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Flight Champs**

**Celebration of  
Silent Flight**

reviews:

**CERMARK'S  
SUKHOI  
SU-26M**

**F-14 TOMCAT  
FROM GREAT  
PLANES**

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### 94407 Micro Ball Bearing Servo.

Weight: 0.96 oz. • Torque: 29 oz./in. • Speed: 0.25 Seconds for 60° Rotation • Dimensions: L: 1.23" x W: 0.80" x H: 1.23"

What do you get when you combine a light-weight and compact design with loads of punch? The ultimate in high-performance versatility! With small powered aircraft you can use the 94407 as an aileron servo, and with its small size and weight you can easily mount it inside the wing. It has terrific torque for a variety of applications, and its ball bearing shaft makes it incredibly durable. Ideal for electric helicopters!

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Weight: 2.5 oz. Torque: 135 oz./in. • Speed: 0.25 Seconds for 60° Rotation • Dimensions: L: 1.54" x W: 0.79" x H: 1.65"

Got a giant scale aircraft? Here's the servo that's perfect for you. This Pro Series unit has a tough, metal gear train and metal output gear coupled with a double ball bearing output shaft. That combination helps it withstand heavy-duty use during competition and ensures longer life. Its hefty 135 oz./in.

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### 92745 Micro Receiver, 72 MHz FM.

Weight: 1 oz. • Dimensions: L: 2.25" x W: 0.96" x H: 0.82"

If you want to get the best out of your small aircraft, electronics and gliders, you have to check out this micro receiver!

The new 4-channel Micro FM Dual Conversion Receiver has all the high-performance, super narrow-band features of its 8 channel big brother, the gold label 92785, but in a smaller, more compact package which still meets all AMA guidelines. What's more, its compact design features state of the art surface mounted electronics, thanks to the ingenuity of Airtronics' advanced engineering.



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Power Supply: 7.2 to 12 Volt NiCd Pack • Weight: 1.7 oz. Dimensions: L: 1.52" x W: 1.3" x H: 0.65"

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prevents overheating, an Arming switch guards against accidental startups and a special Brake Circuit keeps folding propellers from freewheeling, allowing them to fold back in place properly.

The MA-6 handles up to 10 cells or 12 volts input. Get an MA-6 and you'll fly high and fly fast!

**ATTENTION ALL ELECTRIC AIRCRAFT FLYERS!**



**BUILT FOR GIANT SCALE!**

prevents overheating, an Arming switch guards against accidental startups and a special Brake Circuit keeps folding propellers from freewheeling, allowing them to fold back in place properly.

The MA-6 handles up to 10 cells or 12 volts input.

Get an MA-6 and you'll fly high and fly fast!



**SUPER LIGHTWEIGHT!**

### 94581 Microlite Servo.

Weight: 0.57 oz. • Torque: 29 oz./in. Speed: 0.23 Seconds for 60° Rotation Dimensions: L: 1.07" x W: 0.50" x H: 1.07"

Here's proof that good things come in small packages! The Microlite's outstanding performance belies its small size and super light weight. Its gutsy torque makes it ideal for a range of small aircraft applications, while its rugged coreless motor is fast and reliable. And twin mounting holes on an injected molded case give you terrific flexibility of installation.

Compare its performance and superior strength to servos weighing twice as much!



Model built by Colonel Robert Thacher

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For more information about our quality line of R/C systems and accessories, contact your local hobby dealer or Airtronics for our free 1992 catalog.

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



# New book "briefings" from H.A.

**B-17 Flying Fortress**  
Jose Art Gallery

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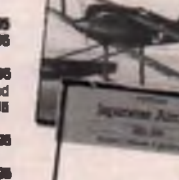
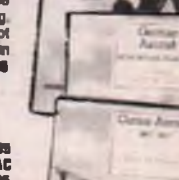
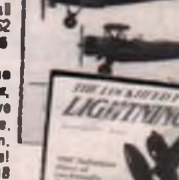
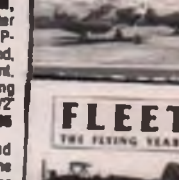
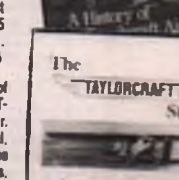
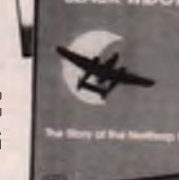
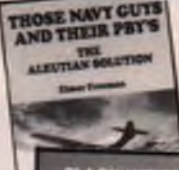
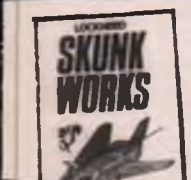
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# MODEL BUILDER

WORLD'S MOST COMPLETE MODEL AIRCRAFT PUBLICATION

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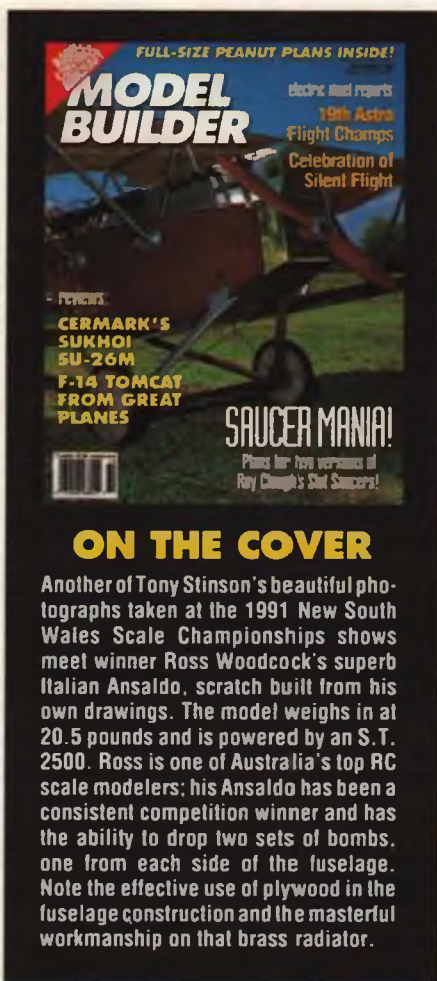
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**ON THE COVER**

Another of Tony Stinson's beautiful photographs taken at the 1991 New South Wales Scale Championships shows meet winner Ross Woodcock's superb Italian Ansaldo, scratch built from his own drawings. The model weighs in at 20.5 pounds and is powered by an S.T. 2500. Ross is one of Australia's top RC scale modelers; his Ansaldo has been a consistent competition winner and has the ability to drop two sets of bombs, one from each side of the fuselage. Note the effective use of plywood in the fuselage construction and the masterful workmanship on that brass radiator.

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# SUPER SKYBOLT

AEROBATIC SPORT-SCALE BIPLANE



Length: 52"  
Wingspan: 57"  
Weight: 8.5-9.5 lbs.  
Wing Area: 930 sq. in.  
Requires: 2-cycle 60-.91 or  
4-cycle 90-1.20 engine  
and 4-channel radio

## The Greatest Show Above Earth

You tilted your head back until all you could see was sky. The exclamations from the crowd echoed in your ears as you watched the daring aerobatics above and imagined you were the pilot of the amazing biplane.

Now the pilot's seat can be yours with the Great Planes Super Skybolt. Modeled after the full-scale Skybolt, one of the most famous homebuilt show planes ever, the Great Planes Skybolt has the looks of a classic airshow biplane. A vacuum-formed clear canopy, molded wheel pants, aluminum landing gear and colorful decals all add to this biplane's realistic styling.

In the air, the Super Skybolt performs the same exciting aerobatic maneuvers as its full-size counterpart...loops, rolls, lomcevak, knife-edge and more. In fact, it follows your commands so smoothly and effortlessly, you'll think you're sitting in the cockpit.

### From field to flight in a matter of minutes

When it comes to building the Skybolt, Great Planes traditional computer-designed construction helps you easily bring this beautiful scale model to life. Interlocking parts simplify cabane construction. Built-in jig-tabs make it easy to achieve a straight, true wing on any flat surface. A durable, quality-designed, two-piece cowl simplifies assembly even further (and looks great). When you get to the field, the Super Skybolt's unique wing attachment system makes set-up easy, too. First, slide the top wing into place. Next, quickly snap on the struts. The bottom wing can then be attached with only two nylon bolts. In just a few minutes, you're ready to fly.

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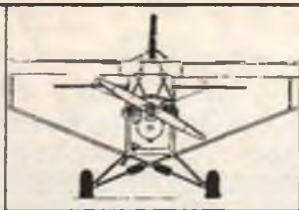
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# AIR MAIL

Have a comment? Question? Suggestion? Gripe? Direct your correspondence to Air Mail, c/o Model Builder, P.O. Box 669, Capistrano Beach, CA 92629.

## MORE ABOUT JAKE

*Model Builder* is the only U.S. magazine to offer any amount of free flight. But could we please have a return of the Old Timer plans? If it's a question of space, you could delete Dear Jake, which is a waste of time and has never been funny!

Bob Stalick is great!  
J.D. Anderson  
Surrey, B.C., Canada

Love your rag! Keep Jake!  
Norman W. Karolenko, Jr.  
Glyndon, Maryland

*Model Builder* always contains many fine articles, just one example being "The Pursuit of Perfection" by Rick Allison in the August issue. But why do you waste good space on Dear Jake? I've tried on many occasions to read this column, trusting that if you print it, it must have some value. I have never found it amusing, informative or worth one line of type. I would call Jake's drivel childish, but that would be an insult to all children.

Jake must be a relative of the publisher to get printed in the first place, but please bury the worm and put the space to worthwhile use.

John G. Smith  
Columbia City, Indiana

The Dear Jake column is a total waste of your paper. A page of "just guys flying free flight" would be of more interest to me.

John Epley  
Tucson, Arizona

Hooray for Electric Power by Roger Jaffe and I like Jake! It's the second column I read, after the electric one.

Richard G. Simpson  
Pittsburgh, Pennsylvania

Don't listen to the humorless people who want to cancel Jake. They wouldn't know humor if it jumped up and bit them. I enjoy *MB* very much.

Richard N. Pann  
Augusta, Georgia

## TRASH WHO?

Getting a little touchy, aren't we? Depicting the Bill Ryan letter (Air Mail, June '93) as "Hate Mail" is an overreaction of the wildest sort and is, itself, an indication that Mr. Ryan may be right on the money. The practice of printing a letter and then trashing the writer with some sort of snotty comeback (rather than an honest response) is, at worst, an indicator of a small mind or,

at best, Cheapo Journalism.

Like many others, I too have Vol. 1, No. 1 and all subsequent issues—up to a couple of years ago, when I started looking through each new issue at my local hobby shop and only buying when I found something interesting. Why? Because *MB* had gone far down the road to becoming indistinguishable from *MAN* and (forgive me for this) *RCM*.

When it first hit the stands, *MB* was far and away the best magazine in the field. Is this the case today? I'd like to say yes, but in all honesty I cannot. On an issue-by-issue basis, sometimes; but generally *AMA's* magazine is the better one. Does this mean that I love the *AMA* and the way it is run? Not!

There is no "nasty" content in that statement. It's merely an observation, not an insult, and should be treated as such. This really is an affectionate letter.

Nagio Forbes  
Glenview, Illinois

*Publisher Mark Thiffault replies:*

*Nagio, your letter prompted us to review the June letter from Bill Ryan of Monterey, California. It was headlined "Hate Mail..." and read as follows: "Some months ago, whoever is in charge wrote how the magazine was drifting aimlessly and how it would have direction in the future. I agree with that—all downhill and for the worst." We did not print any comment on the letter, much less trash Mr. Ryan. His opinion—and yours—are welcome, even if the message isn't positive.*

## FREE FLIGHT FOREVER

Please don't forsake the FF and rubber power groups. The other magazines have all gone RC and leave nothing for the old-timers.

Robert A. Rahn  
Milford, Connecticut

## LOOK TO THE PAST

This will be my last renewal unless there's a vast improvement in *MB*. I have been a reader since 1972 and have only renewed the last several years because I hoped you'd improve.

If you'd like to better your magazine to my needs, read several years of *MB* from the '70s and attempt to emulate the contents. This does not mean redoing old Mooney Peanuts. Your reprinting those plans just proves how far you've slipped. They should be inserted as a bonus for newer readers, but should not be counted as the one or two paltry offerings we are now served.

*continued on page 10*





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These days, many new products appear with unproven new devices just so they can be called "new". Gimmicks that have no clear reason for being. PCM-10 users stated they wanted the radio to stay basically the same, so when JR engineers set out to improve the PCM-10, they built on their success. With added quality. Faster response. More memory. More mixing. And easier use. Features that benefit a



Chip Hyde won the U.S. Masters, AMA Nationals and the World Championships with a PCM-10.

With a 16-bit CPU and an A-D converter, resolution is improved to a phenomenal .12 dig/bit. When combined with the 4131 servo (proven by independent labs to have the highest degree of precision of any servo on the market), this resolution produces the smoothest flights ever.

### SPEEDIER AND EASIER

JR shaved processing time in half, to a scant 20 milliseconds. The fastest in the industry.

You won't need a degree to operate the 10S. In fact, you may not need anything. As Chip Hyde said when he first got his airplane PCM-10, "It was so easy to program, I didn't even need the instructions. All the information I needed was right there on the screen."

And the 10S is even easier. New menu displays give easier directions. New dual speed scrolling saves time during set-up of your model.

In case you want to go by the book, it too is better. Easier to follow. Better organized. Complete with every PCM-10S features explained in details.

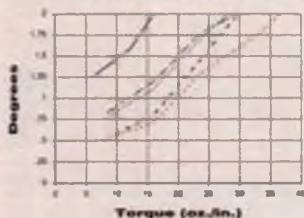
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- 1024 dual conversion with JR's patented ABC&W interference rejection circuitry.
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- Programmable mixing extended to all 10 channels.
- 10 model storage.
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- Adjustable intensity LCD touch panel.
- New ultra-detailed instruction manual.
- Two-speed scrolling.
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#### Airplane Version

- New 3 position Aux 2 switch with unlimited mixing of any channels. Perfect for twin engine throttles.
- New Quadra flap programming for complete mixing of 4 wing servos like speed brakes, crow and spoilers.
- 8 programmable mixes available for all 10 channels.
- Programmable mixes can be turned on/off with a wide variety of switches.
- New origin mixing option derives mixing travel from original throw.
- New gear slow timing allows adjustment of mechanical retracts from 1/2 to 5 second range.

#### Helicopter Version

- 5 programmable mix capability for all 10 channels.
- 3 position flight mode. Stunt trim available for preset trim of Mode 1 and 2. 7 positionable points for pitch and throttle in each mode. Points are assignable 0-100%.
- Tail rotor mix completely assignable to any point for correct mixing when flying inverted.
- Auto Dual Rate: Automatically adjusts rate travel and type for flight controls to eliminate excessive switch flipping.
- P-Mix allows tail rotor compensation to match throttle curve in flight modes... important for aerobatics and switchless inverted.
- Rudder can be preset upon activation of throttle hold.
- Tail rotor mixing is adjustable in flight modes.



For more information about the JR PCM-10S, write JR, Dept. A 4105 Fieldstone Road, Champaign, IL 61821

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## AIR MAIL *continued from page 6*

I hope you take the above in the spirit in which it is intended.

John Breitenbach  
Silver Bay, New York

Please keep running Walt Mooney's construction Peanuts. They are great! All departments are just right!

James McSweeney  
Greensboro, North Carolina

### MYSTERY FLIER UNMASKED

We received the following in response to the "Where's His Sense of Humor?" letter in the August '93 Air Mail:

I understand there have been several "Doubting Thomases" concerning the flying ability of my son, Thomas J. Empey. I can say this: that he can perform any flying task once he puts his mind to doing it. Great flying ability runs in our family; the "knife-edge through the ladder" routine is just one example. Keep up the good work you people are doing with *Model Builder*.

James W. Empey, Lt. Col. USAF Retired  
Mesa, Arizona

As a bit of background, Col. Empey was a P-51 Ace in 1944 and later flew F-100s in Vietnam. He was joined there in 1967 by



son Tom, our infamous RC flier, who was with the 101st Airborne Division. Their reunion was documented by a story and the above photo in a 1967 issue of *The Screaming Eagle*. Our thanks to Col. Empey for sending the photo and vouching for Tom's extraordinary piloting abilities.

### ON TRACK

In the last several months, *MB* has really become a much more enjoyable magazine. It's obvious that there must have been a change in management or a change in philosophy.

What some publishers fail to realize is that there's a great number of hobbyists

who like to read and view photos about models almost as much as they like to build and fly them. I'd buy and read the magazines even if I stopped flying!

What sells magazines is lots of color photos of models. Whether in articles, ads or columns, photos of intricate uncovered aircraft showing wooden framework are great. Not all modelers are interested in all phases of the hobby, such as FF, RC or CL. But all modelers are interested in viewing well-executed framework.

Plane Talk is great! Expand it if you can. Your Electric Power column is great, too. Electrics have a tremendous future. Get established now as the champion of electrics!

Stan Puckett  
Indianapolis, Indiana

### RUBBER FAN

My main interest in modeling is rubber-powered planes. Two years ago I built a Boston Celtic from the centerspread plans from an issue of *Model Builder*. I finally got it trimmed out and am enjoying its amazing flying ability. It has a terrific and stable climb that is most impressive.

I am pleased to see the inclusion of rubber-powered plane plans in every issue of *MB*. Keep up the good work!

John W. Shatto  
Regina, Saskatchewan, Canada **MB**

## Proctor Museum Scale Kits

Acknowledged as the world's finest. Each comes complete with all hardware, fittings, rolled plans and concise construction manual. Enjoy building the same models that are displayed at nearly every major aviation museum. But don't forget, they fly great too!

Nieuport 11	1/5 Scale	81" Span	298.95
Nieuport 28 C-1	1/4 Scale	80" Span	429.95
Curtis Jenny	1/6 Scale	36" Span	429.95
Albatros DVa	1/4 Scale	87" Span	749.95

## Proctor Antics

Lou Proctor founded the company on this classic design and it continues to be an all time favorite. Choose from six different versions. Proctor quality starts as low as 109.95.

Mini Antic Monoplane	58" Span	119.95
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Antic Biplane	64" Span	229.95
Antic Biplane Triplane	64" Span	289.95

## VK Scale Kits

These models represent an outstanding value for the scale enthusiast. Each comes complete with all hardware, finished cowling, rolled plans and manual. If you are considering the move to WWI Scale, these kits are a great place to start.

Hinkle DR1	1/6 Scale	67" Span	199.95
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Nieuport 17	1/5 Scale	54" Span	139.95



Curtiss "Jenny"

Plans by R. Beck

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# PROCTOR



# DEAR JAKE

## Advice For The Propworn

### DEAR JAKE:

I tried following the instructions on a plan from *Model Builder* that told me to cover the plan with a sandwich wrap to keep the glued parts from sticking to it.

I did this, and the glue did not stick to the plan, but the resulting framework didn't look anything like the plan I built it over.

Is there some other wrap besides Reynolds Aluminum that I should have used?

Ed Toner in Howell, NJ

Dear Ed:

We cannot be held responsible for people who do not read all the instructions on our plans before they start a project. If you will look carefully at the instructions that came with your plans, you will find several footnotes at the bottom of the last page. Footnotes #4 and #5 cover your problem and would have prevented it. They are reprinted here to avoid similar mistakes by future builders.

Footnote #4: Aluminum foil wraps should not be used by anyone except Superman.

Footnote #5: Lead foil wraps should not be used by anyone including Superman.

Jake

### DEAR JAKE:

My wife gave me a Classic Car Calendar for Christmas and August has a picture of a 1924 Hispano-Suiza made of tulip wood. It's a beautiful open roadster that looks more like a Chris-Craft boat than a car with all that gorgeous polished wood.

It got me to wondering that if tulip wood is light enough to put on a car, maybe it's suitable for model airplane application.

What do you know about tulip wood?

Jasper in Colorado Springs

Dear Jasper:

You have been the victim of an old hoax.

Tulip wood grows only in Holland. It is very dense and heavy, and is used exclusively in the manufacture of wooden shoes. In 1924, the Spanish and the Swiss (thus Hispano-Suiza) got together to put one over on the Dutch. The Swiss hated the Dutch because of the chocolate rivalry between their two nations. Spain was fed up with all the Dutch complaining about a Spaniard, one Don Quixote, tilting at their windmills.

The 1924 Hispano-Suiza Tulipwood was a mockery intended to show that if the Dutch could be dumb enough to use wood for shoes, then more advanced nations could use wood for car bodies. The Dutch were incensed, of course, and retaliated by staging a bullfight with a chocolate-covered matador and a bull made of Swiss cheese.

The three countries have been mortal enemies ever since, and the poor wooden car got caught in the rain in 1946 and warped itself into the prototype for the Volkswagen Beetle.

Jake

### DEAR JAKE:

On a warm summer evening, after you've had five or six perfect flights, with greased landings, and you've packed the airplane back in the car, and the cooler's still on the tailgate, then it's "Miller Time!" Right?

Bud in Burlington, VT

Dear Bud:

Based on my success at the flying field, if I ever encounter the situation you describe it will be "Pinch Myself and Wake Up Time!"

Jake

### DEAR JAKE:

I read somewhere that the Montgomery Brothers made the first hot air balloon. Of course, we all know about how the Wright Brothers flew the first airplane. And apparently, somebody named the Smith Brothers invented the cough drop.

Why is it that it always takes brothers to invent something? I don't have a brother. How am I ever going to discover something and get famous?

Lowell in Massachusetts

Dear Lowell:

You're off the mark on a couple of points. First of all, it doesn't always require brothers to discover or invent something. I don't think Columbus had a brother. I'm pretty sure Leonardo Da Vinci had no siblings. Alexander Graham Bell was a solo act, unless you count Watson. Come to think of it, Sherlock Holmes worked with a Watson, too. You probably don't need a brother, just get yourself a Watson.

Pardon me, I digress. Your second error was on the hot air balloon. It was introduced by the Montgolfier Brothers, not the Montgomery Brothers. The Montgomery Brothers invented the discount department store, with a little help from their cousin, Ward.

The Montgolfier Brothers would never have conceived their invention either, without the aid of their sister, Jocelyn. Back in the late 1700s, everyone wore powdered wigs. Jocelyn's caught fire at a Bastille Day celebration, and the hot air rising from the flames caused her hat to float several feet above her head. Her brothers witnessed this phenomenon just before she was doused with Vichyssoise to extinguish the flames. This event triggered a flash of creative genius in the Montgolfier Brothers. They ran to their workshop and invented flame-retardant synthetic hair.

A few months later, they stole the hot air balloon idea from some unknown French inventor, who had also seen Jocelyn's floating hat trick and recognized the true potential in it. In a court battle, the inventor, whose name has been lost in unrecorded history, lost all rights to his discovery because 1) it wasn't his sister who inspired it, and 2) he didn't have a brother.

