operate near the maximum lift of a high-lift sail system if it is to be competitive. This is quite different from an airplane, which operates at a very low lift coefficient most of the time, getting up near CL max only at

CD Min's predecessor was this catamaran, called "CL Max." Wing construction on both boats is balsa with doped silk covering.

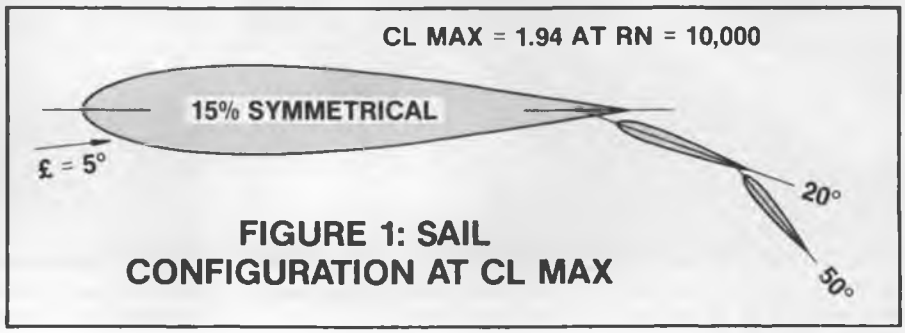



FIGURE 1: SAIL CONFIGURATION AT CL MAX

A wind tunnel model of CL Max undergoing tests at the University of Washington. Multiple trailing edge flaps showed best results.

The "boom" or bottom of the wing sail seals against the deck to prevent air passage and subsequent loss of lift.

takeoff and landing. The published data on high lift airfoils and high lift devices at very low Reynolds numbers was somewhat scanty, and there was another restriction that most airplanes don't have to contend with. A sailboat must sail equally well regardless of which side the wind is coming from, therefore the sail airfoils and any high lift devices must be fully symmetrical. What I really needed was a wind tunnel to study various symmetrical airfoil and flap configurations at low Reynolds numbers.

**WIND TUNNEL TESTS**

Talking my way into one of the University of Washington wind tunnels wasn't difficult, because the head of the Aeronautical Engineering Department was interested in sailing and wanted to see the data I would get. I first built and tested a tunnel model of a conventional, sloop-rigged racing sail boat with cloth main sail and jib, to find out how good the competition already was. It showed a maximum lift coefficient of 1.25 at a Reynolds number of 10,000, not bad for ancient "technology."

(Which reminds me . . . Al Doig, formerly the writer of the "Soaring" column in *RCM*, told me a true story the other day. A would-be designer was talking to an old-time modeler about a unique scale model he wanted to build and test in order to get data applicable to a full scale airplane. The modeler warned him about Reynolds number scale effects. Our beginner said that his tests wouldn't be affected, since he intended to make the model of fiberglass, not Reynolds Metal. I thought that one needed to be passed on by another Reynolds.)

When I built and tested a tunnel model of an NACA 0015 section wing at this low model-sailing RN, I got a max CL of only .80. So far, conventional sails win by a mile! The addition of a symmetrical slotted trailing-edge flap boosted CL max to 1.25, but I had to build a better sailboat, not just equal existing ones. I tried turbulence wires at the leading edge with no success. A leading edge slot device was also tried, but because of the constraint of full symmetry, it didn't show a net gain. The next step was to add a second trailing-edge flap behind the first one. In trying a great many combinations of areas, angles, gaps, thicknesses, etc., in sixty some tunnel tests, a CL max of 1.94 at an RN of 10,000 was finally obtained; fifty five percent better than a conventional sloop rig! All of this took several months. The final, and best configuration, is shown in Figure 1.

This view of the bottom of CD Min's hull reveals smooth lines, with no sharp keel lines that can cause turbulence and added drag.

CL Max competing (make that "drifting") with the then National Champion conventional sailboat. The wing sail area was limited by the yachting rules to only a fraction of that allowed for cloth sails.

**MODELS**

I designed, built, and sailed two R/C models with this wing-sail and cascaded-slotted-flaps configuration; the first was a catamaran. The second and most successful had a single fiberglass hull, aluminum keel fin, lead keel weight, aluminum cantilever mast, and a balsa and silk wing sail. Have a look at the photos. This boat, "CD Min," is the model I referred to in the May issue of *MD&TS*, in discussing the subject of beauty. Is it beautiful to you? "CD Min," of course, stands for minimum coefficient of drag. The earlier catamaran was named "CL Max."

I raced CD Min for five years and never placed lower than third in national competition. That was 35 years before Dennis Conner's Stars & Stripes beat New Zealand with a wing sail in the 1988 America's Cup Race. Incidentally, the courts have finally decided that New Zealand's protest was valid, so the poorer boat wins the cup but didn't win the race. Rulemakers hate progress.

**BIG BOATS HAVE ADVANTAGES**

Speaking of rulemakers, those in the Model Yacht Racing Association of America made me accept a sail area handicap before they would let me compete with a radical-design model. I was limited to 1000 sq. in. of sail area, while my competition was racing with up to 2400 sq. in.

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# SEASPORT II

By STEVE GRAY

**A big, light, non-scale yet very realistic looking flying boat that performs beautifully on only .60 power. Uses conventional balsa/ply construction throughout.**

• The Seasport II was designed as a result of a burning desire I had to have a large flying boat for sport flying at the local water flying site. The design criteria were: something with a large wing area so it would float along slowly as it flew, a wide hull so that it would ride up on the water nicely and to utilize a Supertigre .60 Bluehead engine I had which always had been a most reliable powerplant.

I decided to make the model quite large so as to fly realistically and provide lots of buoyancy for good water handling. In going ahead with my working drawing I tried also to work in some pleasing lines, which meant cowling in and inverting the engine to provide a nice high thrust line, and utilizing a T-tail configuration. I wanted to keep the design realistic so as to make it believable as an aircraft, and I also wanted to occasionally fly from land, so I made provision for an add-on landing gear.

**Left: our author is not a small guy, that just happens to be a lot of airplane he's holding. Steve is a noted R/C scale modeler from Canada, so it's no surprise that his non-scale sport models retain a certain full-size look. The Seasport II lends itself well to "personalized" design changes, such as going to twin engines, altering fuselage contours and/or cowling shape, etc.**

Once the plans were drawn I was anxious to get started. Those who looked at them however, could not believe that a .60 would fly the large model. Being stubborn, I decided to prove that it would. I maintained that the size of the model was not as important as the wing loading, and things looked good from this point of view. The model was constructed in a matter of weeks and as it turned out, I proved my point. The big plane turned out to be a real honey on the water and in the air. It will loop from level flight, do nice aileron rolls, and the touch-and-goes from a placid lake are simply spectacular. All who have seen this model fly have been impressed with its performance. After many requests to make plans available, I have finally forced myself to sit down and write this construction article. Four models have been built that I know of to date, all of which have successfully flown, one of them as a twin engine version with two S.T. .29s for power.

There is a lot of wood in this plane, so pick it carefully for strength and lightness. Use cyano glue or waterproof glue of some sort for construction for obvious reasons. Build the tail as light as possible so that a minimum of nose weight will be required to get the balance point right.


**FUSELAGE CONSTRUCTION**

The fuselage is built by cutting out and joining several pieces of light 1/8 balsa to make the two sides. Glue to the insides of the sides the landing gear mounts (if required), the 1/8 balsa doubler behind the wings, the 1/4 x 1/8 strips along the top and bottom of the rear portion of the sides, the 1/8 balsa doublers along the bottom of the forward fuselage, and the 1/4 x 1/2 balsa strips along the front top section of the fuselage. Be sure to position this 1/4 x 1/2 strip up high enough so that half of it protrudes above the fuselage side. Also, glue in the 1/8 ply doubler at the front of the cabin and the 1/8 x 1/2 spruce cabin top rail. Cut the slot for the landing gear and glue in the 1/8 ply doubler around it, if you will be building a landing gear.

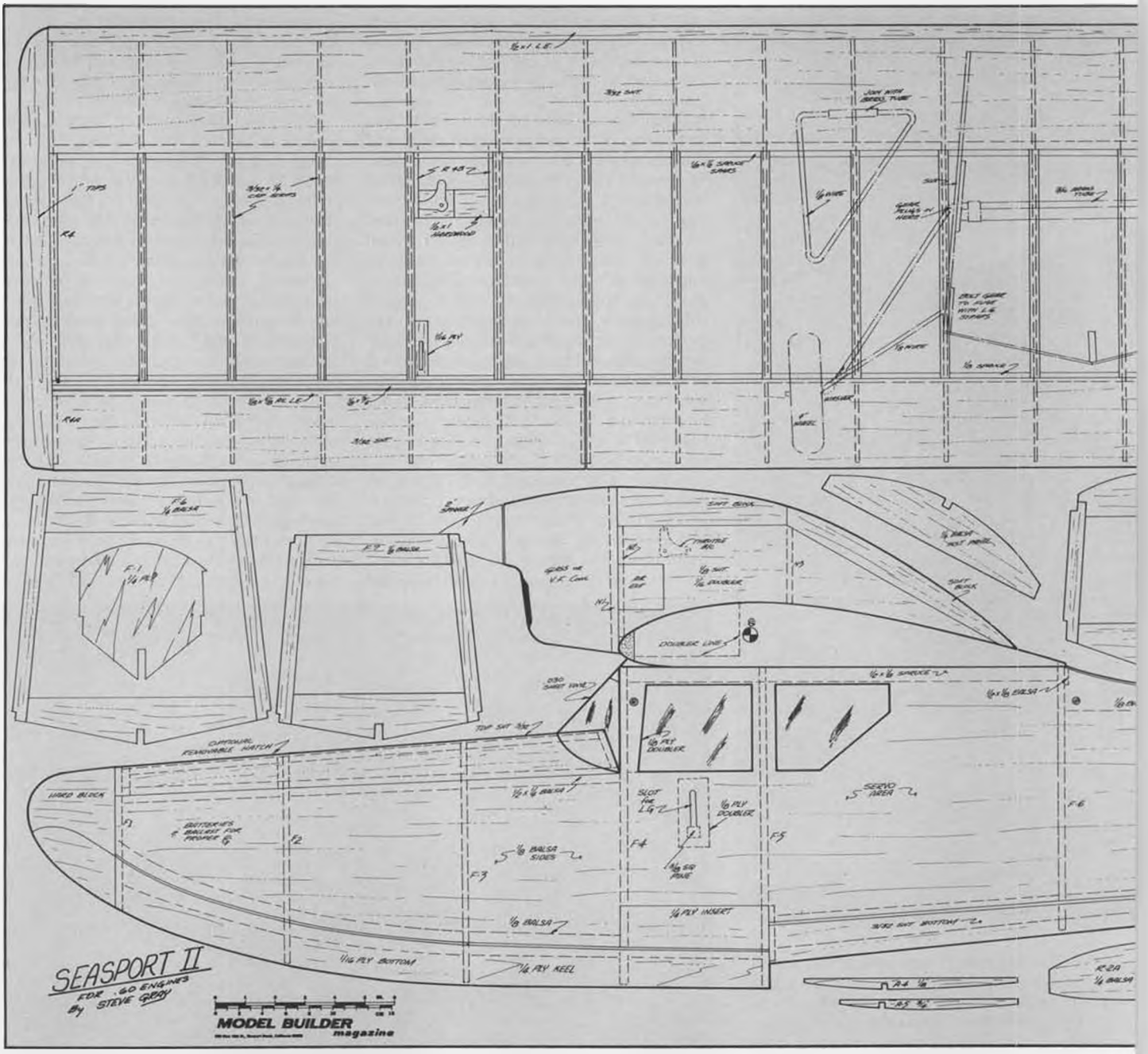
Once the sides are built, they may be joined at the tail with F-9. Build all the other fuselage formers at this time and when all are dry begin installing them as follows: Install F-4, F-5 and F-6. Keep things square as you do this. After this assembly is dry, it will be time for the tricky part, bending the forward fuselage around F-2 and F-3 to F-1. This requires quite a bend, so take your time and be careful. Epoxy in F-1 when you have everything lined up and clamped. After things have dried, fill in the rest of the formers but don't glue the tail together. This is done after the fin is built.

Now lay in the 1/4-inch ply keel in the front and the 1/4 x 1/2-inch keel at the rear of the fuselage. The bottom may now be covered with 1/16 ply at the front and 3/32 cross grain balsa at the rear. Decide if you will want an access hatch at the front of the fuselage. While this may be desirable, it isn't necessary as there is room for most arms to reach through the cabin into the nose. If you do, build up the hatch or even use solid block. There is no problem with weight up here. Lay in the 1/4 sq. top stringer and instrument panel. Plank the top with 3/32 balsa from the instrument panel forward. The rear of the top of the fuselage can also be sheeted with 3/32 cross grain balsa (lightweight). Carve and add the nose block and glue on the 1/4-inch balsa sub fin.

Sand everything to a smooth contour.

**TAIL CONSTRUCTION**

The fin is built in two halves. The left half is built directly on the plan complete with sheeting to keep things flat. Once dry you can remove it from the plan and build

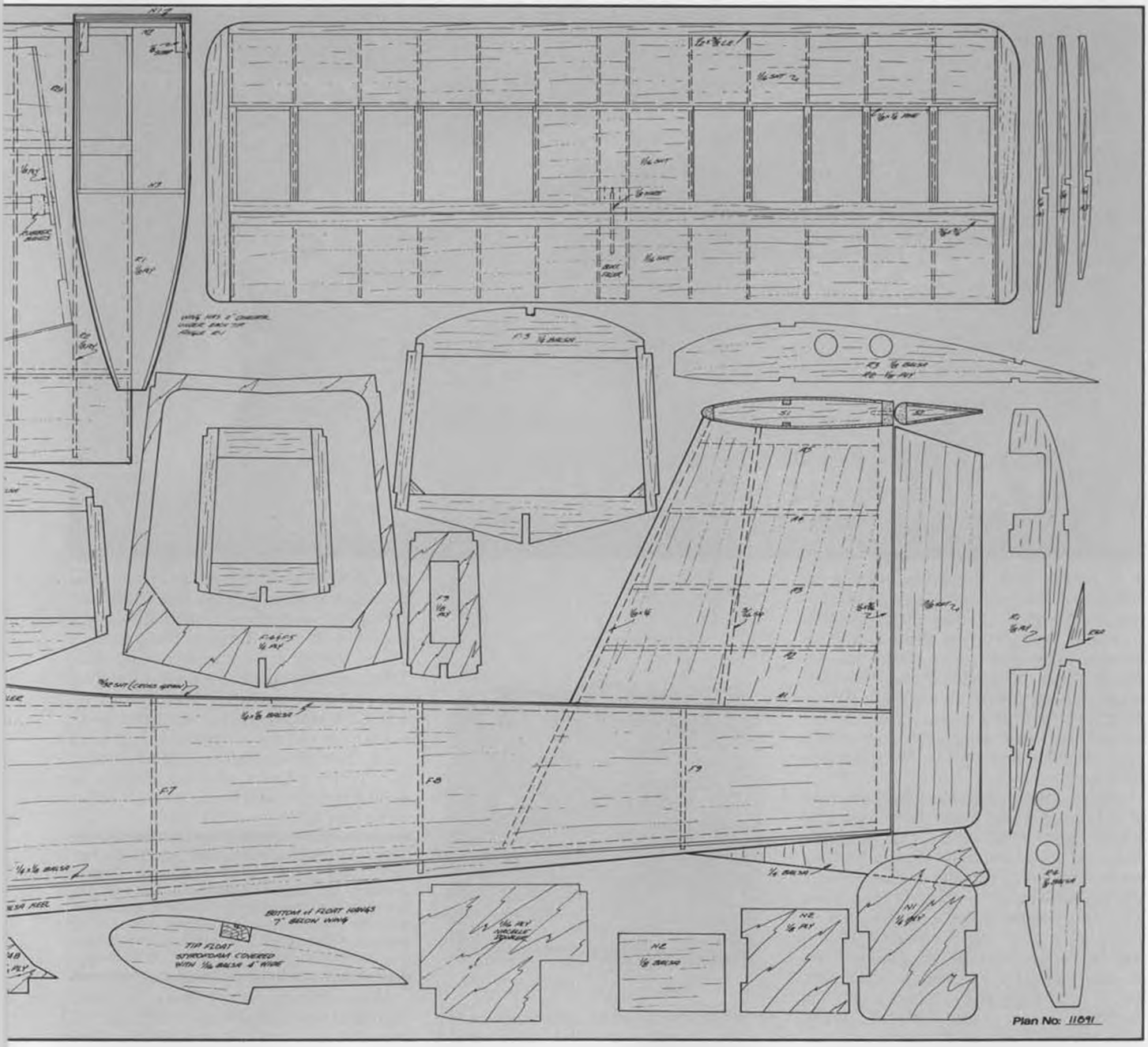



The prototype Seasport II is fitted with a removable landing gear for dry-land flying. This is detailed on the plan, but dyed-in-the-wool seaplane fliers may want to leave the gear off altogether.

## FULL-SIZE PLANS AVAILABLE—SEE PAGE 106

onto it the right side. You will want to plan and install the elevator linkage within the fin before you completely finish sheeting the right side. A flexible nyrod can be installed to take care of this. When complete, glue the fin to the top of the fuselage, inserting and gluing in the tail post fin leading edge. These two structures key into the fuselage to provide strength for the high tail. The rudder is simply cut from some soft 3/8-inch balsa and sanded to shape.

The stabilizer is built on the plan by pinning down the bottom 1/8 x 1/4 spar and 3/8 x 7/8 trailing edge. The 1/2 x 3/8 L.E. is blocked up 1/8-inch and also pinned to the plan. Glue in all the stab ribs and the top spar. When dry, glue on the 1/16 sheeting and cap strips. Remove from the plan when this is dry and sheet and cap the other side. Add the 3/4-inch balsa tips and




sand everything to shape.

To build the elevator, lay down a piece of 1/16 sheet 2-1/2 x 26 inches and glue onto it the small triangular elevator ribs and filler block in the center. Add another 2-1/2 x 26-inch x 1/16 sheet to the top and let dry. Then remove the elevator, sand the front flat and glue on the leading edge. Carve to shape, final sand and you have your elevator and stabilizer completed. You can wait to hinge things and glue the stab to the fin until after things are covered. I used Robart steel pin hinge points for all tail surface hinging. They are easy to use and look good. You can file notches in the leading edge of the elevator and rudder so that the hinge line will be set in a bit and the gap will be closed.

**WING CONSTRUCTION**

The wing is of standard "D" tube construction and is quite thick so it is extremely

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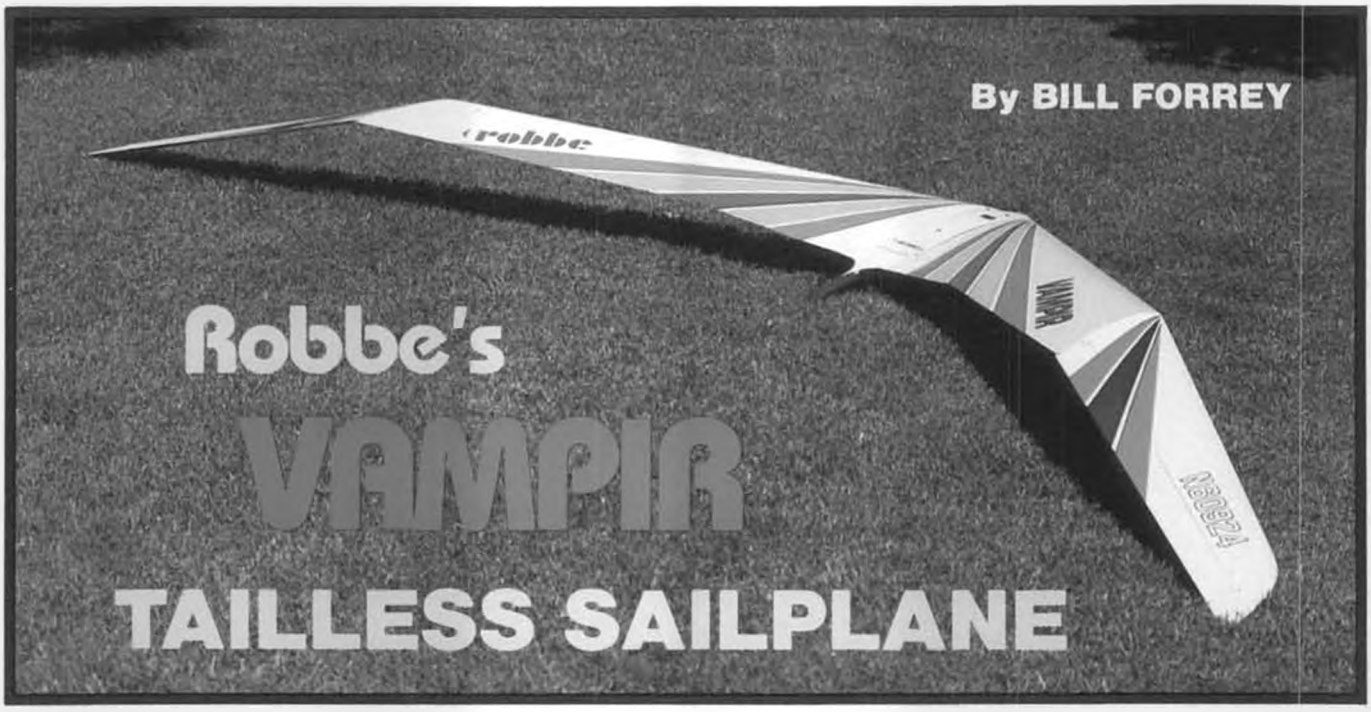



• In recent years there has been a big increase in the number of people designing and flying R/C flying wings. This has probably been brought about by the increased mass media exposure of such tailless aircraft as the stealth bomber, the space shuttles, hang gliders, ultralights, and parafoils. Whatever the reason, the most extraordinary flying wing we've ever seen is now available from Robbe. It's called the Vampir.

The people at Robbe Model Sport, USA (180 Township Line Road, Belle Mead, NJ 08502, phone 201-359-2115) have responded to this trend by introducing their second tailless R/C glider to their lineup, the Robbe Vampir. Imported from West Germany (home of the world's only R/C flying wing club, the Versmold FSV), the Robbe Vampir is a true flying wing. It has neither vertical nor horizontal stabilizers, and it has hardly any fuselage at all. The Vampir, with its optional electric power pod, is the subject of this review.

The Vampir is perhaps the most unusual glider ever produced commercially. Compared to a conventional aircraft, it looks a little bizarre. Even as a flying wing the Vampir is unique. Its strikingly singular appearance and the fact that it is a true flying wing make it a very fascinating model. The Vampir will interest anyone who is perhaps a little tired of conventional models and is looking for a new challenge, or anyone who doesn't mind grabbing a lot of attention at the local flying field.

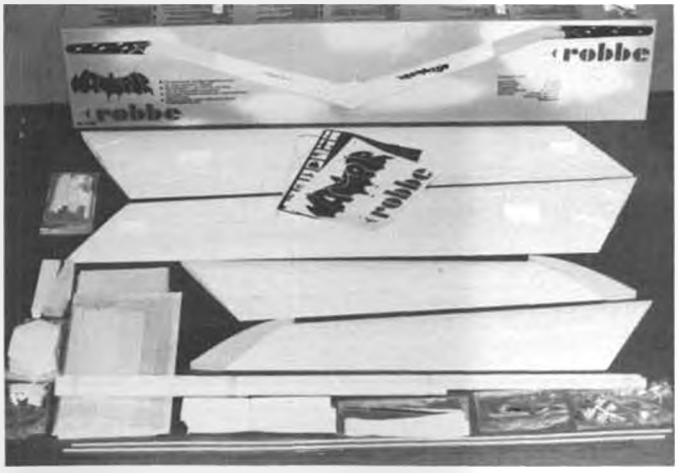

**Left: The transmitter for the Airtronics Vision 8SP radio used in the Vampir evaluation. This is probably the only radio on the market that was specially designed for sailplanes, and can be programmed to accommodate virtually any control/function setup possible—including flying wings. Bill has much to say about this radio in his review.**

The Vampir is very aptly named. Like Bela Lugosi lifting his cape on outstretched arms in his famous Count Dracula role, the Vampir's wings sweep upward and backward from its tiny, stinger-wielding fuselage, then drape downward to its tips. Surely, this is the model that Dracula or even Batman would have owned if either were into R/C!

However, unlike a its bloodsucking, mammalian namesake, the Vampir is big, graceful, fast, and has an excellent glide ratio.

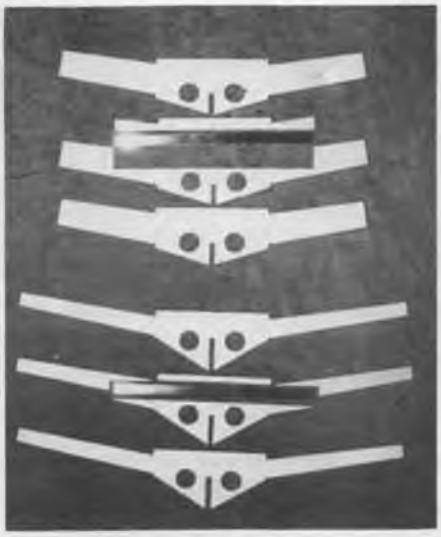
**VAMPIR DESIGN SPECIFICATIONS**

The Vampir, viewed from the front, ac-

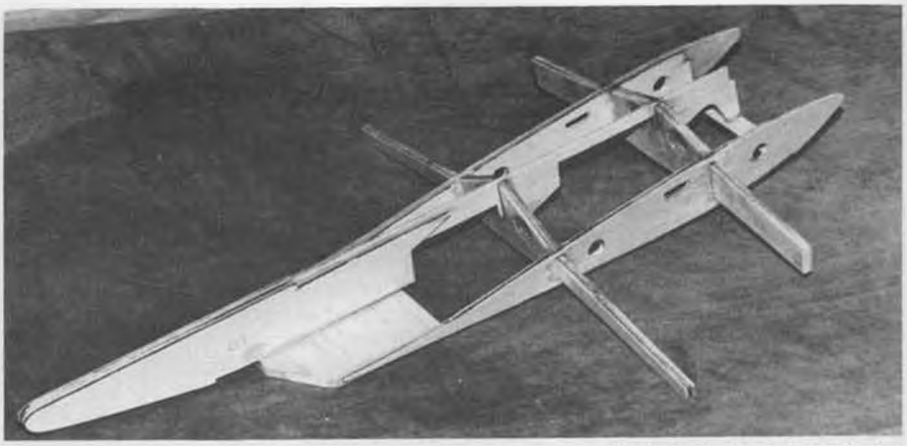



**There's a lot more airplane here than first meets the eye when the box is opened. Pre-sheeted foam wings could be classed as "almost-ARFs."**

**Part of the construction involves separating the ailerons from the wing panels, then facing the cut with 1/16-inch balsa. Leading edges have to be glued on also, then carved to shape.**

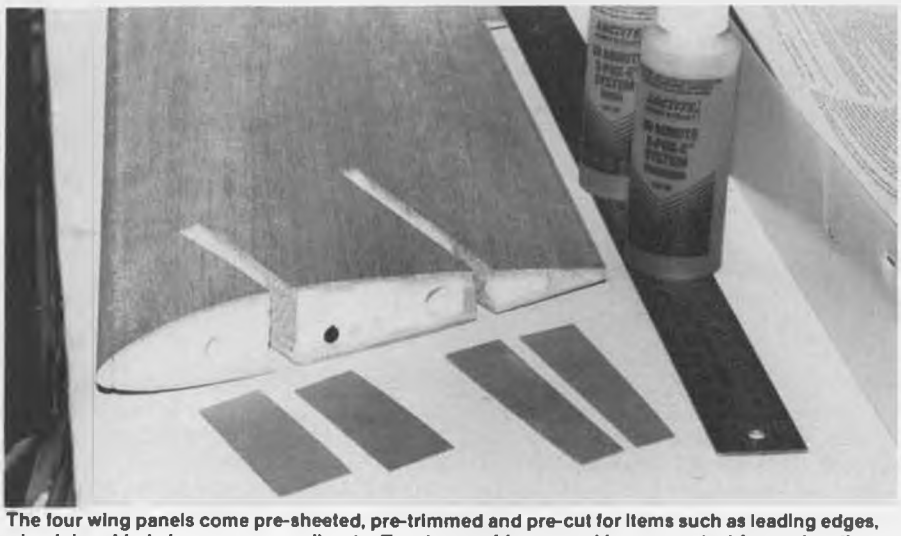


The fore and aft wing joiners are a sandwich of hard plywood and steel blades. The Vampir wings are not likely to break under normal use.



The fuselage skeleton, ready for sheeting with plywood and the installation of balsa nose and tail blocks. As our reviewer learned the hard way, this is a sturdy structure that can stand up to abuse.

Right: The roughed-out fuselage (before shaping) is mated to the wing roots for a parts fit check. Bill chose to apply the optional fiberglass cloth reinforcement to the wing joiner box areas to prevent possible rip-out of the joiners.



The four wing panels come pre-sheeted, pre-trimmed and pre-cut for items such as leading edges, wing joiner blade boxes, servo wells, etc. Two types of foam used here—see text for explanation.

tually has "gull bent" wings, sort of like the famous Minimoa, but more so. The sweep of the Vampir wing is more reminiscent of an exaggerated Horten flying wing.

The leading edge of each wing is swept 30 degrees, which is more than any other big sailplane design that we can think of. Each wing half tapers from a root chord of 12 inches to a tip chord of six inches, which is a lot of taper, but not extreme. The airfoils chosen for the Vampir are "Ritz series," but are not specified further. They look like low camber, semi-symmetrical, non-reflexed sections, with the tip section having very little camber.

Our review Vampir's wingspan, by actual measurement from tip to tip, is 10 ft. 4-3/4 in. (124.75 inches), almost dead-on to the claimed specifications of "3170 mm" (124.8 in). Wing area claimed is "approx. 64 sq.dm" (992 sq.in). By our own measurements, this should be more like 1098 sq.in., not including the fuselage area.

A flying wing's length is something you usually think of as being the length of the

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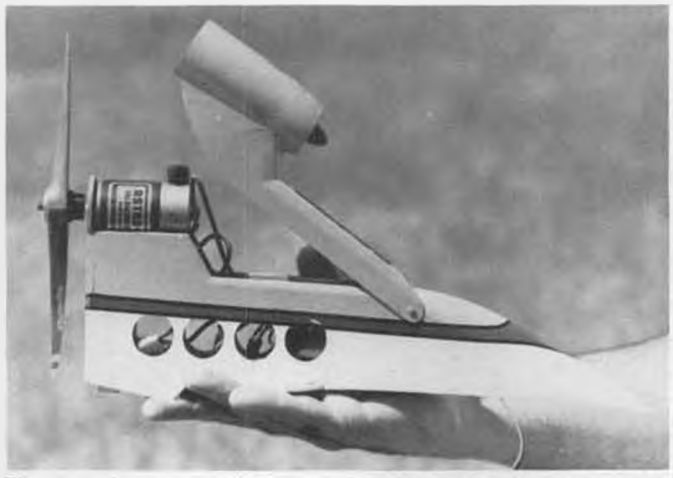


The optional power pod with Astro FAI six-turn 05 Cobalt motor installed. This is the only way to go for acceptable power.

A view of the radio compartment. Receiver battery goes under the receiver, flap servo is at the back. Aileron servos are in the wings.

# R/C SOARING

By BILL FORREY

• There is a new kit line making its debut on the soaring scene these days called Global Quality Kits, distributed by Global Hobby Distributors. This new manufacturer has enlisted the talents of one of America's best R/C glider designers, John Lupperger, to design and develop its first kit. The new model, called the Explorer 2M, has just been released for distribution through Global Full Service Dealer hobby shops all across the U.S.

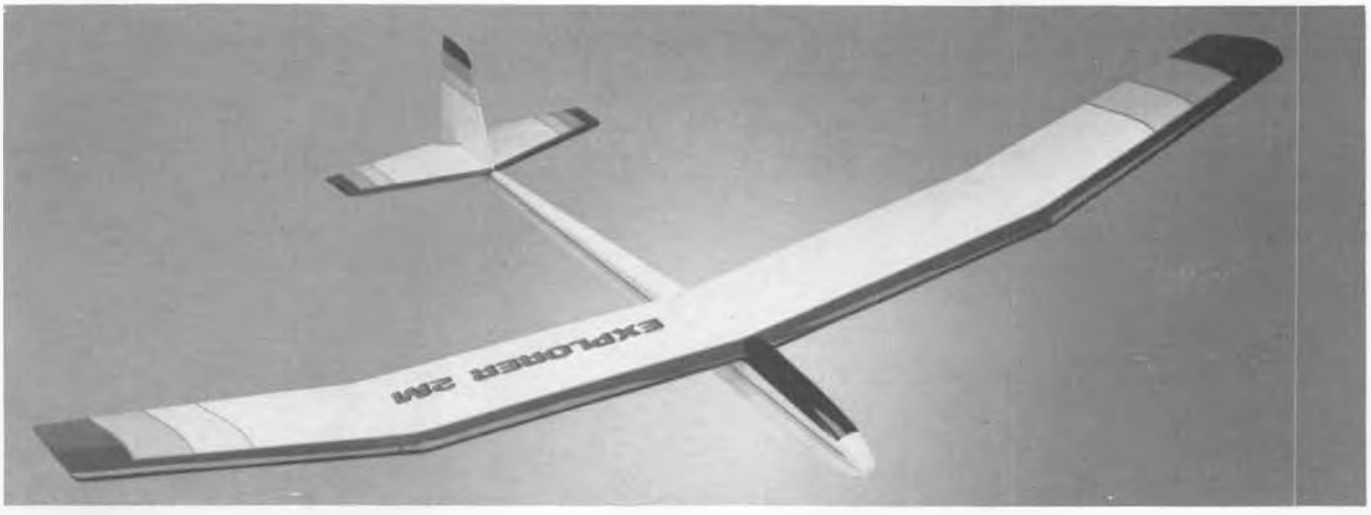
What makes this 2-meter ship so different and appealing to me (personally) is that it is easy to fly, and that it feels comfortable. The Explorer 2M is actually relaxing to fly. It's the kind of model that you would take to the field to escape and unwind with. Yet it has enough performance that it could do well in a thermal contest.

Design wise, the Explorer's tail surface areas are about "standard" for a 2-meter ship, but its tail boom is a LOT longer. This gives the Explorer 2M exceptional pitch stability and exceptionally good pitch damping. It is a smooth handling, graceful glider. It looks and flies much bigger than a two-meter.

The Explorer's wings have just the right amount of dihedral at the root and tip panels so that they perfectly balance out the vertical stabilizer in turns. There is no tendency to fall into the turn (spiral instability), and there is not much need to hold in rudder to keep the model turning. A couple of clicks of rudder and elevator trim will make the Explorer thermal turn all by itself.

The same design features which make the Explorer easy to fly, make it easy to land also. Setting up for spot landings and making that final approach are easier tasks. There is no tendency to dutch roll or swing from side to side after making course corrections because the Explorer is so well damped. It's as if it had shock absorbers in its tail. Make a course correction, let go of the sticks, and it continues on its new course with a minimum of wobbling.

**Below: The first kit offering from Global Quality kits, a new kit line being distributed by Global Hobby Distributors, is called the Explorer 2m, designed by top glider man John Lupperger. Prototype tested out as an excellent all-round performer. Extensively discussed in text.**




Having just recently observed, flown, and been duly impressed by the kit prototype, I am fairly excited about it. Whether or not the kit is a big success sales-wise, I believe the Explorer is probably one of the most significant new soaring designs to appear in recent years. I felt you might want to know about the Explorer 2M just in case it interested you too.

According to the manufacturer, the design criteria for the Explorer 2M from the beginning were quite challenging. The beginner/sport market has many two-channel gliders in it, most of which are very good, and well established. The first Global Kit was going to compete in a very crowded market. Therefore it had to offer the modelers something that the others did not: higher performance and better stability within the design needs of the novice.

It was decided that the Explorer had to be appealing to a wider group of modelers: beginners (of course), but also club fliers. It had to look attractive, but in a classic way, not trendy or faddish. It had to be simple enough for a novice with little or even no building experience to complete successfully. It had to be strong enough to take rough treatment without excessive weight. It had to have easy-to-fly, hands-off stability. It had to have a fairly broad speed range, be forgiving of pilot error, and it had to be affordable.

My enthusiasm for the Explorer 2M stems from a belief that it has met these goals pretty well.

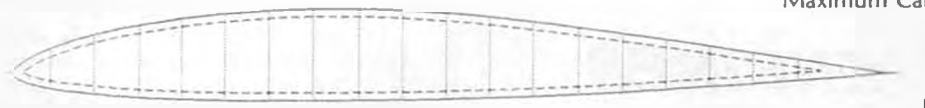
If you are going for LSF Levels I or II, or are planning to do well in the landing circle at the next club contest, I believe the Explorer 2M will give you better accuracy. Spoilers are not needed for landings, but could be added by experienced builders if desired.

The Explorer's D-tube, Clark Y wing can fly slowly and still give roll response to control inputs right up to its slow speed stalling point. The Clark Y profile, although it has been around for decades, is an excellent model sailplane air foil. It is basically a

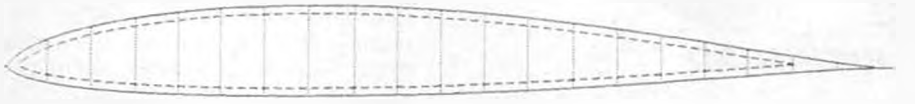
**Angelo Orona holds aloft his scale SG-38 Schulgleiter at Torrey Pines, in Southern California. A big scale sailplane fun-fly will be held here over Thanksgiving weekend; see text for details.**

## EPPLER 374

Maximum Thickness ..... 10.3% at 34% chord
Maximum Camber ..... 1.9% at 43% chord



## SELIG-DONOVAN 6060 (improved E374)



### SD6060

| Line No. | Station % | Upper coord. |
|---|---|---|
| 1 | 0.03 | 0.159 |
| 2 | 0.15 | 0.411 |
| 3 | 0.79 | 1.132 |
| 4 | 1.88 | 1.913 |
| 5 | 3.40 | 2.710 |
| 6 | 5.34 | 3.486 |
| 7 | 7.70 | 4.218 |
| 8 | 10.46 | 4.887 |
| 9 | 13.59 | 5.480 |
| 10 | 17.08 | 5.988 |
| 11 | 20.88 | 6.402 |
| 12 | 24.32 | 6.715 |
| 13 | 29.32 | 6.922 |
| 14 | 33.86 | 7.020 |
| 15 | 38.57 | 7.003 |
| 16 | 43.39 | 6.866 |
| 17 | 48.28 | 6.606 |
| 18 | 53.22 | 6.225 |
| 19 | 58.17 | 5.738 |
| 20 | 63.09 | 5.177 |
| 21 | 67.92 | 4.563 |
| 22 | 72.60 | 3.912 |
| 23 | 77.10 | 3.248 |
| 24 | 81.35 | 2.595 |
| 25 | 85.30 | 1.977 |
| 26 | 88.90 | 1.419 |
| 27 | 92.10 | 0.941 |
| 28 | 94.83 | 0.559 |
| 29 | 97.03 | 0.283 |
| 30 | 100.00 | 0.002 |

| Line No. | Station % | Lower coord. |
|---|---|---|
| 1 | 0.03 | -0.159 |
| 2 | 0.50 | -0.647 |
| 3 | 1.52 | -1.148 |
| 4 | 3.07 | -1.612 |
| 5 | 5.11 | -2.025 |
| 6 | 7.65 | -2.381 |
| 7 | 10.65 | -2.678 |
| 8 | 14.08 | -2.919 |
| 9 | 17.91 | -3.105 |
| 10 | 22.10 | -3.238 |
| 11 | 26.59 | -3.321 |
| 12 | 31.35 | -3.354 |
| 13 | 36.31 | -3.338 |
| 14 | 41.41 | -3.273 |
| 15 | 46.61 | -3.159 |
| 16 | 51.85 | -2.995 |
| 17 | 57.07 | -2.784 |
| 18 | 62.22 | -2.527 |
| 19 | 67.25 | -2.231 |
| 20 | 72.12 | -1.906 |
| 21 | 76.76 | -1.568 |
| 22 | 81.13 | -1.236 |
| 23 | 85.18 | -0.922 |
| 24 | 88.84 | -0.638 |
| 25 | 92.07 | -0.399 |
| 26 | 94.82 | -0.214 |
| 27 | 97.03 | -0.090 |
| 28 | 98.66 | -0.024 |
| 29 | 99.66 | -0.002 |
| 30 | 100.00 | -0.001 |

Credits: "Foiled Again" program by Cygnet Software.

flat bottom section with a little Phillips entry (curve on the bottom surface near the leading edge). It is thick enough at 12% to be quite strong and stiff, it has fair penetration for windy conditions, a gentle stall, and it carries ballast very well.

The Explorer's 2M wing is of higher aspect ratio than most two-meters. Its 10:1 aspect ratio is the same as most 100-inchers! This helps reduce induced drag, which in turn increases the lift to drag ratio and overall performance of the model. The high lift Clark Y airfoil and the extra strong wing spars more than give back what the higher aspect ratio takes away when launching. With the Explorer, you can launch harder and higher than most two-meters.

Structurally, the Explorer 2M wing is going to be difficult to break under normal winch or high-start towing conditions. It has (get this!) 1/8 by 3/8 inch, hardwood spar caps with 1/8-inch I-beam shear webbing. In case you aren't aware, that's bigger and stronger than the spars of most 3-meter wings! The D-tube balsa wing sheeting and the heavy duty spars combine to yield a wing that will stand up to moderate zoom towing season after season!

If it sounds like I am bullish on the Explorer, I am. As I said, I recently had the opportunity to fly the kit prototype. I came away from the field wishing I had an Explorer 2M for my own. It is one of the best handling, best general purpose 2-meter designs I have yet flown. It isn't the fastest, nor is it the slowest, but it flies well in a wide range of conditions. What's really important is that the Explorer 2M has superior handling characteristics, and that helps make everyone look like a better pilot in the air.

As of this writing, the kits are still two or three weeks away from release and distribution. When you receive this *Model Builder* issue, the kits will be out. Ask your local hobby shop proprietor to show you one. The suggested retail is $59.95.

The specifications of the Explorer 2M are: 76-inch span; 574 square inch wing area (3.98 sq.ft.); 36.5 ounces total weight; 9.1 ounces per square foot unballasted wing loading; optional spoiler recommended size 1 x 5.75 inches (ea.); 44.5 inches overall length; 76.5 square inches horizontal stab area; and 38.7 square inches vertical stab area.

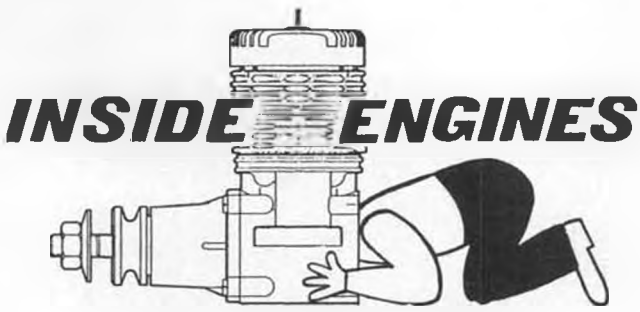
**TORREY PINES SCALE FUN FLY**

Scale sailplane flying is finally grabbing headlines in the U.S.A. like it probably should have all along. Witness the number of scale fun flies popping up everywhere, not just in Washington State (where there is a world-class slope site), but over Illinois sod farms, and at the annual AMA Nationals, to name just a few. Well, hang on, here comes another one in Southern California at the cliffs of Torrey Pines.

Sidetracking for a moment, I think that until recently, scale fliers have had a "visibility" problem. Most soaring editors frequent flying fields where there are lots of people and club activities, and that means thermal flying. The majority of American

*Continued on page 63*

**The "Outlaw" aerobatic sloper as designed by Shawn Cordon of Glide One Model Aircraft Corp. Span is just under four feet, and it's set up for aileron/elevator controls. More in text.**



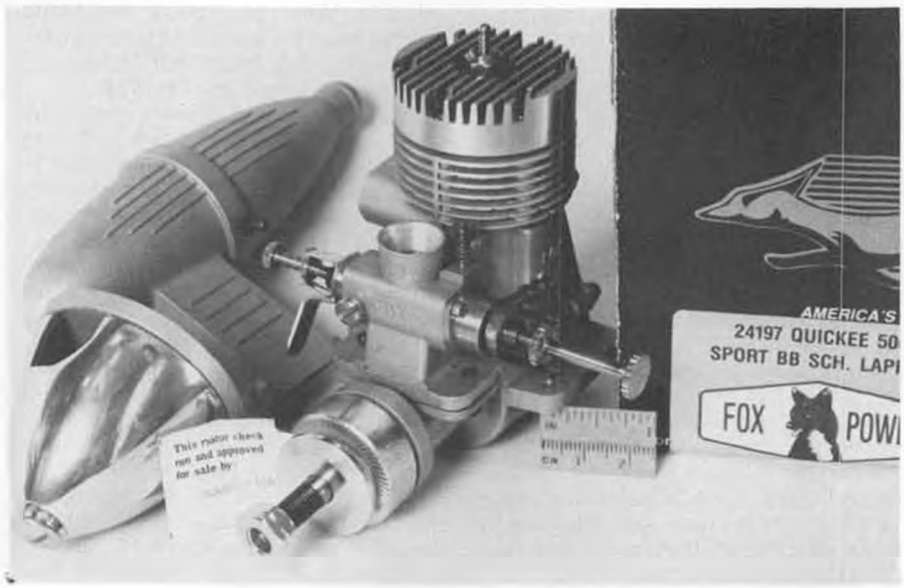

WITH **STU RICHMOND**

# Fox Quickee 500 Sport .40

• Duke Fox introduced this month's engine at the '89 IMS/Atlanta Show. He said to me, "Stu, tell your readers this is a mild-cam street version of my fire-breathing QUICKEE 500 SPECIAL for sport pylon racing." By "mild-cam street version," he was using automotive parlance to indicate this was a mildly detuned performance engine aimed at the R/C sport flier.

The .40 size engine is the most popular size for today's R/C use. This month's engine is Duke's fourth .40 in current availability . . . and a fifth one with an economy sleeve bushing instead of ball bearings should also be soon available. Three of the .40's share the smaller and lighter Fox "C" frame crankcase. They are:

1. The soon-available #24095 without ball bearings and with a cast iron/steel piston/cylinder at an economy price.
2. The #24096 Fox STANDARD with dual ball bearings and cast iron/steel piston/cylinder.




**Below: The new #24197 Quickee 500 Sport .40 is a rugged long-stroke R/C engine, using the same massive crankshaft and beefed-up crankcase as the larger Fox .45 and .50. Sturdy construction make this engine a candidate for muffled tuned pipe use, developing still more power than shown in the chart on the facing page. The engine has an exceptional speed range between full and idle rpm.**

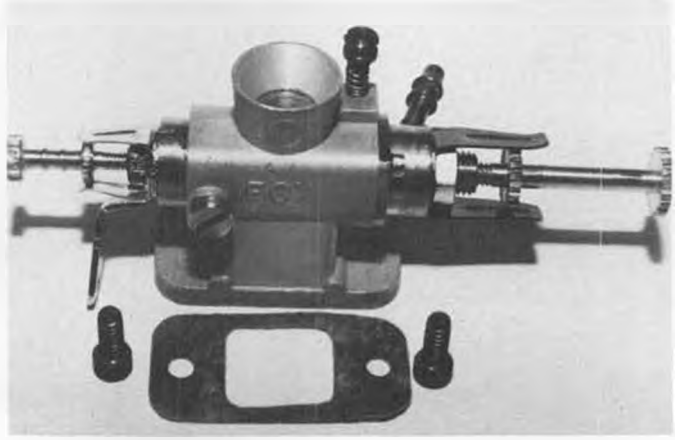
3. The #24098 DELUX with dual ball bearings and an ABC piston/cylinder.

Duke built the #24097 QUICKEE 500 SPECIAL (an all-out pylon racing engine *not* suitable for sport flying) in the larger and sturdier "B" frame crankcase that his .45s and .50s use. In this month engine, he's fitted an economical steel cylinder and lapped iron piston into the same larger and sturdier "B" frame. Our tests show a power gain over the Fox STANDARD reviewed in our April '88 column.

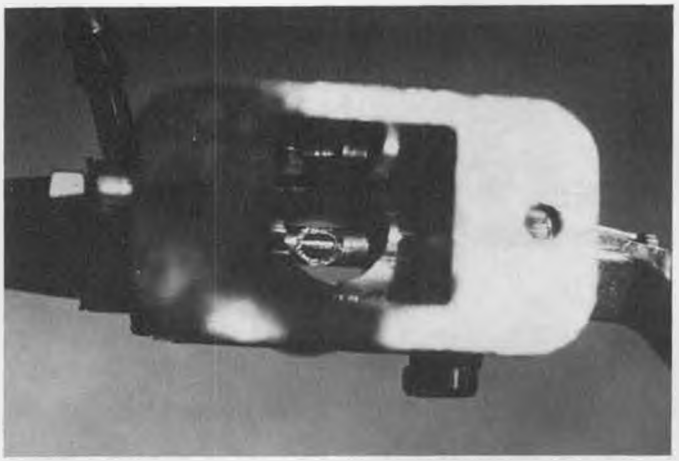
This engine's instructions specify using a fuel with at least 18 percent castor oil, similar to Duke's Fuel (with 10% nitro) which wasn't available here in Central Florida. Cast iron is a very hard, shock-resistant, semi-porous material ideal for our model engines. Castor oil builds a brownish glaze on the working surface of cast iron . . . and this glaze is what allows the iron/steel piston/cylinder to wear so well and to seal so tightly. Please remember, cast iron and castor oil go together. Cox's #551 Super Power Fuel was locally available and it has a very high castor content. I bought a pint for careful break-in.

All Fox engines are now factory test run and come with the new Miracle Plug that extends .050 inches down into the combustion chamber, further than other glow plugs . . . ignition is placed nearer to the

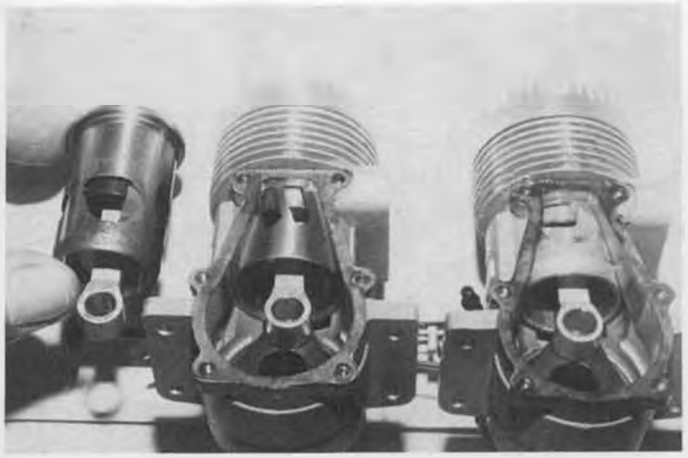

**All the parts laid out for inspection. Cylinder's bore is .800 inch rather than .835 like other Fox .40s. Stroke is longer and the engine is comfortable turning 11x6 and 11x7-1/2 .60 size props.**



**The carburetor's long needle valve is for high speed; short one is for idle mixture. The forward facing screw retains the barrel in the casting, while the one on top acts as the barrel's "stop."**



The camera is focused on the bottom of the carb's spray bar and shows the ragged edge hole for entry of fuel. Stu feels the ragged edges probably promote a steadier fuel flow into the airstream.



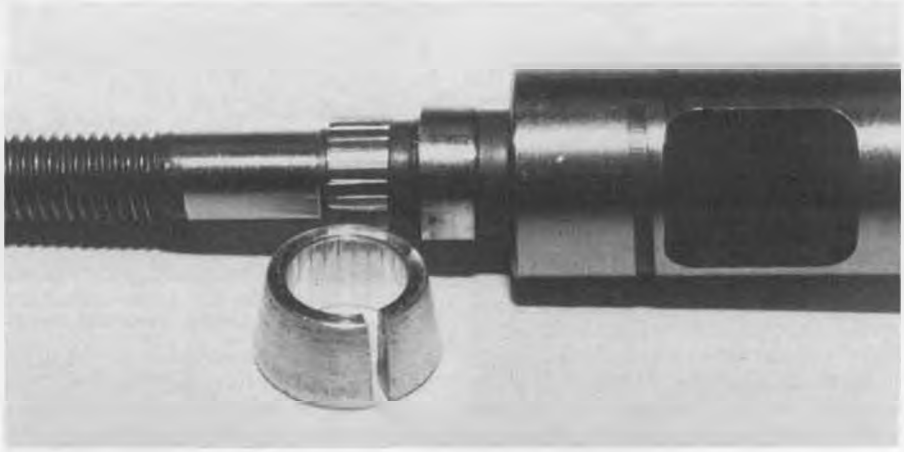
Piston/cylinder comparisons, from left; this month's engine's iron piston in a steel sleeve; the .50's ringed aluminum piston in a steel sleeve; and the "Q" .40 with an aluminum piston in a chromed brass cylinder.

center of the combustion chamber. The high speed needle valve, the big one on the fuel nipple side, was out 1-7/8 turns as received . . . the idle needle, the smaller one on the exhaust side, was out three turns as received. These are slightly rich settings by about one half a turn . . . but were ideal for break-in running. Initial running was with the 9-1/2x6 Master Airscrew. Six chokes at full throttle, glow plug heat added . . . prop grabbed firmly and briskly pulled through compression three turns until I felt an ignition "bump" . . . throttle closed to just above low idle . . . ONE FLIP AND THIS NEW FOX QUICKEE SPORT .40 WAS RUNNING. IMPRESSIVE!!

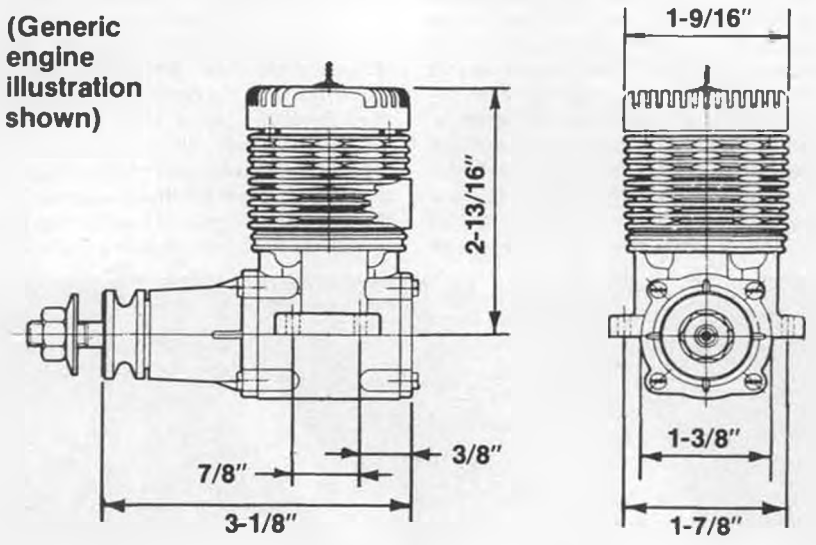
Break-in was a series of 30 second runs at increasingly higher rpm with complete cooling allowed between each 30 second run. Then a series of longer moderately fast runs were made with complete cooling between runs and finally full-throttle slightly rich runs were made with frequent squeezing/pinching of the fuel line to be sure we were still slightly rich. The process takes an afternoon and assures you that maximum performance designed into an engine can be gotten out at the prop. It took the whole pint of Cox #551 fuel. The muffler is left off during break-in to allow maximum escape of heat during this critical time in an engine's life. No attention is paid to idle performance during break-in. Right from the start this crankshaft-to-bearings fit felt perfect . . . there is just the slightest hint of front-to-back freeness (called end-play) as you lightly push and pull the prop's hub backward and forward. The prop readily rocked back and forth off of compression with just a light touch of a finger. Occasionally the engine started backwards, which comes with rather advanced intake timing. Backwards running is easily stopped by just opening the throttle . . . no big deal. All starting was with a "chicken stick" rubber hose rather than my fingers . . . we've yet to use an electric starter on this engine.

The reason Duke specifies as much as 18 percent castor oil initially is simple . . . castor is the world's finest high temperature lubricant for model engines. While metal-to-metal fits are being established

*Continued on page 79*



The tapered split collet is a common method of holding the drive washer to the crankshaft. First shoulder of the shaft has been splined to keep the drive washer from slipping.




**MEASURED PERFORMANCE**

| PROP SIZE | LOW SPEED | HIGH SPEED | RICHMOND SPEED RATIO |
|---|---|---|---|
| 9x6 | 2,500 | 15,600 | 6.24:1 |
| 9-1/2x6 | 2,350* | 15,200** | 6.47:1 |
| 10x6 | 2,000 | 14,200 | 7.10:1 |
| 11x6 | 1,900 | 12,100 | 6.37:1 |
| 11x7-1/2 | 1,750 | 11,050 | 6.31:1 |

*Muffler-off speed varied between 2,500 and 2,700 rpm.
**Muffler-off speed varied between 15,500 and 16,250 rpm.

# ELECTRIC POWER

By MITCH POLING

• About a year ago I outlined a method described by Ed Westbrook for finding the motor constants k and R. This involved using simultaneous equations, which are not everyone's favorite math method. Bob Kopski, in his column in *Model Aviation* outlined a method which does not use simultaneous equations, and is very simple to use. First, you read the current and the voltage at the motor terminals at stall, then the current, rpm, and voltage at the motor terminals under a normal load. The motor equation is voltage = current x R + k x rpm, so at stall you can solve directly for R (armature resistance), since rpm is zero, the K term drops out. Once you have R, you can substitute it in the full equation for the second run and get k. Bob went one more step, he uses 1/k for evaluating motors. I like this; it gives a whole number in the thousands, which is easier to handle than the fourth place decimal you get for k itself. K (or 1/k) is a very useful number, it describes how strong the magnet is, friction loss, and winding efficiency, among other things. The higher 1/k is, the better.

I decided a constant voltage source would be a good idea if I am comparing motors, but I do not have a heavy duty power supply. Regular NiCd packs, as you know, vary quite a lot depending on cycling, temperature, and state of discharge, so they do not make a good source for comparisons. The 12-volt automotive battery is ideal for a power source, but the voltage is too high for the 100-watt (05) motors I usually test. The answer was to use a 25 to 30-foot extension cord (18 or 16 gauge) with the 12-volt battery. This dropped the current to the 10 to 20 ampere range when a Cox gray 6x3 prop is used. This is not strictly a constant voltage source either, as the cord is a resistor and the voltage drop is dependant upon the current, but at least the source voltage (the automotive battery) stays constant. I found that writing the data down as stall voltage/stall current; then rpm/stall voltage/stall current made it very easy. For stall voltage/current, I put a wood block in the propeller's way, then plugged in the motor. The current was read with a DSC 30 ampere meter, the voltage was read with a digital voltmeter attached to the motor terminals. Radio Shack sells a DVM for less than $25, and hook-on probes that plug into the probes for the DVM. I like the hook-on probes and use them. I did read the stall current at not less than two positions of the prop, as it can vary. I used the higher values of current in the calculations. Here are the numbers I got using a 12-volt automotive battery, a 27-foot extension cord, and a Cox 6x3 gray prop. V=voltage, I=current.

Mabuchi 540 motor: 12,860 rpm/6.44 volts/9 amps, (stall) 1.14 volts/11 amps.

Trinity stock 05 motor: 14,090 rpm/6.56 volts/11 amps, (stall) 1.20 volts/11 amps.

Astro Turbo 05 motor: 16,970 rpm/5.65

**Pretty Taube, possibly from a Balsa USA kit, is the work of George Millikan. Except as noted, all of this month's photos were taken by Ben Almojuela at the recent Boeing Hawks Electric Fly-In.**

**Hmmmm. Well, it's obvious that Rex Schlegel has something completely different with his "Mountain Glider," designed to fold up for transport in a four-inch tube. A bit crude, but it's really pretty neat.**

**Keith Shaw has shrunk! Well, not really, but it certainly looks that way as he stands beside his latest project, the "King Crimson" tailless. More in text. Photo courtesy of Keith Shaw.**

volts/20 amps, (stall) .58 volts/12.5 amps.

Let's run through the calculations for the Mabuchi. R is 1.14 divided by 11 = 0.104 ohms. Use this value to get k in the rpm run. For k, 6.44 volts = 9 x 0.104 + k x 12,860. K equals 6.44 volts – 9 x .1O4, all divided by 12,860; k equals 0.000428. I prefer Bob's 1/k, so divide 1 by 0.000428 to get 2335. Values of 1/k exceeding 2000 are fine for sport flying. Values over 2500 are very good, suitable for sport pattern. Values over 3000 are excellent and what you want for competition flying. Try your hand at calculating 1/k for the other motors. The values I got for 1/k were: Trinity = 2634, Astro = 3595. The Trinity is a very good offroad motor and quite competitive in offroad racing. It has replaceable brushes and brush heat sinks, and conforms to the stock off-road rules of 27 turns of #22 wire and oilite (plain) bearings. The armature is machine wound and balanced, and timing is about 15 degrees (17 degrees is about maximum). It costs $28 retail. The Astro Turbo 05 is a cobalt motor with ball bearings and a hand wound armature. This motor is top competitive, and has the smoothest and fastest response of any motor I have driven in offroad cars. It retails for about $80.

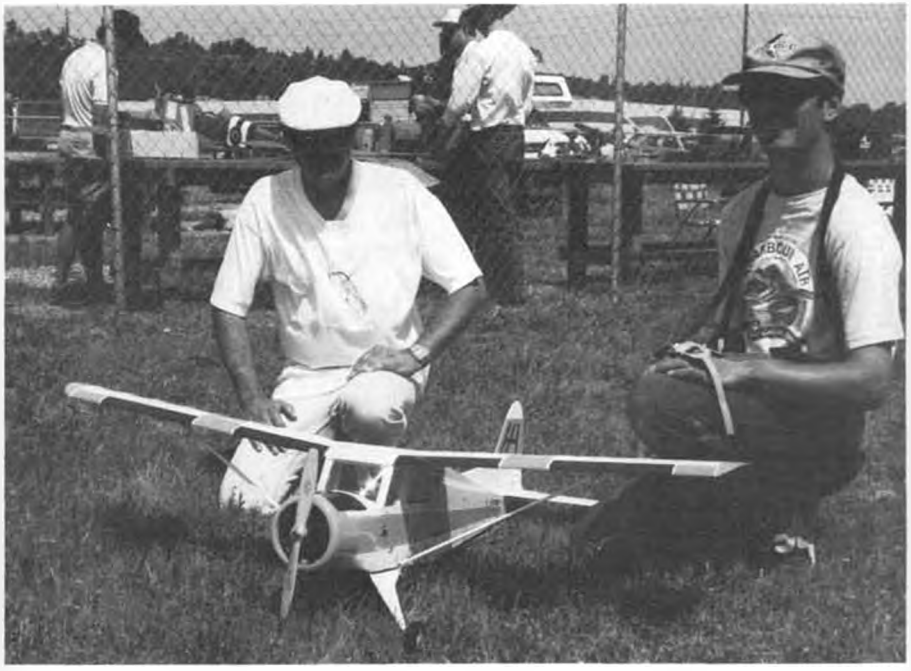
I like to calculate efficiency too, using George Abbot's equation for power output. This is pitch times diameter to the fourth power times rpm to the third power, divided by 1.88 times ten to the fourteenth power. A scientific calculator handles this nicely. If you have just a simple calculator, ignore the powers of ten, and use the first three digits of the answer for the power (in watts). Power input is volts times current. The power output for the Mabuchi motor is 3x6x6x6x6x1286Ox1286Ox1286O divided by 1.88; equals 44.0 watts. If the display overflows, go back a step, chop off some of the trailing digits and go on. Try it and see, it is worth learning. The power in is 9x6.44 equals 58 watts, efficiency is 44/58 times 100 equals 76%. The Trinity motor is 80%, the Astro motor is a whopping 89% efficient! You get what you pay for!

I do like this method for evaluating motors. Thanks, Bob, for passing it on to all of us.

Last month I wrote about a flying wing that weighed only 8-3/4 ounces, designed by Tom Davis. The week after I wrote about it, Keith Shaw sent info on his flying wing, at the other end of the scale! As Keith puts it, the photo is of his "King Crimson" with a miniature Keith Shaw holding it. The span is 126 inches, area 1980 square inches, flying weight 10-1/2 lbs. It flies on four Leisure geared motors using the long gear box (2.5:1), 28 Sanyo SCR cells, and a Jomar SC-4 throttle. The motors are turning 10-8 Rev-Up props, with peak power at 560 watts. Keith says flight performance is awesome; the sound of four motors whining is unbelievable! It will not spin or stall, does good loops, and very slow rolls (they take 300 feet to complete). Level speed is 50-55 mph. The landing gear is Spring-Air retractable. The plane is very attractive in bright red MonoKote. Judging from the

*Continued on page 61*


**A superb building job on this Klemm L25d; unfortunately we didn't get the owner's name. Appears to have been built from the German Krick kit imported by Hobby Lobby.**



**One of these two fellows is Dave Pentland, of Vancouver, Canada, who won Best Scale on the second day of Boeing Hawks meet with his good looking DeHavilland Beaver. Uses Astro 25 power.**

**Lee Urbaniak won an award for Best Gas Conversion with his Ace All Star, equipped with an Astro 15. Wing loading is pretty high, but it put in several nice flights at the Boeing Hawks meet.**

# The Micro-Albin

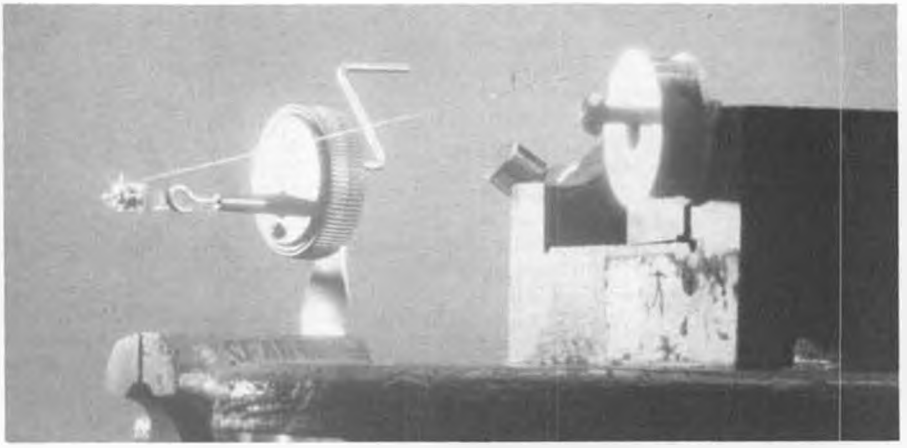
## A most misunderstood receiver

**By FRITZ MUELLER... An introduction to the smallest, simplest, and lightest radio receiver yet designed, by an acknowledged expert in the field of "wee R/C."**

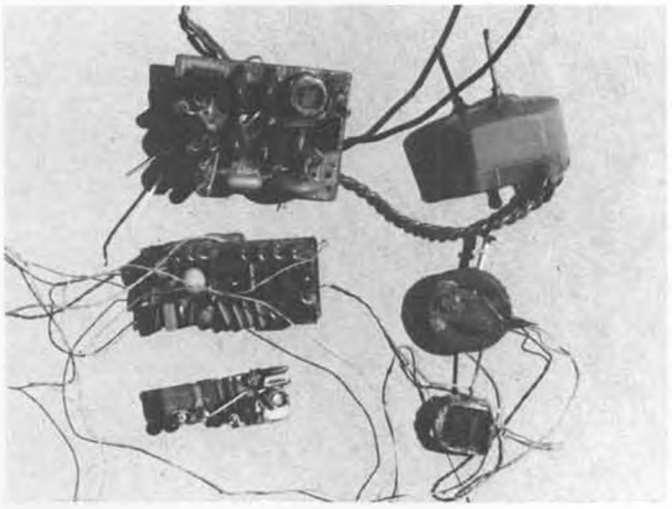
• No other RC receiver is simpler nor lighter than the Albin. It consumes the least idle power of all the receivers I ever worked with and therefore it can be operated with a very light set of batteries. The weight of a whole flight pack complete with batteries, switch, actuator and receiver may weigh between 7 and 9 grams, roughly 1/4 oz. Such a light outfit can be installed and flown in a 16-inch model like Peck's Prairie Bird powered by rubber or $CO_2$. Yet there is nothing "micro" and not even much "Albin" about that little jewel, because the design was originated and proven in flight by Hilmar Bentert and his receiver was smaller. Hence the Micro-Albin is really a Macro-Bentert. It receives radio signals by super-regeneration, a widely criticized but one of the least explored techniques.

Ancient radio hams used simple regeneration to boost reception. That was before heterodyne receivers became popular. Textbooks for amateur operators still today contain a few paragraphs about regenerative Radio Frequency (RF) feedback, with the warning, that excessive positive feedback causes RF oscillations, which radiated by the receiver antenna will disturb other stations. This warning led to the idea, that if regeneration is so bad, then "super"-regeneration must be that much worse. Wrong! The Albin radiates less RF than my electric razor, the smallest appliance in the house, yet in the past it has been stated repeatedly by a slew of experts, that it could "shoot down" an RC model in flight by interference.

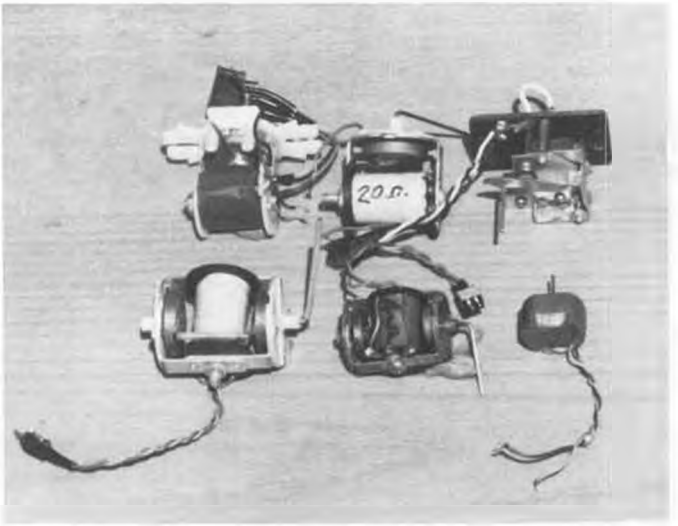
The signal going to the totally detuned Albin antenna is 0.05 volt highdriven only by a fraction of 0.2mA, which is the measured total current of the Rf transistor. Once I realized on paper how limited the radiated power of this superregen receiver was, I went right ahead and put one in the same fuselage together with a regular



Our author uses a 6:1 geared rubber model winder to wind the actuator coil. Once properly set up, you can pile up 400 turns of #40 AWG enameled copper wire in less than a minute.



At the upper left is the original 4.5-gram Micro-Albin with a 7-gram Bentert actuator beside it. The latest version of the receiver (bottom left) weighs just 1.5 grams, the matching actuator just one gram.



The Bentert actuator (bottom right) compared in size to a 42-gram Mattel unit (upper left) and four Adams actuators produced by Ace.

**Right: A one-gram actuator controlling the rudder tab of a 30-inch $CO_2$ powered model. The delicate linkages are made of light balsa, bristles from a bronze wire brush, and aluminum from a sardine can.**

Cannon flight pack. Both receivers were connected to the same battery and switch, the antennas were close together. I flew the model as far as my 20/20 vision allowed and not at one time did I lose any of the 4Ch controls. Should anybody know how to shoot down RC planes with an Albin, please come forward. I was unable to do that, even when trying from a distance of two inches.

Soon after the introduction of superregenerative receivers, they were replaced by superheterodynes. There was not enough time for the development and contemplation of superregen designs, hence you will find in textbooks only superficial descriptions loaded with hints to brush them aside as dirty, just as a bunch of Saudis would do with pork sausage. So I thought it worth the while to briefly stop hacking balsa and look at the process of superregeneration through my cheap homemade oscilloscope.

A diagram of the original Micro Albin was published in the beginning of 1968. By studying these circuits one can see, that superregeneration takes place in the first RF stage: Q1 starts a controlled oscillation at an RF determined by the tuned circuit L1 and C2. Excessive positive feedback through C3 is rectified by the base, which discharges C1. That soon relaxes the Q1 current and blocks RF oscillation. During the period of relaxation R1 recharges C1 until Rf oscillation sets in again. This cycle repeats itself about 70,000 times per second, way up in the ultrasound region. The relaxation frequency is affected by component tolerances and temperature.

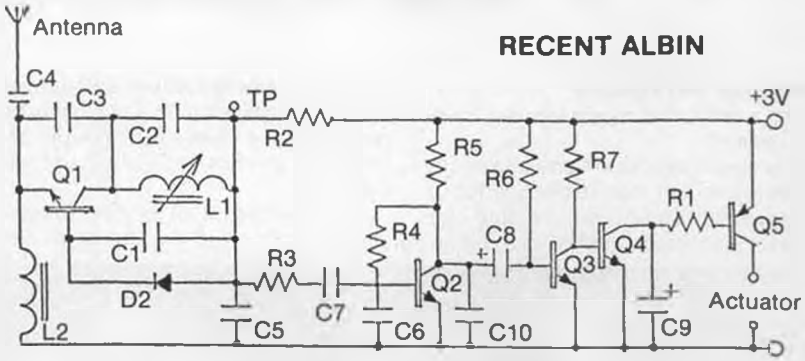
C5 is a virtual short for RF, so no RF will be visible in the scope at the testpoint TP, but you will see the 70kHz (70,000 cycles/sec.) relaxation sawtooth wave. The relaxation potential is reached sooner if the internal oscillation is initiated by an external signal received by the antenna. In such a case the sawtooth will be shorter, which means that the relaxation frequency will be higher. Hence the intermediate relaxation frequency will jump from high to low, for instance 500 times per second, if the received RF signal is modulated by a 500 Hz tone. A modulation of the ultrasound frequency appears on the scope as a doubling or blur of the sawtooth.

Higher ultrasound frequencies going through the low pass filter (R3, C5 and C6) are attenuated more then lower ones. The collector current of Q2 will therefore rise and fall in accordance with the frequency changes of the ultrasound. Q2 is obviously a frequency discriminator and Bentert additionally achieved some boosting resonance in the circuit by using a 3,500 Hz operating tone, a condition which Albin did not meet.

The effectiveness of this primitive receiver is impressive. A single transistor (Q1) with one tuned circuit is not only perform-

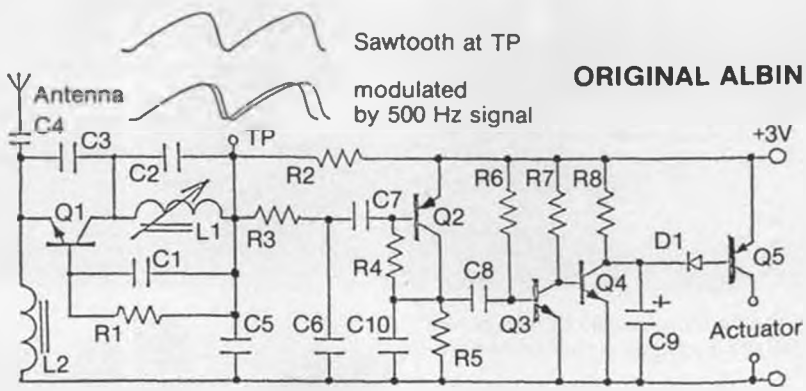
*Continued on page 72*

**RECENT ALBIN**

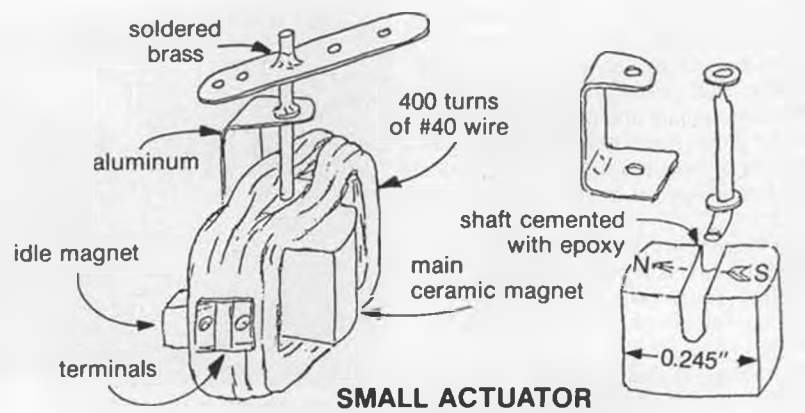



| | | | |
|---|---|---|---|
| C1 - 40pF | C5 - 5000pF | D2 - Sil.Sig. | R5 - 10k |
| C2 - 22pf NPO | C6,C7,C10 - .01UF | R2 - 10k | R6 - 1M |
| C3 - 22pf NPO | C8,C9 - 2.2UF Tan. | R3 - 47K | R7 - 33k |
| C4 - 10pF | L2 - 22mH coil | R4 - 680k | R1 - 1k |

**ORIGINAL ALBIN**




| | | | |
|---|---|---|---|
| C1 - 27pF | C8 - .05UF | R1 - 470k | R6 - 680k |
| C2 - 39pF NPO | C9 - 5,6UF Tant. | R2 - 3.3k | R7 - 33k |
| C3 - 15pF NPO | C10 - .02UF | R3 - 3.3k | R8 - 15k |
| C4 - 10pF | L2 - 22mH coil | R4 - 560k | D1 - 1N60 |
| C5,C6,C7 - .01UF | | R5 - 10k | |




**SMALL ACTUATOR**

# BIG BIRDS

By AL ALMAN

**FAI MIX FOR 4-STROKERS**

Here's a tidbit that might interest four-stroke owners:

Some months ago Nino Campana wrote about trying to run four-strokers without any nitro, sort of an FAI mix. He cited two reasons for wanting to try this brew: eliminating the high probability of rust, as well as greatly reducing any chance of detonation.

Well, he did get around to mixing up a batch and here's what he had to say about it.

"As mentioned in a previous letter, I have put to the test the idea of using 15% castor oil and 85% methyl alcohol in four-stroke engines. It is great to be able to report that the engine I began experimenting with (a new OS .40 four-stroker) has, from the beginning, always handstarted very easily, cold or hot. Throttle response has been immediate and power adequate. When the glow plug is disconnected from the starting battery, the engine does lose a hundred or more rpm, but the idle remains solid.

"I am more than satisfied with the performance of this clean running engine and fuel combo. I plan on using the same fuel with all my four-strokes and hope that in time I can reassert the contention that nitromethane is not necessary for dependable, acid-free operation of these gems. Of course I now make it a practice to run the engine dry of fuel, and then give it a shot of Hoppe's Gun Oil, turn over the prop with the starter for a couple of seconds, add another squirt of oil, and replace the plug.

"In the interest of engine longevity I always try to avoid the use of an electric starter for starting purposes. Hand starting lets one understand an engine better than the ram starting commonly seen at a flying venue.

"I once started a still hot Wankel with an electric starter because these finest of all engines are notoriously reluctant to start without a fast spin-up. The starter was so effective that the engine started despite the fact that there was no glow plug hook-up. This has led me to suspect that more than a few electric starts are actually in part due to compression ignition, or dieseling, if you prefer that term."

It sounded reasonable that Nino's engine would lose a few hundred rpm when the starting battery was disconnected, after all he was running on just an FAI-type fuel . . . but to have the idle remain "solid" on a no-nitro formula was surprising, mainly because for years I've been fed the old story that you need at least 5% nitro to keep from having a crappy and unreliable idle (maybe that was directed at two-cycle engines only).

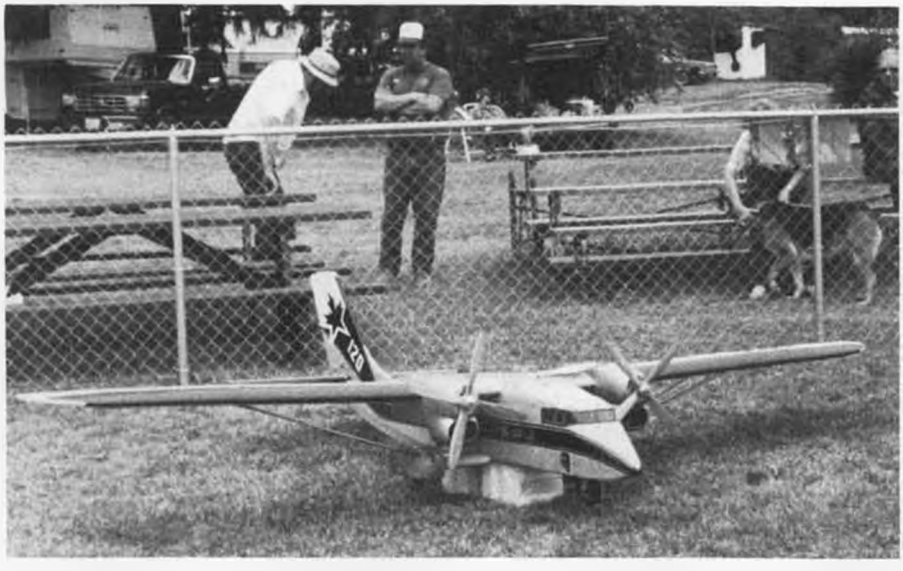
So, I just had to try this simple n' easy fuel mix . . . and since my Hobby Lobby Classic 120 was the only engine within easy reach it became the "volunteer."

I did alter the fuel ratio a bit, though. It's still just an alky and oil combo, but I used Klotz KL-100 instead of castor oil (this synthetic contains about 25% castor) . . . and since the Classic engines are happiest with less than 10% oil, my brew was approximately 92% alky and 8% Klotz.

As expected, rpm on the top end dropped by about 200, but my idle setting did *not* need any adjusting. The 120 kept ticking over (reliably) at almost the same idle speed as before.

Sure, the loss of a few hundred rpm at full power may not be acceptable to some,

*Continued on page 70*



**Left: A close to scale, eleven-foot, scratch-built Short 360 owned by Len Bosman. Weighs 35 pounds and is equipped with twin Quadras, seems to handle well in the air, says Al.**

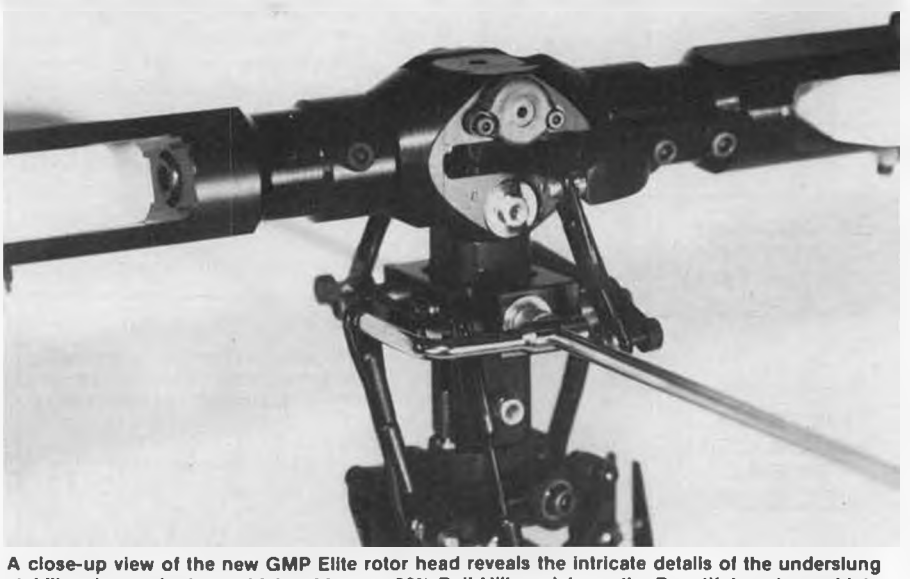
**This is what happens when Erv Solberg goes ape re-engineering a big Ugly Stik. Two ST-2500s make it twice as much fun to fly!**

# CHOPPER CHATTER

By JAMES WANG

• As promised, this month we will start discussing hi-tech model helicopter rotor blade design theory. Many of the fundamental rotor blade theories were covered in my article, "What is the State-of-the-Art Rotor Blade," which was published in the March/April 1988 issue of *International Helicopters*. For the benefit of our loyal readers who do not have that issue, I will illustrate the fundamental concepts again. This month we will concentrate on advanced main rotor blade tip design. In future articles, we will concentrate on airfoil selection, thickness ratio, aspect ratio, twist, and planform.

Let me bring you up to date on what's happening in our wonderful R/C helicopter community. At the time of this writing, the Nats competition was just over. Last year, Miniature Aircraft's X-Cell performed exceptionally well, however, this year the table was turned. GMP swept every category with its new Legend helicopter, and the very newest Legend Elite. Schluter did very well, too. The Legend Elite is simply a GMP Legend with a new GMP Elite main rotor head mounted on it. By the time you read this article, the Elite head should be available in your hobby shops. The photo shows the intricate mechanical design and machine work. However, you have to pay for quality, the Elite rotor head retails at $325.00. To complement, it you need a GMP metal wash-in-wash-out mixing unit which sets you back another $50.00. Are they worth it? The Nats results shown in Table 1 tells the story.



**A close-up view of the new GMP Elite rotor head reveals the intricate details of the underslung stabilizer bar and mixer, which achieves a 90% Bell-Hiller mixing ratio. Beautiful workmanship!**

One of the nice features of the Elite head, besides ball bearings everywhere, it has about 90% Bell-Hiller mixing ratio between the Bell stabilizer bar and the main rotor blades. This is like having a high gain mechanical rate gyro mounted in the pitch and roll axis to help stabilize the helicopter. The Kyosho Concept 30 is extremely stable, too, because it also has 90% Bell-Hiller mixing ratio. Kalt's new K-5 main rotor head on the Cyclone II, and Excalibur, has 100% Bell-Hiller mixing ratio that makes the K-5 composite rotor head the highest ratio model rotor head on the market. I am building a Cyclone II, and a review should appear soon. The Bell-Hiller mixing ratio will be illustrated in detail in my Cyclone review. At around three hundred some dollars, the injection molded Cyclone II with the 14-5 rotor head might find a permanent niche on the market.

It's good to see that Schluter helicopters are making a come back again. Congratulations to Mike Mas, he won second place in FAI, which is the expert class. He was once the U.S. national champion. Mike was flying a Schluter Champion. The Champion is a four-year-old design but it still proves to be a contender. The brand new Schluter Magic helicopter placed third and fourth in intermediate. Very impressive, considering the Magic has only been out since summer. There wasn't that much time for the fliers to get to know the machines thoroughly. However, we should not emphasize the machines that much, because after all, it is still the pilot behind the sticks that has to do the work. Personally, I believe a good design is only 40% important; how well the machine is assembled and set up accounts for 20%; and the pilot's practice and talent contributes the other 40%. My explanation is that most high quality kits now on the market are all very well tested and designed. They all fly very well. Whatever machine each competitor choses has more to do with parts availability, machine's maintainability, ease of trading information, what do his friends fly, and what is in fashion. What is "in"

**TABLE 1—HELICOPTER EVENT WINNERS AT THE 1989 NATIONALS**

**FAI**

| | | |
|---|---|---|
| 1) | Curtiss Youngblood (Texas)<br>GMP Competitor Elite | 682.0 |
| 2) | Mike Mas (Florida)<br>Schluter Champion | 669.5 |
| 3) | Robert Gorham (California)<br>GMP Legend Elite | 667.5 |
| 4) | Tim Schoonard (Florida)<br>Miniature Aircraft X-Cell | 657.0 |
| 5) | Ted Schoonard (Florida)<br>Miniature Aircraft X-Cell | 650.5 |
| 6) | Wendell Adkins (Ohio)<br>Schluter Scout | 631.0 |
| 7) | Wayne Sumner (N.Carolina)<br>GMP Legend Elite | 611.0 |
| 8) | Peter Chow (California)<br>GMP Legend Elite | 610.0 |
| 9) | Derek Corbly (California)<br>GMP Legend Elite | 553.5 |
| 10) | Gilbert Ruiz (Arizona)<br>GMP Legend | 355.0 |

**INTERMEDIATE**

| | | |
|---|---|---|
| 1) | John Thomas (Georgia)<br>GMP Legend | 551.0 |
| 2) | Maui Chai (Utah)<br>Kalt Baron | 498.0 |
| 3) | Steven Rhodes (Texas)<br>Schluter Magic | 480.0 |
| 4) | Michael Goza (Texas)<br>Schluter Magic | 448.5 |
| 5) | Mark Ewert (Wisconsin)<br>GMP Cobra | 439.5 |
| 6) | Steven Mullen (Idaho)<br>GMP Competitor | 433.5 |
| 7) | Joe Escudero (Oregon)<br>GMP Cobra | 412.0 |
| 8) | Ron Bodwell (California)<br>GMP Legend | 407.0 |
| 9) | Jim Bumpaous (Washington)<br>Schluter Champion | 396.5 |

**NOVICE**

| | | |
|---|---|---|
| 1) | Don Nelson (Illinois)<br>GMP Legend Elite | 482.0 |
| 2) | Laura Slocum (California)<br>GMP Legend | 477.5 |
| 3) | Mike Doughty (Montana)<br>GMP Legend | 470.5 |
| 4) | Howard Shpegel (California)<br>Kyosho Concept 30 | 434.5 |
| 5) | William Franklin (Oregon)<br>GMP Cobra | 411.0 |
| 6) | Dwight Larks (California)<br>Schluter Helistar | 374.5 |

seems to have a lot to do with how much advertising the manufacturer puts out. For example, I use to see a lot of X-Cells, and they did very well in all the contests. But suddenly their ads changed from double-page color spreads to small, half-page black-and-white. I used to read about them in the magazines and all the writers talked about them, but not anymore. The little Concept is popular now, not just because it flies great, but Great Planes' massive amount of nice color ads just saturated our minds. What do you think?

Now we shall start the heavy-duty technical blade tip design theory. The environment of the tip of a rotor blade in forward flight tends to set the extreme of Mach number and lift coefficient found over the rotor disc. On the advancing side of the disc, the blade tip encounters high tip speed which can form a shock wave at the blade tip. The consequence of shock formation is to cause shock induced flow separation from the surface of the blade which consequently raises the blade drag. More drag means more engine power required to turn the rotor disc. However, shock-induced flow separation only occurs at a Mach number greater than 0.7 which is about 500 mph. This represents the typical rotor blade tip speed on the advancing side of a full-size helicopter when flying at around 180 mph. For model helicopters, typical blade tip speed in hover is only around 250 to 300 mph, depending on main rotor diameter and rpm. Even in forward flight at 60 mph, the tip speed on the advancing side will at most be 310 to 360 mph. This is insufficient to cause shock-induced flow separation and air compressibility effects. For full-size helicopters, the logical solution to minimize the detrimental effects of onset of shock is to sweep the outermost 20% of the blade back, similar to the wing on a supersonic jet fighter. For example, the full-size Apache AH-64 has the leading and trailing edge of the blade tip swept back 30°. The Sikorski S-76 and Black Hawk also employ swept back blade tips. Their blade tips are swept at 20° on the leading edge, and the trailing edge is swept a little less, at 15°.