Jake MB

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## MAKE IT A DOUBLE, BARTENDER

Not content with having just a single-engine version of his ARF "Turbo Tube" (see the review in the January '93 MB), Hi-G designer Joe Mosca came up with a twin-engine, twin-fuselage, twin-fin version, one of the wildest looking machines to come along yet. Joe claims his new "Turbo-Twin 45" will do over 100 mph with standard two-stroke .45s aboard and is capable of some really fantastic performance. The model, which comes completely built and finished except for radio and engine installation, spans 58 inches, has 520 squares and requires a minimum of four channels (five if you want to incorporate the center wing flap and/or flaperons). No glue, paint or covering are needed for assembly, which takes about 9 hours to do.

Hi-G's Turbo-Twin 45 is built here in the U.S. and carries an introductory price of \$295, with no charge for delivery. From Hi-G, 2131 E. Crocus Dr., Phoenix, AZ 85022; (602) 788-5209.

## A BEAUTY OF A BEARCAT

The latest addition to Model Aviation Technology's line of large scale imported RC scale kits comes from Norway: a 1/5-scale Grumman F8F2 Bearcat, designed for 3.1 to 7.4 cubic inch gas burners. The kit for this immaculately detailed 87-inch span warbird includes a white epoxyglass fuselage, cowl, bellypan and wheel doors; balsa sheeted foam wings, stab and rudder; clear canopy, decals and even a fully articulating retractable main gear.

As you might expect, these kits are not inexpensive—\$1800, not



including S&H. A deposit of \$800 is required to reserve one of the limited run of 50 kits. Full particulars are available from Model Aviation Technology, 12848 Touchstone Pl.,

Palm Beach Gardens, FL 33418; or call (407) 626-6955.

## WHIZ 40 UPDATE

Ace R/C advises that their Whiz 40 kit is now being offered in a Standard version (minus the fuel tank, wheels, engine mount and



"Getting Started" book included with the regular kit), for experienced RCers who already have these items in their junk boxes and don't want to have to pay for new ones to get the popular Ace kit. The new Whiz 40 Standard kit retails for \$89.95—\$20 less than the full kit. It's available now at your local hobby shop or direct from Ace R/C, 116 W. 19th St., P.O. Box 472, Higginsville, MO 64037-0472; (816) 584-7121.

## NEW MAGNUM HELI ENGINE

To get maximum performance out of your .30-size RC helicopter, consider bolting in one of the new Magnum PRO .36SE (Special Edition) heli engines from Global Hobby Distributors. Claiming an output of 1.0 horsepower at 14,500 rpm, the engine features a typical helicopter engine heat-sink head, ABC piston/cylinder with Schnuerle porting, an automatic mixture control carb with dual needles, and even comes with a two-year unconditional warranty (excluding abuse). Suggested retail is \$169.95.

The PRO .36SE is available now in hobby shops throughout the U.S. Magnum engines are distributed exclusively by Global Hobby Distributors. Dealer inquiries are



invited; contact Global at (714) 963-0133.

## SUPER-SMALL SPEED CONTROL

Model Electronics Corp. recently released its "Electro System II"

electric motor control setup, claimed to be the smallest and lightest such unit available anywhere. The motor controller (shown in the photo) incorporates a BEC and battery reserve, and is potted in epoxy to protect against damage.

The other component of the Electro System II is the MOSFET-equipped power cord (not shown here), which is what supplies power to the motor; it also protects the overall motor control system from overvoltage, overcurrent, overheating and static electricity.

A complete catalog and price list



for this and all of the other Model Electronics electric power goodies is available by sending \$2 to Model Electronics Corp., 6500 6th Ave. N.W., Seattle, WA 98117.

## LANIER'S NEW LASER

Lanier's new Laser 200 is a true 1/4-scale kit of one of the first of the full-size contemporary mid-wing competition aerobatics monoplanes. This particular model was co-designed by Bob Godfrey, spans 72 inches, and will handle from .60 to 1.08 two-strokes or .91 to 1.20 four-strokes. Included are foam wings with aluminum spar and balsa sheeting, vacuum-formed wing cover, rear turtledeck, canopy, cowl and wheel pants; formed



aluminum landing gear, and all wood parts, but no hardware. Because it's a true scale model, it's legal for IMAA events.

For price and availability info, contact Lanier R/C, P.O. Box 458, Oakwood, GA 30566; or call (404) 532-6401.



### BUZZ IS BACK

Those who have been involved in RC soaring for any length of time will remember Buzz Waltz and his glider kit business, Buzz Waltz R/C Manufacturing. Buzz has been out of the picture for the last few years but has recently announced his comeback with a new company called Just Plane Fun Models. One



of his first new releases is the "Little Birdy," a 55-inch, 400 square inch polyhedral sailplane for hand launch, slope or even the AMA's provisional RC Duration Event 702. In addition to machine cut and sanded parts, the kit includes a hardware package, full-size plans and instructions. Full details as well as dealer information is available from Just Plane Fun Models, 3390 Paseo Barbara, Palm Springs, CA

92262; or you can talk to Buzz directly at (619) 327-1775.

### DRESS UP YOUR "THING"

Back in our March issue we did a review on the "Wild Thing," a .15-powered sport model produced by Ron Eigenschink at Precision Aero. That airplane incorporated PA's optional dress-up kit, and now, after numerous requests, Ron has come out with a similar option for his larger "Wild Thing 40," which gives the model a look similar to a contemporary full-size competition aerobatic aircraft. The basic Wild Thing 40 kit is priced at \$64.95; the dress-up kit goes for \$19.95 plus



\$4.50 S&H and includes vacuum-formed wheel pants, canopy, hardware, materials and instructions to build a cowl for either two- or four-stroke engines.

For details on this and PA's other neat kits, send an SASE to Precision Aero, 1561 River Highlands Dr., Oconomowoc, WI 53066.

### VALUABLE SAFETY ITEM

Varsane Products, maker of Perry pumps and carburetors, is now producing a remote needle valve for .25 to 1.20 cubic inch engines. The advantage of the remote needle, of course, are that it minimizes the chances of your fingers tangling with the prop—a battle which the prop *always* wins. With the remote needle valve hooked up, your engine's standard needle valve is opened to full rich and left there, all manual adjustments being done with the remote. The unit measures 1-1/4 inches high, 1 inch long and 1/2 inch wide, and weighs less than 1/3 ounce. Suggested retail is \$15.95. From Varsane Products, 546 S.



Pacific St., Suite C-101, San Marcos, CA 92069.

### GRAUPNER'S ELECTRIC AEROBAT

The Graupner company in Germany recently mated its plastic "Uhu" (owl) electric sailplane

fuselage with a new 77-inch span, 543 square inch aileron wing to come up with the "Acro Junior," touted in Hobby Lobby's latest catalog as a good choice for those who want to learn aerobatics with an electric. The airfoil used is the semi-symmetrical Eppler 374, which has long proven itself in

slope aerobatic flying, and the airplane is designed for 8- to 10-cell electric systems (which Hobby Lobby can set you up with also).



Best of all, the Acro Junior comes pre-built and covered with Superkote, requiring only final assembly and radio and power system installations.

Hobby Lobby's current catalog (#22) is a freebie—all ya gotta do is ask! Write to Hobby Lobby, 5614 Franklin Pike Circle, Brentwood, TN 37027, or call (615) 373-1444.

### JET HANGAR'S SBD

Jet Hangar Hobbies has acquired and is now producing kits for the fabulous SBD Dauntless dive bomber formerly offered by Master Scale. It's a limited production item consisting primarily of foam wing cores, balsa wing sheeting and die-

cut parts. Obviously aimed at the experienced scale builder, the \$269.95 kit includes comprehensive plans and building instructions, plus a color 8x10 three-view. Quite a few options are detailed, including flaps, dive brakes, retractable tail hook,



operating bomb yoke, sliding canopy, etc. The finished model spans 64 inches and is designed for .60-.90 power. From Jet Hangar Hobbies, 12130G Carson, Hawaiian Gardens, CA 90716; (310) 429-1244.

### THE GAS / ELECTRIC VIPER

At first glance, Davey Systems' new Viper appears to be your typical low-wing, four-channel, trike-gear sport aerobatic model.

What makes it unique, however, is that it's been engineered from the

start to be light enough to be an excellent performer with 40-size (18 to 21 cells) electric power systems. A side benefit to this lightweight construction is the Viper's ability to fly well with the lighter, less expensive .40-.60 two-stroke glow engines. Its fully symmetrical airfoil wing spans 60 inches and

covers 620 square inches, and the kit is complete with pre-cut parts, hardware, canopy, landing gear, rolled plans and photo-illustrated instruction manual. For pricing and availability, contact Davey Systems at 675 Tower Lane, West Chester, PA 19380, or call Ted Davey at (215) 430-8645. **MB**



When contacting the manufacturers/distributors mentioned in Over the Counter, please tell them you read about their products in *Model Builder* magazine!



# GETTING STARTED IN PATTERN COMPETITION

**To do well in Novice, not even the best equipment can substitute for the right attitude and plenty of practice under your belt. Rick also looks at modern pattern model construction; is the technology really outdated?**

**W**e have several topics lined up in the ready box this month, whose only connection to each other is that they all deal with the subject spelled out in the column header. In no particular order, therefore. . . .

The most common tune asked for on my pattern request hotline is, "How do I get started in Pattern?" The giant majority of the people asking this are really focusing on what special equipment they think they

ment is the single biggest obstacle to getting started in any type of competition modeling. The *real* reason that many of my correspondents ask what to buy is so that they don't show up with equipment that marks them as hopelessly ignorant geeks. The only hopelessly ignorant geek at a pattern contest is anyone who would poke fun at any novice, however equipped.

2. A reasonably straight, four-channel sport plane of any type or size, up to .61

trainer. The difference was that the fellow with the trainer flew well. Pattern is a pilot's sport. As Chuck Yeager has remarked, regardless of the equipment, the better flier will still wax your fanny every time.

3. A current copy of the *AMA Competition Regulations*. This is available from AMA HQ for a nominal sum. Thus armed, you will know what to expect, what will be expected of you, and exactly what to practice—all of which will build your confi-



Six-foot-tall Henry Piorun gives us an idea of just how big his new Piorun Models Python design really is. Our columnist just finished putting one of these together from one of Henry's basic kits—see his comments in text.



Al Coomber and his Exciter 1.20 from GyModels. Al competes in Masters when he isn't running Central Hobbies in Billings, Montana.

have to buy, i.e., airplanes, radios, engines, pipes, retracts and assorted other gimcracks, geegaws and gizmos. The answers to these questions aren't really what a brand-new novice needs.

What a real, fresh-caught pattern chum needs is (and this list is in order of importance!):

1. Enough raw courage and gritty determination to show up and actually enter their very first contest. Simple embarrass-

two-cycle or 1.20 four-cycle powered. Yes, tuned pipes are allowed in Novice, as are retracts (they must be left in the down position). No, they do not confer an advantage. In fact, the Novice pattern is specifically designed so that it can be flown well by almost any aircraft at any power loading. For an inexperienced flier, excess power and speed is often a handicap instead of an asset. I have seen "real" pattern planes beaten soundly by a .40-size high-wing

dence level and drastically reduce the chance of embarrassment (see #1 above).

4. Fuel. The better prepared and practiced pilots at every level of competition do most of the winning and improving. Like most human activities, what you reap from pattern has a direct correlation to what you sow.

That's it, the entire list. All the necessary hardware except item #3 is likely already in the basement or garage. Finding the nerve



to take the plunge is the hard part, and that isn't a part you can buy. Come to think of it, this just might be the reason why timid and shy pattern pilots are so doggone rare!

The answers to the "What should I buy?" list of questions are what the novice needs after the first season, when the pattern hook is good and firmly set and the first step up to Sportsman Class looms ahead. That might be a good subject for a future column, maybe later in the year.

On to something totally different. I recently received an interesting letter from George Voss of Oklahoma City. Space constraints prevent me from reprinting the entire letter, so I hope George won't mind if I just take his central question, provide a little background, and run with it.

In brief, George apparently also flies gliders, and he wanted to know why pattern kits used 1960s construction methods when there was so much "new" (George's quotes, not mine) technology floating around in the modeling community, in particular among the glider glider contingent. He went on to list Kevlar and Kevlar/glass fuselage layups, Spectra cloth, and obechi wood wing sheeting as examples of some superior new technologies that we pattern types might be missing out on. George said that while glider and pattern kits cost about the same (\$200-\$300), the glider guys get much more for their money with sheeting, hardware, etc. included in the kit price. As a parting shot, he quoted an ad for a Brushfire fuselage that was touted to weigh 19 ounces, and stated that an all-Kevlar fuselage could save half a pound (!) without a strength penalty.

What about it? Does George have a point? Are we pattern pilots behind the times? I had a pretty good idea "why" on some of these things, having had intimate experience, and picked up the phone to check on the rest.

First, I have to say that George is a bit behind the times himself. My recently completed Python from Piorun Models used four different types and weights of glass cloth and mat, Kevlar cloth, and carbon fibertow in the fuselage layup. The fuselage was a three-piece layup, with separately molded canopy and bellypan, and the finished length was 80 inches. Maximum width was 6.5 inches, and the maximum depth at the canopy about 10 inches. Weight was less than 30 ounces for this giant composite layup, more than twice the size (volume) of the Brushfire George quoted.

The kit included a beautifully cut set of honeycombed 1 lb./cu. ft. virgin foam cores with all of the spar slots, wing sockets and retract gear wells pre-cut. It was complete with CAD plans, bound instruction booklet, aluminum wing tube, and precision fitted fiberglass wing tube sockets. All incidence angles and wing and stab fillets were molded in, the correct dihedral was pre-cut into the cores, CAD templates were provided for every part, and the fuselage/wing carry-through tube was pre-assembled. The



The new JR X-388S computer radio, distributed by Horizon Hobby Distributors. Eight channels, eight model memory, PCM 1624 resolution and six programmable mixes make it a serious pattern radio!



Advanced competitor Darrell Zwicker of Eugene, Oregon, and his much modified Boxer .60 from Sallent Designs. At 7-1/4 pounds, this balsa-and-foam machine is very competitive.

plans called for composite carbon fiber/balsa wing spars. All of this is hardly 1960s technology.

This was a basic kit, priced at \$280. It represented approximately 15 man-hours of labor to make, all highly skilled hand work, and incorporated about \$60 in materials, including the box, plans and instruction booklet, but not including the labor to make the plug and molds. A bargain, I think. If we discount the several hundred hours of labor to make the plug and molds, and subtract the cost of materials, the labor cost is only about \$15 an hour. This is not much for a skilled craftsman producing a hand-made, custom fitted product. The typical glider fuselage is a single mold layup and much smaller in size and volume than the average pattern ship. The maximum cross-section of the glider and sailplane fuselages I have seen is a few inches, and most are roughly cylindrical, which is by far the strongest shape.

Which brings us to George's next points:



A YS 1.20 mounted to one of the new Super B/Mounts from CAN-AM Aero. Rick is using this mount in his new Python—see text. Photo by Bryan Boutrie.

strength, cost, and exotic materials. Kevlar cloth is very strong, quite light, and has excellent deformation strength when laid up. It is also very expensive, difficult to work with during the layup process, and very hard to cut. In fact, cutting access holes later in a Kevlar fuselage is a miserable experience; the stuff fuzzes up all over the place. Ditto during the finishing process. Heaven help those who sand through the resin into the weave! Spectra is very strong, very light, and very expensive. It also has poor deformation strength and "oil cans" easily in anything but a highly curved or cylindrical shape. And, unlike glider fuselages, pattern fuselages have large flat or nearly flat areas.

Using Kevlar or Spectra cloth exclusively for a pattern fuselage would easily triple the cost of materials, almost doubling the price of the kit. The weight saved, according to the manufacturers I've checked with, would be far less than half a pound, and would not justify the cost increase and the added

*continued on page 82*



# HELICOPTERS: A BIT OF HISTORY

**A brief look at some of the more notable successes and failures at developing a direct-lift flying machine.**

**T**he appeal is this: When you walk you need a trail or something. A pack animal needs a better trail. A horse wagon needs a road. The automobile needs a still better road. The railroad needs a track. Steamships need a waterway. Airplanes need airports. If a man is in need of rescue, an airplane can come in and throw flowers on him and that's just about all. But a direct-lift aircraft could come in and save his life."

The above vision, by Igor Sikorsky, was perfect. Starting in the Korean War, helicopters have saved thousands of lives, and they continue to do so around the world.

The above quotation appears in "Straight UP," an excellent article on Sikorsky by Curt Wohleber, which was published in the Winter 1993 issue of *American Heritage of Invention & Technology* magazine.

For much of the following material I am indebted to aviation historian and fellow Boeing engineering retiree, Peter M. Bowers. One of his many books, *Unconventional Aircraft*, has an authoritative chapter on the history of the helicopter. I'm also borrowing from an article, "The Helicopter is Here!" which Rob Jenny, my friend and patent agent, wrote for *Model Airplane News* in the October 1943 issue. Further history for this article was found in *Air Trails World's Great Aircraft*, Summer 1971. Peter Bowers personally loaned me the photos you see here, from his very large aircraft photo collection.

The helicopter came later than the airplane, not because no one had thought of using a prop or rotor to develop direct lift, but because of the problems of getting thrust-to-weight ratios greater than one, achieving stability, and developing adequate control systems. Successful RC model helicopters came after RC airplanes for the same reasons.

Another problem was that few, if any, experimenters appreciated how difficult helicopters would be to fly. Igor Sikorsky was one who underestimated the skill required. He originally designed and built his VS-300 in the common configuration of today—a single main rotor with cyclic and collective pitch control, and a torque-counteracting tail rotor. Sikorsky patented this configuration in 1935. But he couldn't fly

the original VS-300 very successfully, so he added two horizontal tail rotors which acted like elevons. Pitch, roll and yaw were then all controlled by the tail rotors. It flew but had problems; especially in going forward (the main rotor downwash blanketed the tail rotors). Another configuration was tried where a horizontal tail rotor was used for pitch control, but the roll was controlled by cyclic on the main rotor. Eventually the VS-

300 was returned to the standard configuration it started out with, and several people finally learned to fly it well.

## CONFIGURATION

Isaac Newton reminded us that if we are going to move something, the reaction force is going to be equal and opposite to the action force. In the case of the helicopter, something must be done to keep the fuse-



The great Igor Sikorsky at the controls of his VS-300, the first successful American helicopter, circa 1940. In this configuration the machine is fitted with two small vertical tail rotors in addition to the torque-compensating horizontal tail rotor; these three all rotors controlled the pitch, roll and yaw axes. The two additional tail rotors were eventually discarded.



■ LEFT: How would you like to be that poor devil perched in the giant soup can with those two big rotors whirling directly beneath? This is the 1916 Karman-Petroczy flying observation platform used by the Austrian Army. Power was three rotary engines linked to a central gearbox which drove contra-rotating wooden blades. ■ RIGHT: Between 1920 and 1924, American inventor Henry Berliner experimented with the helicopter concept. One of his efforts was this highly modified Nieuport 21 fighter with large counter-rotating fixed-pitch wooden rotors mounted out near the tips. Apparently he hoped to be able to control it via standard airplane control surfaces.



Another early helicopter was that of Georges de Bothezal, built in Ohio in 1922. It had four rotors with variable-pitch blades, all driven from a single centrally-mounted rotary engine. It was successful in that it could maintain a sustained hover, but could not move horizontally—at least not intentionally.



lage from spinning around when power is applied to the rotor. Leonardo da Vinci showed no understanding of that problem. (Newton hadn't discovered reaction yet.) But most of the early helicopter designers understood it and they used at least three basically different ways of providing reaction torque.

Sikorsky's variable-pitch tail rotor is the most common method today, but it was a latecomer. Oppositely-rotating multiple main rotors, laterally, longitudinally, or coaxially separated, can balance out each other's torque more efficiently. It takes significant power to oppose the rotor torque with a tail rotor, and that power is lost since it does not contribute to the lift; but the single-rotor helicopter has the advantages of being simple, inexpensive, compact, and reliable. The latest torque reaction method is the NOTAR, which stands for "No Tail Rotor." I'm not up on it, but I understand it employs the Coanda effect to obtain a lateral thrust at the tail.

A less-used configuration solves the torque reaction problem another way. Instead of powering the rotor by applying torque to the

rotor shaft, the rotor is pulled or pushed around by powered propellers or jets mounted out on the blades. The Curtiss-Bleeker helicopter was of this type (see photo).

### EARLY VERTICAL ATTEMPTS

In 1825, Vittorio Sarti of Italy foresaw the contra-rotating coaxial-rotor helicopter, but never built one. In 1843 Sir George Cayley, in England, designed his "Aerial Carriage" with four rotors. De la Pauze of France got into the act in 1871 with a rotary wing design powered by an internal combustion engine which burned gunpowder (it was a blast). If it didn't blow up it couldn't have flown anyway, since its single rotor lacked any means of torque reaction. Fellow Frenchman, Paul Cornu, built a 573-pound helicopter in 1907. His machine was the first to get off the ground, and hovered for 20 seconds at several feet of altitude. In 1908 Louis Breguet, also of France, made a helicopter which achieved 15 feet.

A number of early machines were able to get a few feet off the ground, but were unable to go higher because they didn't have power enough to support themselves without the aid of ground

effect. Most of them also lacked adequate stability and controllability.

### SIKORSKY

Igor Sikorsky was one of the first serious helicopter designer/developers. He started experimenting with them in 1907, and built two helicopters in Russia in 1909 and 1910. Both were powered by a 25-horsepower Anzani engine, and neither was able to lift off. Sikorsky shelved his helicopter work until the 1930s. He designed some very successful large landplanes and flying boats, first in Russia, then in the United States, before he became our Mr. Helicopter.

### KARMAN-PETROCZY

The first helicopter to maintain a sustained hover (at an altitude of several hundred feet) was tethered to the ground. It was designed by pioneering aerodynamicist Professor Theodore von Karman and built in 1916 as an observation craft for the Austrian Army. It had two, two-bladed coaxial contra-rotating rotors which looked like big wooden airplane propellers, and was powered by three 120-horsepower



■ LEFT: Side view of Berliner's biplane. Rotary engine in the nose drove the two outboard rotors via shafts running through the lower wings. Note the highly undercambered airfoils used on both the top and bottom wings. ■ RIGHT: The 1929 Curtiss-Bleeker never got off the ground but serves as an example of a machine that needs no tail rotor or other torque compensation. The four-bladed rotor is spun by the thrust from four propellers driven by a radial engine mounted vertically in the center. Who will be the first to do an RC model?



■ ABOVE: Another of Henry Berliner's experiments was this triplane. Here again he used the two big main rotors and also added a small one near the tail. Vanes below the main rotors were for roll and yaw control. ■ LEFT: The first really successful helicopter was the German Focke-Wulf FW-61, first flown in 1936. A radial engine in the nose drove twin counter-rotating rotors mounted on outriggers. A small prop on the front of the engine provided cooling air only, not forward thrust. MB has construction plans for frequent contributor Skip Ruff's RC autogyro version of this same machine: it's plan #4751, \$10.50 plus \$4 S&H.



rotary airplane engines. It was stable only when pulling against its three tether cables. The only one built, it crashed on its fifteenth flight.