As model helicopters do not operate with blade tip speed anywhere near 500 mph, sweeping the blade tip back like on AH-64 probably will not do any good. In fact, it might even do harm because sweeping the tip back will bring the center-of-mass at the blade tip backward. This introduces unwanted inertial couplings that bring in dynamic problems to cause flutter and divergence.

On the other hand, modelers may benefit from swept back tips for other reasons than to reduce shock effects. Sweeping the tip back pushes the center-of-lift backward at the rotor tip. This will cause a nose down moment to twist the leading edge of the blade downward. This is beneficial both in hover and in forward flight because it is like having a "washout" blade. Washout means the blade is twisted so the tip section is at lower pitch angle than at the root. Some high quality Japanese model blades have build-in twist, or washout. An 8° to 10° twisted blade can reduce required engine power by as much as 3%. So why aren't all the model blades equipped with washout? Because washout blades are more expensive, and for inverted flight the twist will be in the wrong direction, resulting in increased engine power requirement. However, a swept back blade, due to the nose down moment, will twist the blade nose down by 1° to 2° regardless of flying upright or inverted. To make the blade twist 8°, we would need a torsionally soft blade, or a large swept back paddle area. Such a combination is prone to dynamic coupling to cause flutter.

The other benefit of swept back tips for model helicopters is to reduce induce drag and also to reduce blade noise. Sweeping the tip back moves the trailing edge tip corner back. Even adding a small trailing edge tab will cause the trailed vortex that is shedding off the blade trailing edge tip corner to shed slightly farther back. By shedding this trailed vortex farther back, the vortex's influence on the inboard section of the blade will be reduced. See Figure 3. (The vortex is simply a rolled up helical air flow that is generated because the higher pressure air below the airfoil is flowing to the lower pressure region that is above the airfoil.) As the air molecules cannot penetrate through the wing, they have to roll up around the wing tip or

**FIGURE 1**

**The advancing blade is defined as the one that moves forward as the helicopter itself moves forward. The retreating blade is the one on the opposite side.**

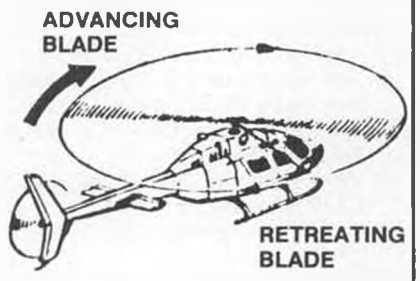



**FIGURE 2**

**Some of the various blade tip designs used by full-size helicopter manufacturers.**

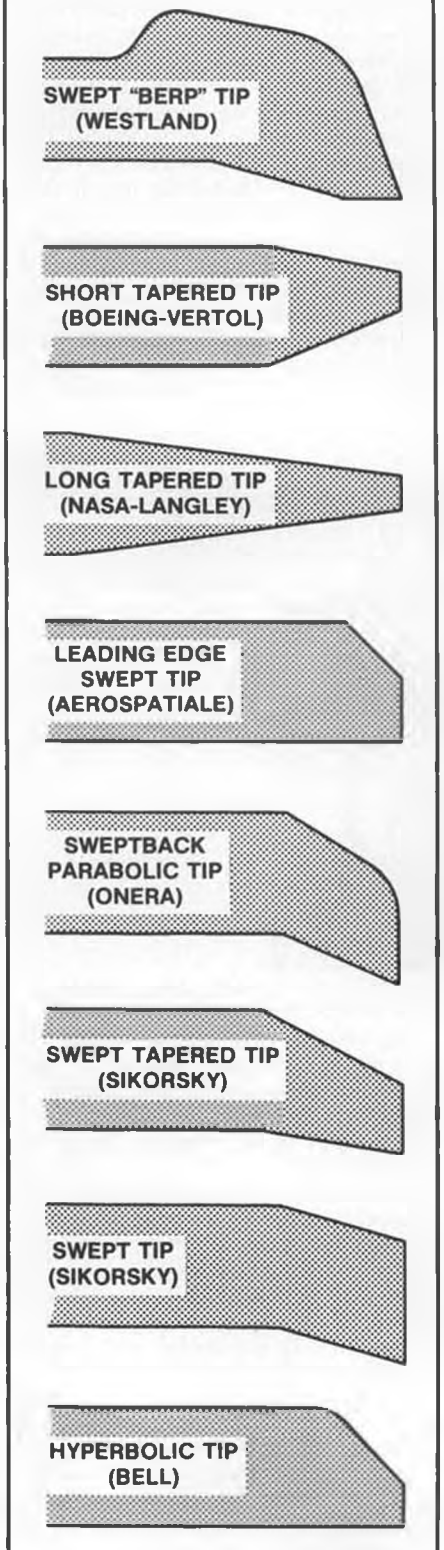
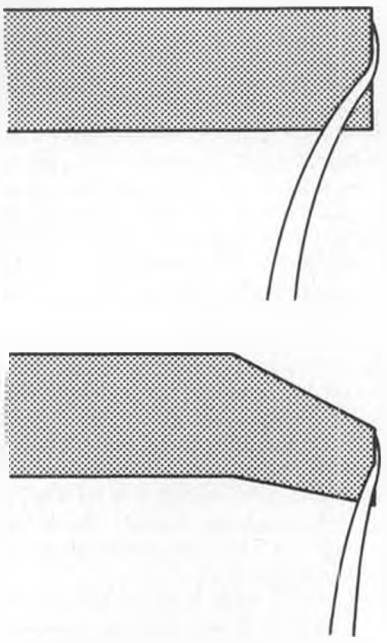



**FIGURE 3**

**Moving the trailed vortex back by sweeping the blade tip or adding a trailing edge tab can reduce rotor drag and reduce acoustic noise slightly.**



blade tip. Combined with the air molecules blowing toward the blade, the air flow thus forms a helical vortex at any wing tip or rotor blade tip. This turbulent or energetic helix disturbs air flow near the wing. Hence by moving it back slightly, we reduce the turbulent influence and make the blade more efficient and quieter. For example, look at the photo of Len Mount's fiberglass blade. Len Mount, of England, says comparing a rectangular blade and his tabbed trailing edge blade, you can hear a difference, especially at the top of a loop.

**British heli flier Len Mount uses a small tab on the trailing edge of his blades and claims they are noticeably quieter.**

How about a curved blade tip such as on Kyosho Concept 30's and some of Miniature Aircraft's fiberglass blades? Basically, the curved tip moves the trailed vortex farther outboard of the blade to minimize the turbulent influence of the vortex on inboard stations of the blade. This reduces the induce drag to improve hover and forward flight efficiency maybe by 1%. See Figure 4.

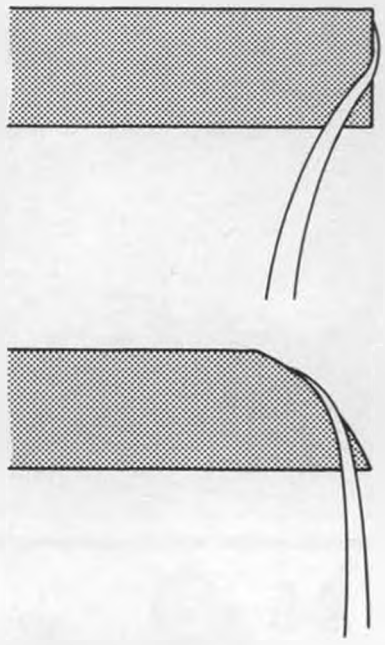
If therefore, we wish to use sweep on a rotor blade but not suffer center-of-gravity, or center-of-lift movements, then the tip must be configured with an area shifted forward. For example, look at the British Westland Company's BERP blade design photo. The photo shows a model helicopter blade with BERP tip that I built for an oil flow visualization test at the University of Maryland's wind tunnel. BERP stands for British Experimental Rotor Program. The BERP tip is designed for full-size helicopter use only. A British Westland Lynx helicopter with the BERP blade holds the present world full-size helicopter speed record of 249.49 mph. The BERP blade leading edge is swept back to reduce advancing blade shock effects. By moving the leading edge forward, the CG and center-of-lift will not be shifted aft.

Having now basically defined a blade tip geometry that will optimize the advancing blade requirements, we must also recognize that a sweep tip geometry of this sort will not necessarily improve the performance of the retreating side of the rotor disc. In fact, experience has shown that a swept tip blade can have an inferior stalling characteristic compared to the standard blade tip. The BERP blade was designed with the retreat blade stall problem in mind, too. On the basis of wind tunnel testings and theoretical computations, it employs a final geometry that performs as a swept tip at high Mach number and low attack angle, yet also enables the tip to operate at very high angle of attack without stalling.

Let me define retreat blade stall problem now. A helicopter in forward flight will have its blade rotating forward on the advancing side, and the blade moving backward on the retreating side. Thus, in order to generate equal lift on both sides, the blade pitch angle must be slightly higher on the retreating side to make up for the lost lift due to slower oncoming air. At high enough forward flight speed, the retreat blade, because its pitch is slightly higher, will stall there before the advancing side. This is what helicopter aerodynamicists call a "hard boundary" because the helicopter can not fly any faster. Furthermore, the stalled blade on the retreating side will change the blade pitch moment and shake the hub and fuselage severely. Retreating blade stall is also encountered during a high-g turn because, in a 2-g turn the main rotor has to produce twice the thrust to sustain the helicopter through the turn without letting it fall out of the sky. High-g turns in high speed forward flight demand high collective pitch, therefore, again the retreating blade will stall before the advancing blade side.

**FIGURE 4**

**A curved blade tip such as that used on the Concept 30 is more efficient than a squared tip because it moves the trailed vortex farther out.**



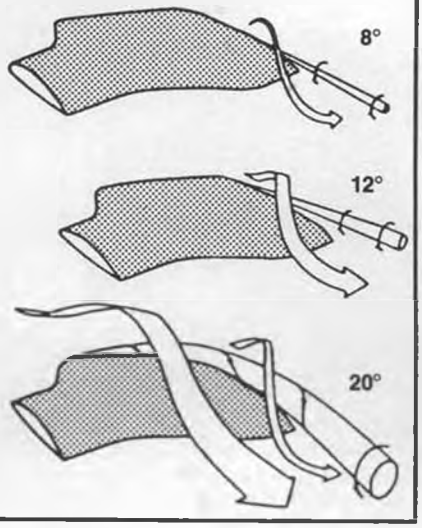
Model helicopters do not suffer from advancing side shock effects, but they do suffer tremendously from retreating blade stall phenomenon. Especially hot dog fliers who like to fly fast and pull sharp turns will need a model helicopter blade that has a higher tip stall angle. Most symmetrical and semi-symmetrical airfoil model blades stall at about 11°. You may think that we only set up helicopters with a top end collective pitch of 9° to 10°, but during a turn we may feed in as much as 20° cyclic command that raises the total blade pitch angle far beyond the stall angle. The result is a mushy, hot dog turn. Wouldn't the hot dog fliers like to have a scaled down BERP blade?

I tried a scaled down BERP from my wind tunnel blade collection on an R/C helicopter. It did not improve the helicop-

*Continued on page 61*

**FIGURE 5**

**Blade tip vortex is put to beneficial use by the BERP tip to raise the stall angle at the retreating blade tip to 20° or more.**




**A model BERP blade in a wind tunnel oil flow visualization test, at a 12° angle of attack. Oil accumulation indicates where the air flow has separated from the blade.**

Left: This month's review subject on GMP training skids. Beginners are strongly advised to either buy them or make your own; they will spare you many sets of broken rotor blades while learning to fly.

# "Cricket"

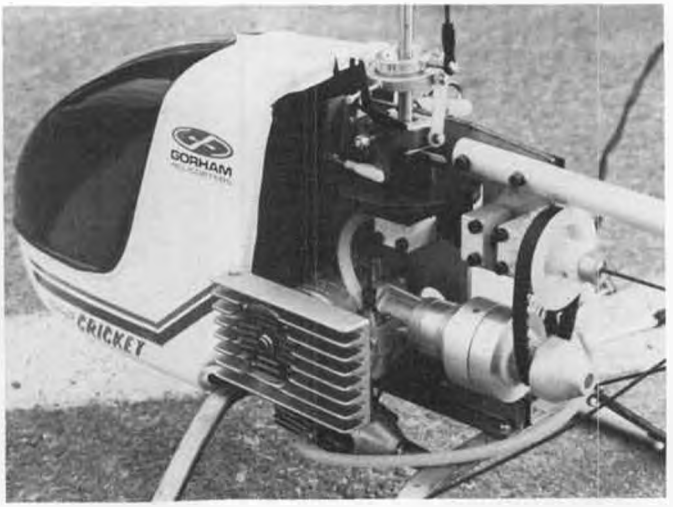
## A popular .30 size beginner's R/C helicopter, from GMP

• This month we will look at the most inexpensive R/C helicopter on the market; the GMP Cricket. With a main rotor diameter of 34 inches and gross weight of under five pounds, Cricket is the most compact gas engine powered R/C helicopter in production today. Amazingly, it is also the longest running design helicopter. It was first produced in 1980, and over 15,000 Crickets have been sold worldwide. It has outsold any other single design on the market. In the hi-tech world of the 1990s, is the venerated fixed-pitch Cricket still a viable first R/C helicopter for beginners? Well, let's take a look.

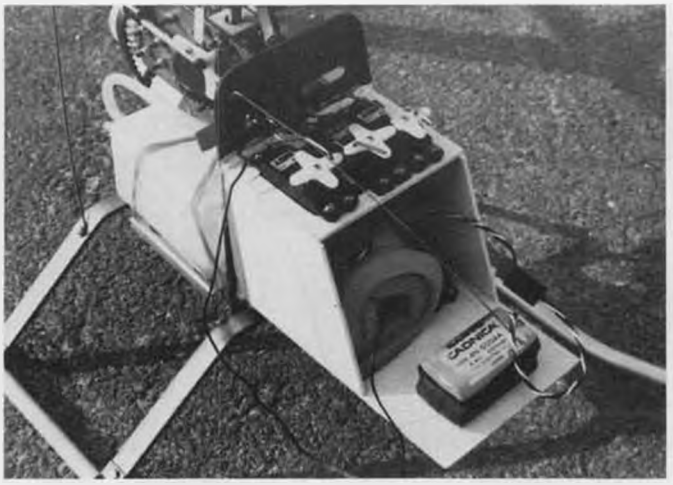
As there already have been reviews done on the Cricket, let's make this article more of a fun helicopter story for people who are thinking about getting started in R/C helicopters. So sit back, and relax. To many helicopter pilots who learned on the Cricket, including myself, this article might bring back memories. For you expert heli pilots, starting next month we will have tear-down, scrutinizing reviews on Schluter's 60-size aerobatic Magic helicopter, GMP's very new hingeless rotor head Rebel for beginners, Kalt's new 60-size high performance Excalibur, Kalt's new almost-ready-to-fly Cyclone II for beginners and intermediates, and Hirobo's new underslung flybar Shuttle Z. We shall look at their performance, handling qualities, structural integrity, material usage, and technical innovativeness. In between these hard core reviews, we will have a 500-Flight Update on the Concept 30 and the GMP Legend that we reviewed in June and July issues of *Model Builder*. Car magazines always have a 10,000 miles update on cars that they have reviewed, so why not re-examine R/C helicopter kits and radios the same way? It's just as important for readers to know how well a particular model will stand up to all the flying and crashes. Furthermore, usually when I write a review on a new helicopter, I have at most run through only few gallons of fuel. Thus, a 500-Flight Update would enable me to tell you things that were overlooked, or flaws that appear only after prolonged use. What do you think?

Ok, let's get back to the Cricket story. It is the first helicopter designed by John Gorham, back in 1980. At that time, the Schluter Heliboy was the most popular kit on the market. But with a price tag over $500, the excellent 60-sized Heliboy was a little steep for beginners. Furthermore, the Heliboy was an excellent, fully aerobatic machine. Mr. Gorham saw the need for a compact R/C helicopter that would be extremely simple to build, compact enough to be flown anywhere, and low enough in cost that people would be willing to give a go at R/C helicopter. Many good design


Fuel level is easily visible in side mounted tank. The Cricket uses a teetering main rotor head design; the teetering spring on the right side of the rotor head provides flap stiffness for improved control response.




This particular machine is powered by a Supertigre .25 heli engine. A standard aircraft muffler is used. Note that the engine's heat sink fins are horizontal, for good cooling during forward flight.



The most expensive component in the Cricket is the tail rotor gearbox, a well built, all metal unit. Tail fin is pre-shaped aluminum sheet.

Left: The plywood radio tray is pre-cut, and will accept four standard size servos and a yaw rate gyro.

## By JAMES WANG

features were borrowed from a British kit called the Micro Mold Lark. Mr. Gorham and his son, Robert, machined all the parts for the prototype Cricket all by themselves. Fortunately, Universal Studio decided to use the prototype Cricket in the movie, "All Night Long." In return, the studio machine shop machined parts for the first 20 Crickets in the world. At that time, Mr. Gorham was driving an old Honda Accord. A year later he was driving a new Saab. That should give you a hint as to how many

**Right: Look ma, no hands! The Cricket demonstrates its super stable hovering ability, even though not equipped with a yaw rate gyro. James found he could keep his mitts off the sticks for four or five seconds at a time, on a calm day.**

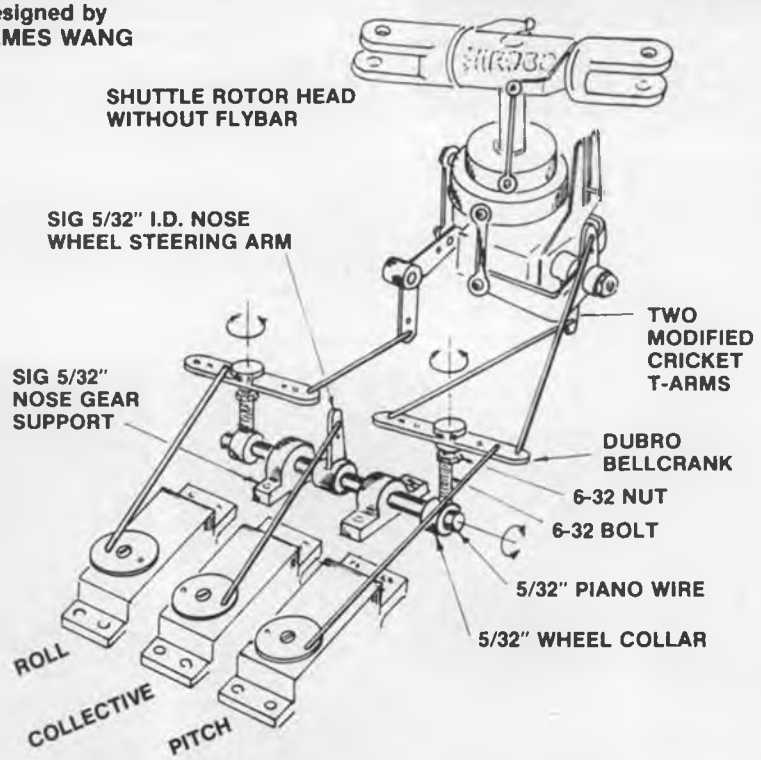
Crickets he sold in the first year!

When my friend, Andy Slatkin, and I saw the Cricket for the first time, it looked so cute, we fell in love with it immediately. We saw John's Cricket tootle around quietly in the parking lot, and it looked so unintimidating as compared to my big growling helicopters, we wanted one, too. We each bought a Cricket in the spring of 1980 at Chuck's Hobbies for $164.95. With over 100 hours of stick time on that Cricket, I got my every penny worth out of it. Today, with inflation rate over 5% per year, it's remarkable that the Cricket still hovers *(Oh James! wcn)* at around $170 per kit. The manufacturer's learning curve has helped keep the price down. With over 15,000 units produced, nearly all the bugs in the Cricket are dissolved. However, the Cricket remains an old fixed pitch design. It does not have a driven fan to cool the engine. It does not have variable main rotor blade pitch to give instantaneous vertical response. But, you may call these the reasons for the success of the Cricket, because they kept the Cricket as the simplest to build R/C helicopter kit. I have built three Crickets; the third one only took me four hours.

A simple fixed-pitch helicopter means you can install any inexpensive four-channel aircraft radio in it. Fixed-pitch helicopters do not require the tail rotor mixing

*Continued on page 90*

**Designed by JAMES WANG**




**SUGGESTED LINKAGE SETUP FOR ADDING COLLECTIVE PITCH TO THE GMP CRICKET**

# PLUG SPARKS

By JOHN POND

• Last month, we were a bit short on photos of the 50th Wakefield Anniversary held this year in the U.S.A. as part of the alternating arrangement between the parent SAM body and SAM 35.

Not enough credit can be given to Dave Baker, the original spark plug of SAM 35 as seen in Photo No. 1. The model, being held by English Mrs. Podd, now a resident of California, is an Albert Judge Wakefield, the winner of the 1936 finals.

**1. Dave Baker, SAM 35, the originator of the 50th Anniversary Wakefield contests, seen with Mrs. Podd ("Britain's No. 1 Girl," according to the shirt) and a 1936 Albert Judge Wakefield. *MB* has plans: #375-O.T., $5.50.**

The idea of a 50th Anniversary Wakefield meet commemorating the winner 50 years ago was first sparked into life at Old Warden in England. Since then, SAM 3 and SAM 13 have been responsible for promoting the event at Taft, California.

The Wakefield meet, originally scheduled to be held at Reno, Nevada, ran afoul of flying spaces at Stead Air Base, Reno, and eventually the SAM Champs and the accompanying 50th Wakefield Anniversary were shifted to the south.

Among the many photos received from R.J. Mikkelson was Photo No. 2 showing Vic Westcar, one of the British group from England representing SAM 35. Seen is his Fairey Facula, a very neat cabin design.

The background of Taft has been described many times, but this photo gives a good view of what to expect on the downwind side of the field. It is a rare day that thermals do not abound.

SAM 39 from the Midwest area was well represented by Tom McCoy of Sterling Heights, Michigan, as depicted in Photo No. 3. Seen is a 300 sq. in. Korda Dethermalizer in Tom's well known color scheme, yellow with black trim. (What, no green this time?)

One of the most interesting side events of this annual competition is the mass fly off of all Wakefield models. This is truly a spectacular sight. Seen in the lineup for flying in Photo No. 4 is Mike Mulligan's "Veteran" (the eventual winner), an "Isis" by Jim Adams, and Alfie Faulkner with a 1936 Bob Jeffrey Moffett. This shot was taken at Mile Square Fun Fly by "Jasper" Mikkelson.

Every good meet always has a good ending, and the Taft Wakefield Banquet was no exception. Mikkelson was able to get an excellent photo (No. 5) of Abe Gallas talking to Frank Zaic and wife, Carmen.

Frank, who needs no introduction to Old Timers, is well remembered for his outstanding Year Book publications that have become the Bible of Old Timer flying. Zaic is looking very good these years; must be the California weather, or the tremendous amount of rubber powered model events (his favorite) being staged in California.

## CHET LANZO 1914-1989

The most distressing news just came in from Jack Brown of New York, to the effect that long time famous modeler, Chester Lanzo, passed away on August 13 at the age of 75. Chester died very peacefully as he was sitting in his chair conversing with his daughter.

The photo above tells it all: Chet with a 1937 Duplex, one of his many rubber model designs, which he built prior to traveling to Warwick, England, as part of the American contingent participating in the 50th Anniversary Wakefield contest in 1987.

Lanzo did it all, winning in rubber and gas F/F, and radio control. His designs will be remembered and used fondly by many of the Old Timer aspirants. Lanzo specialized in simple, square, boxy designs that were easy to build, adjust, and fly. The secret of winning!

John Pond

**NFFS/SAM 57 Champs**

Last month, we reported the NFFS

**2. English contestant Vic Westcar, also of SAM 35, with a Fairey Facula, an outstanding British Wakefield design. Mik Mikkelson photo.**

**3. Michigan's Tom McCoy flew his big Korda Dethermalizer at the Wakefield bash at Taft, held during the U.S. F/F Champs. Mikkelson photo.**

**4 (right). A partial lineup of the models flown in the British/American Wakefield meet held at Mile Square Park, in Southern California, one week after the U.S. F/F Champs. Models seen are, from left, a "Veteran," "Isis," and "Jeffery Moffett." Photo by Mik Mikkelson.**

Champs but photos were sadly lacking as this writer took 25 shots on no film *(Good way to save money on developing. Hawww! wcn).* However, the "boys" back at the Champs took note of this and have sent in a flock of good shots.

Kent Johnson, 2704 E. Walnut, Evansville, Indiana 47714, was kind enough to send photos among which we have picked out Photo No. 6 showing the writer's king size Comet Clipper (called the "Super Clipper") taking off on an official flight. Note the right rudder being given to offset the crosswind takeoff.

Although the model did not win (engine and tank feed problems), the performance was quite good with an ultra superior glide much like the Valkyrie. In scaling up the Clipper design to ten foot, this columnist found at that size, the wing layout is identical to the Valkyrie. Small wonder it glides so well!

**5. SCAMPS member Abe Gallas greeting Frank Zaic and his wife, Carmen, who were honored guests at the Wakefield banquet.**

**6. Nice shot by Kent Johnson of John Pond's Super Clipper going up for an official flight. The big ten-footer is powered by a very rare (and SAM legal) O.S. .90 *open rocker* four-stroke.**

Probably the biggest donor of photos was Dick Stouffer, a professional photographer, 1807A Glenwood Oaks Ct., Urbana, Illinois 61801, who sent a heavy stack that this writer has carefully culled for future issues.

Photo No. 7 is typical of Stouffer's work showing Mitch Post of Chicago cranking away on his Madewell 49 powered Comet Clipper. Although he only placed fifth in Class C Fuselage Event, he did win Class C Pylon in free flight.

David Dobbs, 28320 Acorn Drive, Lawton, Michigan 49065, generously sent in Photo No. 8 showing Kenneth Hopkins of Paducah, Kentucky. Not too many of these double scale Schumacher "Hop-A-Long" models have been built, with this writer producing the first. Hopkins' model makes the third this columnist has run onto.

Fourth place in Antique C isn't bad. When he gets the model fully sorted out, Ken should do quite well.

**7 (right). Chicago's Mitch Post, always a good competitor, seen here firing up the Madewell .49 in his Mk. I Comet Clipper. Dick Stouffer photo.**

## ENGINE OF THE MONTH

For this month's engine, we are again indebted to Robert McClelland, MECA Secretary/Treasurer, for his most generous loan of hard-to-find items.

The McCoy shown this time is the Sportsman 35, one of the "quickie" sport type engines produced by the Duro-Matic Corp. to compete with other sport engines. The "quickie" idea was the development of .36 cu. in. and 55 cu. in. engines from the existing cases of the Red Head 29 and 49 racing engines.

According to an article written by Ted Enticknap on McCoy engines and edited/published by Tim Dannels of the *Model Engine Collectors Journal*, the first 1947 Sportsman 36 maintained the single ball

8 (left). Double-size Schumacher "Hop-A-Long" is the work of Kenneth Hopkins, who hails from Kentucky. Uses an O.S. four-stroke of unspecified size to compete in R/C Antique and probably Texaco events. Photo by David Dobbs.

bearing of the 29 model. This was quickly replaced in early 1948 with a plain sleeve bearing that continued to the end of the production run.

About this same time, a little known Sportsman Jr. 36 was brought out in 1948 featuring a modified McCoy 29 ignition timer. This is the engine we are featuring this month.

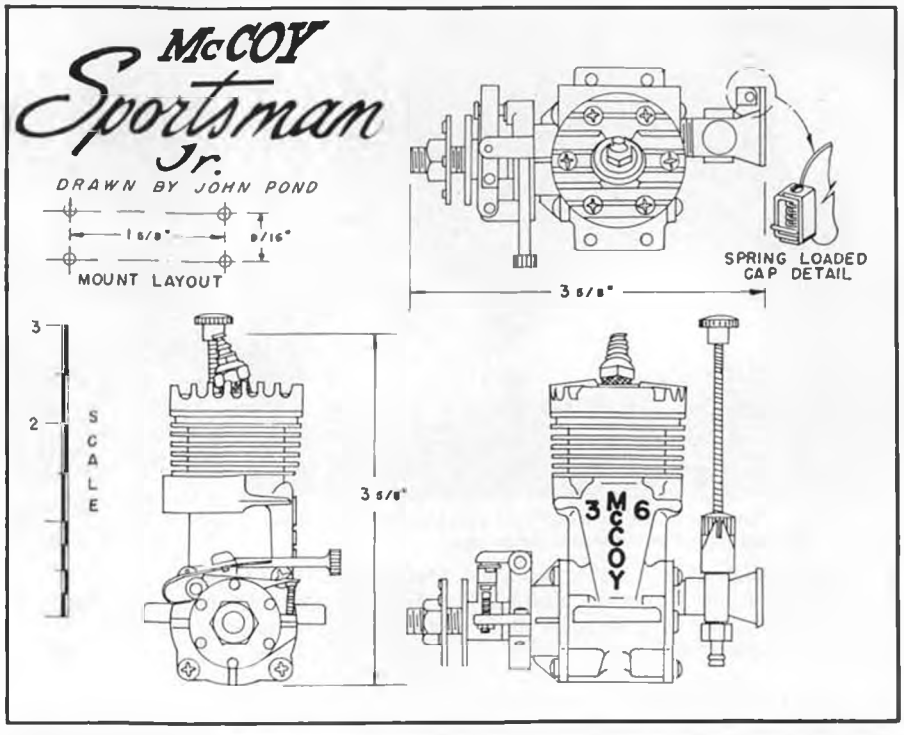
Before anyone thinks this was a standard production item, we hasten to say the timer and drive cam were offered as an accessory item. In addition, another accessory item was the "spring loaded" shut off offered to catch the free flight trade. This nifty little gadget was originally illustrated in the *Air Trails* write up of the Sportsman Jr.

This spring loaded brass cover was simplicity itself, covering the venturi and choking the engine to a stop. Tests with the shutoff showed the engine slowed down just before stopping. In some respects, this was an excellent feature as it allowed the model to reduce the climb angle at the last one or two seconds, resulting in a much better recovery from the usual stalled position.

The McCoy 36 Sportsman Jr., although quite similar in outward appearance to the McCoy 29 (with identical heights and widths), could be easily distinguished by the silver crankcase, black front plate, and black head. Also to be noted was the flexible needle valve placed in a vertical position, making it difficult to put one's fingers in the rotating propeller.

The Sportsman series of McCoy engines were first advertised in the early 1948 issues of *Air Trails* announcing low prices of $14.95 for the 36 and $16.95 for the .55.

The reader might be a little puzzled why McCoy would put out these size engines when they already had Class A (.19), Class B (.29), Class C (.49), and Class D (.60) well covered. This was fine for free flight rules, but at this time there were six categories of




9. The "Miss Fortune X," held here by builder John Delagrange, was designed back in 1936 by Mickey DeAngelis (left), who is still active with the SAM 100 group in Pennsylvania.

10. Another DeAngelis design, the "Cloud Queen," built by Aussie modeler John Quigley. Pond flew it at the last Australian MAAA Nats.

11 (right). This was the O.T. headquarters tent at the 1965 Nats, the first year that Old Timer events were included in the AMA Nationals. Seen from left are Bob Reuter (with camera); Pete Sotich, the Head Timer; Vic Didelot, Recorder; and Mickey DeAngelis and Bill Giblin as interested spectators.

12 (below). Anyone for Indoor O.T.? This interesting phase of Old Timer modeling is slowly catching on. Mark Sexton, shown here with a 1929 Senior R.O.G., was high point man for an Indoor O.T. group based in Washington.

speed, I to VI, ranging in increments of .10 cu. in. per class. The .36 and .55 engines could very easily be "hopped up" with the addition of standard 29/49 racing parts.

However, with the controline rules being changed to align with the free flight categories, there was no incentive to keep producing the so-called "Sport" engine. However, the Duro-Matic people did learn a valuable lesson in that there was a large market for sport type engines; hence, the issuance of many 19 and 29 simplified McCoy engines.

For those interested in specifications, the McCoy 36 featured a bore of .809 in. and a stroke of .670 inch, giving a displacement of .359 cu. in.

Bare weight (no tank) was 6-1/2 ounces and was rated at .4 horsepower. Quite a potent "sport" engine. The crankcase and cylinder were a one-piece aluminum casting with a steel liner insert.

The back plate and the die cast rotary disc assembly were fitted to the crankcase rear with a venturi turned from solid stock threaded into the back plate. As can be seen, the fuel shutoff straddles the venturi being held by the housing and the jet inlet.

Other parts are standard McCoy manufacture with aluminum cast piston and two steel rings. Wrist pin is hollow steel with aluminum with oil hole drilled at crankpin for lubrication. The propeller drive washer is knurled and keyed to the shaft.

Results of the strobatac tests run by the *Air Trails* Test Group show surprising results of 7900 rpm with an 11-6 prop, 8900 rpm with a 9x8, and 11,300 rpm with a 9x6 prop. The above figures were obtained with standard sport glow fuel. Gas and oil spark operation showed an approximate drop of 500 rpm. Remember, this is with the plain bearing!

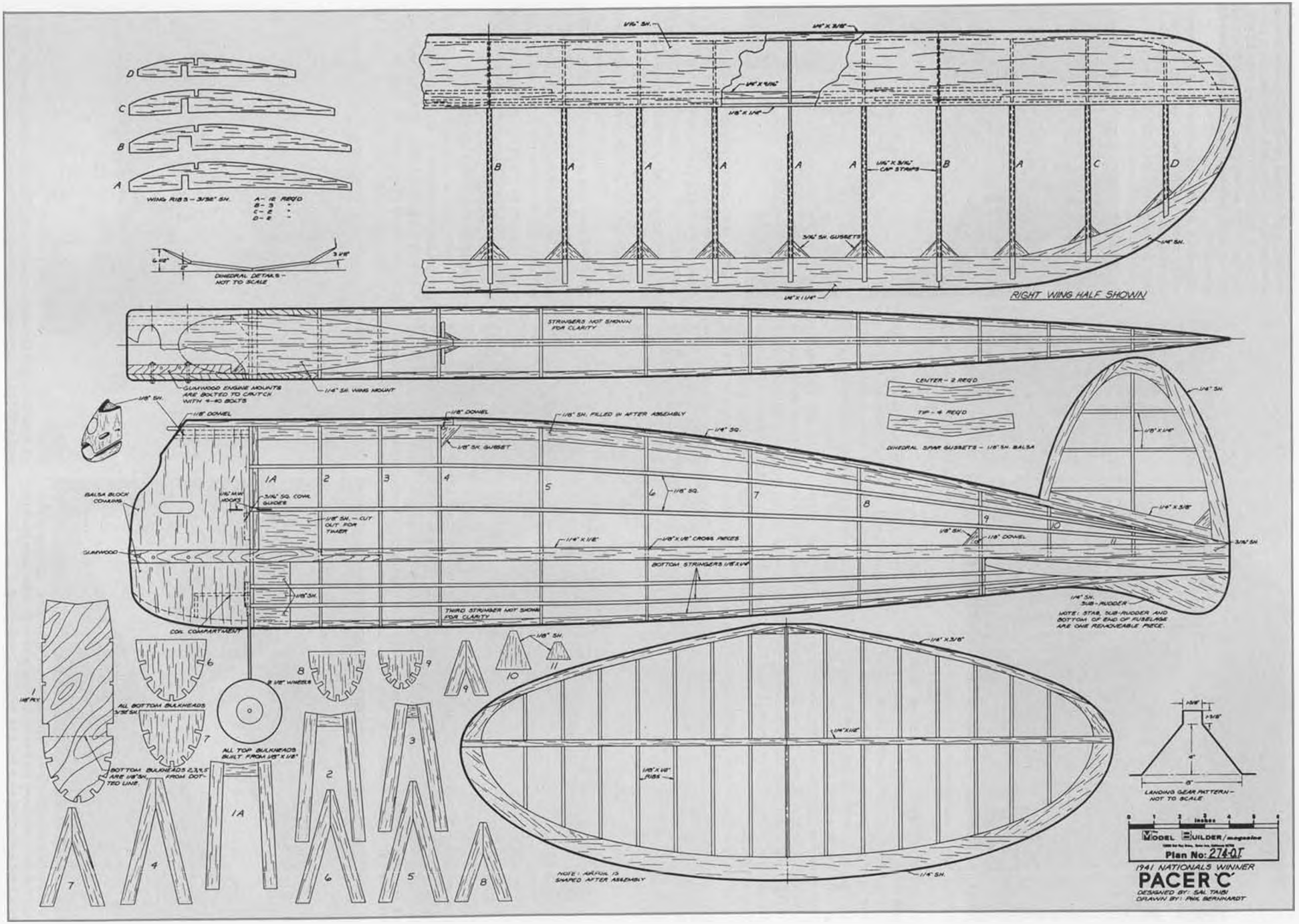
**MODELER OF THE MONTH**

As noted in a previous issue, we will probably alternate this portion with the "50 Years Ago" section. We delayed too long in using the material sent by John Delagrange and got "scooped" by Bill

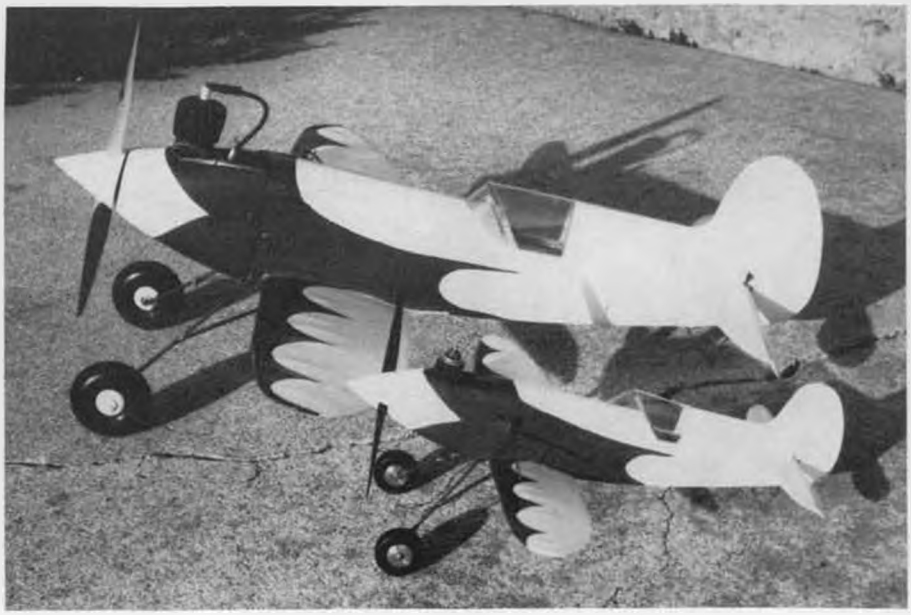
13. There's little question as to why the 1949 Fletcher Wakefield is a seldom-seen design. This one was flown at the 1988 Swedish Old Timer Nationals by Sven Botstrom. Photo by Sven-Olov Linden.

14. Airborne editor Mervin Buckmaster with a "Josephine," another of Dick Schumacher's relatively little-known designs. With its clean lines and high aspect ratio, it could be a hot one for O.T. competition.

15. SAM's humble secretary-treasurer, Bob Dodds, photographed at Taft with a Gil Shurman "Rambler," powered by a Brown Jr. Good combination!


WING RIBS – 3/32" SH.
A – 12 REQ'D
B – 3 "
C – 2 "
D – 2 "
DIHEDRAL DETAILS – NOT TO SCALE
1/16" SH.
1/4" X 3/16"
1/4" X 9/16"
1/8" X 1/4"
3/16" SH. GUSSETS
1/4" X 1 1/4"
1/4" X 3/16" CAP STRIPS
RIGHT WING HALF SHOWN
STRINGERS NOT SHOWN FOR CLARITY
GUAYWOOD ENGINE MOUNTS ARE BOLTED TO CRUTCH WITH 4-40 BOLTS
1/4" SH. WING MOUNT
CENTER – 2 REQ'D.
TIP – 4 REQ'D.
DIHEDRAL SPAR GUSSETS – 1/16" SH. BALSA
1/8" SH.
1/8" DOWEL
1/16" SH. FILLED IN AFTER ASSEMBLY
1/4" SQ.
1/8" SH. GUSSET
1/4" SH.
1/8" X 1/4"
1/4" X 3/16"
3/16" SH
BALSA BLOCK CONNS.
1/16" M.W. HOOKS
3/16" SQ. COWL GUIDES
1/8" SH. – CUT OUT FOR TIMER
1/16" SQ.
1/4" X 1/16"
1/8" X 1/8" CROSS PIECES
BOTTOM STRINGERS 1/16" X 1/4"
GUAYWOOD
1/8" SH.
THIRD STRINGER NOT SHOWN FOR CLARITY
COWL COMPARTMENT
1/4" SH. SUB-RUDDER
NOTE: STAB, SUB-RUDDER AND BOTTOM OF END OF FUSELAGE ARE ONE REMOVEABLE PIECE.
1/4" X 3/16"
1/16" PLY
ALL BOTTOM BULKHEADS 3/32" SH.
BOTTOM BULKHEADS 2,3,4,5 ARE 1/8" SH. FROM DOT-TED LINE.
ALL TOP BULKHEADS BUILT FROM 1/8" X 1/8"
3 1/8" WHEELS
1/8" SH.
1/4" X 1 1/2"
1/8" X 1/8" RIBS
NOTE: AIRFOIL IS SHAPED AFTER ASSEMBLY
1/4" SH.
LANDING GEAR PATTERN – NOT TO SCALE
inches
MODEL BUILDER / magazine
Plan No: 274-DT
1941 NATIONALS WINNER
PACER 'C'
DESIGNED BY: SAL TAIBI
DRAWN BY: PHIL BERNHARDT

**16 (right). Bob Fenske is nuts about the Stanzel Super G Shark and has built them in many different sizes; shown here are the full-size versions with O&R .60, and a scaled-down 1/2A copy. All fly well!**



Darkov of "SAM Speaks," but this columnist feels there is enough for all, hence the write-up on Mickey DeAngelis.

John Delagrange, who is the newsletter editor of SAM 100 starts his write-up by saying that he was introduced to Mickey at a flea market by Paul Ahnert. Inasmuch as John was holding a Super Cyclone in his hand, and had just found out that DeAngelis designed the Trenton Terror, it wasn't long before Mickey offered to send plans for his "Misfortune X" as a design for the Cyclone.

Well, a week later, the plans arrived and John was greatly flattered to receive plans from a man who had been designing and flying models since the early thirties.

Overwhelmed by Mickey's generosity, a warm friendship has developed between John and Mickey, although John lives in Lancaster, Pennsylvania and Mickey resides in Lawrenceville, New Jersey.

Photo No. 9 shows the results of their friendship with Mickey on the left and John Delagrange with a "Misfortune X." Matter of fact, John was so pleased with the design, he has built three in various sizes

In speaking about DeAngelis, here is a modeler who has been in the game since the early thirties, building various types of indoor and outdoor rubber models. It is of interest his first model was an R.O.G. *from Collins Book of Model Airplanes* first published in 1910, 1923, and again in 1929.

It was not until 1935 that the gas bug bit Mickey (very similar to this writer's experience) and the result was the Misfortune X. A buddy, George Van Ness, built a seven-foot version.

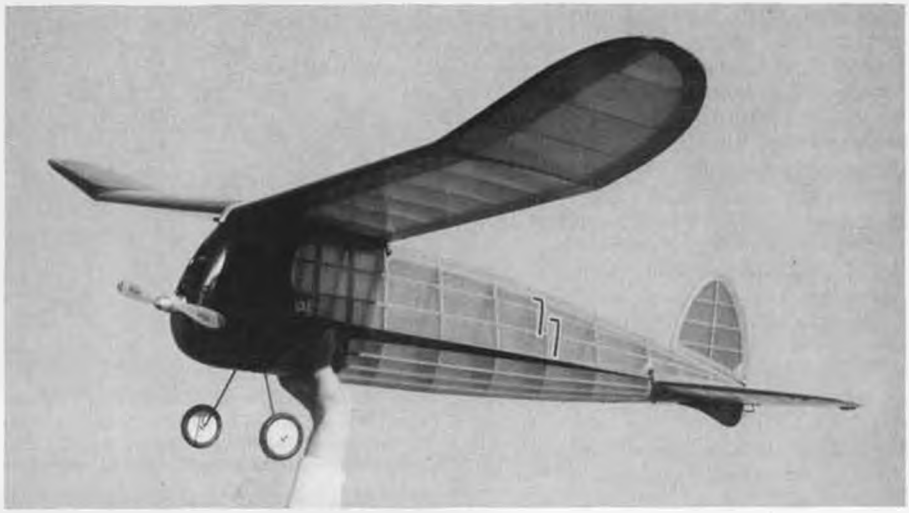
This design was followed by the "Miss Trenton Times" and the "Miss Trenton"

*Continued on page 85*

# OLD TIMER Model of the Month

# PACER 'C'

## 1941 NATS WINNER



**A Pacer "C" as built several years ago by Otto Bernhardt, of 77 Products fame. Ship spans 60 inches, wing area is about 550 square inches, length is 43 inches. A potent O.T. competition machine.**

• So many of Sal Taibi's designs have been famous, it's hard to pick one out and say that it was his "most famous." However, if you add to that description, "the one which was built by the most modelers," then the Pacer just might move out in the lead. Of course, this statistic was helped along by Bay Ridge Model Airplane & Supply Company, which kitted both the 'B' and 'C' versions. Incidentally, those kits sold for $3.95 and $4.95 respectively, including Streamlite wheels. . . . Oh well, eat your heart out. . . .

The Pacer owed its beautiful transition and glide to a most unusual aerodynamic freak. With practically a zero nose moment, the balance point came out just ahead of the trailing edge of the wing. As a result, Sal found that in his larger prototype Pacer, the transition was usually about a 100 foot dive into the glide! The wing simply could not overcome the effect of the huge lifting stab. One day, in desperation, Sal inverted the stab, added positive incidence until he got a floating glide, and there it was! Sal still considers it the best thermalling ship of all of his designs. The second prototype, the Pacer "C" shown here, incorporated the inverted stab and was simply a smaller version of the first Pacer. Normal flight pattern is right circle under power, wide right transition, and then a left glide turn.