### BERLINER

The first American helicopter efforts of interest were from 1920 to 1924 by Henry Berliner. Henry took a WWI surplus Nieuport 21 and added twin lateral rotors. These were powered through gears and shafts by the original engine in the nose. He was only able to make short hops. He built a biplane version, seen in flight here; a triplane version, and one version with the wings removed. On the triplane version, note the tail rotor with vertical shaft for pitch control, and the multiple vanes below the main rotors for yaw and roll control.

### CIERVA

Also in this time frame, Juan de la Cierva in Spain invented the autogyro. Unlike helicopters, autogyro rotors are not powered, so these machines can't take off truly vertically, nor can they hover, but they can operate from much smaller fields than airplanes. Their advantages over helicopters were simplicity and low cost. Cierva first successfully flew an autogyro in 1922.

Built under license, American autogyros, both domestic and military, were common in the late 1920s and the 1930s. I remember running several miles to the local airport, in about 1932, to see a visiting autogyro which had unexpectedly flown over our house. American autogyro manufacturers have included Benson, Buhl, Kellett, and Pitcairn. At least one model of Pitcairn autogyro spun the rotor by engine power first and was then able to jump off the ground by using some of the kinetic energy in the rotor; but the rotor was not powered during flight.

### DE BOTHEZAT

Ex-Romanian designer Professor Georges de Bothezat obtained U.S. Army Air Service support and designed and built a four-rotor helicopter with variable-pitch blades at the McCook Field shops in Dayton in 1922. On February 21, 1923 this machine set a record with a hover of 2 minutes and 45 seconds, but it could not travel horizontally. De Bothezat, like Sikorsky, came back to his helicopter work again later. A modern-looking de Bothezat helicopter, with coaxial twin rotors, flew in 1940.

### CURTISS-BLEEKER

In 1929, Maitland Bleeker, would-be helicopter designer, got his foot in the door at Curtiss-Wright. The resulting Curtiss-Bleeker helicopter had a single rotor with four wide-chord blades which were pulled around by the props-on-the-blades concept. It never flew, and Curtiss-Wright dropped the effort.

### FOCKE-WULF

The question of which country invented the first successful helicopter is a bit like asking which invented the airplane. A later effort of Breguet gives France a claim by flying over an hour and covering 27 miles in 1936. Sikorsky was responsible for the first U.S. successes. But the title probably belongs to Germany. The Dr. Heinrich Focke designed, twin-rotor Focke-Wulf FW-61 first flew on June 26, 1936. This machine set an altitude record of 11,243 feet, a speed record of 76 mph, and a distance record of 76.025 miles. Aviatrix Hanna Reitsch publicly flew it indoors, at a sports stadium in Berlin, in April 1938, still a couple of years before Sikorsky was successful with the VS-300.

The FW-61 had oppositely rotating twin rotors mounted on lateral outrigger booms.

It was powered by a 160-horsepower Siemens-Halske engine. The FW-61 was also the first helicopter to permit disengagement of the rotors from the engine for autorotation landings.

### AND LATER ON:

There was the two-bladed Bell with its stabilizer bar; the Piasecki (now Boeing Vertol) tandem-rotor helicopters; the Kaman helicopters with their laterally intermeshing rotors; the Hughes turbine-powered helicopters; and many more. In the small personal helicopter and single-person military copter fields there have been the Hiller ramjet helicopter, the Pentecost Hoppicopter, the Gyrodyne, the De Lackner Aerocycle, the Rotorcraft, the Seremet strap-on (like a backpack) helicopter, and others.

The helicopter is here to stay and has had a major impact on civilization, but it did not replace the automobile as some thought it would. Its main drawbacks are high initial cost and high operating and maintenance costs.

### SCRATCH-BUILT MODEL HELICOPTERS

I have seriously considered becoming involved with RC helicopters several times in the past. Being a mechanical engineer and mechanism designer, I would love that part of it; but I have decided against personal involvement because my life is already too full, and I would resent spending the time required to learn to fly model choppers well. Also, I like to invent, design and innovate. I was really much more interested in model helicopters before they had been successfully designed, built and flown. Now much of the challenge is gone.

Most RC helicopters now are ARFs, although the chopper fraternity and chopper manufacturers seem to avoid the use of that somewhat demeaning term. If I were to get into RC helicopters I would probably learn on an ARF, but then I would design and build my own, as I always do with planes. Why let someone else do the parts that are the most challenging, rewarding and fun?

The few scale RC planes that I have designed and built have been pre-1917 antiques. These ancient aeroplanes do more for my emotions than a modern jet airplane, and provide plenty of challenge. If I were to do choppers, I'm sure I would like to build an RC Curtiss-Bleeker, De Bothezat, FW-61, or a Sikorsky VS-300. Since I won't be doing it, the best I can do is publish the photos of the scratch-built helicopters that you build.

### PARTING WORDS

The teacher said to the two boys throwing paper airplanes in the classroom, "Wilbur! Orville! Stop that this instant!"—Bill Hoest.

"Man will not fly for fifty years"—Wilbur Wright, 1901.

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



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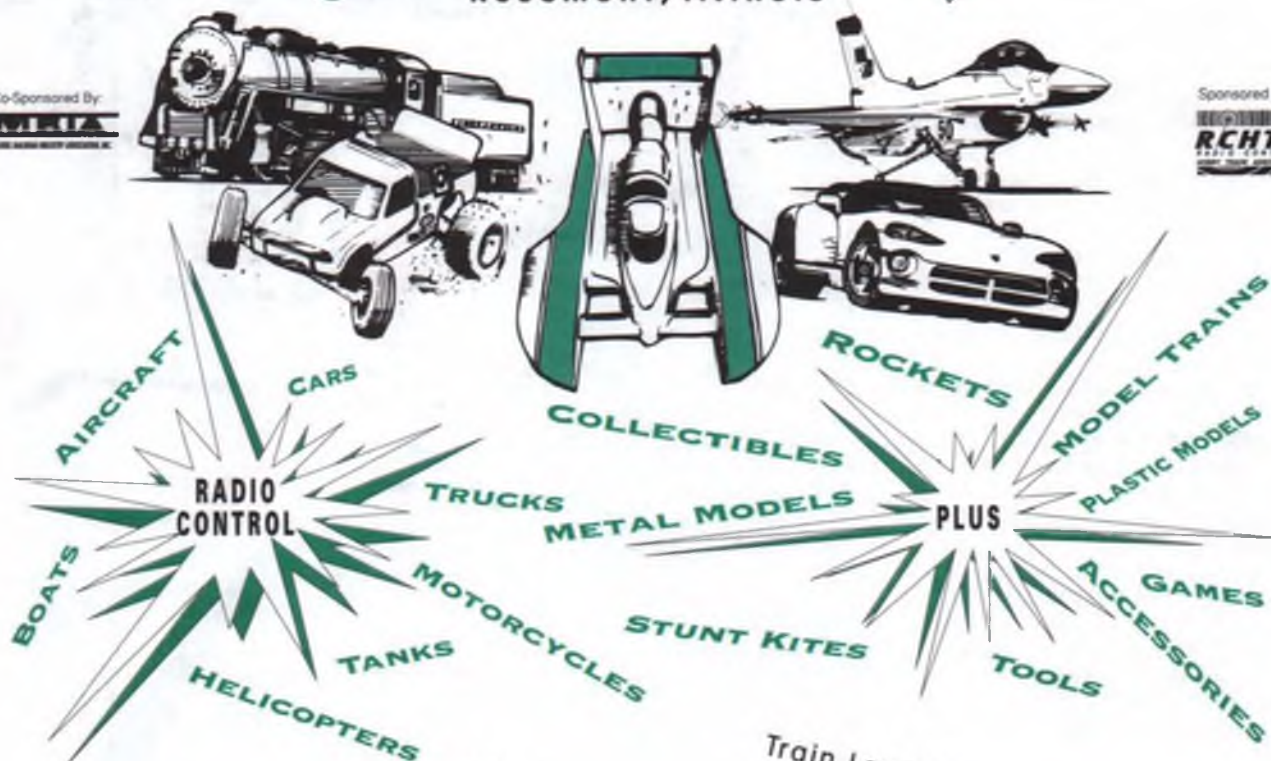
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# AEROTOWING: SOARING'S TIGHTROPE ACT

Nothing in RC soaring compares with the sight of a glider being towed aloft by a power plane. Our columnist recently witnessed it when expert modelers were invited to demonstrate RC aerotowing at a full-size sailplane meet.

**N**o other form of launching model sailplanes over flat land is as majestic, graceful or realistic as aerotowing. It's been my observation that, modelers or not, all who observe model sailplanes being aerotowed correctly by skilled pilots are awestruck. It looks so simple, so easy and so beautiful. And it looks so perfectly natural—after all, full-size sailplanes are launched this way all the time.

Yet, for all its impressive appearance, modelers are constantly amazed that it can be done at all. Consider the odds against it: you have one very unforgiving tow cable tying two very different RC models together, the models are remotely piloted by two different pilots of different modeling background (powered and unpowered flight), each must fly in very nearly the same flight path at speeds and attitudes probably foreign to both, the tower is in constant peril of the towee's guidance errors and (to a lesser degree) vice versa... sounds nearly impossible, huh?

Yet it can be done, and in fact it *is* done quite regularly—in Europe. In fact, over the 17-plus years that I've flown model sailplanes, I've witnessed model aerotowing only twice, and one of those was during my one and only visit to Europe! This is indicative of just how rarely aerotowing is practiced in the USA. Perhaps this is due in part to our relative lack of participation (as compared to Europe) in large scale sailplane models, which generally aerotow much better than they winch tow... that is, *if* they can be winch towed at all (and many are so large that they can't).

Personally, I find the relative dearth of large scale RC sailplanes being flown in America very disappointing.

Whatever the reasons, aerotowing is indeed a fabulous way of launching scale or

**At the recent 6th Annual Vintage Sailplane Association meet, held at California's Hemet-Ryan Airport over Memorial Day weekend, modelers Joe Holtzman, Mike Thomson and Dan Troxell were on hand to give a demonstration of RC aerotowing. They had a grand time showing off to the crowd of full-size soaring buffs! Models included a 5.5-meter AS-K 18 (foreground), a Lanier Stinger to do the towing, a 1/4-scale Multiplex DG-300 (looks almost small at 3.75 meters span!), and another 5.5-meter ship, a Ka-6C.**







Just about ready to launch, towplane pilot Mike Thomson has started his O.S.-300 powered Lanier Stinger and is about to join AS-K 18 sailplane pilot Dan Trozell. Good communication is imperative to maintain relative positions while executing turns, deciding when to release, etc.



Wayne Spani's Bowius Baby Albatross looks just like a big model! The only one of its kind still flying, the Bowius is very lightly built, and Wayne limited his aerotows to 65 mph max.



The towline (125-pound test braided Dacron) attaches to the top of the Stinger's turtledeck just aft of the canopy. Pilot can release the towline by radio if needed. This position ties in structurally very nicely with the Stinger's wing saddle area rear bulkhead.



Close-up of the Stinger with the cockpit section removed reveals more details of the towing setup. Main post is cut from maple, and there are four beety hard balsa compression beams that attach to the top of the post just under the ABS turtledeck and tie in to the basic wood box fuselage farther aft. Towline is captured by a wire that protrudes vertically through a horizontal slot in the maple post; towline can be released in an emergency when a servo pulls the wire down and opens the slot.

Here the big Ka-6C is being towed aloft. It's made from a molded fiberglass fuselage from France and scratch-built foam core wings. A full-size Ka-6CR (the "R" suffix indicates retractable gear) was present at the VSA meet to lend instant scale documentation!



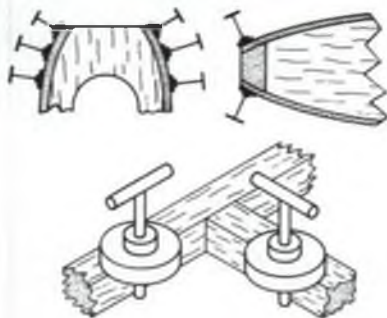


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Wayne Spani had just finished restoring this classic Schleicher Ka-8 when a freak hailstorm at last year's VSA meet inflicted severe damage. This year he finished painting it the morning of the meet. The Ka-8 was the last of the high-performance wood sailplanes and was derived from the Ka-6, but featured simplified construction so that amateurs could build it from a kit.

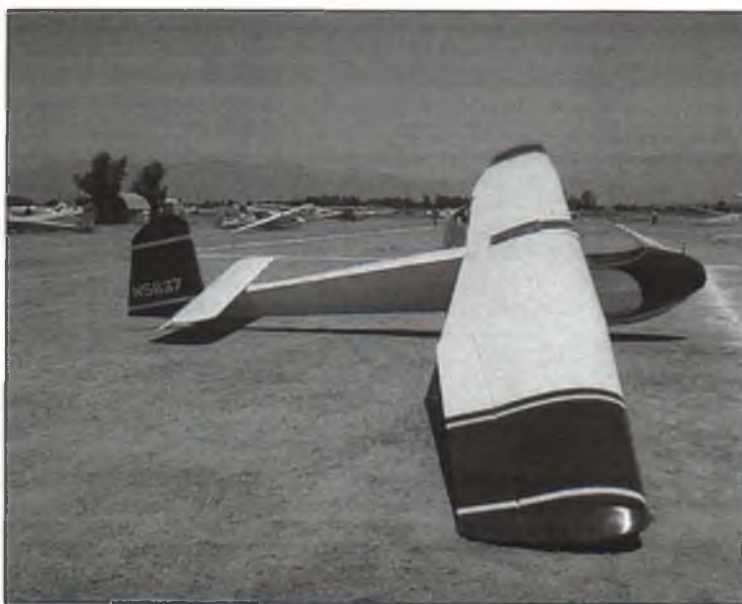
non-scale thermal and aerobatic sailplanes aloft. There is almost no limit to the altitude you can achieve during an aerotow. Obviously there are visibility limitations, but there are no ground-based winch lines, no battery-limited motor runs, and no slope-generated waves to keep you down.

To be honest, aerotowing is more difficult than it looks. The tense initial takeoff roll is probably the trickiest part of the entire flight. Having just one wheel does not provide confidence-inspiring ground handling, and without adequate airspeed, the sailplane typically gets off to a rocky start, wobbling and fishtailing down the runway. Yes, you are supposed to use a wing runner (that's a guy who holds your wingtip and runs with it at the start of the takeoff roll),

but even that sometimes isn't quite enough for a "picture perfect" takeoff. What makes the towee so nervous is the uncomfortably close proximity of terra-very-firma. Aborting a takeoff so early in the game could result in a nasty ground loop.

As the models gain airspeed, the sailplane always breaks ground first and has a strong tendency to climb. The sailplane pilot has to stay alert and keep his ship level and directly behind the tug, just a few feet off the deck. If he fails, he risks crashing the tug at the end of the runway and stalling the sailplane as well. Once up 20 feet or more, the abort becomes a safe option for either tug or sailplane should anything get out of hand. The tow rope can be released at

*continued on page 27*



This would make an easy subject for a scratch-built scale sailplane; constant chord stab, constant chord wing center panels with straight-tapered tips, stringered fuselage, flat sided canopy with no compound curves. It's a Schleicher Ka-4, also called a "Rhonlerche." First flown in 1955, the Ka-4 sports a rather small (for a two-place) 13-meter span and is of metal tube/wood/fabric construction.





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# MACS TO THE RESCUE!

When our columnist needed an exhaust system to replace the homemade one in his Sig Spacewalker II, MACS Products had just what he needed.

Last month in my review of the Sig Spacewalker II, one of the photos showed the exhaust system I made out of flexible copper water pipe. It worked, but I had inadvertently blocked access to the O.S. 1.20's glow plug with the pipe and had a very difficult time changing plugs, needing a special homemade tool to do the job.

1.20 four-stroke engines.

The first part I installed was the MACS #1675 90-degree fitting, which screws into the exhaust port in the cylinder. Because of the close fit of the threads, it is important that they be lubricated before screwing the parts together. I used spark plug thread lube to good effect. One thing you'll need that isn't supplied is some sort of spacer washer

temperature silicone RTV to the adapter and the flex tube, then screwed them together. Excess RTV is easily cleaned up with a paper towel or rag.

I originally thought I would need a second 90-degree adapter, but found that the 3/8-inch flex would go directly into another #1655 adapter, which would in turn attach to one of the new MACS CR muf-



Don Belisle poses with his fine flying 2.5"-1' scale Grumman Turbo Ag-Cat. The scratch-built model is powered by a Zenoah G-38, weighs 22 pounds and spans 90 inches. Model Builder has plans for a radial-engine version of this same aircraft, drawn to the same scale; it's plan #12781, \$24 plus \$6 S&H.

During the Northwest Model Expo earlier this year, Wally McAllister, president of MACS Products, asked if I would like to try some of his company's specially designed O.S. 1.20 exhaust fittings and 3/8-inch stainless flexible exhaust tubing. Think I was going to turn down an offer like that? Of course I was happy to give them a try. They looked like quality custom parts that would work very well on the O.S. engine. I had already struggled for a month or so with my homemade parts, but had a good opportunity to give the MACS components a try when it was necessary to send in my O.S. 1.20 Surpass pumper for warranty work. While it's in the shop, I'm using a standard non-pumped O.S. 1.20 Surpass E. The MACS items will fit all models of the O.S.

that will fit into the exhaust port; the thickness of the washer will determine where the adapter points when it's tightened down. I filed a brass washer to the correct diameter, then filed out the hole in the washer to the correct bore size. You could also file the threaded end of the adapter so that it stops at a specific point when tightened down, but it's imperative that you thoroughly clean the adapter of all metal particles before installing it in the engine.

To join the stainless flex tube to the engine, a MACS #1655 adapter is used and screws into the #1675 90-degree fitting after a liberal application of thread lube. The end of the #1655 adapter is threaded so that the flex tube actually screws into it—no clamps required. I merely applied high-



Van Oscvov is showing us a MAC Products tuned pipe for a Quadra 100. The Q100 shown is one of the engines that will be used in a Pond Racer built to compete in RC Unlimited Racing.

flers, which is threaded to accept the #1655. I think the photo will clear up any questions you might have. All of the MACS hardware is of very high quality and manufactured at the MACS Products facility in Sacramento, California.

I was very pleased with the MACS CR muffler; it is well made and very quiet. I was unable to use a decibel meter on it but felt that the CR brings the O.S. 1.20 very close to the specified 90 decibels at 9 feet. The CR muffler was originally designed as a helicopter muffler, but adapts very well to the O.S. engine. Should you wish to use this muffler with the hardware described above, it will be necessary to special order the threading of the muffler.

You may obtain a catalog for any of these



fine items from MACS Products, 7935A Carlton Rd., Sacramento, CA 95826; (916) 456-6932. A quick phone call will get you current prices or answers to questions.

Incidentally, with the new MACS parts installed on the Spacewalker II, I am now able to easily change my glow plug.

• • •

I had worked hard during the first week in June, preparing my Spacewalker II so I could attend my first Big Bird fly-in of 1993. I had missed the one in Zillah, Washington and the first L.S.G.A.S. fly-in in April, so I was anxious to attend the Bell Air's meet near Bellingham, Washington. The event had proven to be so popular that it was expanded to two days this year.

Unfortunately Mother Nature has been very unkind to us in the Pacific Northwest this year and I knew I was in trouble as I drove to the fly-in through heavy winds and rain. The rain eventually subsided, but not the wind.

Thirty-six pilots braved the elements to bring out their winter projects and dust off some of their favorite old Big Birds. It was my pleasure to assist Dick Snaer, Event Director, in choosing the pilot who best represented Big Bird modeling. Sportsmanship, piloting skills and club participation were the qualities we were looking for. We presented Kent Bergsma with a Model Builder T-shirt and a set of Starduster II

plans. Kent received a nice round of applause from the pilots attending the event.

Dave Grip was flying a very nice Nick Zirolu P-40 he had purchased from a friend. Everyone's heart was in their mouth when one of Dave's ailerons came loose, but with a good deal of skill, Dave returned the P-40 to the runway with no damage.

The lesson here is that if you do buy someone else's plane, be sure to get out the old fine-tooth comb and go over it from

spinner to rudder. In Dave's case, the builder had failed to pin the hinges. A lot of pilots and builders seem to feel that if the hinge is properly glued in place, pins are not necessary, however, it seems like the time needed to put pins through each hinge half is well worth the extra insurance.

I've noticed that it is invariably the flat style of hinge that comes loose. I have not seen this happen to the Robart round, barbed hinges. I suppose they could come loose, but



■ LEFT: Here is a "before MACS" shot of our columnist's attempt to make a neat homemade muffer installation on his Sig Spacewalker II. Ugh—quick, Bruce, put the cow! back on! ■ RIGHT: Aaah, that's better. This is the Spacewalker's new exhaust system using MACS Products components, including their new CR muffer. Fully described in text.



Kent Bergsma represented the best in Big Bird plane lovers at the Bell Air's fly-in in June and received a Model Builder T-shirt and his choice of model plans (he chose a Starduster II). He is pictured here with his G-62 powered Raven, which uses a Bridl Big Bee wing cut to 86 inches.





This is what can happen if you don't pin your flight control hinges. Hinges appear to have pulled out cleanly, taking almost no wood with them. Dave Grip exhibited great piloting skills getting his wounded P-40 back to Mother Earth.

only if too little glue is used to secure them in place or the mounting hole is too big.

### HOBBY LOBBY'S HEAVY-DUTY FUEL PUMP

I have been looking for a fuel pump to use on everything—gas, alcohol, prune juice, whatever. The pumps I've had experience with are either slow, only pump one kind of

fuel, or break down halfway through the flying season.

I was examining Hobby Lobby's new catalog #22 recently and spotted a 12-volt pump that is claimed to be a reliable piece of equipment that should give years of service. The gears are brass, so there should be no fuel compatibility problems. I ordered one and have been quite satisfied

with its performance.

If you buy one of these pumps it will be necessary to purchase a double-throw, double-pole, center-off switch (unless you are using a power panel that already has one); this will allow you to reverse the direction of the pump for fueling or defueling. I purchased my switch from a local electrical supply house. I measured the starting current at 2.2 amps and the running current at 2 amps, so you might want to install a 2.5 or 3 amp fuse in the pump wiring.

### BIG BIRD KITS FROM CHUCK GILL

If you have admired Nick Zioli's plans and designs, as I have, but just don't have time to carve out a scratch-built Big Bird, then you need to give Chuck Gill a call at The Aeroplane Works. Chuck has most of Nick's WWI and WWII Giant Scale planes in kit form, as well as the two WWI models designed by Rich Uravitch, the Fokker D-VII and SE-5a. These are kits only; you'll have to purchase the plans and accessories from Nick or Rich. The kits are in the \$225 to \$410 range, depending on the type and size of the plane. The kits contain excellent quality wood nicely band sawed to precise shapes.

Contact Chuck Gill, c/o The Aeroplane Works, 2134 Gilbride Rd., Martinsville, NJ 08836; (908) 356-8557 to receive further information on these fine kits.

Bruce Edwards, 8304 53rd St. Ct. W., Tacoma, WA 98467; (206) 564-4416. **MB**

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## RC SOARING continued from page 22

either end by either pilot at any time.

Unlike full-size towplanes which attach the tow cable near the tail, model tugs attach the cable just behind the model's aerodynamic center—usually on top of the turtledeck just behind the canopy. This tow position allows for extreme deviations in towing angles without undue adverse affect on the tug's controls.

At a recent Vintage Sailplane Association meet in Hemet, California, Mike Thomson and Dan Troxel gave a superb, well-received demo of model aerotowing in front of a crowd of seasoned full-size sailplane pilots and family members. At the meet, I asked Mike if the tow cable ever interfered with the vertical stabilizer, which is in a direct line with it under tow. His answer was a surprising "No."

His confident answer came from a fascinating experience. He had attached a small video camera to the wing of his Lanier Stinger towplane, aimed backwards at the part of the sky where he expected the sailplane to be most of the time—directly aft and a little up. Here he recorded on tape the tow cable passing back and forth over the top of the fin without any hesitation or hangup. Amazing! The tow cable simply pivoted at the attachment point to suit the sailplane's whims.

Watching these two aircraft on tow was breathtaking. The full-throttle takeoffs were impressive. The huge, wide open circles and straight passes they made during the increasingly higher climbout were like watching precision formation flying at a

On display inside a nearby hangar were these scale models (from left to right): Bowlus Baby Albatross, Schwitzer TG-3, Grunau Baby, another Baby Albatross (from MB plans), and a Minimoa hanging from the ceiling under mock tow by a Tiger Moth biplane (out of picture to the right). A full-size 1930 Bowlus/Schempp Albatross II was undergoing restoration inside this same hangar; by next year Raul Blackstein should have available 1/4-scale drawings of his restored ship. Steel tube framework at right is the fuselage for a 1940 Frankfort Sailplane Co. "Cinema" military training glider also being restored.



military airshow. To see full-size sailplanes being simultaneously towed in the distance made the models seem just that much more authentic and their achievement that much more gratifying to watch.

Actually, three different sailplanes were launched by Mike and Dan that day. The red, white and blue 5.5-meter span Schleicher AS-K 18 which won the Torrey Pines Scale Fun-Fly in March (see *MB*, July '93) was one; Dan's 5.5-meter span Schleicher Ka-6C was another, and the third was Joe Holtzman's 3.75-meter span Glaser-Dirks DG-300 built from a Multiplex kit. They were being towed via a 125-pound test, braided Dacron fishing line cable between 100 and 150 feet long, with loops at each end.

An interesting side note concerns a technique which Dan and Mike tried early on but did not like at all. They had read where the Europeans were adding a length of bungee cord (elastic) in the towline to serve as a shock absorber. Mike and Dan found that oscillations in the sailplane's tow angle were amplified by the stretchy cord. This made towing even more difficult. By contrast, the non-elastic nature of the Dacron made oscillations far less severe. It would be wise not to try the elastic cord technique until much experience has been gained—if you try it at all.

There have not been many articles on aerotowing in the American modeling press, let alone mentions. The most recent I can remember was an article by Robin Lehman in the November 1992 *RCM*, wherein he mentions aerotowing in the context of a giant scale fly-in in Switzerland. Lehman, whose wife and 1/3-scale Club Libelle graced last month's *MB* cover, wrote that the scale sailplanes were required to have a minimum span of 3.75 meters and that most fell into the category of 1/3-scale or bigger, with none less than 1/4-scale. The towplanes were powered by Quadras and G62s muffled by home-brew, modified butane bottles. He says they could not be heard more than 200 yards away!

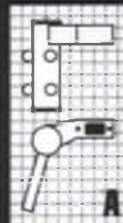
Byron Blakeslee, in his July 1993 column in *Model Aviation* (pages 90 and 118), lists the names and phone numbers of five modelers who aerotow on a regular basis, for those who wish to get more info. One of those sources is Robin Lehman, who lives on Long Island, New York; another is Dan Troxel, whom I photographed at Hemet. His number in Orange County, California is (714) 831-8013, but he asks that you limit your calls to between 9:00 and 10:00 a.m. PDST Monday through Friday. Dan offers to help seriously interested parties buy hard-to-get European-made scale sailplane kits, as shipping in numbers reduces per-unit freight expenses.

In closing, I'd like to repeat what Robin Lehman wrote in his *RCM* article: "Wake up, America! How come almost no one air-tows here? We are really missing out on a wonderful and beautiful aspect of our hobby!" I agree 100 percent! **MB**

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# PLUG SPARKS

BY JOHN POND

## A Salute to Dick Korda

Every so often, a SAM club will organize a meet to pay tribute to one of its most valued members. SAM 39, which claims Dick Korda as a member, has gone all out on its upcoming Dick Korda Commemorative contest. We announced the meet in this column two months ago, but it remained for Leon Shulman, in a letter to contest manager Bucky Walter, to bring out the importance of this meet com-

"I gasped as your model literally jumped into the air and climbed for altitude. The model must have hit a thermal because it kept going in wide circles and never went far from the takeoff area.

"That first flight won the Wakefield event! Wow! What a flight! Although I was an avid gas free flyer in those days, I could not help but admire the model's simplicity and functional lines. As a matter of fact,

going into the Pilot Training Program. My modeling experience was invaluable and I went through the programs easily.

"Now, the interesting part: I missed building and flying models so much that I managed to get leave to go to town to find a hobby shop. The shop had a Burd kit of your winning Wakefield design. This was during the war and many items were not available. The 39¢ kit had no propeller or rubber. In-



■ LEFT: Photo No. 1. Tom McCoy is all set for the Korda Wakefield event at SAM 39's upcoming Dick Korda Commemorative contest. Tom is an expert at Old Timer FF and RC flying and is sure to give the other contestants a run for their money. Johnson photo.

■ RIGHT: Photo No. 2. Contest Director for the SAM 39 meet is Bucky Walter (right), seen here getting an able assist from fellow club member Jim Deats.

memorating Korda's fabulous 1939 Wakefield win at Bendix Field, located in northern New Jersey. We quote from his letter:

"I'll never forget that hot August 6th in 1939 out at Bendix Field. I had not met the Polk Brothers, Irwin and Nat, but there I was, a teenager, to assist Irwin in processing the models.

"You [Korda] were getting ready to fly in this Wakefield competition. Your model weighed out a little light, so I loaned you a couple of pennies to qualify and to glue on the bottom of the fuselage.

"Inasmuch as the Canadian entry, Bovers, passed, you were first. I watched while you wound up (Boy! Could you wind them!) and got ready to take off. I watched with amazement as you went through the process of getting ready.



I just had to build this design one of these days.

"We were all doing our thing in our particular field when World War II came along. I joined the Army Air Corps and qualified as an Aviation Cadet,

asmuch as I always wanted to build one of your designs, I decided to redesign the model into a towline glider.

"Anyone in the armed forces can readily appreciate the problems of building models in the

Photo No. 3. An interesting comparison between Andy Faykun's 1946 Wakefield winner, the Evans Jaguar (left), and Dick Seifried's 1937 Korda Wakefield, as kitted by Burd. Despite the boxy lines of the latter, it is a reliable flier and has excellent soaring qualities. Mikkelsen photo.





services. I reduced the size of the Korda to be able to build and store it. This smaller size allowed me to hide the model between the boards behind our lockers so that it could not be seen during inspection tours.

"When there was no night flying or ground classes, several other cadets would go out with me to help tow the model into the air. This attracted crowds at the parade grounds whenever I flew the model. Needless to say, this rounded out my pilot training and gave all a great enjoyment.

"I just had to write you [Dick] and recall some of the fun we had. We embraced the hobby as kids as being only a hobby, but it has turned into a medium to weld acquaintances into friendships that have lingered these many years. May the future enable us all to continue enjoying this great hobby and each other's friendships in recalling those wonderful memories."

It's interesting to note the parallel of careers. Before the war, Korda produced several

model designs for Scientific and a series for Berkeley. Dick also produced several gas designs for Cleveland, the most prominent being the Champion.

Shulman published quite a few gas designs himself, eventually forming Paramount Models Co., which produced such designs as the Skyrocket, Commander, Kestrel and Skipper. This venture was later sold to Berkeley Models. Shulman produced the Wedgie, Zomby, Banshee and several others before taking off for the war.

After the war, Korda was commissioned by Berkeley to turn out a gas model design known as the Powerhouse. In true Effinger fashion, the model was scaled for all sizes and types of motive power. In addition,

Korda also designed a series of rubber models aimed at the sport or novice modeler.

Shulman, upon getting out of the service, wasted no time in producing the Zoomer and Zoomer A designs under the company name of Pilot Models.

When the control line craze burst upon the modeling scene, both fellows produced control line designs. Shulman far ex-

ceeded Korda in this venture as he produced the Drone Diesel engine (two versions) plus a series of control line designs.

After the first series of AMA Nationals, Korda went into full-scale glider flying. Shulman, on the other hand, stayed active in control line, eventually getting into all forms of radio control flying.

Shulman is proud of his family, noting that all of his boys were into control line flying and are now contenders in radio control. The important point Shulman makes is that they enjoy the hobby and will in the future develop their own friends in the hobby. This will give them some memories to fondly recall.

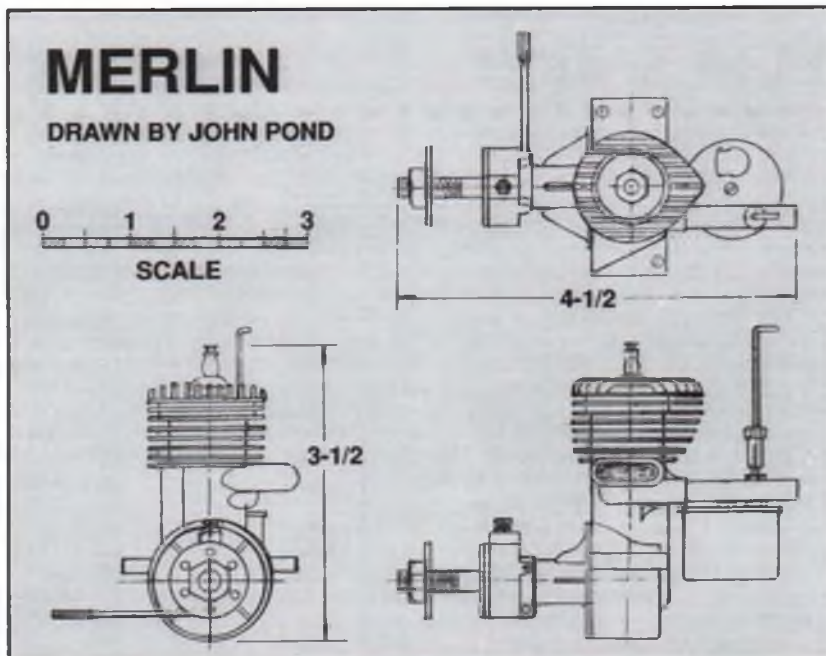
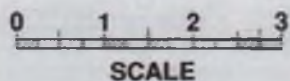
## ENGINE OF THE MONTH

This month we feature a Canadian engine called the Merlin, which, in many respects, resembles the Canadian Hurricane.

The Merlin "Super B" was

# MERLIN

DRAWN BY JOHN POND



ENGINE OF THE MONTH

## MODEL OF THE MONTH

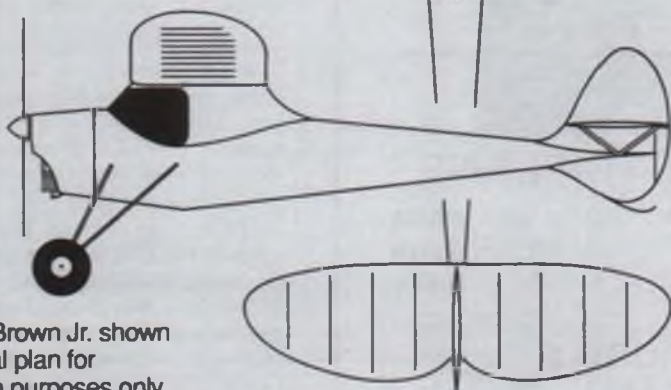
### Megow "Commander"

Designed in 1938 by Paul Karnow



Span — 71-1/2 in.  
Wing Area — 572 sq. in.  
Overall Length — 42 in.

Not To Scale



Inverted Brown Jr. shown on original plan for illustration purposes only.

- Wing: Shallow V-dihedral with Clark Y or similar airfoil. Original kit had machine carved and hollowed balsa block leading and trailing edges. Capstrips optional.
- Fuselage: Fully sheeted, built on a sheet balsa crutch with teardrop-shaped formers top and bottom.
- Tail Surfaces: Built-up construction with capstrip ribs over center spar. Horizontal stab supported by V-struts on bottom.



# PLUG SPARKS



Photo No. 4. Bob Holman's latest is this Brown Jr. powered Gil Sherman "Rambler"; should be a good combo for the Brown Jr. event. Bob is selling an English-made electronic switch that he says works great for RC-operated Ignition cutoff—see text.



Photo No. 5. From Italy comes a shot of a "Toni," a sleek 1947 design by Antonio Patuna. A real beauty, but unfortunately doesn't qualify as an Old Timer under U.S. SAM rules.

first advertised in the 1946 *Air Trails Annual*, priced at \$21 with coil, condenser, tank and spark plug. A full page ad introduced the engine, later followed by 1/2- to 1/3-page ads. Towards the end of 1946, the price of the Merlin was dropped to \$18 and still included all the accessories.

Although the Merlin was the product of a Canadian firm (Merlin Miniatures in Ontario), arrangements were made to also manufacture the engine through an American supplier of the same name in Brooklyn, New York.

This engine is unique in that it was the first to feature a one-piece casting of the crankcase, cylinder, cylinder head, and

intake tube. Specifications are as follows: bore, 11/16 inch; stroke, 5/8 inch; displacement, .232 cubic inch; weight, 6 ounces. Figures worked up by Louis Garami reported the following numbers: with an 11x6 prop—5,050 rpm; 10x8 prop—5,200 rpm; 10x6—6,000 rpm. Note that mostly high-pitch propellers were used. One could expect much better rpm with a 9x4 prop (9,300 rpm). It was a fairly good engine but like the rest of the lesser-known engine names, it was forced off the market by heavy competition.

## MODEL OF THE MONTH

This month's model is the Commander,

as designed by Paul Karnow and kitted by Megow Models. When first categorizing this model (Antique or Old Timer), the Commander was listed as an Old Timer, as the kit first appeared in the spring of 1939.

However, Karnow sent in photos dated Fall 1938, showing the model under construction. Other photos showed the completed model being tested in the winter snow. There is no question that this model is an Antique, based on the photos and the designer's statement of when it was designed and built.

One of the main reasons this design has not been popular is because of its unique wing design, which uses a machine-carved, hollowed balsa block leading edge. Rather than try to reproduce this construction, a similar leading edge could be obtained by using two pieces glued together and shaped properly.

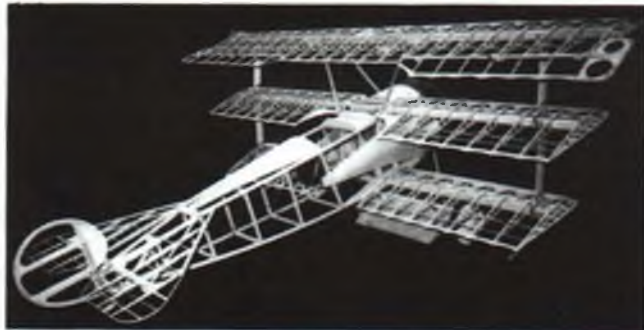
Full-size plans for the Commander are available from Pond's O.T. Plan Service at the cost of \$7.50 plus 8 percent California sales tax and \$1.50 postage. Order plan #1E6.

## FREE PLUG DEPARTMENT

Just received a sample of a new electronic device from Bob Holman (P.O. Box 741, San Bernardino, CA 92402); he enclosed a "Spot-On II" adjustable MOSFET electronic servo manufactured in England by Ibis Designs. Bob says he has used the Spot-On II for ignition shutoff in his RC Class B Playboy and has experienced no problems. The unit sells for only \$20 plus \$1.50 S&H and is supplied with Futaba connectors. Complete instructions for installation and testing are included.

In addition to the foregoing, Bob sends in Photo No. 4 showing his latest creation, a

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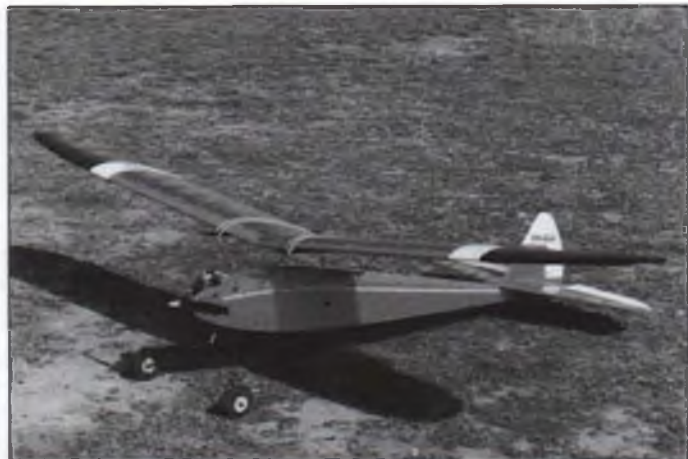


Photo No. 6. An excellently constructed MG-2 (a Mike Granieri design, featured as last month's Model of the Month), flown at the Easter 1993 O.T. contest at Bendigo, Victoria. Power is an O.S. .68 four-stroke converted to spark ignition. Photo by Bruce Abell.

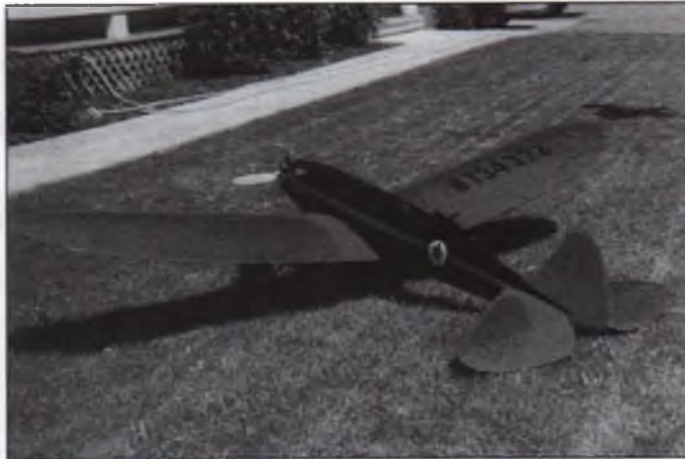


Photo No. 7. A very rare and beautifully built 1938 Dragon Fly low-wing by Les Douglass of Placerville, California. Model spans 85 inches and has a Super Cyka in the nose. We wish more guys would build these fun, interesting models, instead of repeatedly turning out the same handful of designs that have proven to be "competitive."

Brown Jr. powered Rambler. In a humorous note, Bob points out that his famous "wrinkle finish" is not present; the model has been covered with silk and came out quite well. Holman expects the model to be quite competitive in the Brown Jr. event.

## ITALY

Art Watkins submitted Photo No. 5 as received from his Italian correspondent, "Veno," of Monfalcone, Italy, showing his latest, the Italian Champ, "Toni," designed

and built in 1947. This clean-looking model is powered by an English P.A.W. 10cc diesel.

The model climbs quite well, ending up at some 660 feet in 25 seconds. As could be

*continued on page 51*

# EXTRA HORSEPOWER.



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Weight: 27 oz.  
Displacement: 20cc (1.20 cu. in.)

Horsepower: 3.2 bhp  
Shaft diameter: 8mm



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Easy operation is largely determined by the carb, and

Webra's new design is the simplest, most reliable ever. With a machined carb lever and o-ring insulated high-speed needle, it's designed to meter out the horses with the greatest of ease.

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## Upgrading the Hirobo Shuttle

A look at Century Helicopter Products' Diamond Shuttle conversion package and Ninja composite side frame kit, along with James' impressions of the Webra .32H Redhead engine and Byron's Pro-Glow heli fuel.

BY JAMES WANG

Century Helicopter Products in Milpitas, California has been manufacturing an extensive line of upgrade products for the Shuttle, Concept 30 and Enforcer for the past five years. This year, CHP introduced two new upgrade packages for the Hirobo Shuttle—the Diamond Shuttle conversion kit and the Ninja composite sideframe system.

The Diamond conversion kit contains a tool steel spindle, tool steel 8mm main rotor shaft, ball bearing all-metal washout unit, ball bearing radius arm, fiberglass tail fin set, aluminum clutch gear, metal swashplate, Ultra-Tuf black nylon landing gear set, powder painted black tail boom, a complete metal rotor head conversion package, wood Ninja blades, and a mini tuned pipe. For a limited time, CHP is offering the whole package for \$298.

I have been replacing the plastic parts on my old Shuttle one by one with the Diamond parts. The "new"

Shuttle looks very pretty because the metal rotor head parts and washout units are all anodized gold. The Bell-Hiller mixing arms on the main rotor blade grip and the seesaw unit are also anodized aluminum.

I noticed that the ball bearings in the metal arms and the washout unit were slightly loose. I *very carefully* put a drop of CA glue around the flange of the bearing to secure it tightly to the arm. Use the thin Teflon tube that comes with the glue so you do not accidentally get it in the bearing.

After the entire upgrade package had been added, most of the slop in my old Shuttle had disappeared. The metal swashplate is excellent—no slop at all.

The Ultra-Tuf landing gear is a molded black nylon unit that behaves similar to those on the X-Cell 60, except this .30-size gear has a higher ground clearance and a 15-degree forward rake. It looks quite sharp on the Shuttle and matches the look of the new Ninja 30 canopy perfectly.

Both the Diamond conversion and the Ninja sideframe kit come with a new sleek-looking canopy. The canopy has a fairing that extends very high to cover the swashplate to reduce drag. Full-size helicopter research has shown that half of the entire drag on a helicopter comes from the main rotor head, the rotating links, and swashplate region. Adding a fairing to cover up much of the swashplate and rotating links area can significantly reduce drag and improve top speed.

Flight performance is further improved by the wood Ninja Shuttle blades and the special mini tuned pipe system designed for the Shuttle. The Ninja blades have a carbon fiber lamination between the wood layers, and the blade tips are swept. I sanded the tip portion slightly thinner to further reduce drag. The idea behind making any wood blade into a swept tip is to improve the lift-to-drag ratio. However, you must make sure the airfoil is thinned down near the blade tip. The airfoil will become thinner, but the thickness-to-chord ratio should be kept constant. Done properly, you can expect a 1 or 2 percent improvement in the rotor lift-to-drag ratio.