The prototype 60" Pacer won the 1941 Nats Class C Gas event, and was powered by a Vivell-made Comet 35. It was later lost for ever at Langley Field, Hampton, Virginia, where Sal spent four of his years with the Civil Service. •

**The well known stubby Pacer nose. The engine is one of Otto's early ignition conversions, a hot K&B .35 with points on the rear.**

Astro Flight

# Model 112 SUPER CHARGER


**By BOB BENJAMIN**

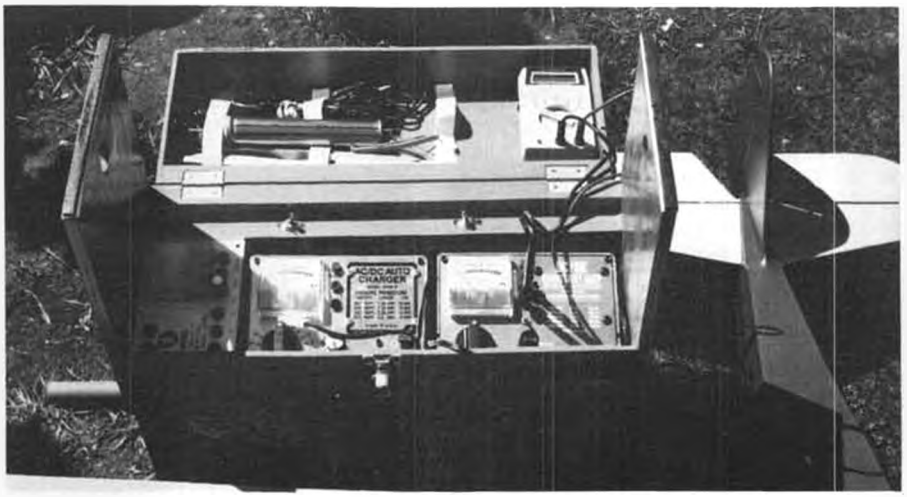
• In my recent review of the Astro Porterfield kit and the Astro Cobalt 25 motor system, I ran into space limitations and couldn't do justice to the new Model 112 DC/DC Super Charger. Astro Flight, *Model Builder* and I agreed that it was well worth a short review of its own. As I explained in the Porterfield article for the benefit of readers new to electric flight, the term "big" electric systems is generally taken to refer to motors intended to run on more than seven cells. The Cobalt 25 in the Porterfield, for instance, is commonly matched to a 14-cell battery pack. Without a charger especially designed to handle such larger battery packs, the electric modeler is faced with using packs that must be broken down into units of seven or fewer cells for charging, with attendant inconvenience and loss of time.

The Model 112 DC/DC Super Charger is designed to charge as many as 28 cells of up to 4000 mAh capacity. The Model 112 is an improvement over the earlier Model 102 in that it includes a constant charging current feature. As a nickel cadmium cell accepts charge and progresses from a discharged to a charged state, its internal resistance increases, and a preset current adjustment on a charger will allow the amount of current actually being put into the cell to diminish unless monitored and adjusted by hand or tended automatically by appropriate circuitry. The latter is built into the Model 112 so that you can set the charging current and leave it.

The term "DC/DC" in the name refers to the unit's being designed to operate exclusively from a 12-volt DC power source, most commonly an automotive battery. A suitably long cord terminating in a pair of heavy alligator clips takes care of input power, and another cord fitted with a plug that mates with all Astro power harnesses handles output. The unit is provided with an easy-to-read output ammeter registering up to 6 amps, a mechanical 15-minute timer, and an output current

*Continued on page 68*


**Family album. The AC/DC Auto Charger (reviewed with the Astro Challenger in the February '89 *MB*) is a perfect complement to the Model 112 Super Charger. The constant current DC/DC Super Charger eliminates the need to monitor and adjust charging current as the charge cycle progresses.**



**The Model 112 is plugged into the Cobalt 25 system in Bob's Astro Porterfield, the subject of one of last month's review articles. Power to the charger is a 12-volt automotive battery built into the custom field box. The "extra" wires are connecting the voltage monitoring jacks built into the charger to the digital voltmeter at the upper right to detect peak voltage for a maximum charge to the motor battery.**

# Free Flight

By BOB STALICK

• Nostalgia. Nostalgia ain't what it used to be, so I've been told, but in this month's free flight column, you are going to get a dose of good old Nostalgia Free Flight.

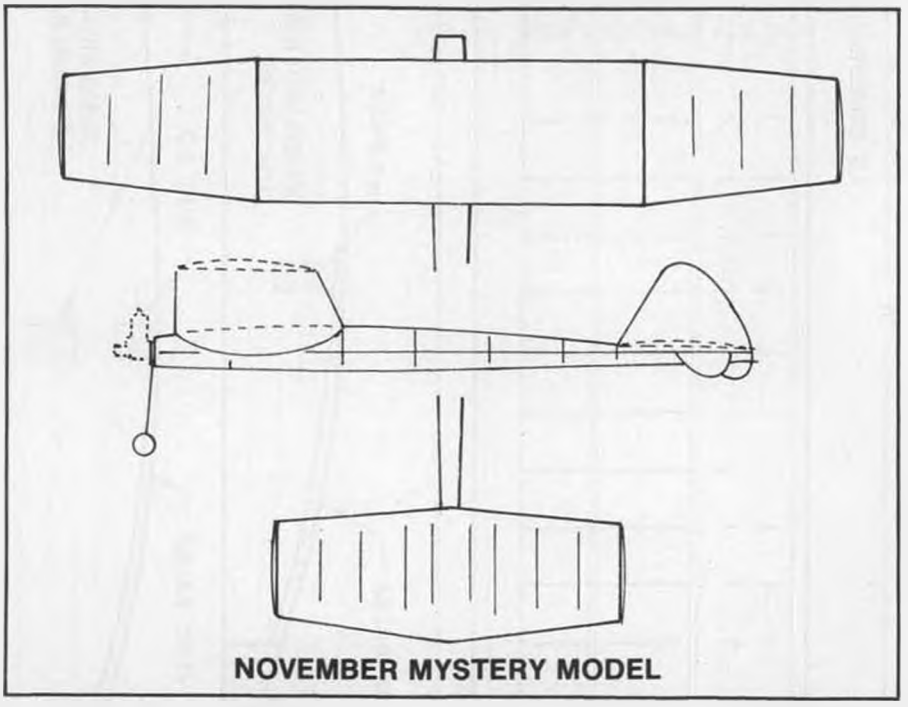
First, take a good look at this month's three view . . . The Prototype Texan 1952. This ship has been approved by the NFFS approval team of Bob Larsh and Ralph Prey as a legal Nostalgia design under the NFFS rules. Since this publication is carrying the official three-views of this ship, you can now build it and be assured that it is now legal to fly it. So, let's get on with the run-down of this ship.

**OCTOBER THREE-VIEW:**
**PROTOTYPE TEXAN 1952**
**by Jim Summersett**

So, you are one of those Nostalgia gas fliers who have drooled over the Texan design and wondered why it wouldn't qualify as a true Nostalgia ship. The fact of the matter is that the design wasn't published in a national magazine until 1960, three years beyond the official cutoff date for Nostalgia. Well, after a bit of digging in the Summersett attic, Jim came up with the plans for the original of the Texan series . . . a 1950 design complete with bottom mounted stab and parachute dethermalizer. However, the rumor persisted that this model was further developed well within the Nostalgia time frame. Sure enough, proof was found that the design did exist in 1952 in the form presented in this month's three-view. In fact, the original was a 660 square inch version by Summersett and co-designer Ed Miller. The 480 square inch version presented in the three-view is a proportional reduction of the bigger model. If you are interested in building the 660, just multiply all of the 480 dimensions by the factor 1.172, and you will have an authentic B/C version for your K&B .29 or .32 Green Head.

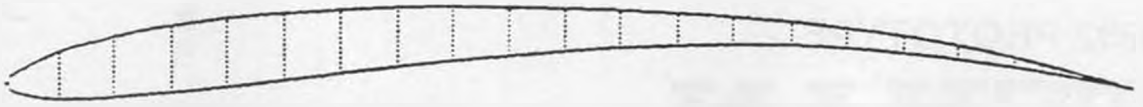
If you remember the later model Texan, the one that was published in 1960, you will readily note some differences between the prototype and the later version. For those readers who don't have the slightest idea of what I am talking about, take a look at the enclosed pictures. Three of them show this month's three-view . . . complete with Miller and Summersett (quite young

**Top man in 1/2A Nostalgia at the '89 Nats was Bruce Augustus, flying a Holland Hornet powered T-Bird. Engine shut-off is by a modified Tomy timer. It's a hot combination for this event.**

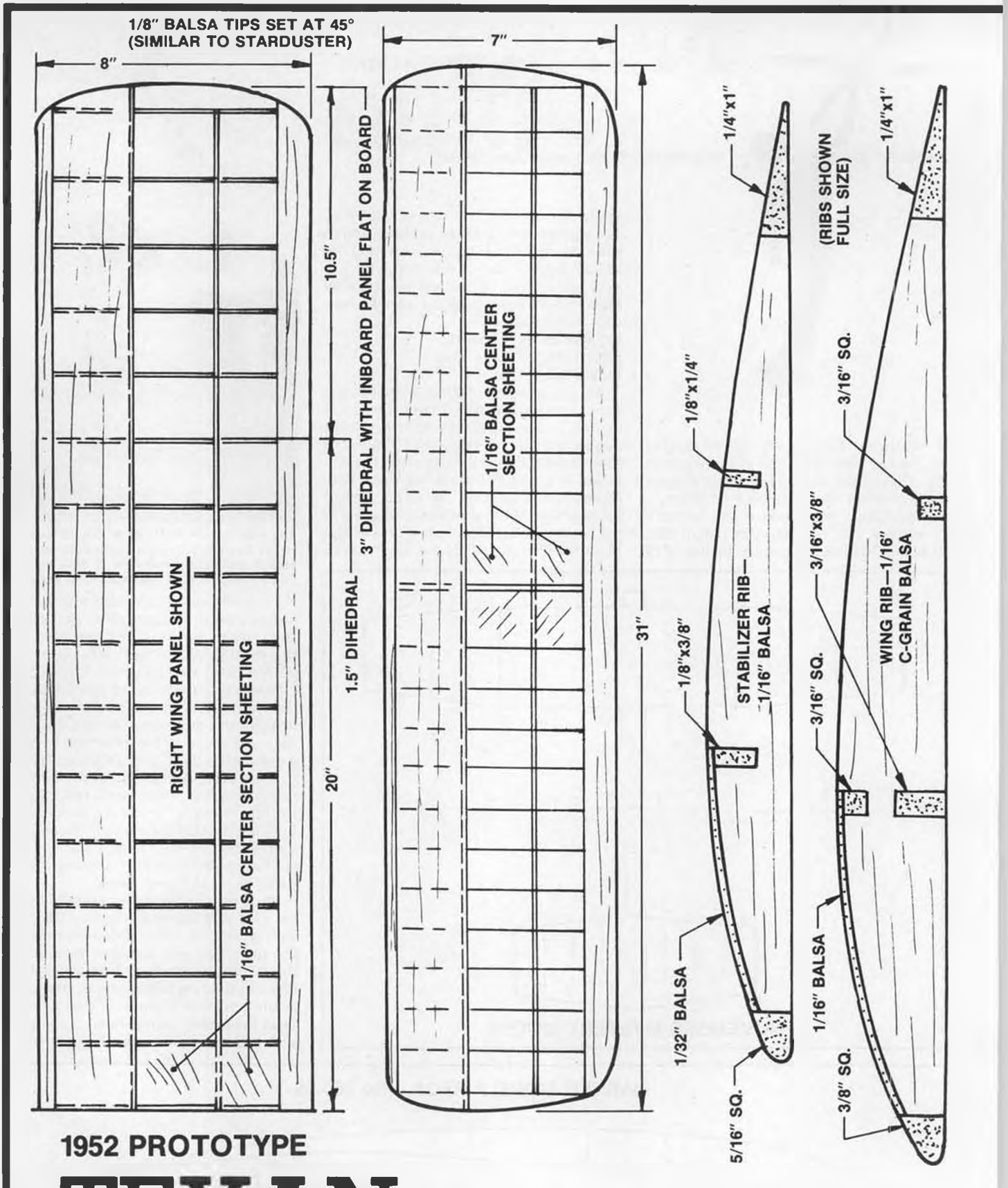


**NOVEMBER MYSTERY MODEL**

## DARNED GOOD AIRFOIL—Bo 560-26



| STATION | 0 | 1.25 | 2.5 | 5.0 | 7.5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| UPPER | 0.0 | 1.1 | 2.1 | 2.9 | 3.4 | 4.2 | 5.1 | 5.8 | 6.2 | 6.5 | 6.8 | 6.7 | 6.4 | 5.7 | 4.5 | 2.6 | 0.0 |
| LOWER | 0.0 | -0.8 | -1.2 | -1.3 | -1.3 | -1.1 | -0.7 | -0.2 | 0.4 | 1.0 | 2.1 | 3.0 | 3.6 | 3.7 | 3.0 | 1.8 | 0.0 |



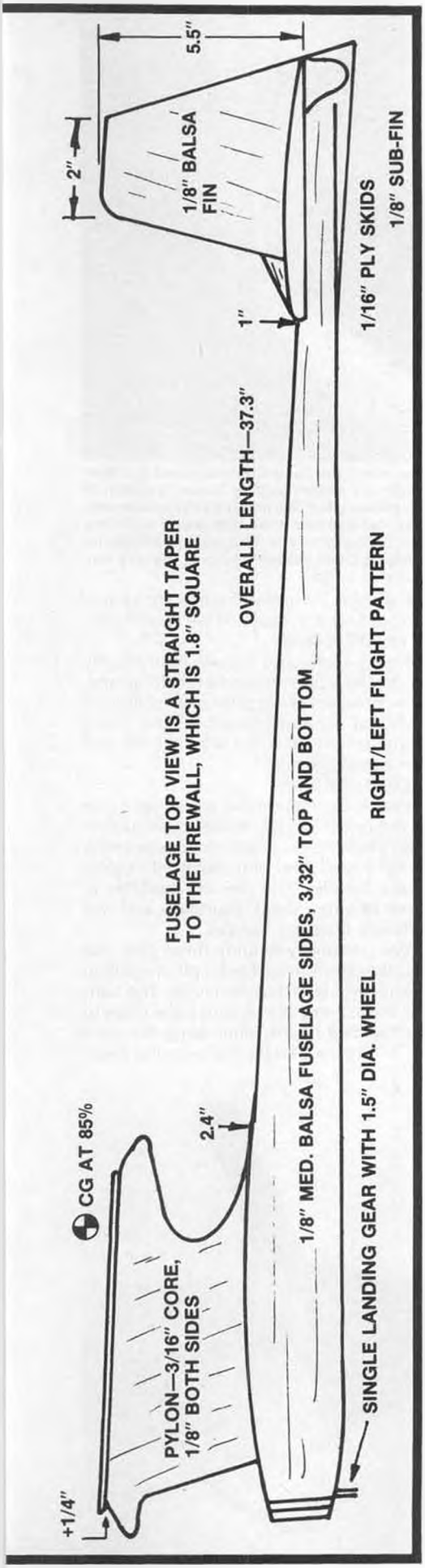

## 1952 PROTOTYPE

# TEXAN

## DESIGNED BY JIM SUMMERSETT

**SCALED FROM ORIGINAL PLAN BY BOB STALICK, 7/89**

**SCALE: 1/4"=1"**




**Jim Summersett and Ed Miller pose with their 1959 versions of the Texan. These are 660 square inch models and are similar to this month's featured three-view.**

fellows it appears). Another shows the later and unapproved version standing in a VTO position. Do some comparisons yourself. The pylon on the later version is lower and of a different shape, the wheel on the landing gear is gone . . . replaced by a simple wire skid, the wing has a lower aspect ratio and is equipped with tip plates. The leading edge sheeting has been deleted from the stabilizer, the fuselage is much thinner, and the fin is shaped differently.

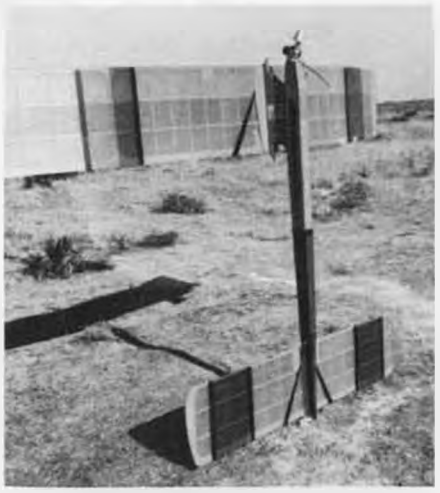
So now that the differences are clear, follow along as I detail some of the features of this ship. Take a good look at the three-view and start at the top. First off, the wing as presented is built without any warps, and it is about as straightforward as they come. The wing ribs are all 1/16 sheet, and the leading edge is sheeted with 1/16 lightweight balsa sheet. The tips are just 1/8 sheet canted up at a 45 degree angle with the spars and sheeting continued out to cover each tip. Sheet the center section of the wing on the top and bottom with 1/16 balsa. Cover the wing with tissue.

The stab is really as big as it looks. It is built just like the wing, except the leading edge is sheeted with 1/32 balsa. The center two ribs are spaced apart to accept the 1/8 fin. The tips are repeats of the wing except they are made from 3/32 sheet. The completed stab is tissue covered, and the 1/16 ply skids are glued to the trailing edge of the stab bottom three rib bays in from each tip.

The fuselage is built from 1/8 sheet balsa sides. It is a simple box fuselage that tapers

**EASY THRUST ADJUSTMENT WASHERS**

**Cut away the shaded portion of a flat washer to use for on-site thrust adjustment (see text).**

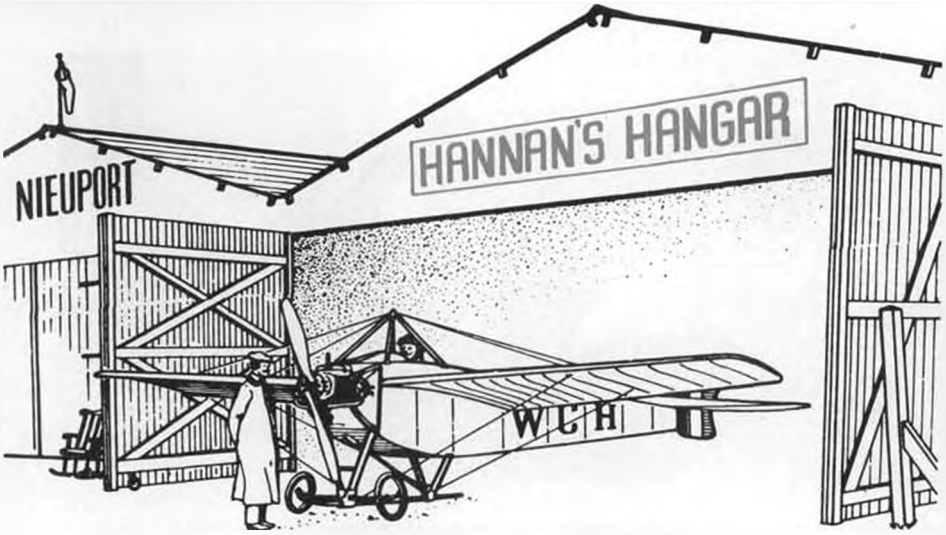


**This Texan is the 1960 version and is not eligible for Nostalgia competition. The photo is included here so that our readers can note the differences between this and the earlier versions. See text for description.**

all the way back from the firewall. The top and bottom are covered with 3/32 sheet. The outside dimensions of the fuselage at the firewall are 1.8 inches square which tapers to 1/2 inch wide and 1.0 inch high at the stabilizer mount location. The 1/8 diameter landing gear leg is sandwiched between the three pieces of 1/8 plywood that forms the firewall. The landing gear must have a 1.5-inch diameter wheel on the landing gear wire in order to qualify this model as a true Nostalgia design. The pylon is built up with a 3/16 core with 1/8 sheet on either side vertical grain. The pylon is mounted in the fuselage in such a way as to give a full 1/4-inch incidence at the leading edge. The pylon has a 3/16 wing platform that is 2 inches wide, with 1/8 square balsa or spruce runners glued to each side on top of the platform. A 1/8 sheet sub-fin is mounted directly below the stab. The finished fuselage is doped and covered with tissue. The full sized plans of this model show it powered by a K&B .19 Green Head engine.

As was the case with many designs during this early period, the model was designed to fly right under power and left in the glide. Consequently, the fin should

*Continued on page 80*




**"You really learn from what *doesn't* fly!"**

• Our lead-in quotation this month is by Al Backstrom, of Texas, prolific producer of unusual models, particularly flying wings.

**SPEAKING OF WINGS**

The Northrop flying wing "stealth" bomber successfully completed its maiden flight. A local newspaper headlined the event thus: "SURE IT FLIES BUT WILL IT B-2 EXPENSIVE?" With a reported 23 *billion* already spent on the program, the Secretary of Defense was quoted as saying: "What you shouldn't do is nickel and dime it to death."

**HI HO SILVER!**

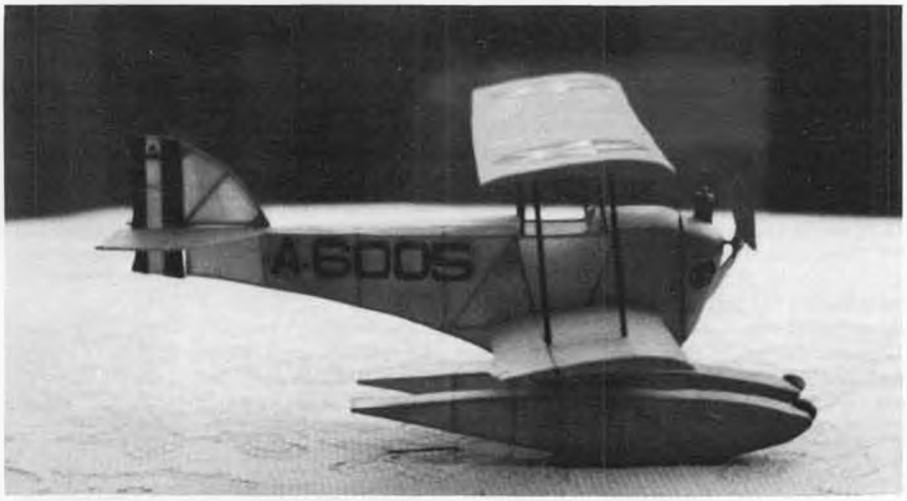
Models can get expensive too. Mark Fineman sent a clipping from *Connecticut* magazine, about jeweler Hans Pennel who makes truly exotic miniatures, such as a helicopter for the Sultan of Brunei and a solid silver Airbus airliner which sold for $10,000. But what Pennell would really like to produce is a solid gold model. Estimated price? $125,000!

**WELCOME BACK**

John McElroy wrote in to say: "I am typical, I'm sure, of many 'Old Timers' who are anxious to get reinstated in the *fraternity of stick and tissue idiocy*. Out here in the east Texas pine forest, I am a little tree-bound, but I do have a fine 20-acre pasture of high grass for a flying field. It is perfect for crashing my overweight Fokkers and Nieuports."

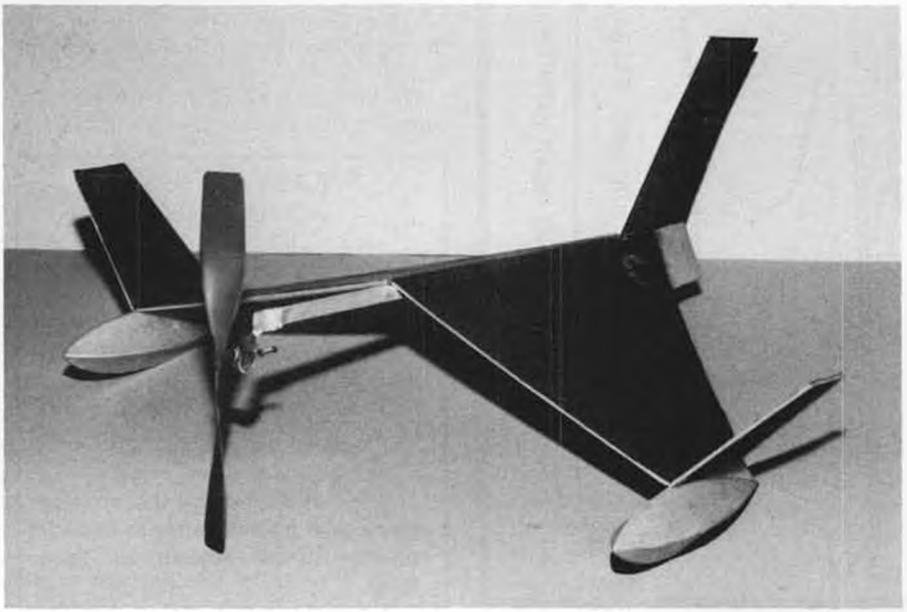
**GOOD QUESTION!**

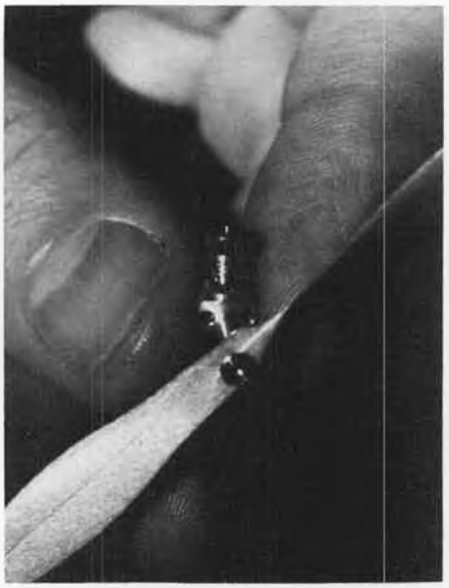
In a letter to Aeroneers newsletter Jim Alaback, scale drawing artist Vern Clements asks: "Wonder, if we did not *know* how old we are, how old we would be!"




**Above: English modeler Lindsy Smith is asking for help with the documentation of his jaunty Macchi M.16 floatplane, in U.S. Navy markings. More in text.**

**Right: "Stealth" ground/water effect craft is just one in a series of off-beat projects by Al Backstrom, of Texas.**





**Last month our columnist mentioned the ultra-small $CO_2$ motors built by Stefan Gasparin of Czechoslovakia; this photo illustrates dramatically just how tiny these little jewels really are. This particular one is designed specifically for Pistachio Scale models! Photo by Stefan's son, Michal.**

**ALREADY FLOWN**

Ready-to-fly and almost-ready-to-fly models have been around a very long time. Now, however, the Smithsonian Institution National Air and Space Museum has a computer-driven robot which folds and flies paper airplanes!

**MODELER'S PINS**

Lawrence Freeborn has announced new lower prices on his model construction pins. These items consist of sharp-pointed, nickel-plated steel pins mounted in clear plastic handles. The pins are available in three different shank diameters and two different diameter handles.

We personally employ these pins and find them indispensable for pinning down Peanut and Pistachio structures. The handle shoulder neatly secures balsa strips to the building board, eliminating the need to "X" regular straight pins over the strips.

Freeborn's pins are also useful in applying planking strips and even make outstanding bulletin-board accessories!

A complete list of sizes and types is available by sending a stamped, self-addressed envelope to Lawrence Freeborn, 3416 Ethelwood, Jeffersontown, Kentucky 40299. However, since they are only a dollar per dozen, why not simply order some and see for yourself? Please tell 'em you read about the pins in the *MB* Hangar.

**THOUGHT FOR THE DAY:**

"Imagination is better than explanation." Alan Pearson, Australia

**DUSTY CARTER**

With personal sadness we report the passing of Dustin Carter. "Dusty" was a longtime modeler, engineer, writer, artist, and aviation historian. It is in the latter role that he became especially well-known, having served as President of the American Aviation Historical Society.

He also served as a scale judge for the (then) North American Flightmasters Model Club, and assisted kit manufacturers with research and documentation.

His articles and drawings have appeared in various U.S. books and foreign magazines, and he was working on a history of P-51 Mustang racing aircraft at the time of his death. It is expected that his friends will complete this important publication.

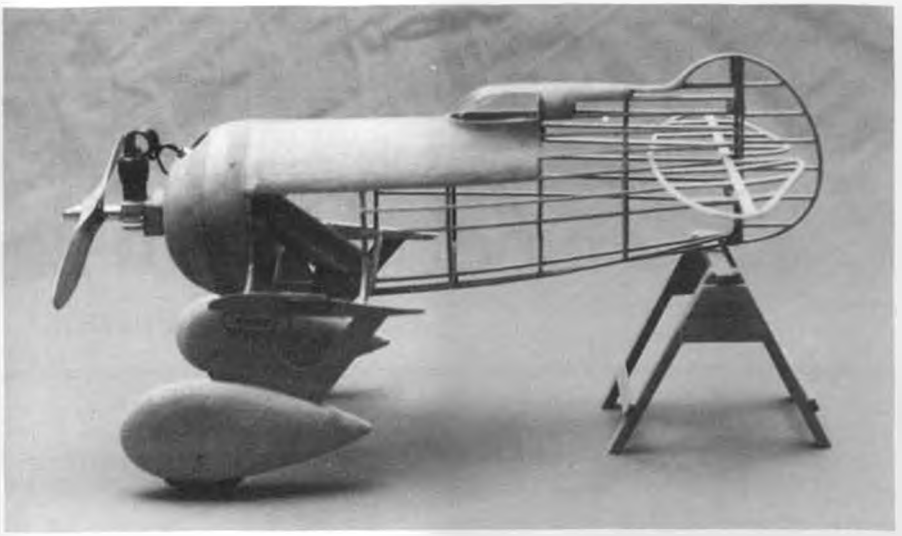
Particularly missed will be Dusty's cheerful outlook and fine sense of humor, which he steadfastly maintained throughout his life. Our condolences to his family and worldwide network of friends.

**DOCUMENTATION SOUGHT**

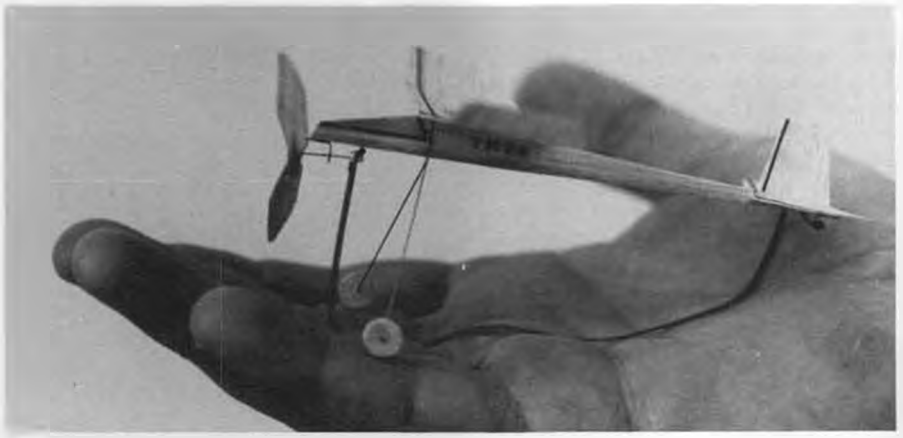
Major (retired) L.G.G. Smith has a fine-flying Peanut Macchi M.16 submarine scout model, and urgently wants more scale information. If any of our readers have any they would be willing to share, please contact: Lindsy Smith, Curator, Museum of Army Flying Ltd., Middle Wallop, Stockbridge, Hampshire SO2O 8DY, England.

**GOOD ADVICE!**

Dan Walton, an engineer with Beechcraft, says: "While check-trimming my models for the Shonai Proxy Peanut contest, I had several people stop and gawk. One father and his son noted that the Peanuts sure looked less expensive than R/C models. Dan explained that while he now builds and flies both kinds, rubber and $CO_2$ powered models were all he could afford while attending college, putting it this way: (Peanuts) make you a more weight-conscious modeler and do not break your parents' budget (parental support is also very important). I did mention, however, that no matter how well mine flew, that it is better to start out with a slightly larger model."



**Neat $CO_2$ powered Gee Bee "Z" at 7/16"=1' scale is the current project of Dick Allen, Canada's resident Gee Bee fanatic. Dick is building it from reduced Granger Williams R/C plans.**



**Sort of a model of a model, this all-balsa cutie by Trung Hua-Ngoc, of France, spans a mere 3-3/4 inches, weighs half a gram and has excellent ROG performance.**

**HOW'S THAT AGAIN?**

According to Frank Scott, modeler Jerry Bokius has been achieving great flights from his McModels . . . made from foam hamburger containers.

**HOW TRUE**

Some things never change, witness this quotation from pioneer aviator Alberto Santos-Dumont, writing in a 1901 copy of *The Century Magazine:* "petroleum motors are like the ladies; capricious, and nobody knows what to do with them." (But we love 'em anyhow, right? . . . the ladies, I mean.)

**NFFS SYMPOSIUM REPORT**

The 22nd Annual National Free Flight Society Symposium report is now available, and we found it fascinating. A random sampling of its contents might include such articles as *The Free Flight Glide Miracle-Spiral Stability,* by Andrew Bauer; *Airfoil Development by Glide Testing,* by Hank Cole; *Influence of Elevation and Temperature on Model Performance,* by Hermann

*Continued on page 74*


**Jane Schlosberg's Embryo Twin, designed by Dick Howard, of Arizona, consistently turns in duration times of 50 seconds or more.**

# the INSIDERS

## INDOOR FLYING REPORT

By DAVE "VTO" LINSTRUM

# INSIDERS AT THE KIBBIE DOME 1989 AMA INDOOR NATS REPORT

• In this reporter's view, the four "hot button" topics at this National Indoor Championships were the Kibbie Dome flying site itself, remote site scale judging, the new FAI Tan rubber, and the Obarski "Torque Burner" device. Since there were three full days (8 a.m. to 10 p.m.) of flying on July 21-23, there was plenty of opportunity for Hangar Pilots to discuss these important topics. The FID flights were often over a half-hour in length, allowing plenty of time for chitchat.

Superlatives like spectacular and awesome simply do not do justice to the University of Idaho Kibbie Dome, a field house with a 146-foot ceiling arching over a football field with a track surround and seats on both sides! The vast floor allowed separate events to share airspace, with heavy models like IHLG at one end, and lightweight Scale and Bostonian at the other, with no overlap! The building is well insulated and very tight, resulting in little thermal activity as the sun comes around. This means it is a very honest building . . .


**Popular "Can O' Beans" awards were designed and built by VTO for the 7g and 14g Bostonian events. The only award you can eat!**

**Below: Detroit's Dick Doig ran all the Nats indoor events except F1D Microfilm, which he entered with this elegant one-gram craft.**

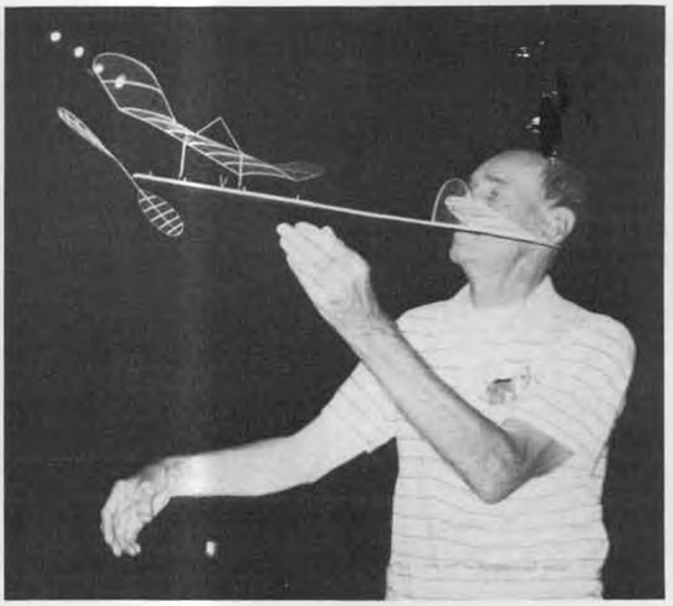
no inversion layers, thermals or drift. These are important factors for record setters like Stan Chilton, who did 23:43 with his EZB, or Cezar Banks who made TWO flights over 40 minutes with his microfilm F1D, thus clinching a place on the 1990 U.S.A. Indoor Team.

Being high and vast, the Kibbie Dome makes an immediate impression, but subtle things like a very clean ceiling (no model


**Richard Miller, a Flying Ace who came all the way from Angola, New York, took 1st in 7g Bostonian with his "Bluefin" lifting body design. Won a *Model Builder* subscription and a can of beans.**

**Former Indoor World Champion and member of the Oakland Cloud Dusters, Bud Romak, fixes a motor to his torque meter before choosing one of the six F1D models he brought to the dome.**

Clarence Mather exhibits the "FAI Tan" rubber in his AMA Scale "Tipsy Jr.," which got only 75 scale points despite fine detail and finish.



Clarence Mather again, this time with the Ultrafilm-covered Intermediate Stick model that took 1st with a 27:19 flight.

trap girders or lights) and a high light level in the pit areas contribute to the overall site value. The immense floor is covered with a smooth carpet, but the scale CD provided a 4x8 sheet of ply for the cautious ROG fliers. The dome is under consideration for a possible 1990 Indoor World Champs bid by the U.S.A., should the Rumanian Salt Mine bid fall through. On a scale of one to ten, the USIC site Johnson City Mini-Dome is a ten and the Kibbie Dome is a twenty!

Waiting for a timer is Bud Tenny, Indoor Contest Board Chairman, who entered Novice Pennyplane with this Ultrafilm-covered model.

The utter stupidity of remote scale judging at the AMA Nats HQ in the Tri-cities area, over a hundred miles away on abominable roads, resulted in a scale entry less than the MIAMA club usually gets at a local meet. The District AMA VP insisted on this travesty, despite dire warnings and pleading. No serious scale indoor flier wants to turn a model in at 8 a.m. Wednesday, then kill time until he can fly it on Friday, not to mention the minimum five hours of driving involved. This is a great example of contest management for the sponsors, not the competitors. We were just lucky that AMA HQ had the good sense to get the Kibbie Dome, as this local yokel wanted to hold the indoor events in a 27-foot ceiling ice rink . . . a worse site than most insiders have in their own hometown. Thanks, Vince Mankowski, for listening to us and for renting the Kibbie Dome.

Peanut entry by Jim Longstreth was a Mooney-designed Douglas AD-1 Skyraider with superb finish, lots of detail with fine decals.

A win in Peanut by Larry Kruse, flying a Santos-Dumont 14bis canard biplane, proves that unusual configurations are winners—he got 113.5 scale points. Also won AMA!

After some serious testing at the U.S. Indoor Champs in June (see last months' USIC Insiders Report) the new Ed Dolby gumband commonly called FIA Tan (Ed runs FAI Model Supply in Torrance, California and he had a U.S.A. rubber manufacturer brew up this Pirelli successor), proved to be the power of the day. "Elastique du Jour" it is, full of oomph and not so fragile as the nearly extinct Pirelli. A few fliers still have a small stash of the Italian product, and they were using it up, breaking motors left and right. However, the smart money was on the U.S.A. gumband. We suggest you get your supply now—it is available for only thirteen bucks in either


Jim Thornberry showed up with a six-year-old T-shirt and a new glider, dubbed "Cold Fusion."

California's Mark Allison shows his Walt Mooney RM-12 canard pusher, built from *MB* centerfold plans. Got 91.8 scale points and flights of 74.9 and 73.5, good enough for 5th place.

In Seattle, Dave Aronstein is an aeronautical engineer for Boeing, but at the Kibbie Dome he flew this 42-inch span Coconut Scale Cessna Caravan—an unusual scale subject and size.

1/8 or 1/4 inch widths. Stripped up to suit your model, it is formidable stuff!

Dick Obarski's ingenious device, the "Torque Burner" was outlawed by the Indoor Contest Board shortly before the Nats. Simply put, it is a small clamp on the rubber at the midpoint of a motor stick (not for scale or cabin models) that allows the model to climb on the front half of the motor, then releasing the turns in the rear for a second climb. This then allows much longer flight in a given site with lots of power and no dangerous rafter-banging. Indoor Nats CD Dick Doig, of NIMAS, made a small demonstrator motor stick with the device, showing it to contestants in the presence of contest board chair Bud Tenny. Frankly, we were happy to see this gadget outlawed as it is an experts-only approach. We would prefer that more emphasis be given to true beginner, or novice flying, to build up a broad base of competent INSIDERS. Indoor ace Cezar Banks may have "Delicate Instruments" stenciled on his model box, but the beginner in indoor needs less complex models than the torque burner could assist.

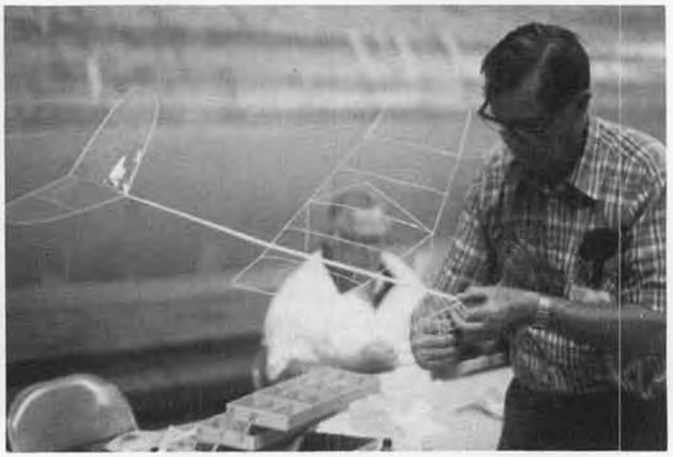
Your Insiders' scribe had the pleasure of sponsoring, with *MB*, the unofficial Bostonian Event in both Whitten 7 gram and Mooney 14 gram classes. We charisma-judged all 17 entries on the following scale, from 1.0 to 1.3 (multiplier for flight score): Zilch, Dullsville, Charming, Irresistible! The first impression counts, and a plain jane model gets zilch while a model with lots of class, color tissue, Hungerford wheels (or equal), and amusing trim or numerals, has

*Continued on page 69*

**Left: Dan DeLoach of Dallas could not attend the Nats, so he had ace flier Larry Kruse proxy fly his 14g Bostonian. It worked—Kruse won 1st place for the absent Texan!**

**Right: Stan Chilton set a new EZB record of 23:43 with his highly refined design. He has dozens of props and has held many AMA records. Stan hails from Wichita, Kansas.**

Big F1D ship is the work of San Diego Orbiteer, Clarence Mather, seen here unhooking the "FAI Tan" rubber from his torque meter.



Unusual V-tail F1D design by Hank Cole was the only microfilm model that was not a Richmond copy! Frank is a former AMA record holder.

# MASS. GENERAL


# BOSTONIAN

**By PERRY PETERSON . . . A good flying outdoor Bostonian, based loosely on the 1929 General Aristocrat. Excellent for beginner competition.**

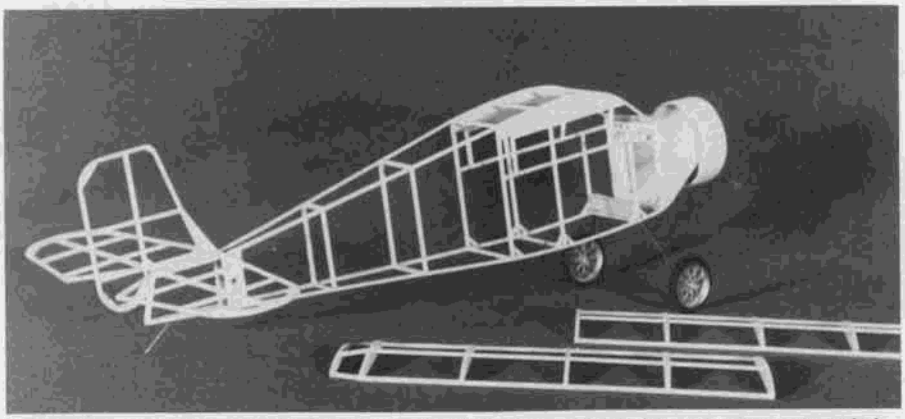
• Aircraft manufactured during the 'Golden Age' of aviation (between World War I and World War II) have always been popular with modellers. This Bostonian model is somewhat patterned after the General Aristocrat, a between-the-wars favorite.

If you have not built a Bostonian model, I urge you to try one. However, I must warn you in advance, they can become addictive! I truly have not had more pure relaxed modelling enjoyment than when building and flying Bostonians.

This Bostonian was built as an outdoor model conforming to the 14 gram rules. If you plan to build for the 7 gram indoor event, you will need to use lighter materials.

**CONSTRUCTION**

Cover the plans with thin kitchen wrap and build the sides, one over the other in the usual box fuselage fashion. Use medium weight 1/16 square balsa for the longerons. Uprights aft of the landing gear, except for the motor peg retainer area, are light weight 1/16 square balsa. When the glue is dry, separate the frames and glue together at the tail post. Add the cross pieces working from back to front, making sure the sides are square with the building board and symmetrical, following the plan top-view. The 1/16 square cross pieces aft of the landing gear should also be light weight balsa.