The mini tuned pipe is quite effective. It works well with the new Webra .32H Redhead I'm using. When the rotor is turning 1,600 rpm, the pipe sounds quite good. The mini pipe sounds



The Ninja composite sideframes took James three hours to assemble. The finished unit is stronger than the standard plastic frames and has higher torsional rigidity. The whole structure, including the servo tray, weighs only 15 ounces.



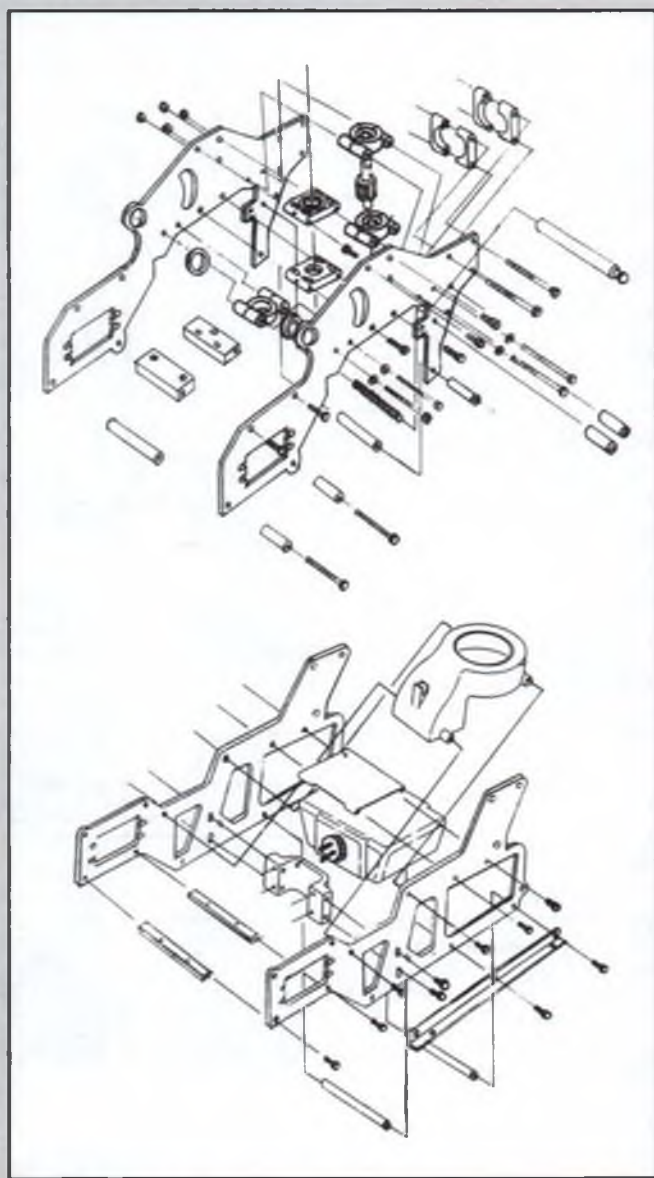
CHP's Ninja composite sideframe kit includes this sleek canopy (supplied unpainted). Note that the mast fairing extends higher than normal to smooth the airflow around the swashplate for reduced drag.



slightly louder and higher pitch than CHP's black Torpedo muffler for the Shuttle.

So far I have only 30 flights on the Webra .32H Redhead, but the motor is already singing at 18,000 rpm in idle-up 2 in forward flight aerobatics. The model hovers best with the rotor head turning 1,500 to 1,600 rpm. If the rotor speed is below 1,500, the tail rotor response becomes slow, the cyclics do not lock on and the model wanders a bit. A small helicopter needs a high rotor rpm to obtain its gyroscopic stability.

In forward flight my Ninja Shuttle screams at 1,700 rpm. Any higher than that and I begin to worry that the blades will fly off, even though I know they won't. CHP also sells a set of hardened feathering spindles with thrust bearings to improve the safety margin and keep the blade feathering (pitch change) smooth



This is the layout of the CHP Ninja composite sideframe system for the Shuttle. There are a total of four major frame pieces that are bolted together using 3mm bolts and aluminum spacers. The collective and throttle servos are mounted on the frames directly. The engine is now forward of the main rotor shaft to move the CG forward. The glow plug is also easier to reach than on the standard Shuttle.

under high centrifugal loads.

Depending on the tuned pipe or muffler used, the Webra .32H's main needle valve setting can vary between 1 to 1-1/2 turns. Neither the main needle valve nor the idle adjustment are critical; you can turn them a click or two without causing a drastic change. The carburetor has a big 7.5mm bore, which is definitely one of the reasons for the increased horsepower. There is no fuel draw problem with this large throat. I used an O.S. #8 glow plug in my Webra and it idles extremely well.

One thing that surprises me about the Webra is that its exhaust opening looks pretty small. I estimate the exhaust timing to be around 155 to 165 degrees. If it does have such a high timing, it is well suited for tuned pipes.

When used with the CHP mini pipe, there really is no need to run 30 percent nitro in this motor. The Ninja Shuttle with the Webra leaps like a rabbit when the throttle is punched from a hover. Even though Hirobo and CHP sell a .40-.46 size motor mount



The CHP Diamond Shuttle conversion kit includes fiberglass vertical and horizontal fins, a new tall boom and the fancy gold anodized main rotor head mixing arms and washout unit described in the text.

for the Shuttle, I recommend leaving it as a .30-size helicopter. A .46 may put a lot of stress on the moving and non-moving parts. When the pitch and throttle curves are properly set up, a motor such as the powerful Webra .32H Redhead is more than enough to do any 3-D hotdogging you want.

Now let's take a look at CHP's Ninja composite sideframe conversion kit. The frames themselves are cut by numerically controlled milling machines from special G-10 fiberglass board, and are colored black to match the black landing gear and black painted tail boom from the Diamond kit. The Diamond conversion kit and the Ninja sideframe kit make a good combination. When both are used, about half of the helicopter will be new. If you have an old Shuttle, these two conversion kits may be a great way to rejuvenate your old model and boost the performance at the same time.

I had the Ninja sideframes together in only three hours. Disassembling the old Shuttle took another three hours. Five more hours were used to mate the new Ninja sideframes with the Shuttle mechanics.

The completed sideframe system including the built-in servo tray weighs 15 ounces. It's a lot stronger and stiffer than the stock plastic frames. This new system has a lot of bracing, and all of the fiberglass plates are parallel to each other; the torsional rigidity is superb.

I am very happy with this new unit. I have yet to crash it, but it looks like it can take a lot more abuse than the plastic sideframes. The Ninja sideframe kit is priced at \$159 and even includes bearing blocks with ball bearings for the belt drive pinion gear, a bearing block with bearing for the clutch, and two plastic bearing blocks for the main shaft.

With the Ninja sideframe kit and Diamond Shuttle conversion kit added, the model flew like a totally new helicopter. It had the typical symptoms of a new helicopter; all of the controls were very tight and the gear mesh was not seated completely. After several flights the gear mesh and controls started wearing in and



# helicopter world



The new Webra .32H Redhead hell motor. This is an inexpensively priced (\$189 suggested retail, usually discounted to quite a bit less) powerhouse that weighs only 9 ounces. It uses an ABC piston and sleeve and a Dykes ring. The carburetor has a big 7.5mm throat for increased power over the earlier version. It is a beautifully crafted piece from Austria.

settled into their sweet spots, and the model hovered glass-smooth. This is true of any new model. It also takes that many flights to dial in the radio and get used to the new control feel.

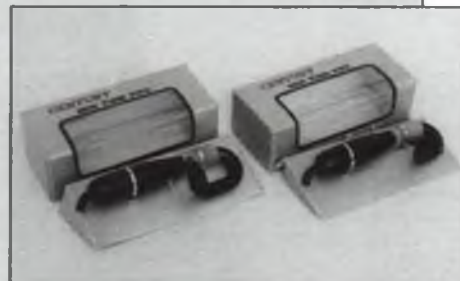
The new Diamond Conversion and the Ninja sideframe system give the Ninja Shuttle a very solid and smooth control feel in hover. The body and tail boom have no problems with shake or resonance. The new canopy, which is larger than the standard Shuttle, makes the model easy to see in the air. Top end speed is about 65 mph with the Webra .32H. The Ninja Shuttle does very nice forward flight aerobatics. There is no pitch-up tendency in a high-speed dive. The resonance of the side frames and the mini pipe make it sound as smooth as a .60-size machine.

One item not in the Diamond upgrade package but which I

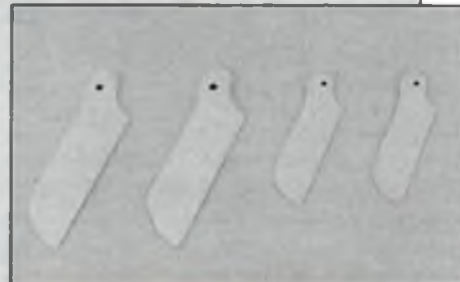
would like to get is the CHP metal pitch control plate for the Shuttle tail rotor. It comes with two ball bearings and probably has less slop than the stock plastic unit. Other items I am using that are not in the conversion kit are CHP's new fiberglass tail rotor blades and the new Glass Ninja main rotor blades. The glass blades have a special airfoil and a swept tip. The Glass Ninja blades weigh 95 to 100 grams each and do fabulous autorotations.

Recently I have been testing the new 35 percent nitro Heli Pro-Glow fuel from Byron Originals. This fuel is great! Actually, I think it has too much nitro for the Webra .32H. I normally run Byron 10 or 15 percent heli blend. The 15 percent Byron already gives the Webra an awesome amount of power. Switching to the 35 percent Pro-Glow increased the main rotor head speed on my Shuttle immediately. I had to raise the hover pitch setting and richen the main needle and low end idle screw to prevent overrevving and leaning out.

The best results with my Webra .32H and O.S. .50H in my GMP Cobra were obtained by mixing two gallons of Byron 15 percent with one gallon of 35 percent Pro-Glow. This gives smooth hovering with plenty of exhaust smoke for cool running and still yields lots of top-end power. Using the straight 35 percent on the .32 Redhead did not increase the speed or climb significantly because the needle was opened to keep the motor cool. However, using the straight 35 percent Pro-Glow on the O.S. 60 SFN and SX definitely yield significantly higher performance than the 15/35 percent mixed blend. **MB**



Shown here are the two mini tuned pipes from CHP. One on the left is designed for the Shuttle, the other is for the Concept 30. The Diamond Shuttle package includes the mini pipe for the Shuttle. It works very well with the Webra .32H Redhead.



Here are the .60- and .30-size Ninja fiberglass tail rotor blades from CHP. The .30-size fits the Concept 30, Enforcer and Shuttle. The .60-size fits the X-Cell 60 and other .60-size models. These blades have a slightly reflexed airfoil.

## NINJA PRO SIDE FRAME CONVERSION KIT FOR SHUTTLE

Century Helicopter Products redefines 30 size helicopter performance with our new Ninja Pro Side Frame Conversion kit for the Shuttle helicopter. Advanced design features include G-10 Modular construction for ease of maintenance and high strength. New locations for the engine, fuel tank and tail rotor drive greatly enhance performance. Moving the engine to the front of the main gear combined with a cool air intake duct at the front of an all new canopy improves engine cooling. A much improved C.G. is accomplished with a highly visible aft fuel tank location. The tail rotor drive is now dual ball bearing supported at the rear of the main gear to increase reliability. The conversion includes all necessary bearings, bearing blocks, servo tray, machined standoffs, all hardware and an all new streamlined Lexan canopy. Of course, all of our diamond upgrades for the shuttle are compatible with the Ninja Pro, making it the most versatile 30 size helicopter on the market today! Part #2001. Phone us for further info and pricing.

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"ELECTRO-GLIDE"	20	3	1.25 x 0.55 x 1.2	0.95	28 oz."	0.22 Sec	1/2 DEG.	SUPER TIGHT	\$ 78.95
"GIANT PACK"	15	3	1.97 x 1.14 x 2.3	3.50	130 oz."	0.23 Sec	1/2 DEG.	B.Brg./OILITE	\$105.95
includes Sm. Thr.	05	1	1.43 x 0.79 x 1.6	1.55	42 oz."	0.24 Sec	3/4 DEG.	HARD NYLON	
"SUB-MICRO PACK"	24	3	1.14 x 0.55 x 1.1	0.60	32 oz."	0.15 Sec	1/3 DEG.	SUPER FAST	\$ 99.95

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					FUT. G	FUT. J	JR	HITEC	CIRRUS	H	W x L		
PGP	21	AM	7	300	100	150	150	150	100	0.84 x	1.47 x 2.43	1.5	\$ 69.95
PGP	31	FM	7	400	—	200	600	500	200	0.84 x	1.47 x 2.43	1.5	\$ 74.95
MICRO	535	FM	5	2400	—	2200	2600	2500	2200	0.82 x	1.17 x 1.98	0.8	\$ 81.95

\*Plus \$5.95 shipping and handling per order, & CA sales tax for CA residents. (Allow 2 - 4 weeks for delivery.)



# The Great Planes F-14 Tomcat

Tempted to get involved in jet models but can't come up with the bucks? The answer may be in this prop-driven replica of one of America's top fighters, which offers impressive performance at a fraction of the cost of a true ducted fan.

■ LEFT: Smokie' down the runway and just about to rotate for takeoff under the capable guidance of test pilot Larry Oakley. Great Planes quite truthfully advertises the fact that the Tomcat is a very fast flying model—even more so with the optional retracts installed, which add greatly to the model's realism in the air. ■ RIGHT: Landing the F-14 is best done by keeping the nose high and carrying a bit of power all the way to touchdown. With practice, this technique will let you put the airplane on the runway anywhere you want.







Close-up of the Irvine .61 ABC installation. Although at the bottom of the recommended engine size range, the author found it to be an excellent choice for the Tomcat—more than enough power to make the airplane perform as advertised. The extra-pointy spinner was designed by Great Planes specifically for this model.

## PRODUCTS IN USE BY GEORGE VOSS



Molded ABS plastic exhaust nozzles were airbrushed with water-based acrylic paint and finished with clear enamel. Neat effect, huh?



"Iceman, Bogies at 2 o'clock."

"Gottum Maverick."

"Keep him tight Ice."

"Oh no, he broke loose and is on my tail! Nail him quick Maverick."

"He's cocked and locked. OK bogie, have a sidewinder to go."

"BINGO, you're out of here!"

Top Gun? Naw, just another day at the club field with the Great Planes F-14 Tomcat.

Great Planes accepted the challenge of bringing ducted fan looks and performance to the masses. By utilizing a nose-mounted engine, the GP F-14 gives jet-like performance without the cost and complexity of ducted fan models. The kit is well within the average modeler's capability and flies like a well-mannered sport ship.

### THE KIT

The kit contains extremely accurate die-cut parts, good quality balsa sheet and stick material and nearly all the necessary hardware. Parts fit is some of the best I've seen. The two sheets of plans are computer drawn and very clear. The 56-page construction book contains over 150 photos/drawings. My review kit was from an early production run and there were some conflicts between the book and the plans, which have since been corrected. Great Planes even includes a phone number you can call if you encounter difficulty during construction/flying or

#### GREAT PLANES F-14 TOMCAT

WINGSPAN .....	58-1/4 in.
WING AREA .....	628 sq. in.
WEIGHT .....	7-1/2 lbs.
WING LOADING .....	27-1/2 oz./sq. ft.
OVERALL LENGTH .....	51 in.
ENGINE .....	.68-.75 two-stroke
RADIO .....	4-5 channels (retracts optional)
SUGGESTED RETAIL .....	\$179.95

Produced by Great Planes Model Manufacturing,  
P.O. Box 9021, Champaign, IL 61826-9021.



## THE IRVINE .61 ABC: FIRST IMPRESSIONS

The Great Planes F-14 project afforded me my first experience with Irvine engines. It is said that initial impressions are lasting impressions. My first look at this engine was certainly favorable.

The .61 ABC I used comes in a relatively large box containing the engine, carb, carb mounting screws, muffler with Allen screws and Allen wrench, decals, operating instructions and a two-year warranty. Casting and machining were top notch. This is a nice looking piece of machinery!

I chose to run in the engine while installed in the airplane, using a K&B 1L glow plug and the smallest recommended prop, an APC 11x8. To keep the engine running cool, I used Omega FAI fuel.

I have a personal opinion about the engines I own/use: if it can't be hand started, there must be something wrong with it! It took only 5-6 flips before the Irvine came to life. I allowed it to warm up a bit before advancing the throttle. It was obviously very rich. I made some adjustments to the carb and let the engine run for several minutes, then shut it down and allowed it to cool. This was done several times until the engine would maintain rpm with the nose pointed straight up. We then started flight testing.

Further running of the engine found it to be very user-friendly, one- and two-flip starts becoming common. I didn't have a tach to check the rpm, but I would consider this a strong-running sport engine. It flew the F-14 around with authority.

have comments about the kit. I had an opportunity to use this service during the review; the folks there were very helpful, with fast and courteous service.

### CONSTRUCTION

The wing has a double-taper, swept planform with leading edge strakes. Construction is typical of many sport planes; D-tube leading edge, full-length spars top and bottom, and full-span shear webs. An additional aft spar in the center section forms a triangle with the main spar to create a

strong center section.

I followed the instructions to the letter and had no difficulty assembling the wing. Wing sheeting templates are provided in the instruction book. Only minor trimming was needed after cutting the sheeting to template size. This was a great feature because there is a lot of sheeting to install. I was concerned about the use of balsa spars and the use of only one 1/8-inch lite-ply dihedral brace; the instructions didn't call for any fiberglass reinforcement in the center section, either. All fear was for naught, as the wing proved

very strong when completely assembled.

The stab and rudder are pre-cut 1/4-inch sheet balsa. These assembled quickly with thin CA.

It's in the fuselage that the captivating lines of the F-14 take shape. It's also the only portion of the assembly that gave me any difficulty—nothing major, just little things that kept cropping up. For instance, after I assembled the firewall and installed the engine mount blind nuts I discovered, to my dismay, that the supplied 6-32 socket-head screws wouldn't thread into them. Apparently the nuts had metric threads. I tapped out the blind nuts with a 6-32 tap—problem solved.

Installation of the low-profile Hobbico retracts went without a hitch until it came time to bend the gear legs. I put the legs in a vise and proceeded to make the bend, but at approximately 45 degrees the gear leg suffered a brittle failure. Then, as I prepared to close up the nose section, I realized my kit was missing the 1/2-inch balsa triangle stock. I called Great Planes and they quickly replaced the missing wood and the landing gear legs. They said they were aware of the brittleness problem and that they will replace the problem struts at no charge to other F-14 builders upon request.

The F-14 allows several different radio installation setups for surface control. I chose to use two elevator servos and one servo each for the remaining functions. During radio installation I realized it would have been easier to drill pushrod holes in the formers prior to assembly. I used a rotary file to open pushrod holes in the bulkheads. Radio installation is easy since all pushrods are pretty much straight shots from servo to surface. All control horns are internal, which adds to the F-14's appearance. I did find some conflicting information between the text, pictures and the plans concerning the radio on-off switch. Just remember, out is off, in is on!

I felt the recommended 10-ounce fuel tank was entirely too small for a .60 size ship. The instructions stated it was imperative to use this size tank when retracts are installed, however, I found that a 14-ounce flex tank would fit and still allow the nosegear to fully retract.

By this time my replacement gear legs had arrived and I was ready to bend the gear legs and cut the wheel well opening. I started with the nose wheel. I followed the plan template, which turned out to be incorrect. Later versions of the plans have corrected this. If in doubt, follow the picture in the instruction book, it's right. Back to the vise with the gear. I hope it was a fluke, but the second set of gear broke too! The third set was heated with a torch prior to bending, which solved the problem.

I covered the F-14 with Dove Gray MonoKote on top and trimmed it just like on the box. Insignia Blue MonoKote was used on the bottom to aid visibility and orientation. The wing was easy to cover, while the fuselage presented a challenge. I did find that

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■ **LEFT:** The F-14 Tomcat kit is what you'd expect from Great Planes—high-quality wood and hardware throughout. Retracts and spinner shown are options (and very worthwhile ones, too), not included with the kit. ■ **CENTER:** View of the wing center section prior to sheeting. Lots of shear webs and the creation of the triangle of spars yields a light, strong structure. Note the construction tabs on the wing ribs; they allow the symmetrical airfoil wing to be built on a flat surface. ■ **RIGHT:** The assembled Tomcat fuselage. Very unique looking but easy to build, thanks to the accurately die-cut interlocking parts. In addition to the large central open area seen here, there is a hatch on each side, just in front of the fins, to allow access to the throttle, retract and two elevator servos. **BELOW—** ■ **LEFT:** Underside nose detail. The nose gear wheel well is larger than shown on the plans, but allows more working room when nose gear service is needed. ■ **LEFT CENTER:** If you decide to go with retracts in your F-14, you'll find the installation to be easier than most. Left main gear shown here. ■ **RIGHT CENTER:** Rear fuselage with the unfinished stab and fins in place—both of flat 1/4-inch sheet balsa. What could be simpler? ■ **RIGHT:** The Great Planes F-14 Tomcat "in the bones." Note how much of the wing is sheeted; the kit provides templates for cutting the individual pieces to shape.



using a trim iron was easier in some places than using a regular iron, especially between the inner turbine sides.

Next came the installation of the supplied graphics. I think Great Planes did an excellent job on the decal sheet. It really sets the

mood for the F-14. I spent two hours installing them and it was time well invested. The final items installed were the canopy

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and pilots. The canopy was glued in place with CA as recommended. The next day, to my horror, I found the canopy had completely fogged over! I neatly removed the canopy and wiped it with a rag sprayed with WD-40. This removed the fogging. I then used glue similar to RC-56 to reinstall the canopy.

## FLYING

Test flight day was a gorgeous Saturday, sunny, light breezes and lots of people! I usually try to test fly a new ship during the week when the field is likely to be empty. Not this time. I lost count of the questions, comments and compliments the F-14 drew. It sure is a crowd pleaser!

With the brand-new Irvine .61 running on the rich side, test pilot Larry Oakley intentionally used a long ground roll, rotated, and we were off to a smooth takeoff. He sucked up the gear and climbed to altitude.

Even with the engine running rich, the F-14 moves out. It was obvious that a peaked engine would make the airplane really scream. The first flight consisted of photo passes and some slow flight in preparation for landing. On the second flight, Larry performed a routine of rolls, chandelles, high-speed passes and landing approaches. The F-14 performed all maneuvers with grace and style. Larry set up for landing as he would with any other sport plane, which yielded three aborted approaches. The Tomcat seems to glide forever! He altered his approach the get the nose up sooner to allow the strakes to take effect. This worked and the F-14 settled in for a smooth landing.

On the second outing we were greeted with an empty field. The Irvine was now running much stronger but we still had it set slightly rich. The Tomcat is easy to get used to. It handles well and flies much like I had expected—very "groovy." The recommended surface throws are a good starting point. Both aileron and elevator response is good, but rudder action is a bit weak due to their small size.

The last flight of our second outing was more typical of our area—windy! Weather stations reported 10-20 mph winds with gusts to 25. The Tomcat handled the wind without problem. The airplane got a bit slow coming over the threshold and fell about 3 feet. The only damage was to the lite-ply nose gear mount. If you tend to bounce a few landings, I'd recommend replacing the lite-ply with hard ply and add a gusset from the gear mount to the firewall.

## SUMMARY

No other airplane in my 20-plus years of modeling has drawn as much attention as the Great Planes F-14 Tomcat. If you've got a low-winger or two under your belt, the GP F-14 should be well within your building/flying capability. Great Planes has succeeded in making a complex aircraft uncomplicated and putting jet-like performance in the hands of the sport flier. If you feel the need for speed, the F-14 deserves your attention! **MB**



## YAK-17 'FEATHER'

For a real change of pace, try this Peanut version of a post-WWII Russian jet fighter. Performance is excellent and the prop is not all that noticeable in flight.

BY J.E. JASON WEBB

The author's Peanut Yak-17 is pictured here with an earlier 18-inch span version. Construction is not difficult; probably the toughest part will be molding that plastic canopy.



Bare-bones components, ready for covering. Note the alignment pins protruding beyond the wing root ribs; these key into holes in the fuselage to provide the correct incidence and dihedral on final assembly.



With the end of World War II in Europe, a vast amount of German wartime jet experience fell into Allied hands. The victors quickly gathered up examples of airframes, engines and test data. German designers and engineers were also spirited away to the U.S.S.R., America and Great Britain. As Russia was behind in jet technology, its designers looked for a quick solution to update their aircraft. Russian designers found a partial answer by the simple adaptation of existing Yak-3U airframes to accept captured German Junkers Jumo

you just don't notice the prop in flight.

I began flying propeller-driven rubber-powered scale jets back in 1984, the result of having admired the unfinished bare bones of an F-84 Thunderjet designed by my close modeling friend, David Smith. This inspired me to design and build an XF-84H as my first prop-powered jet. Since that time, our Columbia, South

Carolina club, The Palmetto Aeromodelers, has sponsored a "Modern Military" FAC event which has seen a number of prop-driven scale jets compete.

I won a Kanone in 1988 with an 18-inch version of this same model. More recently, the FAC has adopted a "Jet Scale" event which closely follows our original intent to showcase these prop-powered jet designs. By modeling jet aircraft powered by rubber-driven props, you can open a new era of exciting possibilities that are very inexpensive compared to other types of jet propulsion.

I trust this is not your first rubber scale model, as I don't really enjoy the step-by-step type article. However, a few tips here should help insure a good flying model. Try to use matched wood for longerons to reduce the chance of unequal pull on the basic structure when assembling the box. Using a balsa stripper is an excellent way to strip your longerons from the same piece of 1/16 sheet.

Naturally, the lighter your

004 engines. The resulting Yak-15 jet still featured a tailwheel landing gear, which was not ideal due to handling problems. An improved version, the Yak-17 (code named "Feather"), featuring an uprated RD-10A engine, was introduced. A production run of 430 aircraft gave many Russian pilots their first experience flying jet fighters.

Before building this model of the Yak-17, perhaps a bit of background is in order. Many scale purists insist that a jet model flown with a propeller "just doesn't look right." This is perhaps true when viewed on the ground. But after having flown six scale jets with propellers, I can attest to the fact that

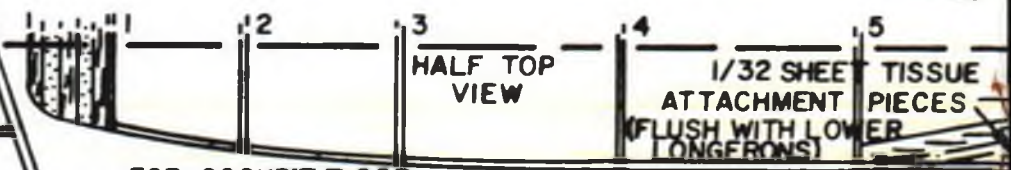
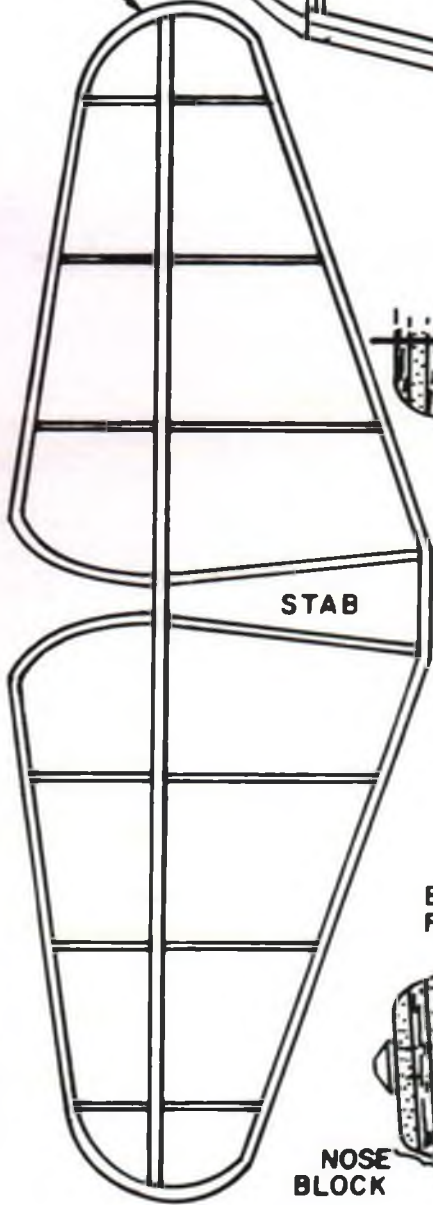


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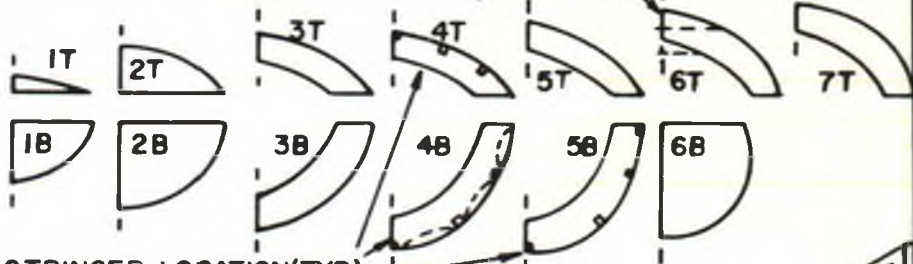
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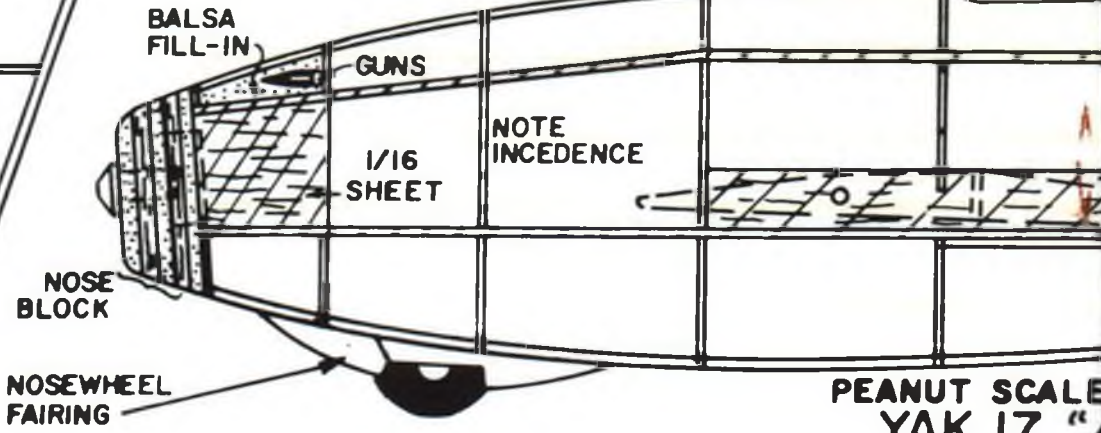
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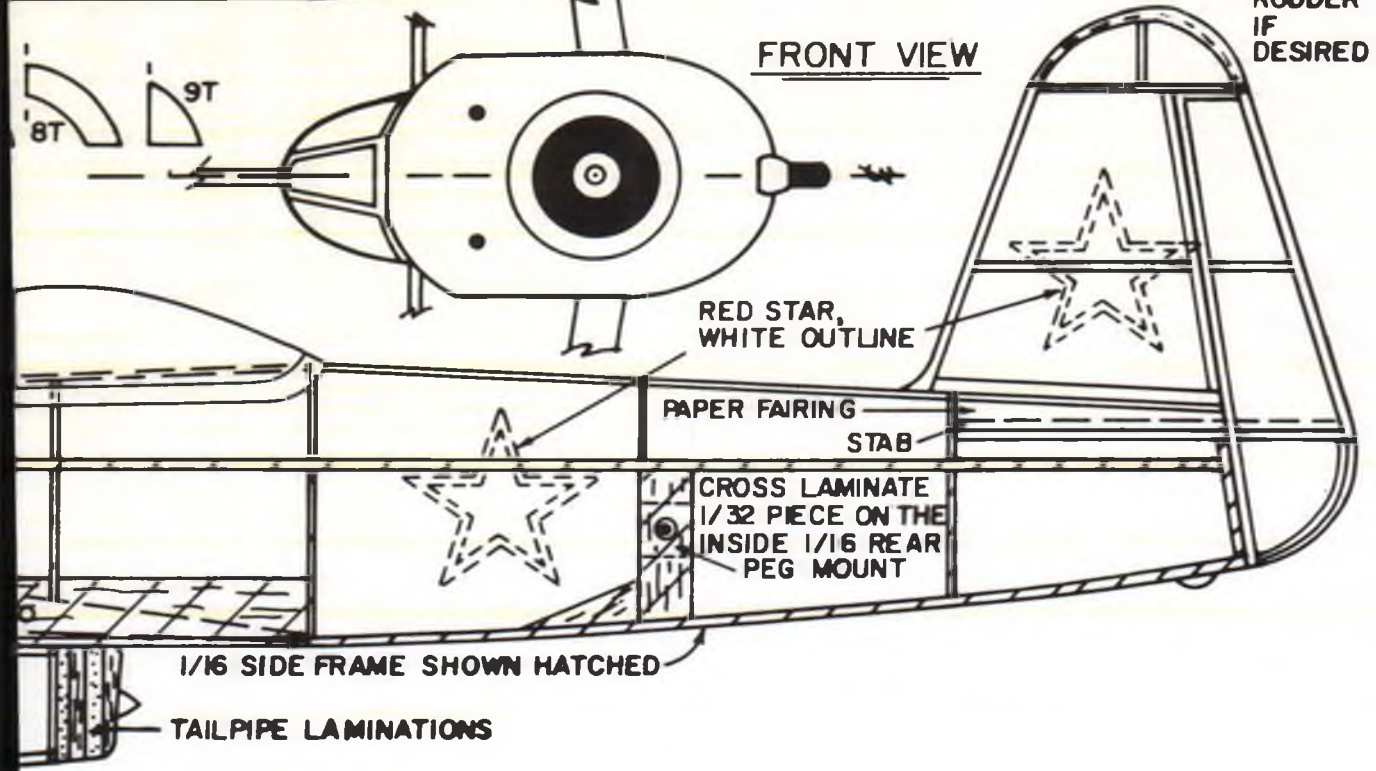
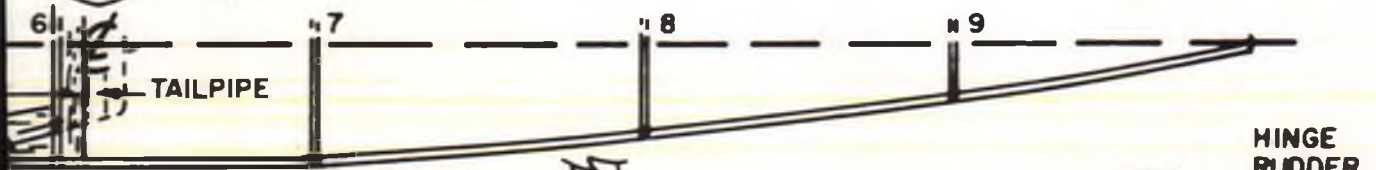
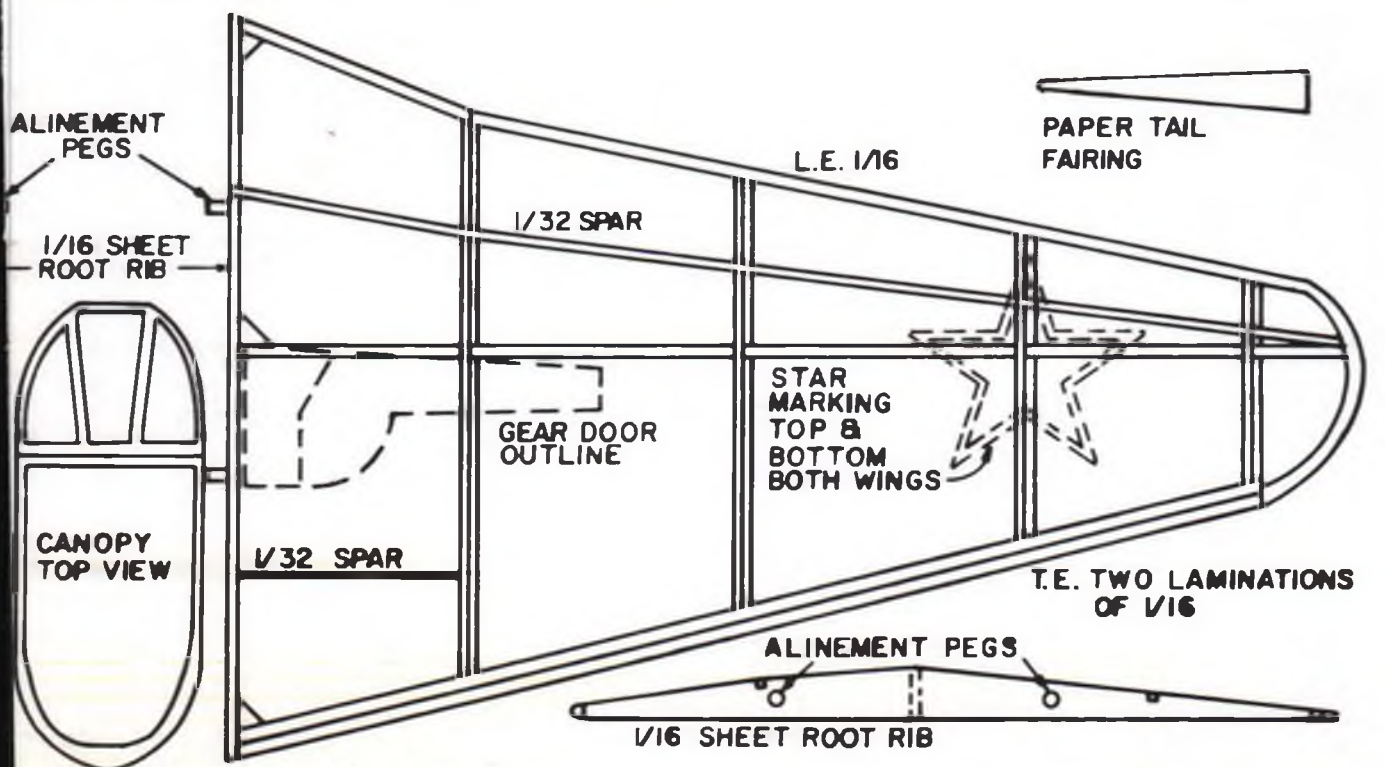
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model is, the better the potential for improved performance. A gram scale is indispensable to the dedicated rubber scale modeler. (I lucked out in this area, being the recipient of an excellent hand-made gram scale constructed by modeling friend Howard Chappell.)

When laminating the tips of the flying surfaces you may want to either wet-form 1/32x1/16 strips around a balsa or cardboard tip pattern covered with Saran Wrap, or cross-laminate two pieces of 1/32 sheet large enough to do all the tips and simply trace the tip patterns onto the laminated wood. I often employ this latter method on very small tips, since wet-forming is slower and, for me, usually ends in broken wood when I bend it around sharp curves.

On the wings you will note the plans call for a "staggered cracked-rib." This is an adaptation of the sliced-rib construction my good friend Dave Rees uses so successfully on his very light Coconut Scale models. This type of rib adds greatly to the strength of the glue joint along the leading and trailing edges of the wing. Also, the wingtips are slightly raised to meet the end of the main spar for added dihedral.

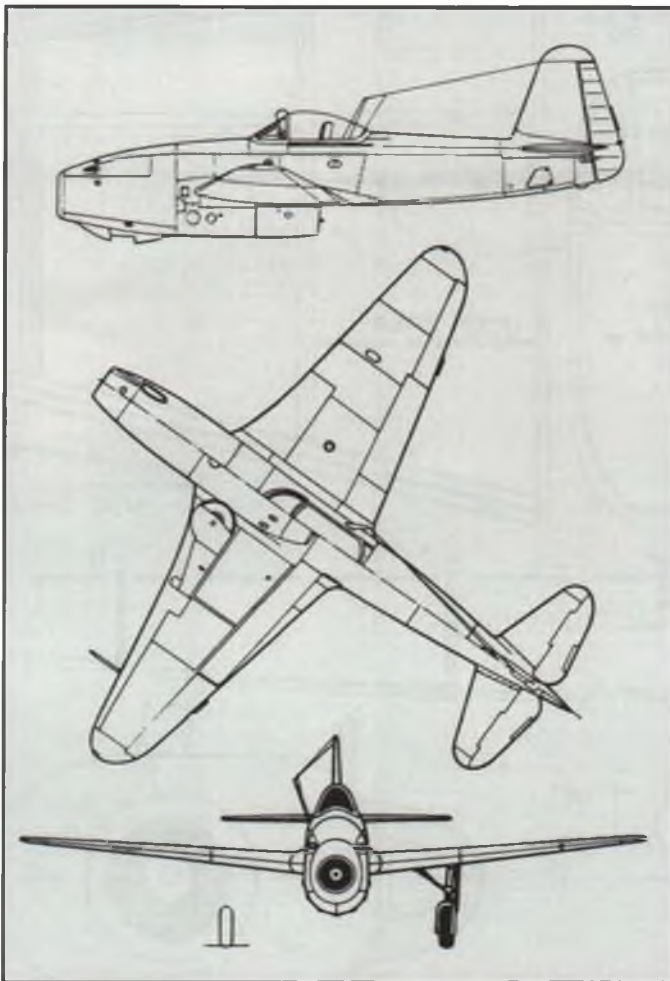
While on the subject of dihedral, you may wish to use the following method on this particular model.

Cut the two 1/16 sheet root ribs and drill the alignment holes so that the wings will be matched. Once the two fuselage sides are complete, use one of these ribs to mark and drill the alignment holes for the fuselage; be sure to add in the positive incidence shown on the plans. When the basic box is complete, pin the fuselage to the work table and temporarily install the wings.

Using short pieces of round toothpicks for alignment pins, set the dihedral so that the wingtips are even with the bottom of the canopy rail. Carefully glue the pins to the wing root rib and let dry. Don't use CA glue here as it will permanently glue the wings in place. Once the pins are dry, you can remove the wings and continue construction, knowing your dihedral and incidence angles are correct when it's time for final assembly.

Hopefully, you are familiar with the methods of molding a canopy. If not, now would be a good time to seek out other rubber modelers in your area to aid you in your efforts. Much of the satisfaction I've received in building rubber scale has been the friendships I've made and enjoyed over the years.

My model was painted dark green on the topside and light gray below. Its flying



Composite three-view from Squadron/Signal Publications. *Yak Fighters in Action*, by Hans Stapler.

weight without rubber was 12.4 grams. With a 6-inch prop and two loops of 1/16-inch braided FAI rubber 13 inches long, my Yak-17 has flown 46 seconds. As this was on only 700 turns (out of a possible 1400 to 1500 turns the motor will take). I'm sure this model will easily do 75 seconds or better.

I used Squadron/Signal Publications' *Yak Fighters in Action* as my primary reference source, supplemented by Yak-17 photos in other magazines and books. As with many scale research efforts, some photos and drawings differed in detail.

I trust you will enjoy building the Yak-17 as much as I have enjoyed doing this article. If you have questions about this model, or other rubber-powered jets, please write me at 4669 Oakwood Rd., Columbia, SC 29206. **MB**



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# The 19th Annual Astro Flight Electric Championships

BY JOHN LUPPERGER



■ **TOP LEFT:** George Clarke kept himself busy flying models in all four classes. Old Timers seen here are Lanzo Bombers in 630 and 720 square inch sizes. He flew an Ultra Mk. IV in the 7-Cell and Unlimited Sailplane classes. ■ **TOP RIGHT:** Typical of the direction that high-performance electrics are taking can be seen in the Falcon 550E flown by Jon Raley in Unlimited Sailplane. See the December '92 *Model Builder* for a product review on this competition ship. ■ **RIGHT:** The top three in 7-Cell Sailplane, from left, Jim Skinner (nice cap, Jim, but look at the camera next time!), Gary Westland and Roger Lackey. Models are a Falcon 500, a Challenger with a V-tail mod and a Falcon 550E respectively. ■ **FAR RIGHT:** The Swift T-2000 is a high-performance electric scheduled to be released soon by Airtronics Specialty Division. Scott MacKenzie flew his Astro 25/12-cell model to 4th place in Unlimited.







Nineteen years is a long history for any type of RC event, but when that event happens to be an *electric* contest, it really is amazing. Perhaps that's why the 19th Annual Astro Flight Electric Championships was advertised as the "Oldest and Best Electric Contest in the West." I have been the C.D. for this event for a number of years now, and I find it to be one of the most enjoyable contests to run. The Harbor Soaring Society of Costa Mesa, California was the host club, and those who worked the event did a professional and courteous job, making all of the contestants feel welcome.

On May 29th and 30th, a total of 47 entries gathered to do battle. Four classes each flew

four rounds of limited motor run (except for Round 4), precision duration, and runway landings to find out who were the "Best Electric Pilots in the West."

The classes flown were 7-Cell Sailplane, 7-Cell Old Timer, Unlimited Sailplane, and Unlimited Old Timer.