**Bones photo shows simple, light construction. Cowl ring helps hide the long nose moment needed for good flying characteristics. Those Hungerford spoke wheels really add a lot of class, as do the dummy engine cylinders, which are made from bendable plastic drinking straws. As for the abbreviated name, our author originally wanted to call the model "Boston General," until research revealed that the hospital of note in Boston is called Massachusetts General. The fuselage wasn't long enough to hold all the letters, hence the abbreviation.**

Cut the forward fuselage pieces F-1, F-2, and F-3 from very light weight 3/32 sheet balsa and glue in place. Cut F-4 from medium weight 1/16 sheet balsa. The cowl ring is 1/16 balsa sheet cut to size, soaked in ammonia and wrapped around a small medicine bottle. The form does not need to be the exact size as long as it is close to the diameter needed. When dry, glue the ring ends together and then glue to F-4. I used the back side of a balsa model rocket nose cone for the crankcase (which is also the removable nose block). The crankcase could also be made from a block of soft balsa. Drill a 1/8 hole for a small Peck-Polymers thrust button, allowing for 2 degrees down thrust.

The dummy cylinders are from drinking straws with a short accordion type bendable section. Cut the bendable section to length, then cut in half to simulate cylinders with cooling fins. The only straws like

*Continued on page 68*

# MASS. GENERAL

A BOSTONIAN MODEL

BY

PERRY PETERSON

1/16 SQ BALSA

1/16 SHEET BALSA RIBS

F-4

.020 MUSIC WIRE LANDING GEAR PATTERN

L-1 2-REQ'D

F-3

3/32 SHEET BALSA

F-2

1/16 SQ. BALSA

F-2 TOP

F-3 BOTTOM

ALUM. TUBE MOTOR PEG

TAIL SKID RETAINER

3/32 SHEET BALSA F-1 2 REQ'D

F-4

BACK OF COWL RING IS OPEN

1/16 SQ BALSA WING REST

WING RIB

USE 6" PLASTIC PROP.

PED 89

1/16 SQ BALSA

F-1

.020 MUSIC WIRE

1/16 SQ BALSA

1/16 SHEET BALSA COWL RING

BOND PAPER

# Control Line

BY JOHN THOMPSON

**Junior class action at the 1989 Northwest Regional Control Line Championships, held in May in Eugene, Oregon, shows Teresa Byerley and Wesley Mullens duking it out in Northwest Sport Race. Teresa was the eventual winner, while Wesley went on to win Junior Class I Mouse Race.**

### BLADDER GRABBER XIV

News flash: California's John Salvin IV emerged victorious in the grueling two days of the 14th Annual Bladder Grabber, AMA combat's biggest shootout, in Snohomish, Washington, June 24-25.

Salvin was one of several second-generation combat fliers showing their fathers how to do it in the $10,000 triple-elimination contest that drew 54 entries on a weekend that was hot in more ways than one. (Others among the second-generation fliers included Michael Willcox, Chris Scoones, and Ron Jaden.)

Salvin IV, with well-known combat flier John Salvin in the pits (the pair are commonly known as Salvin the Younger and Salvin the Elder), edged out Steve Stewart of Phoenix, Arizona, who took second-place honors. Michael Willcox, a former Bladder Grabber winner, was third, and Mike Petri, of Redwood City, California, was fourth.

All winners took home high-tech Carver stereo equipment as prizes, donated by contest sponsor Bob Carver, who flew pretty well, too.

Dan Rutherford of Bothell, Washington, received two special unofficial awards from the "Dreaded Canadian Contingent," the Sportsmanship Award and the BC Bellcrank Award.

The Sportsmanship honor was awarded by the judges based in part on Rutherford's decision to postpone combat in a match with Rich von Lopez until a sour engine run on Lopez's plane cleared up. Also a factor in the award was Rutherford's gracious acceptance of disqualification from the contest when a structural failure on one of his airplanes caused the engine to be ejected. Rutherford exercised his right to protest the decision through the jury process but accepted the jury's ruling honorably when it was rendered. The Bellcrank Award, given in recognition of some crash, bash or other mishap, was no doubt related to the structural failure.

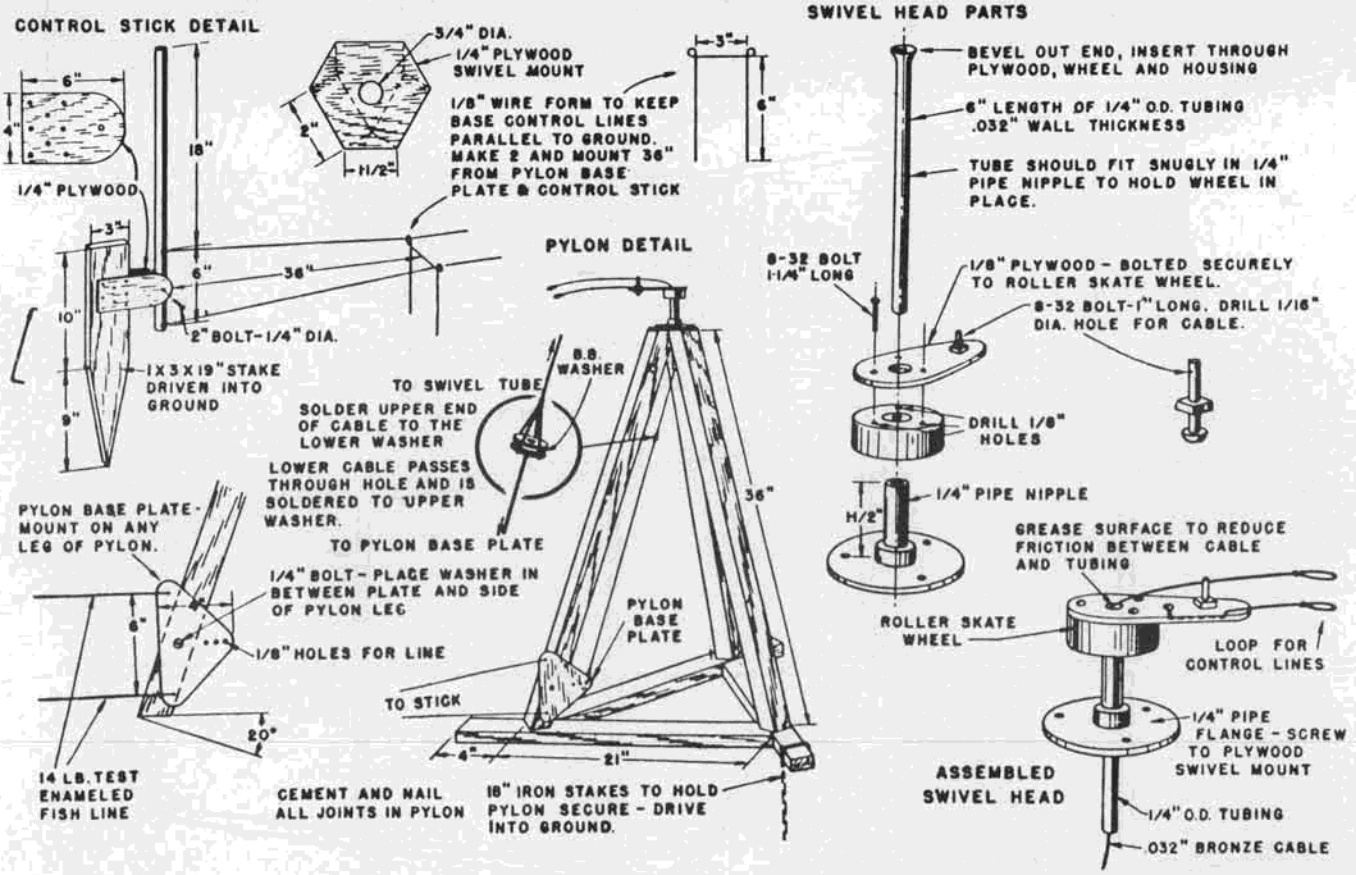
It is worth noting that, in 1990, the penalty for shedding parts from combat planes will be forfeiture of the match, rather than the present rule of disqualification from the contest.

It's also ironic that Rutherford was 4-0, with all wins on kills, when the disqualification occurred.

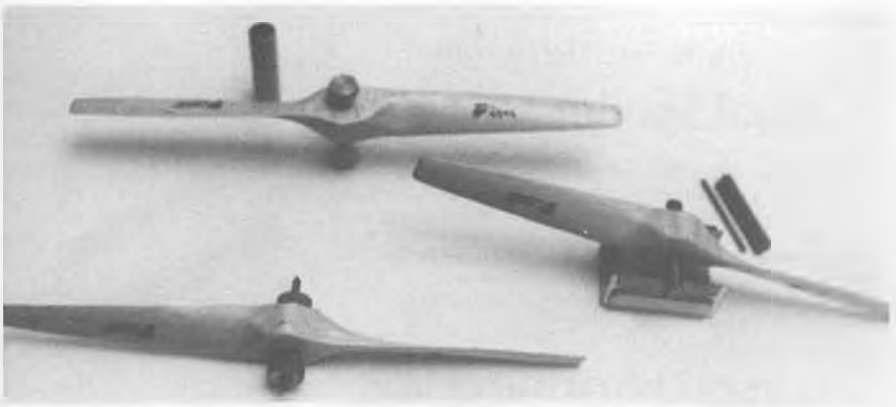
The Bladder Grabber continued to set a standard for excellent administration and judging, with the organizational credit due to Contest Director Howard Rush and a cast of dozens who prepared and conducted the contest preparation and paperwork.

On the field, Jim Cameron was the commander-in-chief of the judging crew in his role as circle marshal. He and his large crew performed flawlessly for some 160-plus matches and there were virtually no complaints or disputes aside from the mat-

**Below: In response to our columnist's plea for information on flying a C/L model from outside the circle, John Kelinske Jr. came through with this diagram from a mid-40's issue of *Air Trails*. Have any of you readers ever flown with such a device?**



**Right: This month's column includes a piece on prop balancing. Shown here are three different types of inexpensive prop balancers. The one at the top balances the prop on a single point, the one at the right is the razor blade type, and the one at the bottom left is the between-the-fingers type. The latter is the handiest to use at the field, while the razor blade balancer gives the most precise results.**



**Below: Kevin Fruehwirth is an up-and-coming Junior C/L flier from the Omaha, Nebraska area. Photo is from Bob Furr, *Orbiting Eagles* newsletter editor.**

Discussions I have heard at contests I have attended in early 1989 suggest that opposition to that change is dwindling as the issue of flyaways becomes more a concern. It appears that 1989 is the year in which the increasing horsepower and weight of fast combat planes has intersected with the strength curve of .018 lines . . . and the result is a troubling number of planes being loosed by lines parting in tangles.

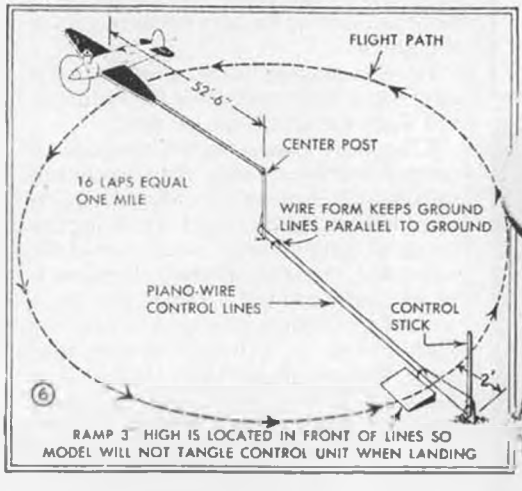
Flyaways resulting from released handles have been all but eliminated by 1987's safety thong rule. Props cutting lines are a rarity in modern flying, as pilots work hard to keep their hands aligned for best streamer-cutting. But line-to-line cutaways are a nagging problem.

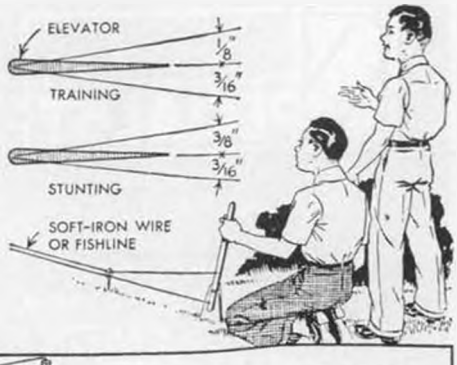
Leading the drive toward .021 lines is top contender John Salvin, chairman of the AMA Combat Advisory Committee through the Miniature Aircraft Combat Association. Salvin has been using the .021 lines on his own planes for three years and is convinced that the bigger lines will considerably reduce the incidence of flyaways.

MACA, which took the lead in the safety thong and engine-restraint issues, is again in the forefront of solving a safety problem. Look for a positive result from this process, hopefully well under way by the time this column reaches print.

Having mentioned the Bladder Grabber, it's only fair to mention also the results of the Third Annual Money Nats in Los Angeles, a triple-elimination fast combat contest where first prize was $1,000 and the rest of the loot pretty good, too: Second was a Carver stereo; third was a KGB 5.8 engine. There were 45 entries.

Mark Smith was the winner, Mike Petri was second, Norm McFadden third, and Mike Willcox fourth. Al Deveuve won the



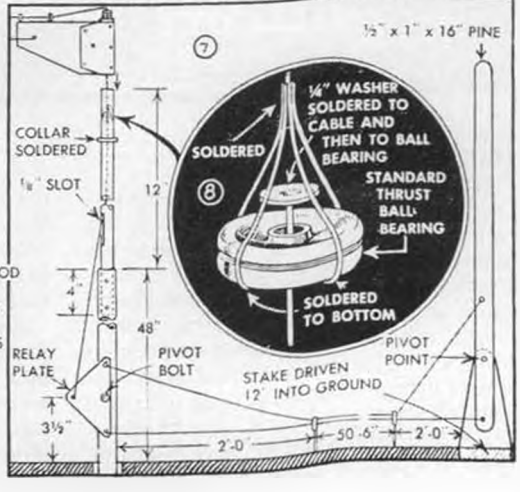

ter of interpreting the facts and rules in the Rutherford case.

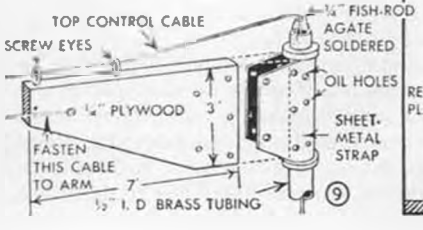
Speaking of combat, there has been considerable discussion during 1989 among AMA fast combat fliers about safety matters.

By the time you read this, the AMA Control-Line Contest Board will have decided whether to require an engine restraining wire on fast combat planes to prevent separation of the engine from the plane in case of collision or structural failure.

Another issue receiving a lot of attention that may be brought before the CLCB a second time (the first one was defeated last winter), is the increase in line diameter to .021".

**Another outside-the-circle method of C/L flying is copied here from the book *The Boy Mechanic*, published in 1952, and contributed by Paul Raborn of Waco, Texas. Basically similar to the setup shown on the facing page.**



Best Pit Man award.

**MAIL CALL**

While in recent months we've been discussing such monumental issues as big contests and diesel engines, the mail has been piling up at *Model Builder's* control-line headquarters. It's time to thank all who wrote and share some of the highlights.

First, our call for information to help Alvin Schroeder find out about an old system of flying C/L from *outside* the circle paid off. Thanks to Paul Raborn of Waco, Texas, and John Kelinske Jr. of Houston, Texas, for passing along information that helps to answer Alvin's questions.

Raborn sent along a copy of an article from a 1952 book called *The Boy Mechanic*. The article entitled "Control-Line Flying of Model Gas Planes" is a complete discussion of how to fly control-line as per the technology of the era.

A sample: "Advantage over free flying is that the plane can be maneuvered by the pilot, which makes possible many stunts such as dogfighting, dive bombing, speed dashes, endurance runs, and balloon bursting. Control-line flying requires less space than free flying and does not have the drawback of long hikes to retrieve models. You can fly the plane around you in a circle, or you can use a control stick located just outside the circle."

Aha! That's what Alvin Schroeder was looking for. Readers may recall that Alvin had sent us an ad from an old magazine, showing a device for controlling the plane from outside the circle. He wanted to know if anybody could give him information about such devices.

The article sent along by Paul Raborn includes not only a detailed discussion, complete with diagrams, of how a control-line model plane works, but also of the outside-the-circle control mechanism.

" 'Contact,' you cry, and you're off with a burst of speed!" the article begins. "Easing back on the stick, you begin to climb higher and higher. At 25 feet you level off at a mile-a-minute clip. Although you're not actually in the cockpit, control-line flying gives you the thrill of plotting your own plane in much the same was a real ship, except remotely." Still a pretty good description of the thrill of C/L flying!

The article goes on in great detail about how to build a plane, with the emphasis on the mechanical aspects. There are diagrams for how to carve your own propellers, how to use a hand drill as an engine starter, and how to rig up controls, and a discussion of how to convert free-flight airplanes for C/L use.

Nearly a full page is devoted to diagrams on the outside-the-circle mechanism. The fairly self-explanatory diagrams are included with this column for those who want to examine the innermost secrets of the system.

Here's a passage from the article that is interesting in the context of the history of C/L since the article was written:

"There are two accepted methods of control-line flying; with one you control the flight of the plane by holding the guide wires in your hand . . . and regulating the elevators up or down by movement of the wrist. With the other method, the plane is maneuvered around a center post by a control stick which is located outside the flight circle. . . . Although outside-the-circle flying is much more thrilling and realistic than the hand method, it is practical only when there is little or no wind because the wind tosses the plane and slackens the control lines. This trouble is avoided in flying by the hand method as the operator can take up such slack by moving his position. However, outside-the-circle flying eliminates the chance of becoming dizzy during prolonged flights."

Kelinske contributed a diagram from *Air Trails* magazine from late 1945 or early 1946, which demonstrated an even earlier version of the "pylon" method of control-line flying. As distinguished from the modern speed pylon, in which the speed flier places his hand to assure that the handle is in the center of the circle, this pylon did all the flying when controlled by a stick outside the circle.

The accompanying text says, "With 'Autotrol,' the lines are held at constant tension, even in windy weather. Pylon flying is the 100 percent fair and accurate way

to make speeds records since there is no way for the flier to whip his model."

It appears that one of the "accepted methods" of C/L flying fell by the wayside as the hobby grew and evolved. Let's hope Alvin Schroeder can bring it back so that us "younger" fliers can get a taste of the early days.

In last month's column, we were treated to an excellent seminar on the care and feeding of diesel engines. The author of that subject, Ian McQueen of Tokyo, Japan, had some afterthoughts that might be useful for anyone trying to use the article as a guide to getting started with diesels:

"I stressed against priming into the cylinder, because I have found with all PAWs, and Davis-converted O.S. .25 and .45 FSRs, plus a converted Cox TeeDee that this method works without fail, and can be wholeheartedly recommended. However, it is possible that some engines will, in fact, start better with a prime directly into the cylinder. . . . The procedure would be substantially the same in all other regards, particularly in learning how to get the engine to start while the tank is empty in order to avoid complications of extra fuel finding its way into the engine.

"The fuel economy depends partly on the prop size. Although a diesel will give better mileage than a glow engine of the same size with the same prop . . . the economy increases dramatically when a larger, more efficient prop is used on the diesel, for the diesel engine is doing more useful work on the air ('better bite').

"I recently visited Nathan Sturman and watched while he flew *(Nathan is another Japan resident who has corresponded with* Model Builder *control-line fliers through the column recently. jmt)* The O.S. 25FP engine fits, unfortunately, into the same class as the 10FSRs that I wrote about, and its compression was rather poor. It was necessary to turn the screw in a full turn to produce a high-enough compression ratio to get the engine to fire (hand cranking), and then back it out that much when it was running, otherwise it would have been grossly overcompressed. The power was excellent, however, once it was going. With a starter it would have started on the running setting.

"It seems that not all diesels are paragons of silence. We got some Silver Swallow 2.47s (.15 made in China), and Nathan reports that it is *very* noisy (without a muffler), considerably more so than a combat Nelson diesel that he has. Don't ask me for an explanation!"

Here's an item not from the mailbag but from the wires of the Associated Press, spotted while your columnist was at work in his real job, that of a newspaper copy editor. Anyone who flies glow model airplanes would have suffered the same agony as I did when this item appeared.

Datelined Flaquemine, Louisiana, the article described the destruction of a 2.5-million-gallon tank of methanol, which had been set afire by lightning. Fortunately, nobody was hurt in this disaster, but it burned up enough high-grade model airplane alcohol to keep us Control-Liners flying for a long time!



The article didn't say, but it occurred to me to wonder if the firefighting efforts were the same as those commonly employed on the C/L circle when fire breaks out on an airplane being started: A lot of blowing, waving, stomping, etc.

The article concluded: "The plant turns natural gas into methanol, a high-quality fuel used for, among other things, drag racers." Other things indeed!

From the mailbox and followed up by telephone from John Elliot at Cox Hobbies comes news that the company which has for decades helped youngsters get started is still out there pushing control-line model aviation.

Cox is being represented at air shows across the country by a Stearman biplane doing aerobatics and featuring wing-walkers. Cox's letter adds:

"In concert with many appearances of the Cox Hobbies Wildcats *(the airshow team. jmt)* will be hands-on flying of Cox control-line model airplanes by youthful spectators. Local Academy of Model Aeronautics control-line clubs have been contacted and will be engaged in bringing model aviation by means of the Cox 'Flying Circle' to many young people who have never seen, let alone fly, a model airplane."

The demonstrations make use of the successful new Cox foam-winged "Chipmunk" stunter. I haven't had a chance to see one of these yet but have read some

complimentary reports.

It's not too late to get in one more day of precision aerobatics flying in Southern California. Sunday, Oct. 29, is the date of the 12th Annual Golden State Stunt Championships at Clovis High School in Clovis, California.

For information, contact Gid Adkisson, 917 Los Altos, Clovis, California 93612 (209) 299-1535. Hey, it's worth the trip to see Gid's "Bud Light" semi-scale stunter in person!

"Quick-building low-cost just plane fun!" says the brochure, and fliers with that in mind may want to take a look at several unusual airplane kits produced by Stangel Enterprises, P.O. Box 336, Waukesha, Wisconsin 53187.

The planes, all profiles, range from an .020-powered plane called the Ellipsoid 020 to a .40-powered Dromader 40, semi-scale cropduster. You have to see the catalog to appreciate the creativity involved in these designs. We'd like to hear from anyone who has actually had an opportunity to build and fly them.

**NEWS YOU CAN USE**

Newsletters keep coming in from far and wide, more it seems every month. A note to newsletter editors: If you haven't caught the new address for *Model Builder* Control-line headquarters, check the end of this column. I'm still getting a few newsletters forwarded. I've tried to let as many editors as possible know of the new address but may have missed a few.

What follows is a few items either plucked out of the newsletters or passed along by the editors, who also are kind enough to pass on photos, flyers, news tidbits, etc. Keep those cards and letters coming!

Bob Furr, editor of the *Orbiting Eagles* newsletter, Omaha, Nebraska, sends the photo of Kevin Fruehwirth, one of the local club members. The model he's holding is a modified Sig Twister. Kevin is a junior who has been building C/L models for about two years, Bob reports. The plane's aluminum landing gear is made from shelf brackets. Modelers are nothing if not resourceful.

News of new control-line clubs is always exciting, so a small bit of correspondence in the *Topclass News*, the newsletter of the Topeka, Kansas, Control Line Association, is worth noting. The letter announces the existence of the new Kansas City Control Line Club, which attracted some 24 members in its first two weeks of existence.

The club plans contests, picnics, and fun-flies. President is Wayne Arterburn, vice president is John Milke, and secretary-treasurer is Susan Arterburn. The club can be contacted in care of the Arterburns at 5312 Troost, Kansas City, Missouri 64110. (815)523-2611.

One of the busiest guys in all C/L model aviation has to be Mike Keville, editor of *Stunt News*, the newsletter of the Precision Aerobatics Model Pilots Association, as well as *Direct Connection*, the newsletter of Southern California's Knights of the Round Circle.

Here are some "random observations" from a recent *Direct Connection:* Never carry tools you can borrow at the field. As you enter the hourglass, someone will fire up a Dyna-Jet. Never shoot pool with a man named "Lucky."

Never pay for a call to a man named "Windy." Probability is inversely proportional to desirability. You'll never live long enough to build all the designs you have in the plan file. You will continue to buy more plans. Lack of a $2 fuel filter can destroy a $300 model. Dropped pieces always land glue-side down. The guy who "knows it all" probably doesn't compete.

**BALANCED ATTACK**

In this column, we've mentioned before that it is always important to use *balanced* propellers. Virtually no mass produced prop comes from the factory in perfect balance. An unbalanced prop will provide less-than-optimum performance and the vibration it produces could cause thrown blades or damage to the airplane and engine.

Having reiterated that important concept, here's a little more information on how to go about balancing propellers.

First of all, you need an inexpensive instrument known as a prop balancer. There are several styles of these, all of which work well. My favorite is the type that provides studs of the various sizes needed to go through the prop's hole; the stud is placed in the prop and then the prop and stud are balanced on a pair of parallel razor blades held in a U-shaped bracket provided as part of the balancing tool. I believe this provides the most sensitive balance.

Also available are balancers designed to be held between the fingers, which are a good item for use on the flying field. Still another type balances the prop on a single point, which gives a three-dimensional analysis of the prop's balance.

In virtually all cases, the use of the balancer is self-explanatory. Ask to see the prop balancers in your hobby shop; once you see them, their method of use will be fairly obvious.

In all cases, the primary information provided by the balancing tool is to tell you which blade is heavier. You place the prop in the balancer, stabilize it, and watch to see if one blade falls.

To balance the prop, you sand material away from the heavy blade, making sure not to change the *shape* of the blade and with it the blade's aerodynamic characteristics. You do *not* remove material from the ends of the blade; you want the blades to be the same length! (Exception: If you have shortened the blades for performance reasons, as discussed in a previous column, check to make sure the blades came out exactly the same length. You may want to equalize them before removing other material.)

I have read articles which say in no uncertain terms that you should always bal-

ance a prop by sanding material from the *back* of the blade. I also have read articles that say just as positively that material should be removed only from the *front* of the blade. Given that difference of opinion, I won't try to say definitively that either is the best way to do it, but I will pass along the method that I use:

Once I have determined which blade is heavy, I select a grade of sandpaper that I feel is appropriate to the amount of imbalance. If the prop is just a little unbalanced, I will use a relatively fine sandpaper. If the prop is quite lopsided, I will use a coarser paper and finish the work with the finer paper.

I sand on the back of the blade first, moving only to the front if the prop needs a great deal of sanding. There are some cases where the whole blade winds up being fairly extensively sanded. However, in most cases, a little sanding on the back of one blade does the trick.

Always be a little conservative when you start sanding. Sand a little and recheck the balance. If you go overboard, you will find yourself having to sand the *other* blade. With wood props, I find that, in most cases, the balance can be achieved by the time the finish is removed. There is seldom a need to remove much wood. With nylon, plastic, epoxy-glass, or carbon fiber props, naturally, you are removing the actual prop material when you sand.

In regard to wood props: After you have balanced them, you will have all or part of a blade with no varnish on it. You will then want to consider whether the prop needs refinishing. I have not found fuel-soaking to be the major concern with propellers; however, water is another matter. If you will be flying, or leaving the plane outdoors in wet conditions, it is advisable to refinish the prop so that it doesn't soak up water and go out of balance again . . . not to mention becoming weakened.

The easiest way to refinish a propeller without changing the balance again, is to apply a drop of cyanoacrylate glue and spread it around the unfinished surface. This will not give the blade its original shiny finish but will protect it from water. Since the cyanoacrylate is nearly weightless, you shouldn't have to do much rebalancing—but you should check.

Once you have your props balanced and are out flying, you still may run into balance problems on the flying field. The tipoff may be an engine that suddenly seems to vibrate excessively. Naturally, you will check all your mounting bolts and the plane's structural integrity. If nothing's wrong, suspect the prop. It could have gotten moisture, been nicked, or shaved on the ground, etc. If another prop makes the vibration go away, you'll need to rebalance the one that caused the shaking.

Help make the Control-Line column a forum for all C/L fliers. Send your contest schedules, reports, hints and tips, photos, and questions, to John Thompson, 1520 Anthony Ave., Cottage Grove, Oregon 97424. •





**Choppers** . . *Continued from page 35*

ter performance across the span. For example, the hover became slightly less stable. The full power vertical climb out causes some shaking, but turning radius seems to improve slightly. Based on the BERP design and our rotor research program at the University of Maryland, we came up with a design that was shown in the March/April '89 issue of *Model Builder*. Our new delta tip blade raised the tip stall angle to 30° in wind tunnel tests. This means the retreating blade stall problem would be ameliorated, which would increase the top speed and g-loading capability. I started testing them on R/C helicopters a year ago, and so far, they show promising results. The principle behind it has to do with utilizing the tip vortex just like the BERP design to produce a stable vortex pattern at a high angle of attack. The vortex would then "entrench" the air to flow over the blade tip area without separation even at high alpha. (Alpha means angle of attack.) The phenomenon is shown in Figure 5. The theory is very similar to delta wing aircraft design such as the Concord. Delta wing aircraft usually land at 30° angle of attack without stalling the wing. This mechanism is enhanced by making the swept leading edge very sharp. Because of the very high angles that the tip can attain in this stable flow state, airfoil sections with very high lift coefficient may be used on the inner stations of the blade to positive advantage without flow breakdown being dominated by the extreme tip.

In the future we will continue on the rest of the blade design theory, and look at anhedral tip design. •

**Electric** . . . . *Continued from page 29*

flying wings I have seen, it should be very efficient, and at a power loading of 42 ounces per motor, quite powerful. Keith won first place in Sport Monoplane at Toledo this year with it, perhaps, as he says, because it is a TRUE monoplane; no stab, rudder, or fuselage! Keith will be flying it at the KRC meet. Thanks, Keith, for the info!

Ben Almojuela sent in a very complete report on the Boeing Hawks Electric Fly-In on June 24 and 25. Thirty-one pilots brought 56 electric planes, 50% more than last year. The weather was excellent, with sun and thermals, though on Saturday it got up to 90 degrees, unusual for Seattle.

The Fly-In is very informal, with most judging for categories done by the participants. There was one official AMA event, the 609 Class A sailplane battery allotment. The goal was to fly three flights of six minutes each without recharging. Scores on Saturday were low, Lee Urbaniak did the best with 526 points out of a possible 1080 with his Electricus. Sunday, the pilots had gotten the hang of it, and Mort Arnold won with his Electra with 1073 points! Not bad for a popular kit airplane! Mort has had a lot of sailplane experience, which helps, but it goes to show that the

Electra is a very good plane for both beginners and competitors. Ben did not include in his report what type of cells were used in the planes. I know the only limit was that the pack should be sub-C size or less. It would have been interesting to see how the 1700 cells compared to the SC and SCR cells.

Best Scale was won on Saturday by Bob Benjamin with his Astro Porterfield powered by an Astro cobalt 25 and fourteen 1200 mAH cells. Dave Pentland, from Vancouver BC (Canada), won scale on Sunday with his deHavilland Beaver, powered by an Astro cobalt 25 turning a 12x7 prop on 12 cells. The Beaver was a very nice flier, the full scale plane being a frequent sight in Seattle. Kenmore Aviation rebuilds them, and many operate as float planes in Seattle, Canada, and Alaska.

The longest flight of all was by Ted Randall, with his old timer plane, but he won it the hard way, it disappeared from sight in a monster thermal at 32:30 and was never seen again! Mort Arnold won longest flight by a sailplane on Saturday with 16:19 flying his Electra. On Sunday, Rick Lim won with his Spinnaker sailplane clocking 33:32. The Most Impressive award went to Tom Davis with his half-size Klingberg wing. I described this in last month's column, and it well deserved the Most Impressive award. On Sunday, Bob Benjamin won Most Impressive with his Astro Porterfield. Mike Kometz won Most Aerobatic on Saturday with his Warlord (Bridi kit) powered by an Astro cobalt 40 and 18 cells. This is the second year Mike has won the award. The Warlord is very smooth and fully aerobatic. It flies like the gas planes. Rich Holste won Aerobatics on Sunday with his Astro cobalt 05 powered ICH plane (not familiar with this plane, so can't give more details-MP).

Best gas kit conversion went to Lee Urbaniak on Saturday for his Ace All Star Biplane, powered by an Astro cobalt 15. I watched Lee fly this, and he certainly overcame some difficulties! On his first flight attempt, the plane did a stall spin on launch, and I thought it was the end of the plane. The fuselage was broken, the motor shaft was bent . . . it looked hopeless. Lee got out the CA glue, straightened the motor shaft perfectly, and flew several times that day without the landing gear. The plane requires a really hefty launch, like throwing a baseball, but once it has flying speed, it performs beautifully. It probably would have gotten Most Aerobatic but for the Warlord. The wing loading is very high; my estimate is that it is a four pound plane flying on 380 sq. in. On Sunday, Mike Kometz won best gas conversion with his Ace 4-20 flying on an Astro cobalt 15, with 12 cells. Those who have seen the four-cycle 20 powered 4-20's fly say Mike's plane flies even better! Mike has been flying it for almost three years now.

Rex Schlegel's Mountain Glider won the Ugliest plane award on Saturday. It is a very clever fiberglass rod and cloth glider that rolls up into a canister two feet long and four inches in diameter. It is powered by a Leisure 05, 79-inch span, 52 ounces, 700 sq. in. On Sunday, Steve Burchett won the award with his Mirage. The old timer planes won the prettiest plane awards: a Maxwell-Basset Miss Philadelphia (Dave Nofziger) on Saturday, and a Henry Struck Record Hound (Bruce Matthew) on Sunday. The Miss Philadelphia was powered by an Astro cobalt 05, the Record Hound by a Robbe 05.

There were quite a few planes powered by larger motors this year, and far fewer underpowered planes than in the past. My feeling is that fliers are becoming much more realistic about power demands, and are using motors that are right for the type, weight, and performance involved. This is a welcome relief from seeing planes that in a .25 gas size used to be powered by 100 watt (05) motors . . . always a performance disappointment. Power is more important than weight. A heavy plane will fly well if it is a good design and has enough power. Do try to build light, even so!

The Puget Sound Electric Model Fliers thank the Boeing Hawks for the use of the field for two whole days, and Ace RC, Airtronics, Al-Tec, Astro Flight, Davey Systems, Eldenken, Great Planes, High Sky, Hobby Lobby, Jomar, Leisure Electronics, Peck-Polymers, Satellite City, Sermos RC, Sig, SR Batteries, and Tower Hobbies, for

their support. I would like to thank Bernard Cawley and Ben Almojuela for their time, labor, and skill, which made it all happen. Till next time, fly high with electrics! •

**Soaring . . . .** *Continued from page 25*

scale glider enthusiasts are slope fliers. Why is this? I think it's because of the potential hazards of winch towing scale gliders. Many commercially available scale gliders are not properly engineered for winch launching. They are intended as either slope ships or aero tow candidates. A few scale ships are electric motorgliders. Many others are power scale slope ships, planes that were never intended for winches.

Because they have no need to buy or maintain winches, retrievers, frequency boards, mowers, or other flatland field equipment, slope fliers are less dependent on other modelers (such as club members). Perhaps because of their less visible status, they seem to have less need for presenting land owners or public officials with proposals for the use of private or public property, a situation where big numbers can be very helpful.

In general, slope fliers don't usually seek attention for themselves in the national press. Slope fliers tend to spread their numbers thin over this great big landscape of ours, like lone eagles looking for lift and unlimited radio air time. They tend to favor the peaceful, recreational solitude of being at one with the wind and a beautiful scale glider. They like to be "away from it all."

Personally, I can really relate to this kind of flying, even though I spend more time thermal soaring within Southern California clubs than slope soaring alone.

Anyway, the point of all this is there seems to be a lot of activity in scale flying these days, but it's not always seen.

There is now a big movement among slope and thermal scale fliers to get a lot of guys together for some FUN flying at a great slope site with no formal rules other than safety. This formula worked very well for the Tri-Cities Soarers in Richland, Washington, and is now catching on elsewhere. The idea here is to share the fun, share the ideas, and watch other scale ships flying in fantastic lift.

Well, the next big fun fly meet is coming up fast! Mark your calendar for November 24, 25 and 26 (that's Thanksgiving Weekend), and plan to be on hand with a scale ship of some kind at the Torrey Pines State Reserve.

The following info was sent in by one of the PR officials for the Torrey Pines Gulls Club, Slope Soaring News Editor Charlie Morey.

". . . Basically, it'll be three days (Friday through Sunday), of flying scale gliders at one of America's best-known slopes.

"As an added attraction, I'm arranging and scheduling demonstrations during the meet where scale glider manufacturers can show off their products. For example, at 2:00 p.m., we might have Byron Bruce, from Combat Models, show off his new A-4 Skyhawk, A-10 Warthog, and MiG-27 power scale-jets. . . . I have a tentative commitment from Byron as well as Marty Silberstein and Steve Peacock of Cliff Hangar Models (warbirds and jets), and Brian Laird and Paul Masura of Slope Scale (warbirds).

"As you may have noticed in your June copy of Slope Soaring News, I've also volunteered to compile a mailing list of interested fliers. I'm sure we'll be mailing info until the last minute, so please print my address. For readers to be included on our pilot and spectator information list, please send name, address, and phone number to Charlie Morey, c/o Slope Soaring News, 2601 E. 19th Street #29, Signal Hill, CA 90804."

Any questions about the scale fun fly can be directed to Charlie at the above address, or call him at (213)494-3712.

**GLIDE ONE OUTLAW**

Boy, does that sound a little strange: glide one outlaw. It almost sounds like the answer to our criminal justice system's incarceration problems.

What we speak of here is another new kit manufacturing concern headed up by Shawn Cordon. Its full name is Glide One Model Aircraft Corp., based out of Valencia, CA 91355. At this time there is only one kit in the line, but that kit is very, very professionally done!

Quoting from the lead paragraph of the instruction manual, we learn the company's aggressive motto: "Congratulations! Glide One kits represent the cutting edge in contemporary R/C aircraft. Each

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# RC10

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# IMPORT FIGHTER.

**THE TEAM DOES IT IN THE DIRT.**

Race the car that beat the imports in the toughest kind of off-road competition.

The All-American Associated RC10 took home the gold in both the ROAR and ORRCA National Championships.

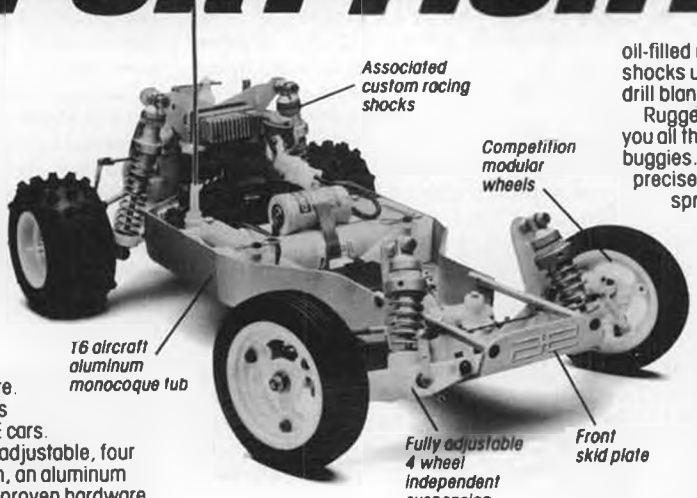
Our RC10 turned back the foreign car invasion with the same racecar technology that has kept Team Associated on top of the RC car racing world for over 15 years.

**A RACE CAR, NOT A TOY.**

Sure, you've heard that before.

But Team Associated designs and engineers only model RACE cars.

The new RC10 features fully adjustable, four wheel independent suspension, an aluminum alloy monocoque tub and race-proven hardware throughout.




And the RC10 doesn't need expensive accessories and modifications to handle the roughest tracks. The strength and durability is standard equipment.

**RACE-WINNING ENGINEERING.**

For maximum traction the RC10 suspension is damped by long throw, oil-filled racing shocks. These custom shocks use machined alloy cylinders and drill blank shafts for silky smooth action.

Rugged, yet light, the suspension gives you all the adjustability of full size, full race buggies. The A-arm/Ball joint design allows precise camber, caster, ride height and spring rate tuning. Even anti-roll bars and a VariLok dif are included.

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**GET THE JUMP ON THE COMPETITION.**

Go RC off-road racing with the leaders. The National Champion RC10 is available now and legal for ROAR and ORRCA nationally sanctioned competition.

Complete RC10 kits, replacement parts and spares are readily available through model car racing's most extensive dealer network.

Take the challenge and build yourself a winner. Team Associated's RC10.

*Sealed gearbox VariLok differential*

*Full race rear suspension includes bulletproof half shaft and u-joints with tapered and keyed modular wheels. Quick release knock off design for fast pit work and tuning.*


*Smooth undercarriage maximum ground clearance*

Model cars for Real racers.

Associated Electrics
3585 Cadillac Ave.,
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(714) 850-9342

kit is based on a unique aircraft that's been designed with a specific purpose in mind. We sell kits that are as simple as possible to construct, have a great range of performance, and are competitively priced. We thank you for choosing our kit, and we hope that you will continue to build and fly our products in the future."

The Outlaw is a two-channel glider of 45.5 inch span, 307 square inch area, 7.5 ounce per square foot wing loading, 16 ounce weight, and Eppler 205 airfoil.

Once again quoting the manual: "About the Outlaw: As its name suggests, the Outlaw is a quick, compact, and aggressive aerobatic glider. For the pilots who are looking to improve their aerobatic flight skills, the Outlaw provides maneuverability with a good margin of built-in stability. For the aggressive combat pilot, the Outlaw will out-turn and out-run most other sport slope aircraft."

Quoting from the box label: "Outlaw. An outstanding, introductory level, aerobatic sailplane, especially designed to transform basic flight skills into razor sharp, aerobatic reflexes!" Quite a bold statement, to be sure.

The Outlaw looks a little unusual because of its boat-like nose. Although I don't know if it is true, I would suspect that the nose has this shape for a reason. That reason might be that this shape will deflect the fuselage upwards if it encounters a large rock or hard ground at a high descent angle on landing. This shape would perhaps keep the nose from digging in on touchdown, thus saving the model from possible structural damage. Form follows function.

Looking over a production run kit of the Outlaw, one finds many expensive production techniques. Bulkheads and wing joiners are die-cut from light plywood, and these cuts are clean and look accurate. The parts practically fall out on their own. Likewise, the fuselage sides, doublers, and reinforcing pieces, which are cut from 3/32 medium balsa, are clean, accurate looking cuts that practically fall out of the sheet wood. The wing ribs are also very well die-cut from 1/16 balsa.

There is some machine cutting too: shear webbs, ply hatches, nose block, and a dozen other small parts are stack-sanded in fixtures. Here too the cutting is top notch. The leading edge material is 1/4 inch pine doweling.

The construction manual is well illustrated with black and white photographs of the various parts of the model being assembled. Step-by-step instructions accompany the photos.

No hardware, other than the hatch screw and washer, is provided. A list of hardware and materials is provided inside the front cover of the manual.

The Outlaw will be available at (one assumes) hobby shops across America. If you can't find it at your local shop, Hobby Shack will be handling it.

**AIRFOIL OF THE MONTH: SD6060**

This airfoil was published in Charlie Morey's Slope Soaring News, June 1989 issue. I don't think it has appeared anywhere else, so perhaps you may not have seen it yet.

The Selig-Donovan 6060 is supposed to be an improved Eppler 374. I have run the Selig 3021 in the past, which is an improved Eppler 205. While I have heard back from many people that the S3021 is indeed an improvement over the older E205, the SD6060 is just too new for there to have been much conclusive experimenting going on at this time.

The E3744 is one of the best slope racer, slope aerobatic, electric power or multi-task sailplane, cross country racer air foils around. If the SD6060 is better, it should be very much worth trying. I would recommend that you cut your experimental wing out of foam and cover it with vacuum

bagged fiberglass. That trailing edge is going to be hard to make out of balsa wood!

**MORE NEXT TIME . . .**

That's going to have to be it for this month, glider fans. Until then, keep that sailplane in . . . Thermals, Bill Forrey, 3610 Amberwood Ct., Lake Elsinore, CA 92330. (714)245-1702. •

**Streak** . . . . . *Continued from page 13*

removed. The instruction manual explains that you must have either an on/off switch or electronic speed controller to control the motor from the transmitter. My thought was, how awful it would be to have a project like this without proportional speed control. I contacted Tom Walker of Robart Manufacturing and discussed the project I was working on. Tom was very helpful and one week later UPS delivered a model HQ500 Series Electronic Throttle and receiver harness. Boy! was I impressed. This unit is beautifully made and best of all it works perfectly. The HQ500 features proportional speed control with high speed and neutral adjustment. It has the capability of operating from 6 to 24-cell battery packs. This means it can handle up to 35 volts DC with an efficiency rating of 98%. All this in a small package that measures only 1.25 x 2.25 x .625 inches and weighs only 1.9 ounces. Other models are available from Robart with a proportional prop brake. The receiver harness plugs directly into my Airtronics radio where the throttle servo lead normally would. Receiver harnesses are available from Robart and fit most popular radios.

**COMPLETION**

The airframe was final sanded and covered in yellow and red MonoKote. Black pinstriping was added to match the vinyl cursive letter on the top of the wing. These letters are not supplied with the kit but may be purchased at a local advertising store where vinyl letters are available.

All servos, electronic components, push rods, landing gear, and velcro for the motor batteries are now installed. You can use the placement of components as shown on the plans without concern about the correct balance because your motor batteries can be moved easily to correct any problems. All pieces except the servos are installed using velcro. Do not use any foam around the receiver, battery pack, or speed controller. This would block or restrict the cooling air flow through the fuselage.

Great Planes recommends breaking in your "Goldfire" motor by running it without the propeller for at least a half hour. They also recommend doing this at a lower voltage. This allows the brushes to seat and provide full power for the first flights. The motor is now installed with a 7 x 6 Grish propeller supplied with the kit. The prop is attached directly to the motor shaft by a small aluminum prop adapter hub included with the kit. If you intend to use a 1-1/2 inch plastic spinner that snaps on, be sure and do one of the following: Assemble the hub, prop, and spinner together before attaching them to the motor shaft, or modify the three spinner snap lugs as mentioned in the plans. Snapping the front section on later without these precautions could bend the output shaft and ruin your motor.

**MOTOR BATTERIES**

Great Planes strongly recommends a good quality 7-cell 1200 mAH battery pack. This will give you maximum flight time. Tom, from Robart Manufacturing, asked me to try an 8-cell 800 mAH pack and monitor the difference. The 800 mAH pack was later tried and although performance was up slightly because of the higher voltage, the flight duration was only 2-1/2 minutes. The 1200 pack offers the best choice all around. The manual was very informative and covered batteries very well. Any other questions were answered by Gary Hamilton, of Taft, California, and the guys at B & F Hobbies here in the Bakersfield area.

**FLYING**

All control surface throws were set according to the manual and proved to be just right. Once trimmed out, the Electro Streak was everything the Great Planes people said it would be. This model is as smooth as any pattern plane I have ever flown. They said it was "highly maneuverable" and they were right again. Snaps rolls, and three-turn spins are effortless. I thought flying four-stroke engines with mufflers was quiet, but this is unbelievable! The only sound you hear is the prop. About 3-1/2 to 4 minutes of flying with the 1200

pack and it's time to land. Be sure and make your approach low and shallow because this is one clean airplane. Keeping the nose slightly elevated will help bleed off airspeed. All surfaces were effective right to the ground.

**SUMMARY**

If you are like me and have never built or flown an electric airplane this is the one for you. Although it is not a beginner's airplane, anyone who has mastered the basics of R/C flying can fly it. Great Planes has made the transition from gas models to electric an enjoyable one.

Good luck and great flying. •

**Seasport** . . . . *Continued from page 21*

strong. Cut out all the ribs required and pin down to the plan the 3/32 balsa leading edge and trailing edge pieces. Add to the plan the cap strips and center section sheeting. Glue on top of this the 1/8 x 1/2 spruce lower front spar and the 1/8 x 1/4 lower rear spar. The ribs can now be glued onto the spars and sheeting. When all the ribs are installed, pull up the leading edge sheeting to meet the contour of the front part of the ribs. Let the assembly dry. Do not glue on the leading edge yet.

Glue on top the 1/8 x 1/2 spruce top forward spar and the 1/8 x 1/4 rear top spar. Now lay on the 3/32 leading edge and the trailing edge sheeting, center section sheeting and cap strips. When all is dry, remove the wing from the plan and sand the front straight. Glue on the 1/2 x 1-inch L.E. Add the tip blocks, build the ailerons as you did the elevator and sand everything to shape. Install the aileron linkage and hardwood float mounts.

There is no dihedral brace. The wing is quite thick and therefore needs only to be butt-glued together with epoxy. Fiberglassing the joint will provide the necessary strength. Once the wing is joined this way, making sure of the 2-inch dihedral under each tip, the engine nacelle can be built.

Start the nacelle by gluing together N-1 and N-2. Cut out the nacelle sides and doublers and glue these together as well. Contact cement works well for this. Glue the firewall to the sides and add N-3. Install some 1/4-inch scrap balsa behind the firewall to allow for carving out the air exit channels. Carve out these channels to allow cooling air to exit from the cowl. Pull the nacelle sides together at the rear and glue on the top blocks. Make the glue joint temporary for the front top block as we will want to make this removable for access to the tank. Sand the nacelle to shape and glue it to the top of the wing with the firewall against the leading edge. Epoxy this well. Install the fuel tank, radial engine mount and fuel lines. Install an aileron bellcrank inside the nacelle to operate the throttle. The cowling was vacuum formed over a pine plug carved by hand. Fiberglass would also make a fine cowl. The cowl is held in place by several #2 screws.

**LANDING GEAR AND FLOATS**

The tip floats are made by hot wire cutting styrofoam blanks and covering them with 1/16 balsa. A hardwood block is imbedded in the top of the float to accept the 5/32 wire mounting struts. The parts for the main gear are bent to shape and are bound and soldered together. The drawing shows the assembly in detail. You purists, however, may not even bother with this step.

**FINISHING**

The model was finished by covering it entirely with Solartex. It was then sprayed with coats of clear butyrate dope to seal the joints and conceal the fabric weave. Follow this with two coats cf color dope and a final coat of clear and you have a fuel proof, waterproof, puncture resistant, good looking finish. Other coverings can be used such as Sig Koverall etc., but it is important to seal them well with dope or similar to prevent edges from coming up and leaks appearing. Do not use Mono-Kote or other films for this reason.

Install your radio and batteries as far forward as possible to prevent tail heaviness.

**FLYING**

Be sure the model balances as shown on the plan; I don't care how much ballast in the nose is required. My plane came out at about 12 lbs. ready to go with about 16 oz. of ballast and a 1200mAH battery pack in the nose. When taking off from water, head into the wind, apply full power and some up elevator to keep the nose up. As soon as the model starts forward, neutralize the elevator and allow the model to build up speed. Use the rudder to keep straight and the ailerons to keep both floats out of

the water. When you're skimming along on the step give a little up and you will gently lift off pretty as can be. The model has good slow speed characteristics and flies on the wing. A good .60 has ample power and a .75 has lots. Flying on land is just like flying any other taildragger.

Flying off the water is a real thrill for me and I know it will be for you if you build the Seasport. •

**Bostonian** . . *Continued from page 53*

this I could find were flashy colored party straws, but that was no problem as they needed to be painted black anyway. Glue these in place on the front of F-4, allowing just enough clearance for the crankcase (nose block) to be removed for stretch winding.

Bend the landing gear from .020 music wire using the pattern shown on the plan. Sandwich the top of this wire between two L-1's and clamp well until the glue dries. Most any wheels will work as long as they are at least 3/4-inch diameter. I used 1/8 x 1-inch Hungerford nylon spoke wheels.

Build the wings and tail surfaces over the plans. Don't forget to angle the inboard wing ribs slightly for dihedral (there should be a half-inch dihedral under each wing tip). Use very light weight C-grain 1/16 balsa sheet for the wing ribs and firm 1/16 square strips for the leading and trailing edges. The tail surfaces should be built from medium 1/16 square balsa stock.

**COVERING**

Mix Elmer's white glue with 50% of water and brush this solution around the framework of the area to be covered by the first piece of tissue. Lay the tissue over this area and gently pat down and carefully remove the wrinkles with moistened fingers. When the glue is dry, trim the excess tissue with a new sharp razor blade. When everything is covered in this manner, it is time to shrink the tissue. Use a spray bottle with an adjustable spray nozzle. Adjust for a fine mist and spray just enough so the tissue will sag a little. Do not saturate. Drying can be hurried with a blow dryer.

Brush on a couple of coats of non-shrink clear dope with 50% thinner added. I used non-shrink nitrate dope from Oldtimer Model Supply. Two coats are plenty for the wings and tail surfaces. Add a third coat to the fuselage.

The red crosses were cut from red tissue and doped over the white tissue of the model. The red lettering on the fuselage is instant lettering rubbed on to clear acetate self-stick laminating material, which was then trimmed to the edge of the lettering and applied to the model. This must be done after the last coat of dope has been applied. The GAC logo below the side windows was drawn on self-stick acetate and applied to the model. The self-stick acetate cannot be moved once it is applied so be careful to position it exactly the first time. The door outlines, vent louvers on the cowl and the movable wing and tail surface outlines were drawn on with a Sharpie pen.

Cut the windows from the thinnest acetate material you can find. Clean all finger marks from the acetate and glue in place with R/C-56 glue used sparingly.

Glue the wings and tail surfaces to the fuselage, making sure that everything is straight and true. The bottom of the inboard wing ribs rest on the 1/16 square balsa wing guides shown on the plans. The wings need half-inch dihedral in each wing tip.

**FLYING**

My Mass General flew right off the building board and is happy flying either right or left, depending on which way I aim the thrust. It is a very stable and docile performer and looks great in the air.

My outdoor flight trimming procedure is to get the plane to glide first, by adjusting the tail surfaces as needed. I like to test the glide of outdoor models by putting in just enough turns in the motor to let the model make a slow gentle descent to the ground. I usually start with about 100 hand winds (use a 12 to 15 inch loop of 3/32 to 1/8 FAI rubber for this model) and launch so the model will leave my hand in a line parallel to the ground. Make sure you do not throw the model upward into a stall. Once a satisfactory glide has been established, I trim the powered portion of the flight with thrust adjustments. Begin powered flights with no more than 200 winds.

Watch each flight carefully and remember exactly what the plane did so you can make the correct flight adjustments. Increase down thrust to correct a power stall. Any tendency to spiral under power to the right or left should be corrected by increasing opposite side thrust. Rudder and elevator were used to establish the proper glide, so if we need to change the tail surfaces to trim powered flight, the glide could be upset and we may need to start all over. When flights are satisfactory, add another 50 turns and fly again. By increasing power in small steps like this, there will be much less chance of damaging your model before you have it properly flight trimmed. •



**Astro 112** . . *Continued from page 44*

adjusting knob. A separate boost switch controls a higher output current range for the largest battery packs. Nominal charging

values for the most commonly used cell sizes are clearly marked on the face panel. Voltage monitoring jacks are provided, making it convenient to connect a digital voltmeter to detect peak charge, and a trickle charge indicator is provided; when the mechanically timed fast charge cycle terminates, a trickle charge circuit automatically takes over. A 20-amp fuse is mounted in the lower right corner of the face panel for overload protection.

So how does it work? In a word, great. I mounted my Model 112 in a custom built field box especially designed for electric flying, with my new charger and the Astro AC/DC Auto Charger I use for smaller systems velcro'd onto the floor of their own compartment, and with their input leads permanently connected to a moderate size automotive battery built right into the box. (This makes it a real attention-getter to carry, but eliminates any question of having enough power for a long flying session with several models, and does away with the need for running back and forth to the car.) I did install heavy-duty switches in the input cords of both chargers, as they would otherwise remain "hot" all the time if left connected directly to the battery. As I think you can see in the photos, a small digital voltmeter is mounted close enough to both chargers to plug into either one easily.

Using the Model 112 Super Charger is super simple. Connect the input power, plug in the output cord to the motor pack, turn the timer to the desired charging interval, and dial in the required current. That's it. The charging current, when using large capacity packs, may vary by 100 to 200 mAH, if at all, when a fully discharged pack begins charging. This is not enough of a drop to cause a problem if ignored, but since the change seems to occur at the start of the cycle, it's an easy matter to watch the meter for a minute or so, adjust if you see the need, and then leave it alone.

As you might guess, my Model 112 is already getting regular workouts. As I write this, it's a warm April afternoon with promise of a good flying season just beginning. Based on the superb quality I have come to expect from the other Astro Flight equipment I'm using, I expect that the constant current Super Charger is going to be at the center of a lot of flying field activity in the coming months. •

**Insiders** . . . . *Continued from page 52*

absolutely irresistible charisma. We hope that all Bostonian sponsors, indoor and out, will adopt the charisma system . . . it is what sets Bostonian apart from pure endurance flying.

Who were the "Top Guns" of Bostonian? USIC winner Richard Miller flew his 7 gram "BlueFin" for over 3 minutes, 24 seconds; with a 1.3 charisma this gave him the highest Bostonian score we have ever seen. Larry Kruse was the expert proxy flier who Dan DeLoach chose for his yellow 14-gram ship. After winning Peanut Scale and AMA Indoor Scale with a pair of canard Santos DuMont 14 bis pushers, Kruse got himself psyched up and won Bostonian for his Dallas buddy. He did not know that a *MB* subscription went to the winner, or he might have tried harder. Seriously, both the proxy and the model had lots of charisma. Our much-admired and long-awaited "BatBostonian," a sinister, all-black craft, with Batman symbols, and a nose mount "Joker Sensor," was not entered in the contest but drew a lot of admiring glances afterwards.

We were set up next to veteran Insider Clarence Mather of the San Diego Orbiteers, so we took time to ask him about his modeling career. He began free flight modeling as a 14-year-old farm boy in Naperville, Illinois. His first model was mail order . . . a dime and an oatmeal box top got him a kit with lotsa sticks. He muddled through these early days, but in 1946-47 began to design his own rubber power canard pusher ships. He started with tip fins on the wing, but these proved unstable. He then went to an underfin on rear of body with great results. His Bostonian "Variant" has no fin at all . . . the entire rear of body, containing the Bostonian box, serves as a fin, with only a tiny nose fin for turn. "BatBostonian" was built on this plan.

Mather's favorite models are his blue Caudron racer and the microfilm F1D model he flew as a U.S.A. Indoor team member in the infamous Rumanian salt mine. Neither of these came to the Nats, but he did have a unique bracing system for his EZB. Since wood bracing is allowed

(unlike F1D where thin wire is the standard bracing) he pulls his wing center panel into slight anhedral with LE and TE struts from the wing post to dihedral break. This puts the wing spars (LE/TE) in compression as the wingtips lift under flight loads. Since balsa is strongest in compression, he can make a very light, yet sturdy wing. He also irons his UltraFilm mylar covering between paper towels, giving it a waffle texture. This was clearly evident on his Intermediate stick, which flew over 27 minutes under the Kibbie Dome roof.

To the AMA for their wisdom, Dick and Melody Doig for their super CD roles (using a lap-top computer for instant score availability and a copy machine at the table for distributing results daily), Bob Stalick for his Indoor Team Finals CD chores, and the 1990 U.S.A. team of Cezar Banks, Larry Calliau and Joe Foster, we dedicate this salute to INSIDERS grand finale of 1989. We hope you enjoy the photos and will be able to see the magnificent Kibbie Dome soon with your own eyes. •

**Big Birds** .. *Continued from page 32*

but this slight drop in output shouldn't bother most sport fliers who aren't trying to tweak every last rev out of an engine.

And there's another plus for this fuel; without nitro it's cheaper and the ingredients are easier to get.

I realize that there are many variables involved here, not the least of which are the type of plug used and the weather. Nino didn't mention anything about either of these factors; however, for what it's worth, I ran my Classic 120 on a rather dry 75 degree sunny day using a Fox Miracle Plug.

I don't have any four-strokers bigger than the 120 (gonna run one of my BIG Tigres on this fuel), so if any of you guys get around to trying this FAI fuel on a BIG twin, please let me know so I can pass the word on.

**BIGGER . . . OR BETTER?**

We always seem to want things to be both bigger and better than before. Our fly-ins are a good example of this. We try to beat last year's event by having more pilots this year . . . and get so wrapped up in this numbers game that we often sacrifice quality for quantity without realizing it.

Having fewer pilots than usual doesn't have to mean that your fly-in's a bust. It can still be as least as good as last years . . . and maybe even better. A case in point was the Puget Sound Rocs (IMAA Chapter #108) Seventh Annual BIG Bird Bash and Tea Social held on July 29 and 30.

We usually average about 55 pilots and 75 aeroplanes at this yearly affair and I know that many of us feel somewhat slighted if less than this number of guests show up on the appointed Saturday morning.

Well, this year we suddenly found ourselves with the worst problem a club could

have: no flying site (after six years we lost our field to encroaching civilization). Fortunately, the Mt. Ranier Radio Control Society came to our rescue and volunteered their flying field for our Fly-In . . . but we still had a few sticky wickets.

Like getting the WORD out to everyone that we would be hosting our annual fly-in and to disregard whatever they'd heard about our Bash being cancelled . . . and how to get to the Mt. Ranier Club field which is way out in the boondocks.

Sooooo . . . we kinda held our breath as dawn came up that Saturday morning, waiting to see who'd be there. At first it looked as though our own club members were gonna be the only people flying . . . but by noon we had 27 registered pilots and 38 aircraft.

I was unhappy about the turnout at first, but I didn't sing the blues for long because what we lacked in numbers we more than made up for in camaraderie and flying. Nobody remained a stranger and for most of the two days we truly were one BIG happy family. This feeling of mutual friendship was so strong that even the spectators got caught up in it.

And to put the frosting on those two beautiful, festive days, nobody crashed or bent their birds. In fact the closest we came to a crash was a WWI type nosing over on roll-out . . . which, I've been told, is actually what happened to many of the real birds on landing.

So, although we ended up with only half the number of pilots that usually attend, we had a GREAT fly-in. Everybody, and I do mean EVERYBODY, had one helluva good time.

Maybe we oughta be less concerned about making our fly-ins "BIGGER" and concentrate on the nitty-gritty details that help make them BETTER.

**PAINT**

When it comes to painting an airplane I sometimes tend to flit around trying different brands and types of paint . . . but all too often I end up sorry that I messed with unpredictable spray cans and didn't stick with a true two-part epoxy paint like K&B Superpoxy or Pettit's Hobbypoxy.

These epoxy paints can be brushed or sprayed, are dust-free in 15 to 20 minutes and can easily be handled in less than 24 hours. And they're TOUGH and DURABLE.

Six years ago I painted "BIG BIRDS FLY BETTER" on the sides of my venerable '73 VW Bus using white Superpoxy paint. Admittedly it wasn't the greatest lettering job in the world, but those six-inch high letters look as bright and white now as they did when I first painted them . . . in spite of the fact that the old V-Dub has been sitting out in our N'West weather these six years with nary a day in a garage (except for a few tuneups).

One warm and balmy day last week I lost control of myself and without realizing what I was doing actually used soap and water on the bus (her second wash in six years) . . . and it was then that I noticed how fantastically well the Superpoxy paint

had endured through 24 changes of season.

Maybe the reason you've never kept a plane long is because you never had a paint job that would last for six years.

**DID YOU HEAR ABOUT . . .**

The three old timer modelers who tried to force their club into building some old 1928 bamboo twin pusher rubber jobs? It was later referred to as the Cane Mutiny.

**CHANGE OF ADDRESS**

Will have moved by the time you read this. We're still in Spanaway so my zip and phone stay the same; only the street number has been changed (to protect the innocent). Al Alman, 1910 154th Street Court South, Spanaway, Washington 98387. (206) 535-1549 •

**Albin Rx** . . . *Continued from page 31*

ing the functions, but also beats the selectivity of two transistors and three tuned circuits of a superheterodyne. True, that there is some drift in the RF, but who says, that a superregen can't be crystal controlled? This crystal would then be at exactly the same frequency as the transmitter. In that case, who cares for receiver radiation, when there is the transmitter nearby radiating over 20,000 times as much on the very same channel? With the exception of the crystal, one coil and three caps, all electronics of a crystal controlled Albin could be in one microchip IC smaller than the black spot in a wristwatch and why not add an RF pre-amp if worries about radiation are all that overwhelming? How about the use of a ceramic resonator or PLL to deal with the intermediate ultrasound frequencies?

While waiting for Silicone Valley to produce a small RC chip operating at reasonably low voltages and currents, think about building an Albin out of discrete components. Transistors did not change much since 1968 and the original design still holds, but I would suggest to increase the impedances of the RF stage and the low pass to better approach 500 Hz resonance. A silicone diode D2 may replace R1 to maintain a low operating potential of Q1, but R1 reduced to 390k will do as well. Some supply current can be saved in the output stages by replacing D1 with a 1k resistor and leaving out R8, but this new circuit will be much slower and in some case too slow for pulse proportional operation. These and other changes are incorporated in the diagram of a more recent Albin. The NPO capacitors are sized for operation on 27MHz bands. L1 in the recent design has two or three more turns to compensate for the smaller C2.

The quality of Q1 significantly affects the range of the receiver, hence a special RF transistor with a good amplification must be selected for this one function, but otherwise cheap general purpose transistors can be used throughout. In one of my photo's you can compare three different units. On top the original M. Albin (4.5 gram) as built from a kit distributed by ACE RC in 1968. Beside it the 7 gram Bentert actuator, which has been distributed at that time by Polk. In the middle is one made by Stefan Gasparin on a thin PC board, weighing three grams and beside it his one gram actuator. The smallest Albin on the bottom is slapped together without PC board. It weighs one and a half grams with its transistors filed and ground down to a smaller size. My actuator beside it also weighs one gram.

The seven-gram Bentert is the smallest actuator ever commercially produced and marketed. It was the first coreless design, a true breakthrough, yet many modelers with obviously more talent for writing than building, instantly decided, that the Bentert was too small and too weak. Hence the much larger and inefficient Adams actuators prevailed. In my second photo you can see a selection of six actuators. The Mattel on the top left weighs 42 grams, the 20 ohm ACE product (top center) pulls four times the current of the Bentert. Disregarding all the published advise, Stefan Gasparin in Slovakia built a one gram Bentert, which ironically has less than 1/10 the power of the one declared "too weak" some 30 years ago. However, with low friction linkages and hinges these minimal forces suffice to control $CO_2$ powered scale models spanning from 13 to 22 inches.

My small actuators are similar, with the difference, that Stefan's look better. The drawing shows how mine are made. The coil is wound of #40 AWG wire on a temporary aluminum core. My winding "apparatus" consists of a 1:6 rubber winder held in a vise. To make the photo, I used a six times larger wire and a 150 watt spotlight for visibility. You can't buy small quantities of #40 wire. Try to recover some from junked relays; mine comes from the coil of a 120-volt electro-mechanical alarm clock priced $4.50 at K-Mart. Lining things up takes time, but then the 400 turns can be put on in about 60 seconds! Before removing the coil from the core, I connect the terminal plate and spot the coil-sides with epoxy. The main ceramic magnet is chipped and slowly water-ground out of a large one sold by Radio Shack. The shaft consists of a 0.020" music wire. It has a brass washer and is bent at the bottom where it is squarely cemented into the groove of the magnet. Use epoxy throughout, other cements don't stand the heat when soldering. You may guess the rest of the assemblage from the drawing. A small magnet chip holds the rotor in the idle position.

The actuator torque is extremely low because of its small size. So, if you think

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building a one gram actuator wasn't easy, wait 'til you start working on the delicate linkage and rudder hinges! The suggested actuator draws about 75mA at a 3-volt supply. Silver, mercury and lithium cells have high internal resistances, their potential will drop sharply at that load. But a set of two 186 alkaline button cells (Radio Shack) weighing three grams can handle 75mA nicely, for how long depends on you. The duration of a battery can be extended when controlling the model in the manual single pulse mode. That is the most relaxing and simplest of all the control methods, a true Free Flight Assist mode, because the model circles in free flight most of the time, only once in a while, when deemed necessary by the flyer, the model can be kicked in the opposite direction by brief pulses.

The Free Flight Assist (FFA?) mode works like this: At idle, the Albin receives the unmodulated carrier RF wave from the transmitter. Actuator jitters stop, because smooth RF covers up fainter disturbing signals or statics. The model is carefully trimmed to fly in wide circles to the left with the actuator off. After circling downwind for a while the pilot might decide to fly the model back. He pushes a button at the transmitter to start a sound oscillator which disrupts the carrier RF 500 times per second. This amplitude modulated carrier enters the receiver antenna and causes a frequency modulation in the intermediate ultrasound frequency generated by Q1. Q2 discriminates frequencies and sends negative spikes to Q3 . . . in other words: You push the button and the model makes a sharp right. A seasoned free flighter supposedly could make this right turn steep enough to prevent an imminent stall or even spiral the model out of a thermal, but don't look at me, my experience with FF is limited. I prefer light and therefore slow duration models spanning up to 30 inches. That gives me time to observe, enjoy and learn. My models are trimmed to fly about straight, when turning the actuator ON for one second with 2 seconds OFF times in between. I didn't lose a model yet . . . think about it!

Not enough details are given here to make this a construction article. Send comments to: Fritz Mueller, 4117 Searcy St., Columbus, Georgia 31907. If enough interest is shown, I could follow up with "How to"-sequels, like switch your transmitter to FFA modulation, build Albins, build actuators, install the system and fly with $CO_2$. •

**Hannan** . . . . *Continued from page 49*

Andressen; *Nose Lifting Canard Soarers,* by Hans Gremmer; *History of the Jordan-Traveler Junior Aviation League,* by Hewitt Phillips, and more. One article, entitled *Rediscovery,* by Kenneth Sturgeon, is especially touching for anyone who has returned to model building after a long time away.

Also presented are the 10 Models of the Year (such as Don Srull's incredible, electric-powered free flight Dornier DO-X), and inauguration of the new NFFS Hall of Fame members. Providing the chuckles is a gallery of 16 cartoons by Dr. Will Nakashima, and Bill Noonan furnished a full-page action drawing.

The NFFS Symposium Report is a kind of miracle itself, being produced by volunteers as a labor-of-love. Certainly George Xenakis, John Oldenkamp, Jan Jacobs, and the rest of the contributors, did an outstanding job.

Copies of this softbound 110-page book are available for $14 to NFFS members and $16 to non-members, plus $2 postage by surface mail to anywhere in the world. For air mail charges please write. Order from Fred Terzian, 4858 Moorpark Ave., San Jose, California 95129.

**UNSOLICITED TESTIMONIAL**

Jane Schlosburg, of Arizona, recently completed an *Embryo Twin* designed by Dick Howard. Dick's reaction to Jane's effort? "The model is beautiful, and it flies like I wish mine did!"

**SO NOW IT IS AUTHENTIC**

For years scale modelers have been resorting to clear plastic trim tabs to help their models fly. Clear material was used, of course, to make the deviations less visible. No need to feel guilty about them now, since, according to Frank Scott, at least one *full-size* ultralightplane he saw at the Florida "Sun 'N Fun" air show featured a clear plastic trim tab. . . .

**PROXY-PLANES INSTEAD OF POLITICS**

Georges Chaulet, of France, commenting upon the increasing enthusiasm for proxy-flown model aircraft contests: "The mixing of the nations in a model built Here and sent There, from plans drawn Over There, show that we live on a very small planet! Or that mail services, after all, don't work so badly . . . It is a good thing that people from so many different countries are in harmony on a common subject. A pity they go on spending money to build armies."

**MODELS IN THE MEDIA**

Our hobby continues to gain publicity in publications other than our own specialty magazines. Gustave Nepper, of Ohio, sent in an article from *The Cincinnati Post Neighbors* newspaper, written by staff reporter Al Andry, from which we have taken the following: "Once powered by rubber bands bought at the corner store for nickels, the highly sophisticated mini airplanes cost the average modeler $600 to

$700 a year." And, "In the United States, an estimated 1-1/2 to 2 million people participate in the hobby." Further, quoting the Radio Control Hobby Trade Association, the article states that retail sales exceed $1.1 billion! However, as model builder Bill Wyrick put it, "It's not a rich man's sport. They may have bigger and better planes, but that doesn't mean they have any more fun."

We also enjoyed this comment, attributed to Dave Brown: "The single most important thing in model aviation is this: on the flying field, everybody is created equal."

**STARTING OVER**

A high proportion of our mail is from people who are returning to model building after a long absence. However, a recently received letter from Ed Bush, of New York, was unusually inspiring. We have taken the liberty of extracting a few passages to share with you: "Last Saturday I realized I could ignore it no longer. I wanted to make something. It didn't matter what so long as it was tangible and three-dimensional. In short, I needed to putter, an activity I had not done for quite awhile, and clearly missed. I guess the need to putter is something you can only try to ignore. Ultimately, you have to satisfy it.

"For the first time in a long time, I had to think up something to putter with. I couldn't spin off something from work anymore. Several years back I made holograms for a living and got my 'puttering fix' in the course of fiddling with lasers and optics. But these days I work on Wall Street crunching numbers at a PC all day, an activity with a very low putter factor.

"For a while I puttered around building and modifying my bicycle. Now it's finished and I don't need another one. No one in their right mind keeps a car in Manhattan, so I can't putter around with that. There aren't too many more home improvements I can make in an apartment. I finally decided to take the easy way out. I would build a model of something."

A visit to a hobby shop proved somewhat disappointing to Ed, since it seemed to be quite different than his memory of it from some years ago: "The store is filled with ready, or almost ready-to-fly, or drive, or sail 'kits' for a hundred bucks or more. 'Be ready to fly, or drive, or sail, in only a few hours as long as you drop another $200 to $300 on a remote control,' seems to be the motto. That isn't for me. High price. Low putter factor."

As for the bewildering array of plastic static scale kits, Ed opined: ". . . they require more puttering time. But they look too slick somehow. They don't seem to call for much skill, and when you're finished they just sit there. I realized that not only did I want to putter at something that was tangible and three-dimensional, it also had to be kinetic like a bicycle or the image in a hologram."

Preparing to exit the hobby shop, Ed spied a dusty pile of boxes against the wall. On the ends were familiar names, such as Curtiss Jenny, Vought Corsair, Lysander, Mosquito, and Nieuport: "Some were large boxes, others were small," Hmm. I pulled out a medium-sized box. 'Rubber Band Powered, Built with Balsa.' How quaint. I was intrigued. Compared with all the high-tech hardware nearby, these kits were appealing for their sheer humility if nothing else. They met my requirements for putter time, skill, dexterity, and kinetics. Besides, they ranged in price from $5 to $25. So I took a $12 kit for the Corsair to the counter." (TO BE CONTINUED NEXT MONTH.)

**SIGN-OFF TIME**

Herb Weiss says he recalls some anonymous advice to the effect that when one chooses a hobby, one should ride it furiously with might and main until one is tired of it, and then go on to another.

A. Edward Newton, however, draws this conclusion, "Young man get a hobby; preferably get two, one for indoors and one for out. . . ." •



**ARFs** . . . . . *Continued from page 15*

which powers the electric motor, and the motor is stopped automatically when there is just sufficient current remaining to operate the receiver long enough to land the model. The beauty of all this is that an entire battery pack for the receiver is eliminated, with a significant saving in weight. Now that all equipment was completely installed, the model was weighed and the result was found to be 43 ounces, well within the top limit of 46 ounces.

When flight test day arrived, my evalua-

tion team assembled at our local dirt field, happy to find that a light breeze was blowing more or less directly down the runway, and the sun was shining brightly. For the first flight Jim Shaver was designated as ground crew, Bill Hicswa was to handle the piloting chores, and I was ready with my trusty camera. Bill performed a range check while I took a few static shots of the model on the tarmac. At no time did we ever consider an R.O.G. takeoff because the wheels appeared much too small for such an undertaking on an uneven dirt field. When all seemed to be in order, I gave the signal and the team swung into action. Jim raised the plane in preparation for hand launching, Bill used his transmitter to switch on the motor, and the little folding propeller began to hum powerfully. Jim expertly heaved the model forward ("threw it out," according to the instructions), and the Aero Sprint climbed briskly skyward, leveling off at about 300 feet in less than a minute.

Aside from a few basic loops, this model is obviously not designed for aerobatics, as it prefers to fly on a straight and true course, automatically righting itself whenever allowed to do so. After all, this natural stability is the typical attitude of a high-winged model with a flat-bottom lifting airfoil. Nevertheless, it displayed an amazing degree of stability for such a small airplane, and when it was finally brought in for its first landing, we decided that it was completely stall-proof. No matter how much elevator was applied, and no matter how slowly the Aero Sprint was moving, at no time did it ever exhibit a stall. Considering that the wing loading came out to be a little less than 14 ounces per square foot, it really wasn't surprising that the performance was so lively. After all, most sport planes fly very well at wing loadings a good deal higher. Total motor running time came to less than five minutes on the 6-cell battery pack, retaining sufficient residual battery charge to power the receiver and two servos. The total flying time varies a great deal, but depending on the pilot's judicious use of his motor, available lift, etc., flights of eight to ten minutes would probably be about average.

Our setup did not employ an electric brake for the motor, and this prevented the prop from folding at the end of each power run. If it is desired that the folding mechanism be operative, it is necessary to utilize an on/off switch with a braking feature. Just such a unit is available quite inexpensively from High Sky RC Accessories of San Diego (refer to this column in *Model Builder*, June '89 for more info on this product).

Parma has been successful in its endeavor to present the R/C flier with a small, handy electric-powered model which can be flown from small fields. In doing so, they have produced a very sturdy little airplane which is constructed primarily of balsa and ply in the time-tested traditional manner, retaining at the same time completely stable and dependable flight characteristics. The Aero Sprint is highly recommended for those who are interested in relaxed, spur-of-the-moment electric flying. For further information, contact Parma International Inc., 13927 Progress Parkway, North Royalton, Ohio 44133.

**GLOW POWERING THE AERO SPRINT**

For some time there has been reposing among my engines a new Cox powerplant called the "Queen Bee .074." This little engine has an R/C type throttled carburetor and a jaunty looking muffler. I've been looking for a likely model to power with this promising little engine, and when flight testing the Aero Sprint with electric power, I realized that this would be an excellent test bed for the Cox. The model is ruggedly constructed and I felt that the extra vibration of a two-cycle engine would cause no problems. After all, elimination of the battery pack alone should radically improve

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the performance, so the Queen Bee was mounted on the firewall using a small Hayes nylon engine mount. As the electric motor weighed 3.25 ounces more than the Cox, the engine was mounted as far forward on the mount as possible in order to keep the C.G. unchanged. However, this was not enough to make up for the loss of nose weight, so an additional two ounces of lead had to be added in the engine mount area. Sure, we saved the considerable weight of the six-cell battery pack, but we did have to substitute a receiver battery pack, an additional servo, a one-ounce fuel tank, plus the aforementioned two ounces of ballast in the nose. All this didn't produce the super-light Aero Sprint that we envisioned, because the final configuration weighed 37 ounces dry, for a total savings of six ounces. Wing loading now came to about twelve ounces per square foot, down two ounces per square foot. Well, we thought at least the glide might be improved.

Just before flight testing, the engine was test run on the ground, and it was determined that best performance was with the recommended Cox 6 x 3P propeller. Throttle response was impressively prompt and reliable, and the noise level was pleasantly lower than the customary scream of such a small engine. For fuel we used a commercial 40% nitro mix I had hanging around for a couple of years, and I estimated that the nitro content had probably decreased to 25 or 30% from just standing around. Anyway, the Queen Bee seemed happy with this fuel mix, so we filled the tank and started her up. As it was mid-afternoon, the wind had picked up quite a bit and was coming straight down the runway, so once again Bill handled the controls while I did the hand launching. With only the gentlest heave the Aero Sprint rose right out of my hand, climbing nicely at about the same rate or slightly slower than it did under electric power. This trend showed through the entire flight and all ensuing flights. No matter what maneuver we attempted, there was virtually no difference in performance between electric and glow power. Surprisingly, we ran out of fuel in only 3-1/2 minutes, so the Aero Sprint was set up for a dead stick landing. Here we found the glide was excellent and the stability was outstanding, with still no stalling tendencies. As a matter of fact, the fine performance was just what we had experienced with electric power, so I just have to draw the conclusion that our glow power conversion did not offer any significant advantages. On the contrary, we actually lost out on the deal, as we now no longer had a noiseless model, were required to carry a fuel supply and a booster battery, and worst of all, we were stuck with a messy clean up job after flying.

It was never intended that this month's column contain an engine review of the Cox .074 Queen Bee, so I will only say that I found it to be dependable and powerful. The throttle feature operated flawlessly, and the idle was superb. In addition, a standard short non-idle bar glow plug is used in place of the more expensive Cox glowhead. However, one nagging little doubt did remain, that of possibly high fuel consumption. A quick call to Cox disclosed that I had made the mistake of using a fuel containing a synthetic lubricant. Cox maintains that if castor oil is not used, the result is a shellac-like deposit on the piston and cylinder wall, even after only one engine run. The varnish was easily removed with #0000 steel wool, and the engine was then tested on Cox Super Power fuel. On full throttle the Queen Bee now ran over six minutes on an ounce, and with normal throttling back during the course of a flight it easily exceeded nine minutes. It is not necessary to use Cox fuel exclusively, just use a quality fuel containing a high grade of castor oil lubrication and 20 to 30% nitro. I'm now very happy with this little marvel, and look forward with great anticipation to using it again in future projects.

As for the Aero Sprint, it once again came through with flying colors, proving itself to be an easy-to-handle sport model. Even though glow engine performance was on a par with electric power, after considering all the pros and cons, I find myself leaning toward flying the model in its original electric powered configuration.

Art Steinberg, 2267 Alta Vista Drive, Vista, California 92084, telephone (619) 726-6636. •

**Engines** ... *Continued from page 27*

during break-in at the top and bottom rod sockets, between the piston and cylinder (even in the ball bearings!), along the wrist pin and the crankshaft too, there are abnormally high temperatures, and castor oil provides the maximum lubrication as well as absorbing heat and carrying it out the exhaust stack too. Some of the major European fuel blenders use only a total of 10 percent oil in their fuel. But of that minor amount they specify in print that one fifth of the total oil is high quality, first pressing castor oil! Some of the popular Klotz oils also contain castor.

Most cold starts required only four chokes and one flip during testing. The piston/cylinder fit on this engine was superb . . . and this precision seal is what gives the compression of the fuel required for easy starting. All starts were made with the throttle opened just above idle speed. As the engine got into higher speed it was exhibiting more vibration than I was comfortable with . . . much more than on my Fox DELUX that's flown regularly. The spinner was suspect. This engine also came with a regular prop driver . . . off came the spinner and its backplate and on went the prop driver and away went the excessive vibration problems. Be prepared to spend some tedious and careful time with a High Point balancer before you use the shiny spinner.

For actual testing after break-in we used the same props from our Fox April 1988 test . . . and bought a gallon of Red Max 10% nitro fuel to which one ounce (protection) of castor oil was added. At this time the idle was carefully set with both barrel rotation and idle needle adjustments.

The Australian model press has made mention of my work on the ratios of high speed to reliable idle speeds . . . they're calling it something like the "Richmond Ratios" . . . and I'm totally flattered. Simply stated, an engine with poor or low ratios of high speed to idle speed should be passed over in favor of an engine with higher ratios for the sport and competition flyer . . . except in all-out speed cases. Unless an engine idles superbly (and reliably) you *cannot* make slow and easy landings or touch-and-go approaches. If your engine idles *slower* than the model's flying speed, the prop and engine serve as an air brake to safely slow the model as the prop is air-driven against the engine's compression. It's parallel to shifting into 2nd gear as your automobile comes to a red light in traffic. The engine's compression resistance helps slow the car. A stopped or stalled model engine with a non-turning prop is parallel to shifting your car into neutral and using only your footbrake to stop your car. I think we've all felt sorry for the R/C beginner trying to land with his engine idling at 3,000 rpm or so!

There are special points of interest in this month's Fox .40 R/C engine. A .0005 inch oversize piston and rod assembly is available if you wear out the original. The supplied tilt-down silencer can be no-charge exchanged at the factory for a #90246 tilt-up one . . . the tilt-up style fits all my models (and the test stand) best. Parts are readily available at the factory . . . call (501) 646-1656, and have your charge card number handy.

This engine's exhaust timing measured 153 degrees . . . enough to respond very well to running on a tuned muffled pipe. The smaller size .40s only measure 145 degrees. This is a much sturdier and stronger engine due to the bigger framed crankcase and the larger crankshaft, and it should stand up well to the higher pressures of running on a pipe. This engine's carburetor throat measures .325 inches in diameter . . . same as on the Fox .45 and .50. The smaller Fox STANDARD and DELUX measures .285. The connecting rod is the same as the bigger .45s and .50s . . . it's sturdy. This engine's muffler outlet is .375 inches ID . . . the Fox STANDARD and DELUX measure .350. A machined aluminum head button sitting on a soft aluminum .010 inch thick head gasket forms the top of the combustion chamber when mated to the cylinder.

This engine is a .40 built into the case of a .50 . . . as you would expect, the cylinder wall is *extra* thick at .080 inch and weighs 43 grams . . . 28 grams = one ounce. The reciprocating weight of the piston and rod assembly totals 18-1/2 grams. As this is a .40 that uses a .50's crankshaft (AND THE 50's STROKE TOO) the bore is a smallish .800 inches . . . in effect, THIS ENGINE IS AN EXTRA RUGGED *LONG STROKE* sport .40. It shows best speed ratios (Richmond

ratios?) with a 10-6 prop and, as one would expect of a long stroke configuration, it long-stroke turned the 11x6 and 11x7-1/2 *very* comfortably at speed ratios above 6:1 . . . TRULY SUPERB PERFORMANCE!

**CAUTIONS**

There's a paper gasket between the crankcase and its rear cover. A new gasket compresses with time and you should gently re-snug the cover's six bolts before running the engine and before installing it in a model after break-in. Same applies to the two bolts that hold the carburetor assembly. A drop of GOO cement will nicely retain the bolts after tightening.

While visiting the North Dallas (Texas) R/C club recently I saw a Fox .50 giving its owner troubles. As soon as the engine warmed up it quit . . . the rear cover was loose and one of the six bolts was already missing! I suggest you don't use the spinner unless (like propellers) you balance it first. Test fit the spinner cone to the backplate until you get the best balance, then slowly grind away metal from the *backside* of the backplate on the heavy side and retest . . . until you get it just right. Be sure to put a light file mark across the edge of the backplate and extending into the outer edge of the spinner so you can properly align them each time you change your prop, to maintain balance.

**PAST AND PRESENT**

If you've been reluctant to buy a new Fox engine because you remember the questionable Fox R/C carburetors of years past . . . *those days are over!* I assure you the indicated speed ratio figures are possible and attained only through modern and excellent design and manufacture . . . and that there are other manufacturers who most probably wish their speed ratios were as good.

**MEASURED PERFORMANCE**

Readings are after break-in, with black Master Airscrew propellers, and using 10% nitro Red Max fuel with one ounce of castor oil added for new engine protection. The optional tilt-up muffler is installed except as noted.

The original Miracle Plug failed the first time we encountered the spinner-induced vibration mentioned earlier. With the vibration problem solved, the second Miracle Plug looks like new after the testing concluded.

The Fox #24197 QUICKEE SPORT R/C .40 engine is made in America by Fox Manufacturing Company, 5305 Towson Avenue, Fort Smith, Arkansas 72901. Retail price is $129.95. A small initial batch of these engines got out with rear ball bearings that somebody sold to Fox Manufacturing that are of inferior quality. They rust and cause the engine to fail. Please be assured that Fox Manufacturing speedily repairs these engines without charge . . . and is sorry for the inconvenience these few engines may cause modelers. •



**Free Flight** . *Continued from page 47*

have a bit of left turn built in, and the stab should be tilted with the left side higher (viewed from the rear). After you have checked the center of gravity at 85%, you are ready for test gliding. Hand glide it into the proverbial tall grass on a wind-free day. It should show a left glide tendency. If not, shim in more left stab tilt until it does. When satisfied, start the engine and try some short test flights. The model should climb to the right. Use thrust offsets to get the power pattern where you want it. Some slight increase or decrease in the incidence angles may be necessary to finish the trimming.

Well, there you have it. The prototype Texan 1952. A bonafide Nostalgia model that should perform well in the Nostalgia contests. It's easy to build and trim, and you should try one for yourself. If you are interested in a full sized version of this plan, contact Bob Larsh at 45 S. Whitcomb Ave., Indianapolis, IN 46241. Bob didn't indicate a price, but I would guess that $5.00 would do the trick. However, in the time that it takes to get the full sized version, you could have drawn up one from this three-view and have it ready for covering. Well, what's keeping you?

**DARNED GOOD AIRFOIL—Bo 560-26**

From the pages of "Scatter," the newsletter of the Southern California Aero Team, comes this sleek looking airfoil section. I believe that this is one of a series designed by Bill Bogart. The section has a couple of unusual features including the location of the maximum camber line at 60%. The trailing edge of this airfoil is very thin and would pose some structural challenges unless the now-common aluminum

sheet wing surfaces are employed. As with many of the very thin sections used on F1C designs, this one has an upswept leading edge entry point (Phillips Entry), and is built for high speed climbs.

I am unaware of anyone who is using this exact section at the present time, but it is very similar to those in use today. Consequently, it would be a starting point for anyone who is considering F1C airfoils for experimentation purposes.

**MYSTERY MODEL FOR OCTOBER**

This ship is a true Nostalgia eligible design. It was published in one of the American model magazines in 1953 and subsequently appeared in one of the Aeromodeller Annuals. One of the selling points of this ship is that it is built completely of 1/16 sheet balsa. It was powered by a Cub .049 but could have been fitted with any of the popular 1/2A engines of the time. At 32-inch wingspan, it was at a size that was common for that time.

If you know the name of this design, please drop a letter or card to Bill Northrop c/o *Model Builder* Magazine ASAP. Who knows, you might be the first in line with the correct answer. If so, you would find yourself receiving a free one-year subscription to *Model Builder* magazine. One heck of deal, I think!

**NOSTALGIA AT THE 1989 NATIONALS**

I will cover the regular Nats free flight events in the next issue of *Model Builder*, but I thought that since this is the Nostalgia issue, you might like to know of the Nats Nostalgia event. For those who weren't at the 1989 Nationals, the free flight events were flown on a very large field that was covered with a dry thin grass known locally as cheat grass. The field also had some rather thick patches of sage growing here and there. Generally, the field size and terrain lived up to its description. Unfortunately, so did the predicted winds. On all but two days, the winds were blowing for the majority of the contest at speeds in the 14-20 mph range. As a consequence, the field was minimally large enough to accommodate a Cat. II contest, so all AMA events were flown Cat. III.

One of the two good flying days was Tuesday, July 18 . . . the day that the Willamette Modelers Club along with the National Free Flight Society had scheduled the Nostalgia unofficial events. It was a day with temperatures in the 90s, but with winds that were in the 4-8 mph range. The AMA contestants determined that Cat III was going to be flown this day as well, and the Nostalgia event followed suit. In all, 25 event entries were registered in Nostalgia, with 1/2A leading the way at 12 entries. Thermals were abundant for most of the day, and it seemed as though the winners would be determined during the flyoff rounds. However, when the contest finally ended at 4 p.m., all flyoff flights had been completed and the winners had emerged.