(Unlimited models could use up to 30 cells.) The duration time for each round was the same for each class, while the motor run time varied from one class to the next. Landings were measured with a graduated stick off of



■ ABOVE LEFT: Would you believe this is an *Unlimited* entry? Gary Westland built his own Astro 15/10-cell rocketship based on the 340 square inch wing from a 1940 Ranger O.T. gas job. His was by far the smallest model entered. ■ ABOVE: Unlimited Sailplane winners, from left: Joe Nave (an Electra Glide, would you believe it?), Lowell Norenberg (Zebra), and Jim Skinner (modified Snipe F3E ship). Joe's surprising 1st place win proved that, properly flown, a relatively low-tech, years-old design can still win contests. Also of interest, Lowell's Zebra was powered by one of the new Aveox brushless motors. He flew in 7-Cell and Unlimited by switching between 7-cell and 14-cell packs; motor and prop were unchanged. Climb performance was very good in both classes. ■ LEFT: Winners in Unlimited Old Timer, from left: Lowell Norenberg (Schmaedig Stick), Harold Reed (Playboy Sr.) and Joe Ballasch (Playboy Sr.). Joe produces some excellent electronic speed controls, used by over a third of all Astro Champs entrants.



■ **RIGHT:** Hobby Horn proprietor Bob Sliff's Electrifier was one of the larger 7-Cell Sailplane entries—86-inch span, 650 square. Bob finished in 6th place. ■ **FAR RIGHT:** The top three finishers in 7-Cell Old Timer, from left: Jim Skinner (Playboy Sr.), Neal Doly (Lanzo Bomber), and Ross Thomas (Playboy Cabin).



a central runway with a possible 1 to 100 points for the sailplane classes (within the allotted measurement), and 10 points "in or out" for the Old Timers. All flight scoring was done man-on-man to remove the luck factor of being called up during "good" or "bad" air.

Round 1 was a 3-minute duration, Round 2 was a 7-minute duration, Round 3 was a 5-minute duration, and Round 4 was a 5-

minute penalty-duration where each flier had two timers; the first kept track of the 5-minute duration (which started at launch) and the second timer kept track of the motor run time, which was subtracted from the flight time. The motor run was unlimited for a single run at the discretion of the pilot. All flight groups were called, and all groups were launched at the same time under command of the launchmaster, with the motor

run time also being called out by the launchmaster for the entire group.

Flying was continuous, with only a short period between flight groups. Each group was called to the "ready area" while the previous group was completing their flight task. When one group was finished, the next group went to the flight line. Each pilot was assigned a launch position directly in front of his landing runway. This tight organization

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<b>UNLIMITED OLD TIMER</b>														
1.	Lowell Norenberg	Schmaedig Stock	*		78"	680	58 oz.	12.2 oz./sq. ft.	Clark-Y	Futaba	E/R/T	S-33 Micro	Astro 205	Astro 25/6T
2.	Harold Reed	Playboy	*		80"	800	54 oz.	9.7 oz./sq. ft.	Undercamber	Futaba 5UAF	E/R/T	S-148 Standard	Ballasch	Astro 15 Geared
3.	Joe Ballasch	Playboy	*		67"	582	49 oz.	12.1 oz./sq. ft.	Undercamber	Airtronics Vanguard 6	E/R/S/T	501 MicroIta	Ballasch	Astro 15
4.	Gary Westland	Playboy	*		80"	800	80 oz.	14.4 oz./sq. ft.	Undercamber	Airtronics Vanguard 4	E/R/T	RCD	Ballasch	Astro 25 FAI
5.	George Clarke	Lanzo Bomber	*		74"	720	60 oz.	12.0 oz./sq. ft.	Lanzo Special	Futaba	E/R/T	S-133 Micro	ON/OFF Switch	Astro 15 Geared/11T
6.	Ray Westland	Playboy	*		67"	582	50 oz.	12.3 oz./sq. ft.	Undercamber	Cirrus Excell-4	E/R/T	N/A	Homemade	Astro 15 FAI Geared
7.	Ross Thomas	Lanzo Bomber	*		80"	816	104 oz.	18.3 oz./sq. ft.	Lanzo Special	Airtronics Vanguard 6	E/R/T	N/A	Ballasch	Astro 40 Geared
<b>UNLIMITED SAILPLANE</b>														
1.	Joe Nave	Electra Glide	*		72"	500	40 oz.	11.5 oz./sq. ft.	Eppler 205	Airtronics Vision	E/R/S/T	TT S-189 Mini	High Sky	Astro 05 Geared
2.	Lowell Norenberg	Zebra	*		75"	526	57 oz.	15.6 oz./sq. ft.	Selig 3021	Airtronics Vision	A/E/R/S/T	T501 MicroIta	Aveox 120LV	Aveox Brushless/4T
3.	Jim Skinner	Modified Siipa	*		72"	500	64 oz.	18.4 oz./sq. ft.	RG-15	Futaba 7	A/E/T	S-133 Micro	Ballasch	Astro 25/ST
4.	Scott MacKenzie	Swift T-2000	*		80"	620	55 oz.	12.7 oz./sq. ft.	RG-15	Airtronics Module 7	A/E/F/T Spoilerons	501 MicroIta	Astro 205	Astro 25/ST
5.	Jon Raley	Falcon 550E	*		74"	550	44 oz.	11.5 oz./sq. ft.	Eppler 374	Futaba Super 7	A/E/S/T Spoilerons	N/A	Ballasch	Astro 05 FAI
6.	Gary Westland	Ranger "E"	*		40"	340	37 oz.	16.9 oz./sq. ft.	Undercamber	Airtronics Vanguard 4	E/R/T	N/A	Becker	Astro 15 FAI
7.	Dan Wilson	No-Name	*		65"	525	40 oz.	10.9 oz./sq. ft.	Selig 3021	Cirrus Excell 7	E/R/T	S-133 Micro	Ballasch	Astro 05
8.	Roger Lackey	Falcon-E	*		81"	600	N/A	N/A	Selig 3014	Airtronics Vision	A/E/T Spoilerons	N/A	Becker	Astro 15 FAI
9.	Bob Sliff	Snipe Electric IV	*		92"	550	102 oz.	26.7 oz./sq. ft.	RG-12A	Airtronics Vision	A/E/T	JR 341 Micro	Astro 102	Astro 60 FAU/BT
10.	George Clarke	Ultra Mk IV	*		87"	750	56 oz.	10.7 oz./sq. ft.	Eppler 208	Futaba 6	E/R/S/T	S-133 Micro	ON/OFF Switch	Astro 15 Geared/11T
<b>7-CELL OLD TIMER</b>														
1.	Jim Skinner	Playboy	*		67"	580	40 oz.	9.9 oz./sq. ft.	Undercamber	Futaba 5	E/R/T	S-133 Micro	Ballasch	Astro 05 Geared/ST
2.	Neal Doly	Lanzo Bomber	*		70.5"	630	40 oz.	9.1 oz./sq. ft.	Lanzo Special	Futaba 5	E/R/T	S-133 Micro	Barison	Astro 05 Geared/ST
3.	Ross Thomas	Playboy Cabin	*		67"	580	46 oz.	11.4 oz./sq. ft.	Undercamber	Airtronics Vanguard 6	E/R/T	N/A	Ballasch	Astro 05 Geared
4.	Gary Westland	Lanzo Bomber	*		N/A	550	39 oz.	10.4 oz./sq. ft.	Lanzo Special	Cirrus PCM 5	E/R/T	S-133 Micro	Becker	Astro 05 FAI Geared
5.	Steve Ciambra	Lanzo Bomber	*		70.5"	630	40 oz.	9.1 oz./sq. ft.	Lanzo Special	ACE MP8000	E/R/T	S-133 Micro	Nyosho ON/OFF	Astro 05 FAI Geared
6.	Wendell Staud	Lanzo Bomber	*		70.5"	630	N/A	N/A	Lanzo Special	Futaba 4NBL	E/R/T	N/A	ON/OFF Switch	Astro 05 FAI Geared
7.	George Clarke	Lanzo Bomber	*		70.5"	630	42 oz.	9.8 oz./sq. ft.	Lanzo Special	Futaba 4	E/R/T	S-133 Micro	ON/OFF Switch	Astro 05 FAI Geared
8.	Harold Reed	Playboy	*		67"	580	42 oz.	10.4 oz./sq. ft.	Undercamber	Futaba 5	E/R/T	N/A	Ballasch	Astro 05 FAI Geared
9.	Joe Ballasch	Playboy	*		67"	580	48 oz.	11.9 oz./sq. ft.	Undercamber	Airtronics Vanguard 6	E/R/S/T	501 MicroIta	Ballasch	Astro 05 FAI Geared
10.	Bob Boies	Lanzo Bomber	*		70.5"	630	44 oz.	10.0 oz./sq. ft.	Lanzo Special	Futaba 4	E/R/T	S-133 Micro	RCD w/BEC	Check Point
11.	Frank Wetherill	Viking	*		60"	500	32 oz.	9.2 oz./sq. ft.	Undercamber	Futaba	E/R/T	N/A	Futaba	Astro 05 Geared
12.	Russ Cordell	Lanzo Bomber	*		70.5"	630	40 oz.	9.1 oz./sq. ft.	Lanzo Special	Futaba 4	E/R/T	S-133 Micro	Futaba	Astro 05 Geared
<b>7-CELL SAILPLANE</b>														
1.	Jim Skinner	Falcon 500	*		73"	500	47 oz.	13.5 oz./sq. ft.	SD 6080	Futaba 7	A/E/T	S-133 Micro	Ballasch	Astro 05 Geared/ST
2.	Gary Westland	Challenger	*		N/A	650	39 oz.	8.6 oz./sq. ft.	Eppler 195	Airtronics Vanguard 6	E/R/T	501 MicroIta	Ballasch	Astro 05 FAI Geared
3.	Roger Lackey	Falcon-E	*		81"	600	N/A	N/A	Selig 3014	Airtronics Vision	A/E/T Spoilerons	N/A	Becker	Astro 05 FAI
4.	Dan Wilson	No-Name	*		65"	525	40 oz.	10.9 oz./sq. ft.	Selig 3021	Cirrus Excell 7	E/R/T	S-133 Micro	Ballasch	Astro 05
5.	Scott MacKenzie	Electra	*		78.25"	663	44 oz.	9.5 oz./sq. ft.	Flat Bottom	Futaba Conquest 4	E/R/S/T	S-133 Micro	High Sky	Astro 05 FAI Geared
6.	Bob Sliff	Electrifier	*		86"	650	42 oz.	9.3 oz./sq. ft.	Eppler 195	Cirrus PCM 5	E/R/S/T	S-133 Micro	Ballasch	Astro 05 FAI Geared
7.	Joe Nave	Electra Glide	*		72"	500	38 oz.	10.9 oz./sq. ft.	Eppler 205	Airtronics Vision	E/R/S/T	TT S-189 Mini	High Sky	Astro 05 Geared
8.	Lowell Norenberg	Zebra	*		75"	526	50 oz.	13.6 oz./sq. ft.	Selig 3021	Airtronics Vision	A/E/F/R/S/T	501 MicroIta	Aveox 120LV	Aveox Brushless/4T
9.	Joe Matsumoto	Swift T1500E	*		61"	400	42 oz.	15.1 oz./sq. ft.	SD 8000	Airtronics Vision	A/E/T	S-133 Micro	PDI AeroZeta	Astro 05/ST
10.	Al Cron	Ultra Mk IV	*		87"	750	54 oz.	10.3 oz./sq. ft.	Eppler 208	Airtronics Vanguard 4	E/R/T	S-20 Micro	ON/OFF Relay	Astro 05
11.	Dick Pantzar	Eclipse	*		78"	660	48 oz.	10.4 oz./sq. ft.	Flat Bottom	Futaba 4	E/R/T	N/A	ON/OFF Switch	Astro 05 Geared
12.	Ray Westland	Electricus	*		78"	820	45 oz.	10.4 oz./sq. ft.	Eppler 205	Futaba 7	E/R/T	N/A	Becker	Astro 05 FAI Geared
13.	Tim Elliot	Falcon 550E	*		74"	550	49 oz.	12.8 oz./sq. ft.	Eppler 374	Airtronics Infinity 660	A/E/T	501 MicroIta	Homemade	Homemade Brushless
14.	Kevin Elliot	Bola 1700E ARF	*		68"	480	48 oz.	14.4 oz./sq. ft.	Eppler 207	Airtronics Vanguard 4	A/E/R/T	102 Standard	Novak 410	Astro 05 FAI
15.	Jon Raley	Falcon 550	*		74"	550	42 oz.	10.9 oz./sq. ft.	Eppler 374	Futaba Super 7	A/E/S/T Spoilerons	N/A	Ballasch	Astro 05 FAI
16.	George Clarke	Ultra Mk IV	*		87"	750	44 oz.	8.4 oz./sq. ft.	Eppler 208	Futaba 5	E/R/S/T	S-133 Micro	ON/OFF Switch	Astro 05 Geared
17.	Pat Hart	Electra	*		78.25"	663	42 oz.	9.1 oz./sq. ft.	Flat Bottom	Cirrus Excell 4	E/R/T	CS-248 Std.	Flight Tac	Astro 05 Geared
18.	Preston King	Electra	*		78.25"	663	48 oz.	10.4 oz./sq. ft.	Flat Bottom	Airtronics Vanguard 6	E/R/S/T	501 MicroIta	Ballasch	Astro 05 FAI Geared





■ FAR LEFT: George Clarke's Ultra Mk. IV is poised on the landing runway strip that was used for scoring landings. After landing, a measurement was taken from the strip to the nose of the airplane to determine the landing score. The intent was to minimize the "dork" landings so common when using the standard spot landing tapes, a practice that can easily result in a busted electric airplane, particularly the more fragile Old Timers. ■ LEFT: Wendell Stout's Lanzo Bomber, built from one of the old Leisure kits, was easy to spot with its very colorful finish. (Good news: the Leisure Electronics kits, including the Bomber and Playboy, should be available again shortly. The rights and all tooling have been purchased by Spirit of Yesteryear Model Aircraft Co., 40 Holgate St., Barrie, Ontario, L4N 2T7 Canada; 705-726-6208.)

kept the event running smoothly and provided constant action for the spectators and other competitors alike.

It's interesting to note that overall, 70 percent of the models were from kits; the rest were scratch built. Trophies were given to 3rd place in each class, and of these, eight were kit planes and four were scratch built. Clearly, an off-the-shelf kit model can be competitive.

The smallest (40-inch span) and largest (92-inch span) models flown were both in the Unlimited Sailplane class. Weights ranged from a low of 32 ounces (7-Cell Old Timer) to a high of 104 ounces (Unlimited Old Timer). Wing loadings ranged from a low of 8.4 ounces per square foot (7-Cell Sailplane) to a high of 26.7 ounces per square foot (Unlimited Sailplane). No single airfoil dominated, but Eppler and Selig airfoils were the

most common in the Sailplane classes.

Four different brands of radios were used, with Futaba and Airtronics each having 20 users. Many of the aircraft used computer radios for their mixing capabilities, and almost all of the models used mini or micro servos to help reduce weight. Ballasch motor controls were the most popular, with better than a third of all entries using one of the units made by local modeler and competi-

PROPELLER CONNECTORS WIRE BATTERIES

K&W 12x7 Folder	Sermos	14G	16/900 mAh
Rev-Up 12x7	Astro 0-Loss	13G	14/800 mAh
13x7.5 Folder	Anderson Powerpole	14G	16/450 mAh
Sonic Tronics 13x7	Deans	13G	16/1000 mAh
Robbe 14" Folder	Sermos	14G	16/800 mAh
Sonic Tronics 13x7	Deans	13G	10/800 mAh
Hobby Hero 12x7	Anderson Powerpole	13G	
Sonic Tronics 13x7 Folder	Sermos	14G	9/800 mAh
K&W 13x7 Folder	Sermos	14G	14/600 mAh
Sonic Tronics 10x6 Folder	Astro 0-Loss	14G	14/1000 mAh
K&W 9x6 Folder	Astro 0-Loss	13G	12/800 mAh
Aeronaut 8x5.5 Folder	Anderson/Deans	14G	12/800 mAh
APC 7x6	Deans	13G	10/800 mAh
Freudenthaler 9.5x6 Folder	Anderson Powerpole	14G	7/900 mAh
Freudenthaler 8x5 Folder	N/A	N/A	10/900 mAh
O.D. Carbon Fiber Folder	N/A	13G	27/1000 mAh
M. Airscrew 12x5 Folder	Sermos	14G	16/800 mAh
K&W 13x7 Folder	Sermos	14G	7/1000 mAh
Aeronaut 13.5x7.5 Folder	Anderson Powerpole	N/A	7/1000 mAh
K&W 12x7 Folder	Anderson Powerpole	14G	7/900 mAh
Freudenthaler 13x7 Folder	Deans	13G	7/800 mAh
13x7.5	Astro 0-Loss	14G	7/900 mAh
13x7.5	Astro 0-Loss	14G	7/1000 mAh
M. Airscrew 12x5 Folder	Sermos	14G	7/800 mAh
Rev-Up 12x6	Sermos	13G	7/800 mAh
13x7.5	Anderson Powerpole	14G	7/1000 mAh
Sonic Tronics 12x7 Folder	Deans	N/A	7/800 mAh
Homemade	Deans	14G	7/800 mAh
Sonic Tronics 12x7 Folder	Deans	N/A	7/800 mAh
Sonic Tronics 13x7 Folder	Sermos	14G	7/1000 mAh
Sonic Tronics 13x7 Folder	Deans	13G	7/800 mAh
Freudenthaler 8x5 Folder	N/A	N/A	7/900 mAh
Freudenthaler 9.5x6 Folder	Anderson Powerpole	14G	7/900 mAh
K&W 13x7 Folder	Astro 0-Loss	13G	7/600 mAh
O.D. Carbon Fiber Folder	Anderson Powerpole	13G	7/1000 mAh
Sonic Tronics 13x7 Folder	Sermos	14G	7/800 mAh
K&W 13x7 Folder	Sermos	14G	7/800 mAh
Aeronaut 8x5 Folder	Sermos/Astro 0-Loss	13G	7/1000 mAh
Taipan	Moles	N/A	7/900 mAh
M. Airscrew 12x5 Folder	Banana Plug	12G	7/900 mAh
Sonic Tronics 13x7 Folder	Deans	13G	7/1200 mAh
Aeronaut 7x6 Folder	N/A	N/A	7/1000 mAh
Graupner 8x4.5 Folder	N/A	N/A	7/1000 mAh
Aeronaut 8x5.5 Folder	Anderson/Deans	14G	7/1000 mAh
Sonic Tronics 13x7 Folder	Sermos	14G	7/800 mAh
Sonic Tronics 13x7 Folder	Astro 0-Loss	14G	7/800 mAh
Sonic Tronics 13x7 Folder	Deans	14G	7/1700 mAh

Here are a few of the 15 models on the way up in the "All Up/Last Down" event flown at the end of each day. The two winners each received a free Model Builder magazine subscription.





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tor, Joe Ballasch. On/off switches accounted for 17 percent of the entries.

All but four of the 47 entries used Astro cobalt motors. There was one Check Point motor, one handmade brushless motor, and one entry that flew in two classes with an Aveox prototype brushless motor. All of the 7-Cell Old Timers used gear drives, while just over half of the 7-Cell Sailplanes used gear drives. Sermos, Anderson Power Pole, Astro Zero-Loss and Deans Ultra Plugs were almost evenly distributed among the competitors. It is interesting to note that the Deans plug, which is primarily used by the RC car fraternity, had a very good showing with the fly-boys.

The choice in batteries was rather interesting, with a definite trend towards smaller capacity, lighter battery packs, to help reduce overall weight. Packs ranged from 450 to 1700 mAH. Of the 47 entries, less than a third used batteries of 1000 mAH capacity or larger.

The most interesting thing to note from the chart is that the majority of aircraft used hardware readily available at most hobby shops. This type of event is very competitive, yet the equipment that produces winning models can be easily acquired by the average modeler.

At the end of each day's official flying an "All Up-Last Down" event was flown, with 7-Cell Sailplanes and Old Timers competing together. Unlike most other AULD events, where the models are carrying multiple battery packs of high mAH capacity and motors with extremely low amperage draw, this event had a limited motor run of 55 seconds for the 7-Cell Old Timers and 40 seconds for 7-Cell Sailplanes. There were 15 entries each day, with the winner receiving a complimentary subscription to *Model Builder* magazine donated by Gallant Models. Saturday saw seven Old Timers and eight Sailplanes launching 15 seconds apart into a windy afternoon sky. Lift was very sparse and at the 7-minute mark, Scott MacKenzie was the winner with his Goldberg Electra. Sunday saw six Old Timers and nine Sailplanes launching into clear skies with spotty lift. After 15 minutes, Dan Wilson was declared winner with his original, as yet unnamed sailplane. By the way, on Sunday, the next to last model down was George Clarke's Lanzo Bomber, proving that the Old Timers can give the Sailplanes a run for their money. If you've never seen or heard 15 high-powered electrics heading for the wild blue at the same time, you don't know what you're missing!

Like the flyer said, this really was the "The Best Electric Contest in the West." Many thanks to Astro Flight and Bob Boucher for prize donations, along with Gallant Models, Midway Model Co. and Hobby Shack for the goodies they contributed. I'm really looking forward to next year's contest, which will be bigger and better than ever. Plans are in the works to have manufacturer's displays and some new events that will make it more fun than ever. If you like electrics, this is going to be the place to be on Memorial Day weekend in 1994! **MB**

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## PLUG SPARKS continued from page 31

expected with such clean lines, the Toni soars very well. The model derives its name from the designer, Antonio "Toni" Patuna.

### AUSTRALIA

From that tireless writer, Bruce Abell, comes a real beauty of an MG-2, a 1936 design by Mike Granieri of New Jersey, seen in Photo No. 6. This is the airplane featured as the "Model of the Month" in last month's *Model Builder*. Bruce wasn't sure about the identity of the builder/flier—probably Greame Sinclair, he says—but points out that it is well constructed and flies equally well.

*(Editor's note: In the drawing we presented last month showing the MG-1 and MG-2, we listed Model Builder as being a source of MG-2 plans. We didn't discover until it was too late that Pond himself lists plans for the MG-1, for those who prefer the cabin fuselage version. They're plan #64C1, priced at \$12 plus \$2.40 S&H and California sales tax if applicable. See his ad elsewhere in this issue.)*

### NCFFC

Not enough credit can be given to Bill Bowen, who tirelessly produces seven O.T. contests a year at Waegell Field in Sacramento. With so many participants, it is inevitable that unusually well-built models



Photo No. 8. How about this 1942 Japanese gas job? Shimpei Yamamura of Kyoto, Japan built this Brown Jr. powered design known as a K-1. Lack of flying space in Japan limits the bigger O.T. gas models to RC only.

will appear.

Such is the case of Photo No. 7, showing a Williams "Dragon Fly," a 1938 design originally published in *Flying Aces*. When converted to RC, the 85-inch span ship is a very competitive low-wing model. For those who think low-wing designs don't fly well, this writer says they all look alike at 1000 feet. Les Douglass of Placerville, California is to be congratulated on turning out such a gem.