In 1/2A Nostalgia, the top five placing fliers and their models were:

First: Bruce Augustus, 480 seconds, T-Bird, Holland Hornet

Second: John Crosetto, 408 seconds,

Pogo, Cox .049 Reed
Third: Bruce Kimball, 360 seconds, Ramrod, Cox .049 Reed
Fourth: Chuck Gode, 327 seconds, Spacer, Holland Hornet
Fifth: George Moul, 291 seconds, Ramrod, Thermal Hopper

In Class A Nostalgia, six fliers entered, and all recorded official flights. In this instance, no flyoff flights were needed. The top five contestants were:

First: Greg Davis, 575 seconds, Civy Boy, Torpedo .19
Second: Dick Williamson, 348 seconds, Swiss Miss, Torpedo .19
Third: John Bortnak, 334 seconds, Y-Bar, Torpedo .09
Fourth: Jerry Rocha, 323 seconds, Calypso, O.S. Pet .09
Fifth: Mark Sexton, 290 seconds, Top Banana, Holland Wasp

In B Nostalgia, five fliers entered, but only four recorded official flights. A flyoff between Greg Davis and Larry Heagren was needed to determine the winner, but Larry suffered a timer disintegration on his flyoff flight and could only register an attempt. Since flyoff rules do not permit more than one attempt, Larry had to settle for second place behind Greg. The winners:

First: Greg Davis, 480 seconds, Blue Flame, Torpedo .29
Second: Larry Heagren, 360 seconds, Top Banana 600, Veco .29
Third: Chuck Gode, 352 seconds, A/B Spacer, Torpedo .29
Fourth: Dick Williamson, 331 seconds, Ramrod 600, McCoy .29

In C/D Nostalgia combined, only one flier entered, and he did not put in any official flights, so the trophies went begging. Speaking of trophies, these were wall plaques that were hand painted by Shirley Gode of the Willamette Modelers Club. The Spirit of Nostalgia High Point award was also presented to the flier who had beaten the largest number of contestants. Since a tie existed between Greg Davis and Bruce Augustus for this honor, the tie breaker of high total time was used and the award went to Greg.

In all, the Nostalgia event was a success even though the amount of pre-meet publicity was limited. Fortunately, it was flown on a day that was suitable for competitive flying, and those who entered seemed to really enjoy themselves. The folks who came to the meet just to take pictures, found a wealth of old style free flight models to snap. My two personal favorites were Mike Slessor's 1947 Zeek powered by a Cox .049 R.V. and Jerry Rocha's Calypso, an early British rear fin ship, powered by an O.S. Pet.

From my point of view, the Nostalgia event should become a regular feature of the Nationals Unofficial event schedule.

**THE 1989 NFFS SYMPOSIUM REPORT IS OUT**

If you are a collector of the National Free Flight Society's Symposium Reports, you should know that the 1989 version is now available. It is report number 22. This year, the symposium was held in conjunction with the U.S. Outdoor Championships in Lawrenceville, Illinois, so it became available to the public in late June. Many features abound in this issue, including: Spiral Stability, Radio Direction Finding for Free Flights, Free Flight in China, plus nine other articles as well as the ten models of the year and the NFFS Hall of Fame. This year's issue is bountiful and contains useful information for both the free flight experimenter as well as the grizzled practitioner. You can have yours for only $14.00 plus $2.00 postage if you are an NFFS member or $16.00 plus postage if you are not a member. Order from Fred Terzian, 4858 Moorpark Ave., San Jose, CA 95129.

If you are not a member and would like to be, you can join. The memberships are $15.00 per year and include 10 issues of Free Flight Digest each year. Membership applications should be sent to NFFS, 6146 East Cactus Wren Rd., Scottsdale, AZ 85253.

**ON-THE-FIELD THRUST ADJUSTMENTS MADE EASY**

Elsewhere in this column you will find a sketch of an on the field thrust adjustment system that Al Grell and I have been using for better than two decades. I thought it was old stuff that everyone knew about, but at a recent test session, Ross Thompson noted me slipping one of these cut washers behind an engine mount and commented, "Why didn't I think of that?"

Well, here's the scoop: One of the biggest hassles about making engine thrust

adjustments on the field is the need to remove the engine or the engine mount so that a regular washer can be slipped over the mounting screw and the whole works can be bolted back together. The secret is to take a few flat washers, and using a pair of sidecutters nip a pie shaped section from each one. The secret is to nip out a section just large enough so that the cut washer barely slips over the bolt. Toss the cut washers into your flight box to use at the field just in case you need some minor thrust adjustments on the site.

Using this method, the engine mount only needs to be loosened enough so that the cut washer can be slipped over the bolt behind the mount. Removal of unwanted washers can be accommodated similarly. As I said earlier, I thought this was a commonly used free flight trick. Guess not! Now, it should be.

**FIFTY YEARS OF NATIONALS COMPETITION**

Sal Taibi, the grand gentleman of free flight, just completed his 50th year of Nats competition at the 1989 Tri-Cities Nationals. Sal's accomplishment is even more amazing when you realize that he is still very active and competitive in the hobby. Sal won D gas this year flying a Starduster 900 to perfection. And this year was no different from prior years in which he has won trophy after trophy in Nats competition. Sal is one of the very few active modelers whose designs can be flown successfully in Old Timer, Nostalgia, and contemporary AMA gas events, and I believe very few of us who fly free flight did not at one time or another owe our inspiration to Sal Taibi . . . I know I do.

So, as I attempt to whet your appetite for a run down of the 1989 Nationals in the next issue of *Model Builder* Free Flight, give a kind and welcome warm thought to one of the true pioneers of free flight . . . Sal Taibi.

**THAT'S IT DEPARTMENT**

Well, that about wraps it up for this month. Next month, as announced earlier, I'll share with you a report of the 1989 Nats along with my usual opinions and some pix of the competitors. Come along for the ride, and in the meantime, catch a thermal for me. •

**Electronics** . *Continued from page 11*

you can come up with the proper information. It is a letter from Bud Gewinner of St. Louis, Missouri, who writes:

"I like to build my own electronic equipment that I need for electric powered flight. I have built my own fast charger using transistor controlled current and an expanded scale voltmeter to be able to charge to the point of voltage drop off.

"But I now have a problem. I am going to set up a new plane that will use a Cobalt 15 motor that requires 14 cells. I don't know how to step up my 12V field battery to the 24 to 30 volts that is required to charge 14 cells. I know Astro Flight makes a charger that will do this, but I would prefer building one myself. Do you know of a schematic that shows how this is done?

"A second question I have is whether

you have a schematic that shows how to cut off a charger automatically when the voltage drop-off shows full charge. With my present charger I have to be present to watch the voltage."

This brings up another frustrating point about those foreign magazines I mentioned earlier . . . the fact that sometimes you run into an article you can understand completely, but are still unable to duplicate the subject item because of an inability to cross reference components which are identified only by a foreign brand. I have only seen one schematic for a charger of the type that Bud inquires about, it having appeared in the "Ampere Flyer," a newsletter published by an European electric flier's group. I have a copy of the article, which includes a schematic and printed circuit board layout. But it also includes a real bottleneck: it requires a toroid transformer identified only as 28 turns of 1.6mm wire on a core completely unknown and so far impossible for me to reference. As a matter of fact, the reason I have this material is because a Canadian reader sent it in, specifically to ask for help in identifying the transformer core.

The article in question appeared in the June 1985 issue of "Ampere Flyer," and was credited to a Frank Bremer and Ton Thielen. Possibly one of our European readers can come up with more information about either the design or one of these two gentlemen. But don't hesitate just because you might not be in Europe, should you have any experience with this or similar chargers, please share your information with Bud. I'm also sure that many others out there can use it and would appreciate it.

For background, it must be remembered that to charge a battery, any battery, the charging voltage must be greater than the peak voltage of the charged battery, and that the higher the charge voltage, the greater the charge current. When charging from a 12-volt battery, we are limited to charging batteries of seven cells or less. What's the big deal you say? Why not feed the 12 volts to a transformer and build it up to whatever is required? Well, the big deal is that a transformer is an AC (Alternating Current) device, and will not work on the DC supplied by a battery. There are any number of ways to convert DC to AC, most of them being too inefficient to even consider, especially at the current levels that we are interested in.

The most desired way, and actually about the only way it is now done for all such applications, most of which don't involved R/C equipment at all, is to use transistor oscillators feeding a step-up transformer of the proper design. Actually, the output of the transistors is not a true AC, but more of a pulsating DC, which will provide the desired results with a transformer of the proper design. The whole thing is rather critical, as the transformer design, transistors, and all related circuitry, have to be just right so that oscillation will start and be maintained at the correct frequency. All of which does nothing to help revive Bud's dead NiCds, and we are both asking for your help.

I'm not much help with the second part of Bud's question either, except that the Ampere Flyer charger also includes automatic charge shutoff circuitry, but without having built or even breadboarded one of these chargers, it is difficult to isolate one part of the circuit from another. Again . . . SOS! Any information is appreciated and you will be credited as the generous donor. Well, it isn't just ANYBODY that gets his name mentioned here in EC!

**BEC's AND SENSING CIRCUITS**

Voltage sensing circuits such as those just mentioned are not uncommon in electronic equipment, but there are many different kinds. The type referred to above is intended to react to a voltage peak lasting only milliseconds, and can be quite critical to design and calibrate. Such circuits are generally found only in NiCd battery chargers. A less critical type, designed to operate at a given voltage level, such as used for wet or gelled electrolyte battery charging, is much more common, electronically simpler, and easier to adjust. For electric powered R/C use, we are seeing another voltage sensing circuit which is being confused with another electric flight accessory, the BEC (Battery Eliminator Circuit). There is enough confusion in R/C, let's see if we can head this one off at the pass!

First, the BEC, which is just another name for the common voltage regulator. It is intended to reduce the high main battery voltage in an electric powered model to the nominal five volts required to power the receiver and servos, and to maintain that voltage at the design level under the varying load conditions imposed by moving servos. That is ALL that the basic BEC does . . . it does not cut off power to the motor at a predetermined level as seems to have become generally accepted and/or expected by many electric fliers. Such a feature requires additional circuitry . . . of the voltage sensing type.

Let's take a closer look at a BEC circuit. First, there is an IC (Integrated Circuit) voltage regulator, of the type probably made by the millions as they are found in just about every consumer and commercial electronic device more complex than a flashlight. Though they might look more like a MOSFET to the average R/C'er who has learned to identify them from his experience with electronic speed controls, they are a completely different breed of cat. The physical shape is an electronic industry standard, called a TO-220, and within it can be found a large number of quite different electronic devices. The TO-220 voltage regulator is designed for an output of the most commonly used voltages, and nothing can be easier to use. It has only three terminals: an input, an output, and a common negative. Of primary interest to us is the five-volt regulator, found with such numbers as 7805, LM340-5, etc., depending on the manufacturer. They will all safely handle up to one amp of current, which is more than ample for any R/C system in normal operation. The diagram shown includes a full size drawing of this regulator, as well as the proper connections. Note again that all it takes is three connections; the capacitors shown are for RF noise reduction as the unit is turned on and off.

Also shown is another type of BEC, of a type called a series pass regulator. This one uses a couple of transistors; a small one driving a larger one capable of handling the required current, and a Zener diode to establish the output voltage. While I have never seen the advantages of such a circuit over the physically simpler IC, there must be some as similar circuits are not at all uncommon. A simpler version, using only one transistor is sometimes used for low current uses.

This then is the Battery Eliminator Cir-

cuit; a voltage reducing unit only. That is all that the circuits shown, and all such similar ones, can do. The devices that are being sold which will power the receiver and servos, and which also cut off the power to the drive motor while still maintaining enough juice in the battery to power the radio, all have additional circuits which actually measure the battery voltage and at the desired point, actuate a relay which opens the circuit to the motor. Any additional functions that one of these units might perform, such as applying brakes to the motor, requires yet more circuitry, beyond that of the simple BEC. Remember, the BEC is a voltage regulator only, and it is a mistake to expect more from it.

**LOST PLANE FINDER**

I know of more than one R/C'er who has lost a plane to some light fingered individual(s), in which case the device I am about to share with you will not help much. But if you fly close to grassy or wooded areas, this little light and inexpensive item might some day lead you to the site of an unplanned landing. It is called a "Frequency Sniffer," plugs into any unused channel of your R/C receiver, and under normal conditions does nothing more than sit back and enjoy the ride. However, under no-signal conditions, i.e., upon turning off your transmitter after that unplanned landing we were talking about, the Sniffer emits a high pitched signal that will lead you to your model.

The Sniffer is available with plugs for most popular R/C systems, does not require tuning, adjustments or any critical installation, and is priced at $22.95, with special quantity prices for club purchases. For more information, contact D.R. Matenkosky, 4028 Duchess Court, Murrysville, Pennsylvania 15668.

Next month! Here! Eloy Marez, 311 Mesa Dr. #10, Costa Mesa, California 92627. •

**Plug Sparks** *Continued from page 43*

built in eight and ten-foot sizes. Actually, one of Mickey's buddies built a 14 ft. version. However, this was so lightly built, its career was rather short.

These designs were followed by the "Cloud King" and the "Cloud Queen" designed for the new limited engine run events varying from 45 seconds to 20 seconds. In that same line, this writer is pleased to submit Photo No. 10 depicting John Quigley of Sydney, Australia, with a Cloud Queen built especially for John Pond for his last visit in January for the MAAA Nats at Amberly AFB.

Powered by an OS 40 four-cycle engine, this model turned out to be one of the easiest models to trim out as, after one flight, the model was flying and soaring beautifully (with a Clark Y airfoil, no less!).

After one "throwaway" round (the test flight being official), flights were great until the third max. Not sitting in a chair, this writer suffered from vertigo from looking up directly overhead and fell flat on his back! By the time he picked himself up and found the transmitter, that max flight was gone! This in no way detracts from a great flying machine!

Getting back to history, 1937 was the year of the "Trenton Terror" as named by the publication "Flying Aces" in which the article appeared (April 1938). The design was conceived to allow anyone to use the club engine, a Brown Jr. engine at $21.50. This was a considerable sum as most people were lucky to earn that much in a week. Mickey designed a motor mount that would accept the Brown Jr. motor mount as it came from the factory. To install, one screw was used to lock the mount in the fuselage bearer.

Everyone got to fly under this system. If you couldn't afford a Brown Jr. engine, you simply brought your model out and waited your turn to fly. And they talk nowadays about having to wait on the R/C frequency flag!

This writer first ran into Mickey DeAngelis in 1965 when he staged the first "unofficial" Old Timer Events at Willow Grove NAS near Philadelphia in 1965. To show we are not fooling, Photo No. 11 was taken back then showing the interest that DeAngelis and Bill Giblin had in the new idea of Old Timers started back in 1960 by the Stockton Gas Model Club.

The difference between prior contests was that the models were required to be built to size, not the 1/2A size that made all look pretty much alike. That was the start back in 1962!

**OLD TIME INDOOR ACTIVITY**

Although we have mentioned it in this column, there is a growing interest in Old Timer Indoor models, particularly in the Northwest where Edwin D. Lamb, 15911 S.E. 42nd Place, Bellevue, Washington 98006, has been actively promoting this facet of Old Timer modeling.

This year, three "Old Timer Indoor Challenge" contests were held with a large sweepstakes trophy for the high point man. Results looked like this:

1. Mark Sexton (1929 Senior R.O.G.) 11 pts.
2. Dave Aronstein (Megow Sr. R.O.G.) 11 pts.
3. Ed Lamb (Indoor Pusher) 9 pts.
4. Ed Lamb (Baby R.O.G.) 8 pts.
5. L. Wright (Senior R.O.G.) 6 pts.

To give you an idea of what type indoor models are being flown, Photo No. 12 shows Mark Sexton with a Megow Senior R.O.G. Looks like a great event for winter flying!

**LYKENS BROWN PROJECT**

We finally have some good news from Herb Wahl of Herbs Model Motors, Box 61, Forksville, Pennsylvania 18616, wherein he is pleased to announce he will be producing Lykens Brown engines in about a year from now.



To catch up with the progress on this engine, Herb says, "For four grim years, I have had to field all the complaints and queries on the progress on the Lykens Brown. To put it succinctly, Bill Brown has been involved in getting the township to approve the construction of his home. Finally getting permission, Bill has been wrapped up in building a new home. Of course, first things first, the Lyken project simply languished for lack of time.

"What really upset me in this whole deal was a notice from the Pennsylvania State Attorney General's Office accusing me of *fraud*. That did it! I contacted Bill immediately and wrote up an agreement to have Bill take the responsibility off my back, when in truth, I never was responsible!

"Imagine my surprise upon arriving at Bill Brown's house when I was informed they had everything ready to turn over to me. After resolving the finances (primarily the deposit fees), we had ourselves an agreement.

"After loading everything in my car and unloading in my garage, I found the good work Bill Brown had done, but not sufficient to complete any engine. Crankshafts are the main problem (only 50% started) which has changed my mind to the point I will now make them in a one piece method.

"Boy, do I have the work cut out for me! Actually, with the addition of the Lykens Brown, there is simply too much work and too little time, hence the late 1990 schedule for delivery. Here is how we stand:

"1. Bill Brown has turned over the Lykens Brown project to me.

"2. As of April-May, it will be a year from now before starting. This is contingent on the completion of the Bunch engine.

"3. Figure another year for completed engines to start coming off the assembly line. Wish me luck!"

**SWEDEN**

We are again indebted to Sven Olov Linden of Orebro, Sweden, for Photo No. 13 showing Sven Botstrom, Jorsby replica of Warren Fletcher's third place Wakefield winner in 1949.

Called the "Surprise," the model had a surprising fast climb and flat glide. Botstrom's model flies very similar to the original and did very well at the 1988 Swedish Old Timer Championships.

**AUSTRALIA**

Received a very pleasant letter from Mervin Buckmaster, editor of the Australian modeling magazine, "Airborne." Photo No. 14 shows Buckmaster with a rare Schumacher "Josephine," taken on Mervin's ranch property.

The Josephine was designed for the Thermite 60 for Charlie Pottol back in 1938 and has been approved as a SAM legal model. Incidentally, Pottol has been recently activated as a member of SAM 21.

Mervin also reports the weather has been terrible for model flying in Australia this year. Seems like the same old story, good weather on working days, and rotten winds on the weekend.

**SAM SECTY-TREAS.**

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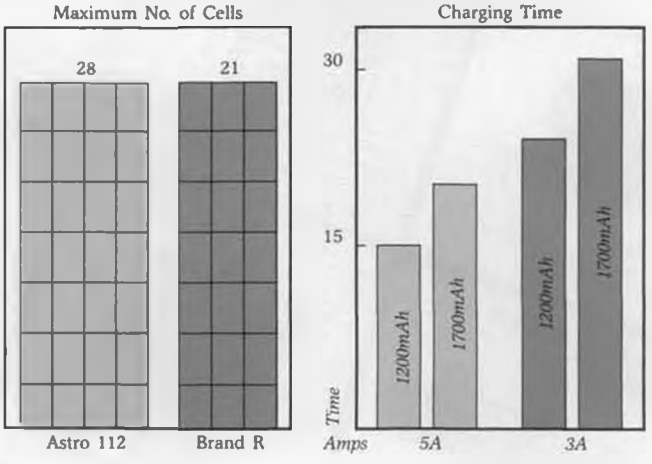
**DC/DC CHARGER COMPARISON**

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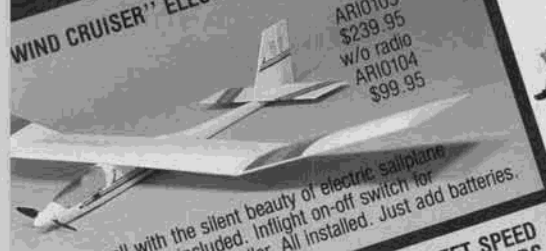

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Easy to use car quick-charger has charging range, 6V-8.4V. Single button operation with minute auto cut off.

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the Secretary-Treasurer. Robert Dodds of 209 Summerside Lane, Encinitas, California 92024, is one of those quiet but effective officers who gets their job done well without any great fanfare.

In that same line, "Mik" Mikkelson sends in Photo No. 15 showing Bob in a recent meet at Taft holding a Brown Jr. powered Gil Sherman Rambler. We have no reports on the model's performance but needless to say, the proximity of the retrieval scooter says it all.

Before closing off, to join SAM, send ten dollars to Dodd (address shown above) for admission to the world's best modeling event for fun. What more proof is needed than to say SAM has been growing steadily for 23 years.

**TIGER SHARK REVISITED**

Just received a follow up letter from Bob Fenske, P.O. Box 87, Elgin, Minnesota 55932, in which he submits Photo No. 16, showing what his passion for Stanzel designs has accomplished.

The picture shows the standard size, Super G Shark, while keeping it company is a scaled, 13-inch version of the Shark G. Fenske reports he has had numerous fellow Shark lovers write and even purchase some of his miniature Shark versions.

Of course, when one reduces the Shark to the size of 13 inch wingspan, the ignition system gets too heavy for the wing area. In this case, Bob has powered it with a Cub 049. Building time was about the same, as there are still the same amount of pieces, although smaller. Flight characteristics are the same.

Fenske's next projects will be the Stanzel P-60 tethered rubber model, to be followed by the Shark Cadet. Fenske's "Stanzel Project" will continue as long as there are other Shark designs available.

Bob envies the Californians, as there is really only three months of good weather in the "Frozen North." Building time is expanded with the net result they are able to crash more in three months than any other part of the nation.

**THE WRAP-UP**

We don't always catch the passing of our Old Timer brethren as I discovered in John Delagrange's newsletter of SAM 100 called "Old Time Plane Talk."

An announcement of the Harry Moyer Memorial Fun Fly scheduled for August 27, caught my eye. Turns out that Harry passed away early this year.

For those not acquainted with Moyer, one of his most prominent designs was the Cloud Cruiser, which appeared in the July 1937 issue of *Model Airplane News*. This semi-scale appearing parasol has turned out to be a very popular model for the sport and semi-competitive modelers.

Moyer will be remembered as the original charter member and founder of the L.V. R/C Club. Harry was into R/C as early as 1939. He helped numerous young members learn how to build and fly models.

The memorial will be as Harry would have it; flying of all types of models from Old Timers to Pattern to Helicopters. Everyone can come out and enjoy the Moyer Memorial. Contact John Delagrange for details. •

**Cricket** .... *Continued from page 37*

function of a helicopter radio. This is because, as the pilot increases main rotor rpm to increase lift to go up, the tail rotor rpm is geared to the main rotor so it will spin faster to automatically compensate for the higher main rotor torque. As there is no collective pitch, which means the main blades are locked at 4°, there is no need for fancy helicopter radio features like throttle hold, high idle, pitch curve adjust, etc. These features can do wonders to a sophisticated collective pitch helicopter, but they are simply non-applicable in fixed pitch helicopters.

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Radio installation is straightforward. Most control linkages are preset, requiring little adjustment.

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The enclosed construction and smooth surface of the rotor head allow a freely rotating head to be stopped safely.




# it's the best.

The Concept 30 is the best 30 size elicopter you can buy. No other machine ffers so many technical advances designed pecifically for your flying success. These dvances include a hardened main shaft nchored in two locations high and low to rovide for a very rigid design. A smooth ll drive system incorporating a drive wire nd 45° bevel gears in the heavily reinrced tail casing provides for a very effient and responsive tail. The Concept 30 s the best tail pitch mechanism you've er seen on a 30-size machine.

Kyosho's state-of-the-art main blades ally perform. With a glass mainspar/ ading edge and foam trailing edge coved with hard plastic, these C.G. corrected blades give the response and feel of a .60-size heli. To complement this, Kyosho placed the flybars in the same plane with the main rotor blades for additional stability and maneuverability.

Neatness counts — the radio system mounts easily and conveniently with unique "extras" from Kyosho. And, the inverted engine makes this heli a breeze to start with an easy-to-reach starting cone and glow plug.

This thing is tough! The Concept has the strongest composite mainframes you'll find in any machine. A practically indestructible poly-propylene canopy withstands the hardest landings. Resilient landing gear bounces back time after time.

There are two basic designs to choose from: the DX version flies just great with its heavier flybar paddles. If you wish to get the top of the line, opt for the SE version with a complete set of bearings and lightweight flybar paddles for quicker, snappier maneuvers. Both machines fly great with an O.S. .28FH, but of course the .32FH will give you a little added punch.

Technically speaking, Concept 30 is the best!

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If you do build a Cricket, please buy a new 28 to 32 size helicopter engine. Fixed pitch helicopters depend on good throttle response for vertical control. Also, run the engine rich, with plenty of smoke, to prevent overheating. By the way, there is no excuse for you to run out of fuel when flying because Cricket's gas tank sits clearly on the right side of the main frame. You can see the fuel level from 10 feet away. In this respect, R/C helicopters are better than R/C airplanes. You can't do a touch-and-go with airplanes in order to check the fuel level.

The simple Cricket does have its attributes. The control set up is extremely simple. The single 1/8 inch thick main frame is nearly indestructible. The one-piece clutch is all metal construction, and it is of the same design as on all the expensive big choppers. The belt drive transmission is quite maintenance free. The rear cone start feature is very convenient. The teetering rotor head design is simple and functional. The thin steel teetering wire provides nice rotor flap stiffness to give better control response than the conventional pure teetering rotor head design such as on real Bell Jet Ranger helicopters. While a real Jet Ranger helicopter cannot perform loops or rolls, the Cricket can be pushed into doing loops and barrel rolls because of this teetering wire. (See June '89 *Model Builder* "Chopper Chatter" column for good physical explanations on helicopter rotor head design theory.) Make sure you have plenty of altitude, at least 250 feet, before you try looping the Cricket for the first time. Build up plenty of speed in a shallow dive, then just yank back and pray that you maxed out all your control throws!

Once you are familiar with your Cricket, then you can quicken the pitch and roll control response by replacing the stock teetering spring wire with a slightly thicker piano wire. Thicker wire increases the flap stiffness of the main rotor even more, thus your command to tilt the main rotor will immediately tilt the helicopter fuselage, too. (See August '89 *Model Builder* on control theory.) Sometimes the teetering wire will break due to fatigue, so bring some spare ones. Once the teetering wire breaks, you will notice that pitch and roll cyclic control will be very sluggish. Now, it becomes a totally free teetering main rotor, just like on the real Bell Jet Ranger. Many magazine writers often write phrases like, "The head damping on this helicopter is too tight," or "The damping is too weak." They are technically incorrect. The teetering spring, or rubber damper piece on many collective pitch machines, provides a spring-like action which is called stiffness, not damping. You need a shock absorber or friction to get damping. So, if you are a beginner, learn the right terminology and concept. Now, with a stiffer teetering wire you can pull high-g turns, tight loops, and quick rolls.

Back in 1980, electronic yaw rate gyros were not very popular. Thus all my Crickets never had gyro to help stabilize the tail rotor control. I flew my Cricket almost every evening in my front yard, even when the wind gusted up to 20 mph. As no one used gyros back then, I just learned to hover without it. If one does not know what is good in life, then one would not know what he misses. Unfortunately, now I am so spoiled by the ease of hovering with a yaw rate gyro that I can no longer fly comfortably without one. Yes, I absolutely recommend every beginner buy a gyro, it makes your life easier.

Flying the Cricket in the front yard really brought out the strong point of the Cricket; the ability to maneuver in a confined space. The front yard is only 30 feet by 30 feet. The street is on one side, the garage door is on the other side, then the left and right side have a fence of trees that rise 20 feet into the air. That piece of square concrete recorded history. All of those permanent exhaust oil patterns on the concrete mark the maneuvers that I have practiced day after day. Cross shapes represent translational movement practice. Small circles represent pirouettes, and the figure 8 represents flying the figure 8. If one day the energy crises returns again, at least a few gallons of castor oil can be extracted from my old front yard. In addition to my oil paintings on the ground, there are a few tree limbs missing here and there, and a red dent mark at eye level on the garage door. You can guess what caused them. Let me give you a big hint; I bought many sets of Cricket main rotor blades! These close quarter hovers really honed my hover

skill!

After a while, when hovering became quite monotonous, I ventured into doing forward flight toward the street and then do a U-turn back. As the Cricket flew back toward the garage door I would make a sharp U-turn back toward the street. Soon I was doing a high-speed circuit in my front yard. Now you know how that red dent on the garage door came about. After a while, two-dimensional flying became boring. Why not expand vertically? I started doing four or five spinning pirouettes straight up to 30 feet high, then chop the throttle and see how close I could come to the ground before giving power to stop the fall; a great reflex and timing exercise! This helps explain why you can find many 1/2 inch wide, 1/8 inch thick, bent aluminum bars still lying around in my large junk box.

Soon I graduated to flying toward the street and doing a stall turn to come back instead of a U-turn. The ultimate stunt I practiced before we moved away was to practice landing on a one-foot square, four-foot high podium by the street that says, "600 Endrino Place." As I never had a complaint from the neighbors, I guess the MACS Heliball muffler did a wonderful job muffling that OS 25 FSR on the Cricket.

On calm days the Cricket is really stable, and I think it does make an excellent, super low-cost beginner helicopter. Robert Gorham use to hover the Cricket two feet away from his head, then reach out with his left hand to do an in-flight needle valve adjustment, or grab the landing skid and then chuck the helicopter out. To check out the Cricket stability for this article, I did not quite repeat the same stunt, but I did take both hands off the transmitter to see how long I could keep my hands off in hover. On calm days the Cricket will sit there for 4 or 5 seconds before drifting more than five feet away. That is excellent. However, on windy days it's best to leave it at home. Its small size and the slower vertical response of the fixed pitch rotor design make it bounce around in the air. If you are a beginner, buy a set of GMP flybar weights for the Cricket. The steel collars weigh about a half ounce each, and they make the Cricket even more stable. The flybar weights increase the rotational inertia of the stabilizer bar to make it a firmer inertial reference. The purpose of the stabilizer bar is if there is a sudden disturbance, such as gust tilting the main rotor, the stabilizer bar acts as an inertia reference in space that will automatically let the rotor know it's tilting and know to return to its original position. But adding flybar weights will also slow down the helicopter's control response because the stabilizer bar can now oppose the pilot's commands to impede the desired rotor movements.

As this is not intended to be a detailed, technical review of the Cricket, let's end it by looking at what Mr. William Sewell of Anchor Point, Alaska, has to say about his Cricket. Amazing how these Crickets propagate; even as far as Alaska! Bill is one of many wonderful readers of our "Chopper Chatter" column who wrote to me in the past few months. He just went on and on, telling me all sorts of adventure stories he had with his little Cricket. Here is his story:

"I really cannot remember how many Crickets I've had, only one new one from a kit which was my all-time favorite, plus quite a few used ones from people who have given up trying to fly them. The first one was lot of fun putting together, for a .25-sized helicopter, or any size for that matter, it really was a great machine to learn to fly with! I feel very good about the fact that I never broke any blades learning to fly, and this was not a result of sheer luck either. I never had any help from another experienced heli flier, so I was pretty much on my own. Patience and persistence was my learning method. I never pushed myself; if it was not calm enough to suit me I wouldn't fly, and I never ran the Cricket with anything out of balance. This coupled with my using a frozen lake to learn from led to my painless transition to heli flying. The best parts of using a lake in the winter are: 1, perfectly flat flying surface; 2, smooth low friction, as ice reduces risk of tipovers; 3, helicopter stays clean; 4, engine does not eat dust and will last longer; 5, it's winter so the engine stays cool; and 6, cold air has a higher density so your machine will perform better. I can think of only two disadvantages for which both have remedies and one caution. 1, engine is harder to start in the cold, so keep the machine warm inside the cab of a vehicle

before starting it. 2, cold fingers have a harder time controlling the heli. . . . As for me, I can't get away with just gloves, so I've worked on a transmitter thermos with a pocket warmer in it for extra warmth. Caution, it's better to lube your chopper with tri-flow instead of grease for winter use. Grease is like glue when it is cold.

"By the time summer had arrived, two gallons of fuel had passed through my Cricket, and I was looking forward to a lot more flying. As the loop is the only real aerobatic maneuver the Cricket can do, it was first on the agenda. There's not much to doing a loop; you just go full bore into the wind, pull back and watch it go up, slow down, then flop over on it's back and dive for the ground while you keep pulling back. I demonstrated a loop to a friend of mine and without intention gave him a real thrill! On collective helis they let off on the cyclic and lower collective to make the loop as round as possible. Well, I pushed a little forward cyclic on the top of this loop and put the Cricket into an 80° inverted descent . . . not really my intention, but I had a lot of altitude so there was no need to panic. Anyway, things are a little gray in this area. I thought I pulled out with room to spare, 10 or 20 feet, but to this day my friend says at best it was only 1 or 2 feet between the skids and the ground!

"After a while I really grew hungry to be able able to do something different with my helicopter flying. Finally it came down to putting a load hook on my Cricket and picking up a one gallon K & B fuel can tied to a eight foot long string. I never went into fast forward flight this way due to the risk of P.I.O. and the fact that I didn't have a 5th servo hooked up to dump the load if needed. Nevertheless it was real fun to hook up and carefully lift off and fly over the load, slowly pulling the line snug until enough power was applied to lift the can. After the can was in the air the helicopter became very stable with the load acting like a dampener to any movement. With just a little skill I could pick the can up, fly over to another spot and set the can down on a small "X" painted on the ground."

Bill did send me a picture of his Cricket sling loading a one gallon K&B can, but the photo is too grainy for reproducing. I was curious to know how full the gallon can was, so I wrote back and asked. Well, here is his answer.

"To get the Cricket to pack a full can of K&B into the air I had to run 35% nitro with 5 oz. to the gallon of lubricant No. 1 added. Pitch was set at 12.5°.

"To get the 3.9 shaft horse power to lift the load, the mix was sweetened with nitrous oxide from two Rhom Air tanks. First attempts resulted in head melt down. Successful lift off required adding the oxide by servo control after pulling tight over the load and limiting the flight time to no more than 90 seconds, and then. . . ."

At first Bill really had me fooled that he was sling loading a full one gallon can of K&B. As he enjoyed his fixed-pitch Cricket so much, he is going to write back and tell the readers his adventures with GMP's new 40/45 size fixed-pitch Rebel helicopter. The Rebel features a one-piece nylon, hingeless design main rotor head. The benefit of this head will be explained in my Rebel review. There will also be a scaled-down nylon hingeless head soon to be available for the Cricket, too. Will the Cricket production last another decade? The designer, John Gorham, gave a firm "yes." Well, we will see. There is one thing of which I am certain, the Cricket will probably hold the title, "The most inexpensive R/C helicopter" for another decade.

* * *

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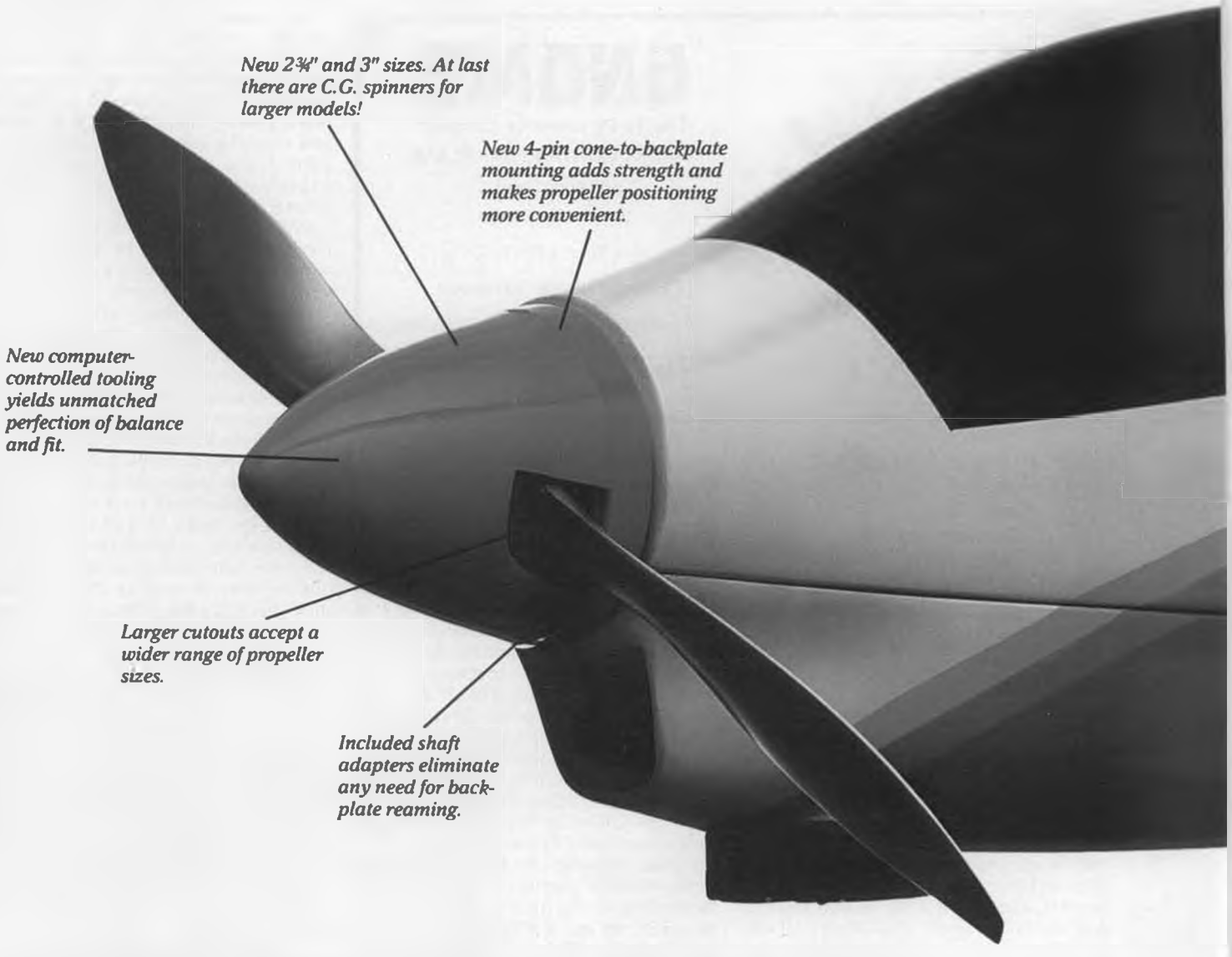


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not be appropriate for all occasions, but they do have their appeal. Small R/C helicopters, like Concept 30, Hirobo Shuttle, Kalt Baron 30, and X-Cell 30, are all extremely cute looking, and docile flying machines. I have flown them all, except the X-Cell 30 which has not been released yet, and I love their pleasant handling qualities. If the weather is not extremely windy, these mini helicopters are just as enjoyable to fly as big 60-size machines. Furthermore, they don't drink like a fish. They all have collective pitch control, so they can perform all the aerobatic maneuvers that their big brothers can, including invert flight and autorotation. Now, let's see how we can add collective pitch to your old fixed pitch CMP Cricket to put in some extra pizzazz.

The sketch shows the modification that I have designed for the Cricket. I have to admit that I have not tried it yet, but I have confidence that it will work quite well. If not, write me a letter and explain why not. The objective is to convert the Cricket to a flybarless, collective pitch helicopter like the Legend. People have modified the Shuttle into a flybarless machine and reported that it flies very well. Thus, if we install the same flybarless Shuttle main rotor head on the Cricket, it should do quite well, too. As the rotor head is the dominant ingredient in determining any helicopter's handling characteristics, the flybarless Cricket should behave similarly to the nice flying flybarless Shuttle.

I chose a flybarless Shuttle head because there would only be two linkages from the swashplate to the main rotor head. This simplifies set up, and reduces cost. The new Shuttle head (models manufactured after 1988) have a floating axle design similar to the Schluter Champion, or Miniature Aircraft's X-Cell rotor head. The new Shuttle's floating axle design provides a stiffer flapping rotor head than the old Shuttle DDF heads that have individual blade flapping. The stiff rotor head makes a better flybarless R/C helicopter because it provides some longitudinal and lateral direction vehicle damping that is lost due to the removal of the stabilizer bar. I have tried flybarless DDF heads on the Stork, and it was very difficult to control.

Besides the Hirobo Shuttle rotor head, you might try a Kalt Baron 30 rotor head, or a Kyosho Concept rotor head. Just like using the Shuttle head, you can remove the stabilizer bar on these heads, too. Kalt's Baron rotor head is a hingeless design, which means its rotor blades flap up or down by elastically bending the spring steel hub plate. For a flybarless Cricket, or to make a flybarless Baron 30, I suggest you install an extra hub plate to stiffen the flap response, which would improve the dynamic stability and control power. Note: A stiffer head will always give quicker control rate. I do have a feeling that removing the flybar might worsen the Concept 30 because it has a soft, individual flapping rotor head similar to the old Shuttle's DDF head.

The general rule of thumb is soft teetering, or a soft DDF head, improves static stability, resulting in an easier-hovering helicopter. While stiff rotor heads makes hover feel "stiff," not smooth, but tends to make forward flight tracks slightly better and to make controls feel slightly more solid. (Static and dynamic stability were explained in August 1989 "Chopper Chatter.")

With any flybarless helicopter, the main rotor blades need to be weighted with some lead to artificially generate some vehicle damping to tame the helicopter. Nicely damped means that if the dangling helicopter fuselage is suddenly hit by a gust, the fuselage will oscillate only momentarily and then settle down. A helicopter with strong vehicle damping is nice to fly because, during a quick stop maneuver, say from 30 mph to 0 mph by doing a flair, it will stop smoothly without the typical spasmodic jerking oscillation at the end. You can also check your helicopter by rocking the cyclic stick to rock the helicopter laterally, or longitudinally, in hover. For a well damped helicopter, the oscillation will stop as soon as you release the stick. Stock Shuttle, Concept, and Baron 30's all have excellent inherent vehicle damping.

Stock Shuttle and Concept blades each weigh about 75 grams. For your flybarless Cricket, I suggest you try the stock Shuttle blades first. If you find the cyclic response is too quick, and the helicopter is not stable enough, then add 20 grams of lead weight. Do not add too much lead because then the higher centrifugal force may break the plastic main rotor. If you have never built a set of weighted blades before, it would be safer to buy a set of Yale weighted blades for GMP Cobra and shorten their length to suit your Cricket.

As the drawing illustrates, only a few new parts are added. Collective pitch is controlled by rocking the 5/32 piano wire shaft. Typical 40 to 60 size R/C airplane landing gear is usually made from 5/32 piano wire. You can easily buy a 36-inch long piece at your favorite hobby shop for about a dollar. The supporting bracket, collective control arm, and 5/32 wheel collars are all conventional model airplane parts. Then simply use two 1-1/4 inch long 6-32 Allen-head bolts to lock the wheel collars. The bolts also serve as supporting

shafts for the two rotating pitch and roll control bellcranks. A collective input will rock both bellcranks forward or back. Rotating the bellcranks gives pitch or roll control. The original Cricket 90-degree roll control bellcrank is not changed. However, the original T-arm on Cricket's pitch control is cut and modified slightly. Instead of one T-arm, you need two T-arms, each with one ear cut off. One T-arm needs to have its ear bent backward.

With collective control added we have five servos, thus the tail rotor control servo will now have to fit on the lower servo tray. What do you think? Send your story and comments to me at P.O. Box 692, College Park, Maryland 20740, or call (301) 589-0855. •





**Tech. Stuff**. *Continued from page 17*

Perhaps the worst part of that penalty was that my sail was shorter. Because of friction, the velocity of the wind is low near the surface of the water. I tended to be sailing down in the doldrums, while the rest of the fleet could stick their tall masts up where the wind was beginning to blow.

**BOOM HEIGHT**

There are a number of other features of this R/C model design that I think you will find interesting. The first is the "boom," which in this case is simply the lower end, or root, of the wing sail. In a conventional sailboat the boom is normally some distance above the deck, so that when the boom swings across in a jibe it doesn't sweep the crew into the water. However, space between the boom and the deck reduces sail efficiency, because it allows air to flow under the sail. The boom is like a wing tip, and the most important of the two tips on the sail, since the sail is triangular and most of its working area is down near the boom. At any wing tip, part of the high pressure air on the "lower" surface of the wing will flow around the tip to the low pressure area on the "upper" side of the wing or sail and cause a wing tip vortex.

With my racing wing-sail model, the one-man crew was on shore and was in no danger of being lost at sea, so I made the lower tip of the wing square and placed it right down against the deck. This effectively eliminated all of the loss of lift and the induced drag of the lower wing tip. Since the sail sealed against the deck, and the hull was in the water, there could be no airflow under the sail. Theoretically, this had the same effect as doubling the aspect ratio by doubling the wing span. Picture a complete, high-aspect-ratio wing where the lower half is imaginary and is sticking straight down into the water. Most of you are aware that gaps between airplane wing panels or between wing panels and the fuselage are a no-no. A big gap under a sailboat boom is a huge no-no, if anything can be done to eliminate it. On my model, I could.

**HULL AERODYNAMIC TURBULENCE**

In addition to a high boom, manned sailboats have a sharp angle between the deck and the sides, and a railing around the deck, again to keep people from falling off. This really messes up the air flow around the hull. I didn't need the fence. You will also see in the photos of CD Min that the deck is rounded laterally and longitudinally so the air can flow smoothly and efficiently into the lower part of the sail.

**WEATHER VANE**

I wanted to put the vane, which gives wind direction information to the sail servo, up at the masthead, "where the wind is undisturbed by other parts of the boat." I soon realized, however, that even there the airflow will be disturbed by the vortex off the wing tip. A simple solution to that problem was evident, however, so to the masthead went the vane. I couldn't eliminate the vortex, but I could compensate for it. I put a scale vane on the top of the wind tunnel model with a protractor behind it. For each wind tunnel data point I read and recorded the angle between the tunnel axis (wind direction) and the vane. These figures were the errors in the wind direction readings due to tip vortex. When I designed the linkage between the vane and the electrical feedback system to the sail servo, I simply incorporated the angular errors due to vortex into the design, but with negative phasing. Now the vane angle is still in error, but the linkage corrects for it, so the sail is always set correctly. Solutions like that are fun and rewarding.

**HULL DESIGN**

My ignorance of hull design was nearly total, and the books I could find on the subject didn't answer all my questions, so I planned and conducted a series of tow tests on the water, in addition to the wind tunnel tests. A grown man walking along a low dock with a stop watch in his hand and towing weird-looking things in the water with a spring fish scale inserted in the tow line to measure drag, does tend to arouse the curiosity of passersby; but that is part of the price of progress.

**KEEL DESIGN**

A sailboat needs to have a vertical keel to develop hydrodynamic "lift" opposing the aerodynamic lift or sail force, to keep the boat from skidding sideways instead of sailing ahead.

Early sailboats had very shallow keels. Part of the reason for that was to minimize the draft of the boat to allow operation in shallow water, but I suspect that ignorance of hydrodynamics also played a major part. An optimum keel to develop hydrodynamic lift needs to look a lot like an optimum wing to develop aerodynamic lift, and the cross section of this vertical "hydrofoil" needs to be like an airfoil. Sure, a flat keel will work, poorly; so will a flat airplane wing, but who wants it? Recognizing that a keel is really an underwater wing, we can see that not only should it have a good symmetrical section shape, but it should have a reasonable aspect ratio. Shallow, long-chord keels have too much induced drag. Likewise, the keel needs to be placed in the proper position fore and aft with respect to the sail to "balance" the boat. This is comparable to getting the cg in the right place in an airplane.

One thing that bothered me was the use of skegs and sharp keel lines or edges down the middle of the bottom of the hull on conventional sailboats. Why? Because in order for the keel to develop its intended reaction force it must operate at an angle of attack. That means the hull must be yawed slightly with respect to the boat's course, which in turn means that the water flow along the bottom is somewhat skewed. A sharp keel line will cause turbulence and added drag in this skewed flow. The keel line on CD Min is therefore nicely rounded to reduce that turbulence.

The keel fin on CD Min is deep with a streamlined bulb lead weight at the bottom of it. This configuration is used on many modern racing boats because it allows a streamlined high-aspect-ratio keel fin, yet gets all of the lead down as deep as possible for maximum righting moment, to counter the heeling force of the wind.

You will recall that the Australians introduced a keel with wings on it into the America's Cup a few years back. This was no high-tech mystery device. The rules limited keel depth, so the Australian designer got around that rule by putting "tip plates" on the bottom of the keel fin to effectively increase its aspect ratio. Airplanes where the span is limited for some reason also sometimes use tip plates, with the same objective. If you can't go farther out or down, go sideways.

Model Design is challenging and fun, whether the model flies in the air or across the water.

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**Vampir** . . . . *Continued from page 23*

its fuselage, or the width of its widest wing chord. However, when there is as much

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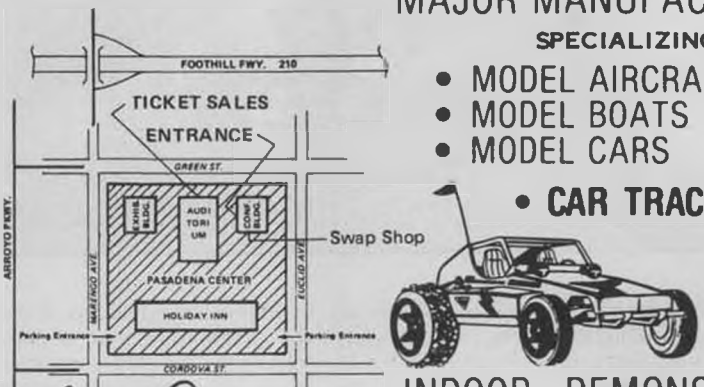


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wing sweep as on the Vampir, length takes on a new dimension. A line extending from the Vampir's nose straight back to a line connecting the two wing tips measures 39 inches. This compares favorably with the length of many conventional gliders with tails.

Weight claimed is "approx. 1700 g" (about 60 oz.), however, ours weighed in much lighter, at 54 ounces, which is almost a 1/2 pound better. Our model required no nose weight to achieve correct longitudinal balance, but required a 1/2 ounce of wing tip weight for correct lateral balance. With the wing tips well behind the nose of the aircraft, balancing the wings can affect the "CG" by moving it backwards slightly.

The Vampir's wings are foam core presheeted with balsa skins. The wings are manufactured in molds to assure accuracy with every wing panel produced. Visible from the end view of any wing panel pulled right from the box are two kinds of foam: an inner core of expanded bead polystyrene, and a darker, outer core of open cell polyurethane. This kind of wing structure is called Robbe Siros Expert, a registered trademark name.

It is my understanding that the reason the two kinds of foam are needed is related to Robbe's molding technique. Closed cell polystyrene will not adhere to the balsa skins like the open cell polyurethane. The end product is a very strong, pressure resistant, lightweight wing panel.

The Vampir has pre-cut ailerons, pre-cut servo and bellcrank wells, pre-cut wing joiner slots, and pre-cut leading edge surfaces. There are top and bottom spruce spar caps with balsa shear webs in the main panels, but no spar structure in the tips. The overall quality of the wings is excellent.

The Vampir's flight functions are: elevator-ailerons (or elevons), flaps, optional aero tow release mechanism, and optional electric power pod.

The optional power pod is 13.5 inches long. The finished pod weighs 22 ounces including a seven-cell, 900 mAH battery, Novak T4 electronic speed control, Astro Challenger 05 cobalt direct drive motor, and Robbe 8x4 glass nylon prop. This, plus the 54 ounce weight of the Vampir, brings the Vampir's total weight as a motorglider to a rather hefty 76 ounces.

**BUILDING THE VAMPIR**

The Vampir is a kit plane with partially pre-built foam core wings. The fuselage is constructed from die-cut heavy plywood parts and machine cut balsa blocks. The parts fit throughout the model is generally excellent.

The instructions were likewise excellent with very good English language, and complete, step-by-step guidance. The plans are well drawn, well labeled, and easy to work from. Parts are numbered by assembly and construction sequence. However, the lack of all but box art photographs did make a few things difficult to visualize.

Using simple hand tools, the Vampir can be successfully built to completion. We chose to use only a minimum of power tools: a hand drill and a Dremel Moto-tool.

A set of metric drill bits would be handy to have, but we built ours using American bits with no problem. A good rule of thumb: when in doubt about equivalency, drill undersize, trial fit parts, and drill or file bigger if necessary.

There is a lot of wood carving in this kit. For this reason we recommend using some good, basic wood working tools: a razor plane, a Perma-Grit sanding tool, a sanding block with 400 grit abrasive paper, single edge razor blades, Uber Skiver and X-acto knives, and a set of X-acto needle files.

If you have access to a power jig saw or small band saw, either would come in very handy for helping to cut all the die-cut ply parts. Let me explain.

It is common for European kit manufacturers to use some hardwood plywoods in place of the softer, lighter, Italian poplar (or so-called "light ply") as mostly used in the US and Japanese kits. This yields a much stronger finished product (our fuselage survived a very hard landing completely intact), but it is consequently much harder to die-cut.

Rather than cut completely through this hard plywood, which would quickly dull and ruin the cutting dies, forcing their frequent replacement and driving up the kit cost, Robbe has die cut through MOST of the wood. This leaves you to finish the

cutting with a hobby knife or jig saw. Yes, it does take extra time. No, it is not particularly fun. However, the finished model is very tough and less costly. We think the compromise works.

The power pod is constructed from die-cut light plywood, machine cut balsa, and molded (but not cut) ABS. Like the hard ply fuselage parts, some of the light ply die cutting did not go completely through. This I can't explain.

The accompanying photos tell most of the story about what was built and how, so we will go on to the next topic, radio requirements.

**RADIO REQUIREMENTS AND SURFACE THROWS**

The Vampir instructions plainly specify transmitter elevon mixing. Any radio system with this feature will work with the Vampir, but the best choice is the Airtronics Vision glider radio. The Vision, with its ATRCS computer, allows for adjustments and mixing like few other transmitters on the market. It was custom designed for glider use, including flying wings.

A transmitter-mixed elevon system is needed because there is no room in the fuselage for any kind of airborne mixer. The two servos which control the elevons are located in the two main wing panels near the root, one per wing. There is no possible way to mix the functions mechanically due to their physical separation.

Standard size servos will not fit inside the wing because of their thickness which causes them to stick out of the wing's servo wells. The smaller Airtronics 831 servos fit nicely and are a more "heavy duty" than the 401 Micro or 501 Microlite servos which also fit.

Setting up the proper amount of elevator-aileron and flap throws is (unfortunately) left up to the modeler. As good and as thorough as the instructions are, no mention is made in them or on the plans for the correct throws. Not having a whole lot of experience with flying wings, this left me a little puzzled.

Luckily, the standard, round servo arm of the Airtronics 831 servo provides enough pushrod travel to get you into the proverbial ball park. To help achieve differential throw in the ailerons, the pushrods were attached to the servo arms offset by about 20 degrees using the premolded servo arm holes provided by Airtronics.

The pushrods act through bellcranks located near the polyhedral break. Shorter, exposed pushrods connect the elevon horns with the bellcranks. Without using any extra transmitter mixed differential, our aileron throws were: total up throw, 1/2 inch; and total down throw, 3/8 inch. Likewise elevator throws were 1/2 inch and 3/8 inch.

The flaps are driven by a clever brass tube and music wire torque rod arrangement which requires some soldering. The music wire rods exit the left and right sides of the fuselage and angle back about 80 degrees. The root side of both flaps have pockets for these angled torque rod ends to slide into. During rough landings, the wing can pivot forward a little without damaging the flap linkage or flap. Usually in these cases the flap pops off of the torque rod end and must be repositioned.

Total flap throw should be about 45 degrees. The flap servo is mounted in the fuselage. Here a standard size servo is a tight fit, but will work. In our case, the smaller Airtronics 831 servo was again used.

**THE AIRTRONICS VISION 8SP RADIO**

The Vision 8SP is the most versatile, most convenient, most reliable, 1991 certified model sailplane radio system available today. Inside the Vision is a micro-chip computer processor which allows the modeler to program just about any kind of control mixing, surface position presets, and individual surface throw or centering adjustments for any servo in nine basic aircraft configurations.

Within these nine configurations (also called program "templates"), there are many further choices you can make which allow you to customize the Vision to your specific model application. Using the alternate setup program, you can even fly one sailplane with two different sets of mixing adjustments for experimentation while fine tuning.

The Vision 8SP allows you to "memorize" specific program setups for up to four different models at a time. With this capability you could conceivably fly a flying wing, a thermal contest ship, an F3B ship, and a scale sailplane all in the same day

from one Vision transmitter with just the punch of a couple of buttons. The Vision is the only transmitter you will probably ever need!

The Robbe Vampir is not a complicated model. Its mixing needs are: elevator/aileron mixing (elevons); and optional, flap to elevon mixing for pitch compensation. The only other function needed is motor on/off. We used the spoiler/camber channel to control the motor. Although we didn't feel it was necessary, we *could have* mixed in motor to elevon pitch compensation through this spoiler channel as simply as pushing a button.

There are two flying wing drawings in the very complete, 32-page instruction manual. One shows independently operated flaps (two servos) and one shows two dependently operated flaps (a single servo). Both show a straight trailing edge with sweep in the leading edge.

The two flying wing templates are actually shared with two conventional aircraft layouts. The Vampir, having a single flap, uses the "2A/1F <> E R" template. This means it is intended for a model with two ailerons, one flap, an elevator, and a rudder. Obviously, two receiver outputs will not be used: separate elevator and rudder.

Because flying wings use these shared, conventional aircraft templates, the drawings label the trailing edge surfaces as: Left Aileron, Left Flap, Right Flap, Right Aileron, and Rudder. (There is no mention of elevator or elevons at all.)

The label "Flap" could cause confusion. Without sweep in the wing, these surfaces are really elevators or inner elevons, not flaps. Similarly, the left and right "Ailerons" should be either ailerons, or more likely, outer elevons

For the flying wings depicted, elevator functions are mixed into the "Flap" and "Aileron" surfaces, thus giving the models elevons and elevators across their entire trailing edge if desired.

In the case of the Vampir, there is so much sweep in the wings that the "Flap" really *is* a flap, not an elevator! As such you need to use the flap stick (ratcheted left stick) for the flap, and you *don't* want any elevator function mixed into the flap at all.

It would be nice, however, to go the other way and get the flap to mix a little pitch-compensation into the elevons. Well, you won't find "Flap to Elevator Mix" anywhere in the menu choices available to you (remember, you don't have a separate elevator output). What you must use instead is "Crow" mixing, as if the Vampir was in reality the wing of a conventional aileron and flap equipped model.

The normal crow configuration is: flaps deflect down while ailerons deflect up. The problem with a Vampir flying wing is that you want both flaps *and* elevons to go *down!* This is not a problem to the Vision! Simply push a button and decrease the aileron mix from a positive percentage figure to a negative percentage figure and you have it!

Elevon control is achieved by both the Elevator to Right Aileron, and Elevator to Left Aileron mixer gains. Each is independently adjustable which is very nice to have just in case the linkages you install aren't perfectly alike, and they produce unequal throws.

For our Vampir, the correct configuration template is: 2A/1F <> E R with the flap and left aileron's servo throws reversed. The Vision's mixer gains were set up as follows:

1) 1 Ail → Rudd:0% (not used)
2) 2 Ail → Rudd:0% (not used)
3) Crow → LAil:-15% (pitch compensation)
4) Crow → RAil:-15% (pitch compensation)
5) Elev → LAil:66% (left elevon mix)
6) Elev → Flap: 0% (not used)
7) Elev → RAil:66% (right elevon mix)
8) Spoil → Elev:0% (not used)
9) Gear → Elev:0% (not used)

The Vision's Surface Adjustment features were used to control individual servo centering, independent of the external transmitter trim tabs. This allows for perfectly centered flight surfaces and trim tabs without having to adjust pushrod lengths. We also controlled aileron (elevon) differential, and servo throw volumes.

Surface Adjustments will vary from plane to plane, but ours turned out as follows:

1) Center LAil:15%
2) Center Flap:10%
3) Center RAil:20%
4) Center Rudd:0% (not used)
5) Differ:40% (elevon differential)
6) Landing Differ:0% (not used)
7) L Ail LTV:66% (up throw L Ail)
8) L Ail RTV:66% (down throw L Ail)

9) R Ail LTV:66% (down throw R Ail)
10) R Ail RTV:66% (up throw R Ail)
11) Flap TV:41% (flap throw volume)
12) Elev UTV:66% (elevator up throw)
13) Elev DTV:66% (elevator down throw)
14) Rudder LTV:66% (left rudder throw)
15) Rudder RTV:66% (right rudder throw)
16) Side/Cmb TV:82% (side lever's camber changing throw volume or spoiler throw volume; in this application, used to control the motor)

There is still more that can be done with the Vision in the Vampir (for example: flap presets for winch towing), but these are the basics.

All these fancy control mixing and surface adjustment settings only need to be set once and loaded into memory. After this, they are automatically loaded into memory every time you switch on the radio, or until you decide to change them.

All this sophistication makes flying unusual models like the Vampir so much easier and more enjoyable, that we can confidently say, Try it once, and you will be "hooked" on this "Vision of the Future!"

Contact your local dealer or favorite mail order house for current availability and price of the Vision 8SP. Airtronics offers the Vision with three different servo options: (4) 102 Standard Servos, (3) 831 Heavy Duty Ball Bearing Mini Servos, or (4) 732 Heavy Duty Contest Servos.

**HOW THE VAMPIR FLIES**

The instructions for the power pod specify a Mabuchi 540S motor and a seven-cell battery pack. Going into this review we had our doubts about the Mabuchi 540S type motor being able to push the heavy Vampir hard enough to climb. Giving the manufacturer the benefit of the doubt, we went ahead with our plans to be objective and use what was recommended.

To find the best Mabuchi 540 motor for the job, we consulted with an electric power columnist of another national R/C publication, John Lupperger. He said that Bob Sliff (yet another electric power columnist) had tested many different Mabuchi 540 can type R/C car motors for electric flight. Bob found that the Mugen Manx 4WD car was supplied with the best Mabuchi motor he had tested for aircraft.

A Manx RS-540 motor was located through Hobby Shack. It was then broken in on the workbench using an AC/DC variable output NiCd charger set to a low amp output. Brush break-in took about 14 hours using a 3x3 plastic prop (cut down from a Cox 6x3) and running at about three volts.

For a seven-cell motorglider, the Vampir is a heavyweight at 76 ounces. Most gliders using this type of power weigh between 35 and 50 ounces. You can see why we had doubts about using a Mabuchi can motor, even though the power output from the RS-540 was exceptionally good.

The initial test flight involved this RS-540 motor powered by seven 900 mAH Sanyo Cut-Offs, and turning a Robbe 7x4 Dynamic glass nylon prop.

The first test site was the Harbor Soaring Society field in Costa Mesa, California, the same field used for the Astro Champs. At one end of this field is a 100-foot cliff overlooking the Santa Ana River. This field has flat, weedy landing sites at the top and bottom of the cliff. Just in case the Mabuchi failed to lift the Vampir, there was little danger in a forced landing.

The wind was blowing about five mph at launch time, angling in at about 45 degrees. Slope lift was minimal, and out over the river, only thermal lift was expected. The Vampir was thrown over with motor running.

Lo and behold, it held altitude. Seconds later it began to pick up enough speed to begin climbing. The stick was eased back very gently to keep the Vampir climbing, but without causing the speed to drop off. After running for a good minute, we had only climbed to about 80-90 feet above the cliff top. We powered off, cruised around for a minute, and ran the model back in toward the cliff to see if the slope was working. It wasn't working well enough, so after a few traverses, we headed back out and switched the power back on.

Perhaps 30 seconds later we were about back up to where we were. Fearing we would not have enough reserve power should we need it on final approach, we switched off again. We cruised around a little, checked out the Vampir's handling,

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observed the pitch change while deploying flaps (as recommended in the instructions), then got set up for a landing.

For the first landing, flaps were deployed, but not fully (only about 30 degrees). Perhaps because we were expecting a more dramatic slowing response to the flaps (which we didn't get), the approach was hotter than anticipated. The Vampir kept right on coming towards us, showing us (up close) what kind of speed a 125-inch, heavy, clean flying wing can generate on a somewhat steep descent!

The touchdown point was a good 30 feet in front of us, and the stopping point was at least 10 feet past us. The Vampir's stinger fuselage had left a Morse Code scratch mark in the hard dirt where it bounced a little as it bled off speed.

Our lessons for the first flight: use the next bigger pitch prop (7x6), use more flap on landing, and land over thick grass to avoid scratching up the fuselage.

On our next available lunch hour, we used the 7x6 Robbe Dynamic prop. The motor's rpm sounded about the same. The climb looked a little better, but this time we launched over the flat field behind the cliff. It was obvious that the Mabuchi wasn't providing the thrust we needed for a relaxed, enjoyable flight. The climb was still too shallow.

We had picked a grassy area on the flats behind the cliff for the second flight's take off and landing area. The landing was supposed to be softer, but it didn't work out that way.

On final approach, full flap deflection (about 45 degrees) was slowly fed in, combined with gradual full down elevator. (At this point in the flight testing, no ATRCS-mixed elevator compensation was utilized.) At altitude, this combination of commands had proven effective at slowing the model, while retaining some roll and pitch control. However, on a steep final descent with airspeed climbing, we found that we ran out of down elevator!

The Vampir pulled up into a stall which caught this pilot off guard. Compounding

## INDEX TO ADVERTISERS



the error of the steep approach, I pulled off the offending flaps. The plane nosed back down. It regained airspeed as it headed earthward. With full up elevator (but no flaps . . . boy that could have made the difference) there wasn't quite enough altitude to pull out. The touchdown was about 25-30 degrees steep, and pretty hard.

The left wing tip hit about the same time as the fuselage and broke off just outside the fiberglass joining tape. The power pod cracked and shed two small parts from the sudden slow down. As a testament to the Vampir's strength, the damage done was actually slight, and nothing else was broken, including the Airtronics PCM receiver which (for lack of room in the fuse) had no foam packing around it!

Lesson of the day: limit flaps to 30 degrees if no transmitter-mixed elevator compensation is used. Otherwise, use the elevator compensation for additional elevator throw!

The repairs were made easily and were nearly undetectable when completed. Foam core wings (in general) usually break cleanly and go back together like two jigsaw puzzle pieces. By using epoxy and micro balloons, the wing did go right back together. Some two-ounce fiberglass cloth helped strengthen the new joint. A little smoothing with a Perma-Grit sanding tool left the repaired area ready to recover with Top Flite Econocote and Trim Monokote scraps. The wing was as good as new after about an hour's work (plus cure time for the epoxy).

Likewise, the power pod was easy to repair. All it needed was to reglue the broken CA glue joints, patch one little area inside with 2 oz. glass cloth and thick CA, and reattach the motor mount flange which had broken off. The latter was reinforced with carbon fiber strips, making it stronger than new.

At this point, we decided not to fly with the ferrite magnet Mabuchi motor anymore. We proved the manufacturer was technically correct in saying that a Mabuchi 540 motor WILL take the Vampir up. However, for practical purposes, they are incorrect in recommending a motor that (at best) appears to only deliver 100 feet per minute climb rates.

An Astro Flight FAI 6-turn cobalt magnet motor was installed. This motor is the most powerful, seven-cell, "05" motor made in the USA. As with the Mabuchi, the Astro was a direct drive motor.

First flights were with an 8x4 Robbe Dynamic prop. A better choice would be the 8x6. The climb rate was now about 200 feet per minute. Because the Astro consumes more current, the motor run time on the 900 mAH pack is reduced to about 80 seconds.

Although ground handling can be awkward, once airborne, the Vampir handles very well. Turns are predictable and stable with only slight aileron adjustments required to keep it turning at the proper bank angle. Handling is very normal.

The Vampir does seem to have a couple of funny little quirks. In gusty, high wind conditions, it sometimes has a very slight pitch oscillation or "wiggle." This does not upset the flight path at all, it's just occasionally there.

Also, the Vampir seems to change geometry as it passes in front of you. One wing appears to gain sweep while the other looses it. Obviously, this is an illusion. It's just one of those neat, but bizarre things that makes the Vampir such an extremely interesting model to observe!

Because many modelers may be afraid to try their hand at building and flying a tailless R/C aircraft, let's take a quick look at why the Vampir is actually a very stable design.

Pitch stability in a conventional model is achieved through a downwards force created by the horizontal stabilizer and its negative angle of attack relative to the wing. Pitching oscillations are similarly damped by big, lightweight horizontal tails. These stabilizing forces act through the tail boom to keep the natural, but unstable, pitching moment of a cambered wing in check.

In the Vampir, the root chord of the outer wing panels are toed-in about six degrees. This creates a somewhat lower angle of attack for the tips. They are effectively serving as horizontal stabilizers. The 39-inch length of this model, the area of these tip panels, and their angle of attack combine to give the Vampir very good pitch stability.

The dihedral and anhedral of the Vampir's wings combined with their high sweep angles present a large vertical surface behind the fuselage. When you view the Vampir from the side, the wing comes up and back like a swept V-tail, then down and back like a swept, inverted V-tail. In this case, the length of the wings and their total vertical area combine to serve the same function as a pair of vertical stabilizers.

The net stabilizing effect of the Vampir's swept, gull shaped wings is considerable. We've found that when the airspeed is kept up to a rate commensurate with efficient flying, the Vampir tracks almost as well as a conventional aileron ship. Kept well above the stall speed, the Vampir is actually easy to control.

Where the Vampir can get into trouble, however, is when its airspeed is allowed to dip too close to the stalling point. Here adverse yaw becomes apparent when aileron commands are given. If, after the adverse yaw has begun, the Vampir does stall, it temporarily loses all stability and simple inertia takes over. It is the queerest maneuver I've ever seen a sailplane do! It is a rotating, sideslipping, almost slow motion . . . falling! And, to see such a big, high aspect ratio, gull-wing, chevron-shaped flying wing do such a bizarre slide and then pull out, is to want to do it again, deliberately, just to watch it again! Luckily, the Vampir recovers quickly, and control does return with airspeed.

Lesson learned: keep the Vampir's flying speed up at all times, especially near the

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ground.

The Vampir is a big, graceful ship that behaves in a graceful manner. It is not meant to be horsed around the sky like a small slope racer. Stirring the sticks unnecessarily will yield a large increase in the Vampir's sink rate.

The Vampir thermals controllably, covers a lot of sky in a hurry, looks great in the air, and always draws a crowd on the ground.

It would make an excellent big slope ship, given a big enough landing area. Many have flown mild aerobatics with Vampirs: loops, rolls, and inverted flight. We did not attempt this in our review: (1) because we felt this kind of flying was not in keeping with the basic intent of the design, and (2) because our local slope site in the Cleveland National Forest was burned down to big, black, aircraft-eating sticks about the time we wanted to fly there this past summer.

Further, we did not attempt aero towing or winch towing, although these are possible and have been done extensively in Germany.

Most people in the US will want to enjoy the fun and convenience of electric motorgliding with the Vampir. Just charge up, throw, and go! Anywhere! Anytime!

The Vampir is available through your local dealer or directly from Robbe. List price is $219.95 for the Vampir (kit number 3135), and $17.50 for the optional power pod (kit number 3136). •

**Jake** ..... *Continued from page 7*

*starts fighting it. Bill roars by on his takeoff run and snags the guy's line in his undercarriage. The line back to the fishing pole snaps, and Bill's Robin rises from the lake with a four pound fish trailing behind it on about a hundred feet of line.*

*The fish guy is jumping up and down hollering and screaming that he wants his fish back, and Bill is trying to figure out how to get rid of it before he attempts a landing. Ray Sindelaar suggests to Bill that he make a low pass to drag the fish in the water and maybe break the line. Bill thinks this is a good idea, so he descends to set up a full throttle low pass. It might have worked too, if the mayor hadn't come speeding by in his ski boat with his wife in tow on water skis. Edna and the fish come together at about eye level, and Mrs. Hizzonner gets whopped a cold, slimy one, right in the kisser.*

*As luck would have it, the line didn't break, so the Robin climbed back up with the bass still dangling behind. Patty Cochran says he thinks the line might break if Bill does some acrobatics. So Bill does a snap roll and a spin, but to no avail. The fish just follows along for the ride. Finally, Bill pulls a real tight loop and catches up to the fish with the prop. Guts, scales, and half digested worms rain down on the lake and on Melba Franklin's south shore bed-and-breakfast inn.*

*Bill dead sticks the Robin to a safe water landing, but before he can get to it, the deranged fisherman wades out and beats it to death with an Abu-Garcia spin casting outfit. The mayor meanwhile, who has retrieved his fallen mate, revs up the ski boat, draws a bead, and pulverizes what's left of the Robin's floating wreckage.*

*My question boils down to this. Melba and the mayor are suing and the fisherman is threatening to file. We're suing the fisherman for destroying the airplane, but we're not sure if we can sue the mayor for running over an airplane that was already trashed. What do you think?*

*Aqua Aviator in Ashtabula*

Dear Aqua Aviator:

I think Melba's place sounds ideal for the Labor Day weekend. Do you know what her rates are?

Jake

* * *

*Dear Jake:*

*A rumor was circulating at our last club meeting that a biplane won the FAI Pattern Masters at Pensacola. That can't be right, can it?*

*Sceptic in Skagway*

Dear Sceptic:

Of course not. Everyone knows that a biplane can't possibly fly as well as a monoplane. The biplanes at the Tournament of Champions would have been nowhere without the scoring bonus to make up for their inherent deficiencies. If a biplane were ever flown in FAI pattern, it would receive no bonus whatsoever, and therefore would be wholly noncompetitive.

The source of the rumor you heard was probably a biplane that was seen at the Toledo show. It was entered in the pattern category of the model display competition. The judges at Toledo know a good pattern airplane when they see one, however, and the biplane did not even place in the category. Further proof that anyone who thinks a biplane can hold its own against sleek pattern ships is sadly mistaken.

Jake

* * *

*Dear Jake:*

*What would you say if I told you that three years ago my R/C Buzzard Bombshell landed on some high tension wires, and that 4000 amps went through the radio system, and that even now, after three years of regular use, the battery is still fully charged?*

*Jolted in Jericho Park*

Dear Jolted:

I'd say that if it weren't for the fact that it happened three years ago, you could call that a current event.

Jake

* * *

*Dear Jake:*

*In the past you have mocked the state of technology in Russian radio control equipment. I have not complained earlier because until recently our radio equipment did lag behind American and Japanese products, although not as much as your cracking wise implied. However, recent advances in the Russian technological state-of-the-art have brought our electronic equipment up to par with everyone else.*

*Please inform your readers that our equipment is first rate and modern, and that you will no longer be making fun of it.*

*Sergei Vlastopov, Soviet Consulate*

Dear Sergei:

You are quite right! I just finished an evaluation of the new Kolchoi PCM-10. The truss that comes with it to prevent injury when lifting the transmitter is now made of Kevlar. This is truly a space age fiber and your radio equipment can no longer be considered archaic. My apologies.

Jake

* * *

*Dear Jake:*

*I have discovered (at great repair cost to my airplanes, I might add) that even with a full overnight charge my radio system will only operate for 23 minutes before failing. This is the case regardless of what airplane I put it in. What should I do?*

*Distressed in Decatur, Georgia*

Dear Distressed:

I suggest the following: Charge your system overnight whenever you plan to fly. Turn on the radio exactly one minute before you start your engine. Warm up the engine for exactly two minutes before taking off. Fly for exactly seven minutes before landing. Turn off the radio exactly one minute after landing. Repeat this entire process exactly once, then go home. You shouldn't have any more trouble.

Jake

* * *

*Dear Jake:*

*I am a theoretical physicist at the Batel*

*Institute in Columbus, Ohio. I have read with amusement your rather trivial treatises on aerodynamic half-life and the aerion subatomic particle. You have postulated that foliage absorbs aerions and therefore model aircraft flown in the vicinity of trees have a consequently shorter life expectancy. Rubbish!*

*The Blenheim Reciprocity Criterion clearly contradicts your misinformed theorem on the relationship between chlorophyll based photosynthesis and aerion absorption. If this is so, as you may ask, then what does explain the foreshortening of the aerodynamic half-life of aircraft flown in proximity to deciduous trees? The Heisenberg Uncertainty Principle is the answer. Simply put, the Heisenberg Uncertainty Principle states that no two objects may occupy the same place at the same time. This universally applicable law explains traffic accidents, the rules of board games like "Sorry," and the low life expectancy of models flown near trees.*

*In the future, please research your facts before you publish another woefully unsupportable claim regarding particle physics.*

*Veejav Raviz, PhD*

Dear Doc:

Sorry, but I can't accept your argument. I happen to know the origin of the Heisenberg Uncertainty Principle and I have to conclude that it is not relevant to aerodynamic half-life.

Gustav Heisenberg was an expert on uncertainty because he was a notorious drunk. After decades of staggering home to the wrong house and finding his key wouldn't work, he had the following revelation: "Hey, this isn't my house. I must be in the wrong place." Shortly thereafter he came up with the original version of the Heisenberg Uncertainty Principle which stated that, "Two objects can't be in the same place at the same time, unless you count succotash." Hardly an adequate explanation for the rapid decay of aerions in a wooded area, wouldn't you say?

Jake

* * *

*Dear Jake:*

*What became of the Handley-Page company that built those magnificent British aircraft of the early aviation era?*

*Stanley in Livingstone, Kansas*

Dear Stanley:

Handley-Page withdrew from the aviation industry when the boom years tapered off and went back to their background in the manufacture of motor cars. Their best known product is the Rolls-Canardly. This is the well known luxury automobile of British nobility that Rolls down one hill and Canardly get up the next.

Jake

* * *

*Dear Jake:*

*How important is a good pit stop in the U-Control Team Race events?*

*Howard in Thornton, Mississippi*

Dear Howard:

Team racing, like virtually all control line events, is conducted outdoors during the summer months when temperatures and humidity run high. With all the pilots sharing the tight quarters of the flight circle center, and because each pilot has his control handle arm raised toward his plane, a case of pungent underarm would make things very unpleasant for everyone involved. Therefore, a good anti-perspirant/deodorant is a crucial element of any successful Team Race. Pit Stop is my favorite brand also, but there are many others that work as well.

Jake

•

**O' Counter** . *Continued from page 10*

nationwide, but if you can't get it in your area, you can order direct from Frank Tiano Enterprises at the address above.

* * *



Noted Gee Bee scale modeler and historian, Henry Haffke, is in the process of shipping copies of his new book, entitled *GEE BEE: The REAL Story of the Granville Brothers and Their Marvelous Airplanes.* We haven't seen a copy so we can't give you a first-hand review, but here is what Mr. Haffke's press release has to say about it:

"For the first time, the story is written as it really happened, not as it has been distorted over the years by writers who had little regard for the facts they reported on.

"Written by Henry Haffke who grew up near the Springfield Airport where it all took place, with the help of Bob Granville,

Bob Hall, Howell Miller, and members of the Granville family who put the author in touch with those pilots and owners who were actually involved with the Gee Bee aircraft.

"Over 15 years were spent on research before the book was written. The book contains over 150 pages and tells the entire story of the Granvilles from their childhood days in Madison, New Hampshire, until the demise of the Granville Brothers Company in 1934. Featured are over 200 photographs from collections of various Granville family members, many of which have never appeared in print before. Also three-views of all of the Gee Bee aircraft by Harry J. Robinson and Bill Hannan."

Books can be ordered directly from the author for $27.00, which includes shipping. Write to Henry Haffke, Magic View Motel, Route 11, Londonderry, Vermont 05148.

* * *

Specialty Services, of Canby, Oregon, is offering identification plaques custom engraved with your name, address and phone number, to be used to identify your transmitter, field box, tool box, etc. They measure 1-1/2x3-1/2 inches, are available in your choice of brass or aluminum, and contain four lines of information. The plaques come pre-drilled for screws, or they can be mounted with double-sided tape or even sewn on, in the case of a cloth bag. Going price is $6.95 each plus $1.50 postage and handling. An order form is available by sending an SASE to Specialty Services, P.O. Box 134, Canby, Oregon 97013-0134. •

**Workbench** . *Continued from page 7*

Murray Ave., Goshen, NY 10924, and his list of stock basswood ranges in 14 section sizes, from 1/8 square up to 1/2x3/4, and in lengths of 36, 48, 60, and 72 inches. He also offers to cut any other special sizes to order. The prices seem quite reasonable to us, ranging from 20 cents for 1/8 square by 36 inches up to $1.35 for a 1/2x3/4x72-inch chunk. The 72-inch lengths could certainly eliminate a lot of those worrisome splices that sometimes become necessary on the biggies. (You might know it . . . I just measured the 1/3-scale Gipsy Moth drawings, and the bottom longeron is 74 inches long!)

By the way, the third request was for information on the designer of the aircraft shown on page 6 of the September issue. Still no response to that one. Does anyone recognize the plane and/or its designer? Also, we've had three wrong guesses on the identity of the currently well known modeler and model manufacturer on page 6 of the October issue . . . and no correct answers. Of course, we won't accept an answer from the modeler himself, or from his son, who is a world class competitor.

And while we're on the subject of questions and answers, can anyone help us to identify the engine pictured this month? The photo was sent in, along with the request for identification, by a reader from Aachen, West Germany, Klaus Hammerschmidt. He'd like to know the name of the engine, as well as the name of the manufacturer.

**WHAT'S THIS?!**

The 3rd Pacific Free Flight Championships is being held in Carterton, New Zealand, on February 3 and 4, 1990. Categories to be flown include the basic F1A, F1B, and F1C, plus P-30, A/1, and a Junior event only described as "FFOXY." To quote a press release, "This event incorporates the biannual Trans Tasman Challenge between teams of sportsmen from Australia and New Zealand, this being the 11th challenge, and this time it is also listed by the F.A.I., which is the global body controlling all aerosports. This contest is an F.A.I. Open International and will attract World Cup points, which considerably increases the prestige of the event, and the organizers are confidently expecting contestants from the U.K., Belgium, Holland, West Germany, Indonesia, U.S.A., and Argentina, as well as a large contingent from Australia."

OK, so this is great, and it will undoubtedly be a major event for the 1990 modeling year, but let me tell you what should *really* make you sit up and take notice. The above press release is part of the entire announcement about the contest from its sponsor . . . are you ready for this? . . . the Futaba Corporation! Is there anyone reading this who doesn't know that Futaba is a major manufacturer of radio control equipment? •

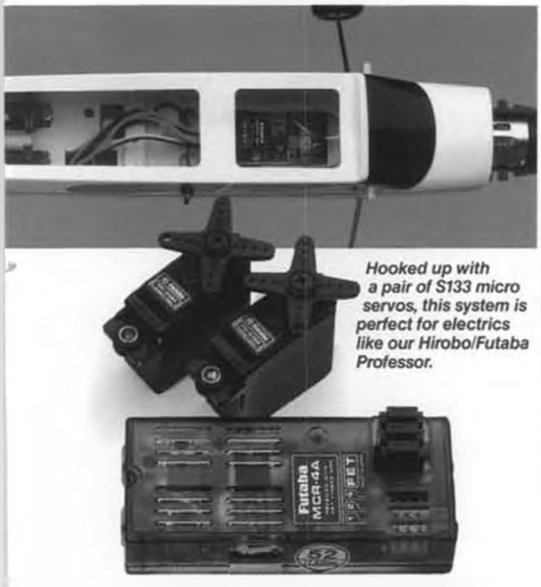
# FOUR BY FOUR.


## THE ATTACK 4NBL

Our newest 4 channel system has something for everyone. In fact, the Attack 4NBL is such a versatile performer we've customized it for all kinds of radio control fun.

## ATTACK ELECTRIC

The 4NBL/MCR system is destined to become a favorite with electric flyers. This Attack system comes complete with our new MCR-4A integrated receiver/speed control. This remarkable device incorporated a four channel receiver and a MOSFET speed control into one very compact, very light and very efficient package. It also incorporates BEC to eliminate the need for, and extra weight of, a receiver battery.



*Hooked up with a pair of S133 micro servos, this system is perfect for electrics like our Hirobo/Futaba Professor.*

*The MCR-4A four channel receiver/MOSFET speed control weighs just 1.5 oz. and can easily handle 280 to 540 size electric motors. 1.24" x 2.92" x 0.63".*

## SILENT ATTACK

There's a 4NBL system for sailplane flyers, too. With the Attack glider package you get a pair of S133 servos, R114H four channel receiver and a 250mAh NiCd pack. Again, when size and weight of the airborne package is critical, Attack is the answer.

| Transmitter/T4NBL | | | | |
|---|---|---|---|---|
| RECEIVER | SERVOS | BATTERY | FREQUENCY | TYPE |
| MCR-4A | S133(2) | BEC | 72MHz | Electrics |
| R114H | S133(2) | NR-4K | 72MHz | Sailplanes |
| R114H | S148(3) | Dry Case | 72MHz | Aircraft |
| R114H | S148(3) | Dry Case | 75MHz | Truck/Boat |

## ARF ATTACK

Looking for the perfect system for ARF and conventional sport aircraft? Once again, it's Attack to the rescue with a high value package including R114H receiver and three S148 servos.

## 4X4 ATTACK

There's even a surface Attack 4NBL system on 75MHz. Supplied with three S148 servos and R114H receiver, this ground and sea outfit has what it takes for gearbox-equipped 4x4's and RC boats.

*The ergonomically designed T4NBL transmitter features comfort contoured case and adjustable length control sticks.*

No matter which 4NBL system you choose, you'll also get our new four channel Attack transmitter.

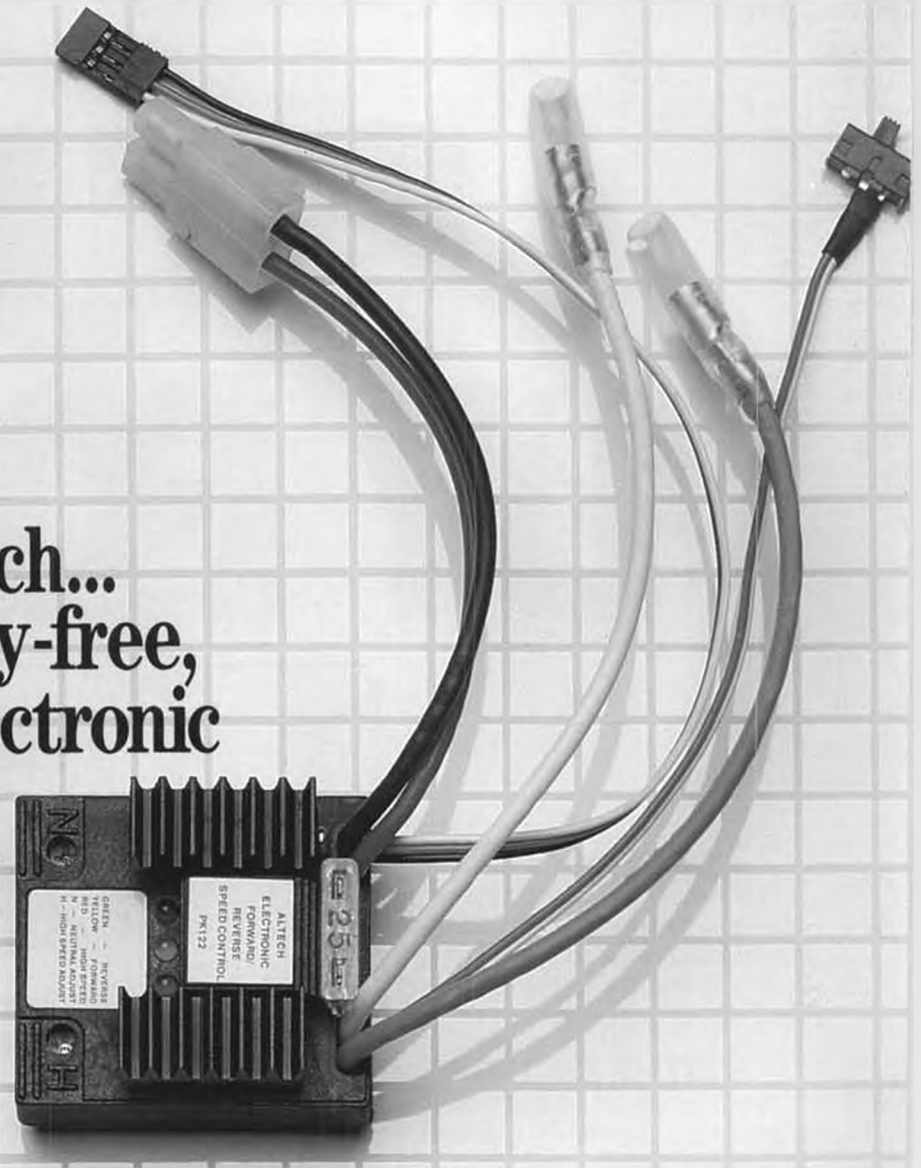
Loaded with extras like adjustable stick gimbals, servo reverse switches and a rechargeable NiCd pack, the T4NBL transmitter also features a comfort contoured case and neck-strap for fatigue free operation.

*The R114H and MCR-4A receivers both meet the new 1991, 20KHz specifications.*

**Futaba** 20KHz 1991

**Futaba Corporation of America**
555 West Victoria Street, Compton, CA 90220

# From Altech... the first worry-free, hassle-free electronic speed control




You no longer have to worry about whether it will fit your boat or buggy. If it will be compatible with your radio. Or will last and perform as advertised.

The Altech PK122 was engineered to answer these questions. First, it fits just about all popular electric boats and buggies that are equipped with a 540 motor (.05). And works with the most popular radios, including Acoms, Challenger, Futaba J and newer MRC systems.

Best of all, unlike conventional speed controls, hobbyists tell us that many times, long after their buggy or boat gears wear out, their PK122 is still going strong.

What do you have to know to select a speed control? Know what kind of maximum continuous current you can use. Find out if it has MOSFETS, and what in the world is a MOSFET? And is there a delay circuit built in for extra protection?

**Here are the answers:**

MAXIMUM CONTINUOUS CURRENT is the amount of electricity flowing through the speed control to the motor on a constant basis. DELAY CIRCUIT is a programmed delay in the speed control to prevent damage to the transmission when responding to a forward-or-reverse command.

PROPORTIONAL SLOW SPEED CONTROL means a stepless variation in speed. It means that now at your fingertips you can command precisely the power you need, in any amount you need. So when changing speeds, you'll experience a silky smooth transition and instant response.

A MOSFET is a Metal Oxide Silicon Field Effect Transistor, or "power gate," which controls the power going to your motor.

So when you're ready to lighten your load and get the most out of your boat or buggy, turn to Altech PK122, the electronic speed control that's hassle-free, performance engineered and built to last.

Here are just some of the features:

- High Power MOSFETs with aluminum heatsinks for maximum power transfer and efficient cooling.
- High Speed, Forward and Reverse/Brake indicators for adjustment.
- Neutral and High Speed Adjustments permit use with a variety of R/C systems.
- Fuse protected output to protect MOSFETs plus thermal overload protection circuitry.
- Convenient ON-OFF switch.
- Prewired battery connector and motor socket connectors eliminate most soldering.
- Battery eliminator circuit provides power to the receiver and steering servo; receiver battery is removed for lighter weight. Also, the speed control eliminates the throttle servo and mechanical speed control.
- Universal servo connector fits Acoms, Challenger, Futaba J and newer MRC R/C systems.
- Reverse delay feature prevents car transmission damage.

**SPECIFICATIONS:** Forward Proportional, (1) Speed Reverse. Maximum Continuous Current: Forward: 90 amps, Reverse: 45 amps, Maximum Peak Current: Forward: 240 amps, Reverse: 180 amps. Input Battery Voltage: 6 to 8.4V, Voltage Drop: 0.015V/A

| SIZE: | LENGTH: | WIDTH: | HEIGHT: |
|---|---|---|---|
| MM: | 48.0 | 42.0 | 29.68 |
| INCHES: | 1.88 | 1.65 | 1.0625 |

ALTECH MARKETING

P.O. Box 391, Edison, NJ 08818