### THE WRAP-UP

The Old Timer movement is slowly growing in Japan. Having heard from Nathan Sturman recently, it was rather a surprise to

receive mail from Shimpei Yamamura of Kyoto, Japan. Yamamura sent three photos of the antique designs he has built: a Japanese K-1 and 1943 Winner (Zipper type) that set a record of 17 minutes, 20 seconds, and lastly a German "Hummel," a design that was reproduced in the Japanese magazines. Photo No. 8 shows the K-1, one of the first gas models introduced in the Japanese model magazines.

Inasmuch as there is very little open space in Japan, these models are flown exclusively by RC. Shimpei goes on to say that only a few people there are enjoying Old Timers, consequently no big contests have been staged. **MB**

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# SAUCER

BY ROY L. CLOUGH, JR.

Not one but two great flying modern versions of

## ZOOMSLOT

A slab of foam, a single-channel Cox FailSafe radio and a reed-valve .049 are all that's needed to experience the thrills this strange flying machine can provide.



Zoomslot is capable of some surprising performance using only a Cox reed-valve .049. Text tells how the author squeezed two control functions from the single-channel FailSafe radio.

**W**ith a thrust-to-weight ratio near unity and abetted by a unique two-control surface hookup of the Cox FailSafe receiver, this latest version of my classic slot saucer design is a real mover and shaker.

From a hand launch this hotdogger will burn around in a low circle like a ukie, roll out of its launch pattern in the opposite direction with a touch of rudder and scream skyward in startling 200-foot zooms at the flick of its elevator.

Consecutive loops require no practice; wingovers, Immelmans and snap rolls require just a little. When the power quits, Zoomslot glides surprisingly flat and can be aimed to land where you want it with a neat little elevator flare on touchdown.

It would be difficult to imagine a simpler RC flying machine. The body/wing/fuselage is shaped from a slab of 3/4-inch thick bubble foam packing. (You could substitute pink builder's insulation foam, which is only slightly heavier.) Three-quarters of a sheet of 1/16 or 3/32 medium-soft balsa and a scrap of 3/32 ply covers the wood inventory. Medium or lightweight silkspan

*continued on page 55*



# MANIA!!!

the author's famous "slot saucer" of the 1950s.

## MINISLOT SAUCER

For small field FF fun, try this ultra-simple electric slot saucer. Uses an inexpensive HiLine power system.

**P**owered by a HiLine Mini-6 motor, this 38-year-old design will draw interested attention at any flying site.

The slot saucer is perhaps one of my most famous designs, but no mention of it would be complete without acknowledging the fact that, although I invented it, Fran McElwee secured its place in history. Since the '60s, his larger radio controlled versions have been stealing the show wherever they have been flown.

Minislot is built from a sheet of light-weight polystyrene bubble foam and 1/32 and 1/16 balsa glued together with thick UFO CA glue, which works great and won't melt foam.

There is no pretense of an airfoil section, and except for a purely optional rudder tab, no control surfaces. Balance and flight trim is achieved by moving the batteries as needed.

The Minislot Saucer must be slightly dished to secure recovery coupling. Trim a curve into the last third of the central stiffening spine to raise the trailing edge of the saucer 1/4 inch.

*continued on page 55*



Skip Roll took this shot of his dad, Gordon, launching the designer's Minislot Saucer. Skip added the landing gear for flying from the famous FF field near his home in Teft, California.







# ZOOMSLOT

continued from page 52

laid on with 50/50 diluted Elmer's GlueAll covers all.

The molded-looking canopy came from a blister packaged tube of plastic rubber. Use something similar or make a sheet balsa hatch to cover the radio recess. Sheet acetate or Mylar drafting film is used for the self-centering hinges of the fin and rudder. The elevator is deli tray foam. For power I used an old Cox reed-valve .049 with a 6x3 prop.

The Cox FailSafe radio system makes all this simplicity possible. It is light in weight, positive in action and can be bashed to do much more than it was designed to do. I added a toggle switch to jump the transmitter's timing capacitor so that I can disarm the transmitter's failsafe function if needed.

The receiver is powered with four 72-mAH NiCds stripped out of a "9-volt" rechargeable transistor battery to save the weight of the battery holder and bother of replacing AAA cells. An even better choice would be four 110-mAH Sanyo cells for more flights between charges. The battery pack is recharged through two red and black wire stubs until perceptibly warm to the touch.

You'll need a new servo arm to operate the two-surface control system. Not having a spline-compatible Airtronics arm handy, I added a Futaba S133 4-prong arm using a 3-48 machine screw to replace the self-tapper. The Futaba arm sits on top of the Cox arm with an external prong star washer between them.

(Do not leave out the star washer if you use the Futaba arm. During my early experiments I decided that friction between the plastic parts would be enough to handle control loads and still allow enough slip to tweak in final adjustments. The fallacy of this notion is documented on a few seconds of videotape showing a spectacular 200-foot zoom followed by an equally spectacular 200-foot dive. Luckily, Zoomslot proved quite easy to repair. Foam excels at absorbing impacts.)

Construction details should be clear from the plans, but a word on working the foam might be helpful. Bring it as close to shape as possible with sharp razor blades and finish it off with 200-grit sandpaper, delicately applied. Be sure to push the reinforcing bamboo teriyaki skewers into both sides (rotating while pushing) to strengthen the slot area. Don't try to cover them with glue, even Elmer's, and push them in place before it dries. You may find yourself snapping off seized sticks and trying again, and besides, the friction and grab of the foam makes glue unnecessary.

Use silkspan for covering, laid on with 50/50 diluted white glue, but use UFO thick CA for all assembly. I used Red Devil water-based latex for paint and trim and have had no problems. Do not decide that once the

surface is sealed you can use fuelproof dope. Solvent fumes will permeate the silkspan covering and collapse the foam underneath.

Self-centering elevator and rudder hinges are thin Mylar or acetate. The elevator's center position is slanted 1-1/2 degrees up by inserting its hinges into the foam body at an angle.

Mount the Cox FailSafe receiver with a few dabs of hot-melt adhesive on the corners. Control horns are made from tin can metal stuck on with CA. Control cables are black button thread. (Pushrods won't work with this split-control setup because the inactive side must slack off.) The thread hookup need not be violin-string tight, just free of appreciable slack.

***From a hand launch this hotdogger will burn around in a low circle like a ukie, roll out of its launch pattern in the opposite direction with a touch of rudder and scream skyward in startling 200-foot zooms at the flick of its elevator.***

Control moves are: Pushing the right-hand button moves the rudder to the right. Torque effect is your left rudder under power. Pushing the left-hand button lifts the elevator.

Flight trim is fairly important (by fairly, I mean that if you blow it you can probably white-knuckle the model down under some semblance of control but good trim gives you more elegant operation). The saucer is assumed to be absolutely flat and symmetrical. Thrust line is dead nuts zero—no offset of any kind. Same for the fin/rudder setup. In addition to the built-in up elevator, a small negatively angled auxiliary stabilizer on the vertical fin helps provide a recovery reflex for the otherwise symmetrical wing section.

Balance point is fine-tuned by moving the battery back and forth before sticking it down with a couple dabs of hot-melt glue. Test glide the model over tall grass if possible; it should shoot out fairly fast from a strong heave with just a suggestion of nose-up mushing.

The flight mode is to lean out the engine and hand launch about 10-15 degrees nose up. Zoomslot should move out rapidly and bank into a left-hand turn under the influence of torque. All things being equal, you should get a fast circling flight with a very gradual increase in altitude. Very brief touches of right rudder will ease the nose out of the circle into a shallow climb. Holding the elevator button briefly will produce a near-vertical zoom.

Climb is stopped by right rudder blips to bring the nose down. Holding rudder will produce a screaming spiral from which a

punch on the elevator button will bring instant recovery. The elevator is very responsive and the model loops spectacularly fast. Wingovers and snaps come from nosing up vertically or a little past vertical and then hitting the rudder.

When the power quits the trick is to aim the model where you want it to land using a rudder that moves only to the right. It's fairly easy once you learn where to get off the rudder. Give Zoomslot full elevator a couple of feet off the ground and it will flare nicely to a soft landing. **MB**

# MINISLOT SAUCER

continued from page 53

The underbelly fin exists solely to protect the prop and motor. You can leave it off or install the two-wheel landing gear devised by test pilot Skip Ruff for flying over the gravel that passes for model flying sites in California.

The motor is mounted with two 1/16x 1/4 balsa legs which, with the Mini-6's fiberglass shaft carrier, are stuck to the 1/32 balsa base with one small drop of CA each. In the event of a crunch, the wood will split off without damage to the motor. The above-center thrustline needs 1 to 1-1/2 degrees upthrust.

The three-cell 110-mAH battery pack that came with the Mini-6 works great, but I fly from a small field and wanted less duration and more pizzazz. Dick Henderson had sent me four tiny 50-mAH cells; I used them with good results in a simple battery holder. NiCd manufacturers advise against soldering cells because excessive heat can ruin them. While most of us seem to get away with soldering larger cells, a holder makes more sense for the very small cells as they have little capacity to dissipate heat. (Commercial packs are assembled with a spot welding technique that imposes virtually no heat on the cells' interior.)

Stick a small piece of double-sided tape to the battery pack or tube and use it to shift the pack fore and aft and sideways until the saucer glides with about a 5:1 mush and a barely perceptible left turn. The ideal adjustment is climbing left-hand circles a hundred feet or so in diameter. When you are satisfied you have the balance point nailed down, replace the tape with a couple drops of CA.

Wiring hookup is total simplicity. Hooks bent into the tinned positive leads serve as a switch. Recharge is via a couple of color-coded alligator clips from a pocket battery pack. I use a charging pack with one more cell than the flight pack and leave the clips on until the pack being charged is just perceptibly warm. Bench charging at .5 amp for 3-5 minutes will pack in a bit more duration. **MB**



# ELECTRONICS CORNER

BY ELOY MAREZ

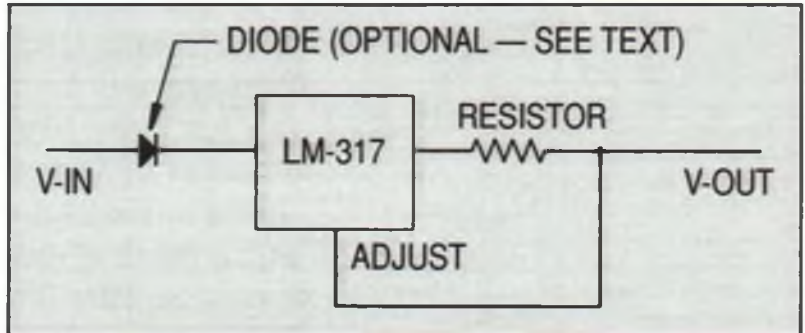
## •More on NiCd Charging •Sanyo Battery News •Intro to Relays

NiCd battery charging is always a popular subject. It seems that no matter how much it is discussed and how many circuits I include, there are always new questions. This month is no exception, the question coming from a previous correspondent who has been silent for some time, Dick Henderson, of Phoenix, Arizona. Dick asks about a "good charging method for small batteries" which he uses for small electric-powered airplanes.

For Dick and those others who have special charging requirements, there is the LM-317 Adjustable Voltage Regulator IC circuit that I have used quite successfully in the past. It has a number of advantages, requiring only a minimum of external parts, and can be easily tailored to exact requirements. This circuit can be further tailored to whatever number of

A note of caution: this is a constant current device. That is, it produces the programmed amount of current for as long as it is connected, without tapering off as do many RC system NiCd chargers, nor does it include any automatic charge reduction or cutoff. Therefore, the charge time must be calcu-

versions, the large TO-3 and the smaller TO-220. Some of you will look at the drawing for the latter and assume it to be a MOSFET. Not so. There are dozens of devices that look just like these, but which electrically are completely different. I have shown both configurations with their connections.



Schematic of an ultra-simple constant current NiCd battery charger. The one resistor used adjusts the output to the required current. Its effect is independent of the input voltage, whose only requirement is to be higher than that of the battery being charged.

lated and manually terminated and not allowed to remain on for much longer, as overcharging of your expensive batteries will begin to take place. Don't look at this as a completely negative feature, as you will find that many commercially available chargers—for example most of those available from Ace R/C—are of the constant current type.

The LM-317 will handle currents up to 1.5 amperes, though as the current increases, so does the heat it generates. If you plan to use it at high levels, you should plan on a heat sink right from the beginning. If the current is less than half an amp, just mounting it on the side or cover of an aluminum box will suffice. Radio Shack has available a mounting package for either of these two configurations, which should be used to insulate the transistor when it is mounted on a metal surface.

The LM-317 comes in two

I now have to hit you with some formulas, but bear with me, they are simple ones. The formula involved has to do with the single resistor shown, whose function it is to adjust the output current of the regulator. As stated, it is simple: you divide 1.25 by the desired current in amperes; the result is the resistor value in ohms.

As a reminder, the charge time required is the battery capacity divided by the rate. Normal system charging is based on 500 mAH (milliamper hour) batteries being charged at .050 amp (50 milliamps), requiring 10 hours.

For example, say we wish to charge the common 500 mAH capacity battery faster than the overnight charger supplied with the system. A one-hour charge rate will require 500 milliamps. Thus, by dividing 1.25 by .5 (500 mA), we wind up needing a 2.5 ohm resistor. Want another example? Okay, let's charge a 1200 mAH capacity battery in, say, three hours. First, 1200 divided by 3 gives us a required charge rate of 400 mils. Then, dividing 1.25 by .400 give us a required resistor value of 3.125 ohms.

As you can see, some rather



Newest electronic goodie from RAM is their On-Board Glow Driver, which allows you to light your engine's glow plug without using an external battery. The unit can also be set to automatically come on at any preset throttle stick position—especially useful for maintaining a reliable idle, particularly in inverted engine installations. Suggested retail is \$39.95, from RAM, 229 E. Rollins Rd., Round Lake Beach, IL 60073; (708) 740-8726.

cells you are using, by adjusting the supply voltage. This input voltage requirement is not as critical as the current adjustment, as only the maximum number of cells is applicable, the charger will then work properly with all packs of lesser cells. Full information for all these adjustments follows.



small and fractional resistor values are required at the high charge rates. Forget the fractions, and don't even bother to try Radio Shack for them. You'll have to go to a real electronics supply house, and even then, some of the values will not be available directly, but will have to be made up using more than one resistor, either in series or parallel. Remember that resistors in series add, i.e., two 10-ohm units connected end to end will total 20 ohms. If, however, you connect them in parallel, the result is only 5 ohms. Likewise, three 10s in series will give you 30 ohms. To get the value of resistors connected in parallel, divide the single unit value by the number of resistors. In this case, three 10s in parallel will give you 3.33 ohms.

It is not absolutely necessary to come up with the exact value called for by the formula; you have unit tolerances to contend with anyway, so it will never be 100 percent exact. Just go for something as practically close

as you can get. For example, instead of the 3.125 called for above, settle for a 3 ohm if one is available. Working the formula for that value gives us a rate of .4167 amp—close enough to the required .400. Simply adjust the time, the results will be the same.

Wattage? Half-watt units will

do just fine, keeping in mind that large ones are perfectly acceptable. For example, Radio Shack carries 0.47 and 1.0 ohm units, though in 5-watt size. They are physically larger than required, but they are available, and in the proper combinations, might work for the particular charge rate that you are looking for.

Input voltage? Just as simple as the rest of it. The minimum,

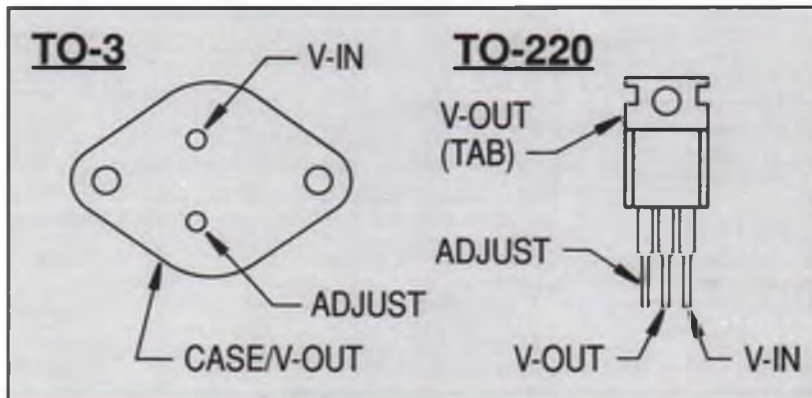
The only considerations are the voltage as mentioned, and the current rating of the power supply. For low currents, you can even use your system charger; the transmitter side is good for about 10 volts. They are normally marked for 50 mills, but that is not a completely true rating, being the amount of current they will provide to an eight-cell battery. When connected to lower voltage batteries, the current will be higher. Try yours in your particular requirements; a completely non-scientific but valid test of whether or not you are overloading it is simply to feel it now and then. If it is getting uncomfortably hot, you are overloading it.

A good choice of an AC power supply would be one of the 12-volt, 500-mA chargers sold to revive 12-volt car starter batteries. Don't overlook the many such "battery eliminators" on the market intended for other purposes but which will also do this particular task. Radio Shack can help here too, though they are a little pricey.

Batteries must definitely follow any discussion about battery chargers—and there is interesting news in that department. I just received some information from Cermark Electronics, a major purveyor of NiCd batteries for the RC hobby, about some new cells to be available from Sanyo, probably around the end of the year. They are—now get this—800, 1200 and 1400 mA capacity cells just slightly larger and heavier than the common 600 mA units.

In a practical four-cell battery configuration, without covering or wires, they compare as follows:

- N-600AA, 600 mA: 1.80 cu. in., 3.68 oz.
- KR-800AAE, 800 mA:



Full-size drawings of the two available versions of the LM-317 Adjustable Voltage Regulator discussed in text. Note that on the TO-220 version, the top tab and center pin are common. Insulation is recommended when mounted on metal panels—see text.

repeat *minimum* required for the full 1.5 amp capability of the IC should be 1-1/2 times the battery voltage plus 3 volts. So for a four-cell pack, at full throttle, you'll need about 10 volts, though at lower currents you can get by with less input voltage.

Most applications for this type of charger will be in the field, the natural supply then being the 12-volt car battery. It is perfectly OK to use the higher input voltage, the only consideration being that the greater the differential between it and the voltage of the battery being charged, the greater the heat generated by the IC. The input voltage, and thus the said heat, can be reduced by the addition of a series diode of ample current carrying capacity at the input, as shown in the schematic. In this case, the diode acts both to drop the input by .7 volt and also to provide a measure of safety if you are using unpolarized clips to make your connections. In the event that you connect things in reverse, nothing will happen, other than that no charging will take place.

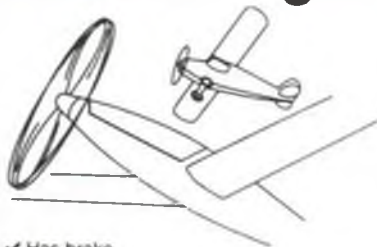
AC operation? No difference.



Custom Electronics, R.R. 1, Box 1238, Higginsville, MD 64037; (816) 584-6284 recently introduced their new Custom Charge Mount, a universal, fuselage-mounted charge receptacle that can be used with Airtronics, Cirrus, Futaba J, JR, Hitec or the new World Engines radio charge connectors. Price is only \$2.50 each.



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# ELECTRONICS CORNER

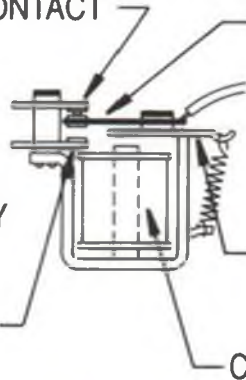
NORMALLY CLOSED (FIXED) CONTACT

MOVABLE CONTACT

NORMALLY OPEN (FIXED) CONTACT

ARMATURE (HINGED)

COIL



Drawing of a basic Single Pole Double Throw relay and its individual components.

when an electric current flows through a coil of wire, it produces magnetism. The magnetism pulls on a movable part, in relay parlance called an "armature," to which a contact has been attached on one end. This contact then makes or breaks with another contact, to provide the increased switching action.

These contacts are rated and designated in the same manner as are switches—for mechanical configuration and for current ratings—and they are wired in the same manner. They may come in basic Single

- 1.81 cu. in., 3.24 oz.
  - KR-1200AUL, 1200 mA: 2.20 cu. in., 3.8 oz.
  - KR-1400AU, 1400 mA: 2.54 cu. in., 4.36 oz.
- The maximum charge and discharge info released so far includes:
- N-600AA: Charge 4-6 hours, discharge at 8C.
  - N-800AAE: Charge 7-8 hours, discharge at 8C.
  - KR-1200AUL: Charge 14-16 hours, discharge at 4C.
  - KR-1400AU: Charge 14-16 hours, discharge at 4C.

Good news, huh? No price information yet, but you will be able to get that, and the batteries themselves, just as soon as they are released, from Cermark Electronics and Model Supplies Company, with two U.S. locations: 107 Edward Ave, Fullerton, CA 92633, (714) 680-5888; or 551 Mulberry Ct., Buffalo Grove, IL 60089, (708) 808-0145.

A catalog listing all of the many fresh Sanyo batteries currently available both for RC systems and for electric powered models, as well as chargers and many other useful accessories and all-wood no-plastic ARF airplanes can be obtained from either address.

## AN INTRO TO RELAYS

Queries have come my way lately that indicate it's time for a short discussion in the basics of the common relay, as used in motor cutoffs and a few other RC applications.

Basically, the relay is an electrically operated switch, a two-part device, one electrical and one purely mechanical. Its function is primarily to increase the current handling ability of a switching circuit.

The relay operates on the principle that

Pole Single Throw (SPST) units, up to multiple pole arrangements for more complex switching chores. The most common one we will probably run into will be the Single Pole Double Throw type as shown in the sketch, which can be used to provide switching from one point to another. The current switching capacity of these contacts is dictated purely by their physical size and the metal used, and can be obtained only from the maker's literature. Like switches, these contacts can also be ganged together to increase the ratings. For example, a double pole relay rated at 5 amperes is rated for each set of points; connecting them in parallel would provide a safe switching capacity of 10 amps.

The other spec that must be considered is the voltage and resistance rating of the coil itself, also available only from the maker and often found stamped somewhere on the relay. The voltage indicated is the best operating voltage for that particular unit, though I have found that you can deviate plus or minus some 20 percent and still obtain acceptable operation. However, the costs are that on lower voltage, the relay may not close as solidly and be more affected by vibration, while on higher voltage the current consumption will also be higher. Ohm's Law always applies, and never deviates!

Also in accordance with Ohm's Law, the resistance of the coil determines the current that will flow in the coil. The rule of thumb is to use a low resistance coil where current consumption is a consideration, though such relays usually have weaker return springs and therefore less contact pressure, and are also more easily affected by vibration.

Next month? Who knows—your ideas are welcome. Eloy Marez, 2626 W. Northwood, Santa Ana, CA 92704. **MB**

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1938 Mercury 72"	.....\$61.28
1938 Zipper 54"	.....\$26.24
1940 Ranger 48"	.....\$33.55
1940 Sailplane 78"	.....\$88.00
1940 So Long 50"	.....\$31.88
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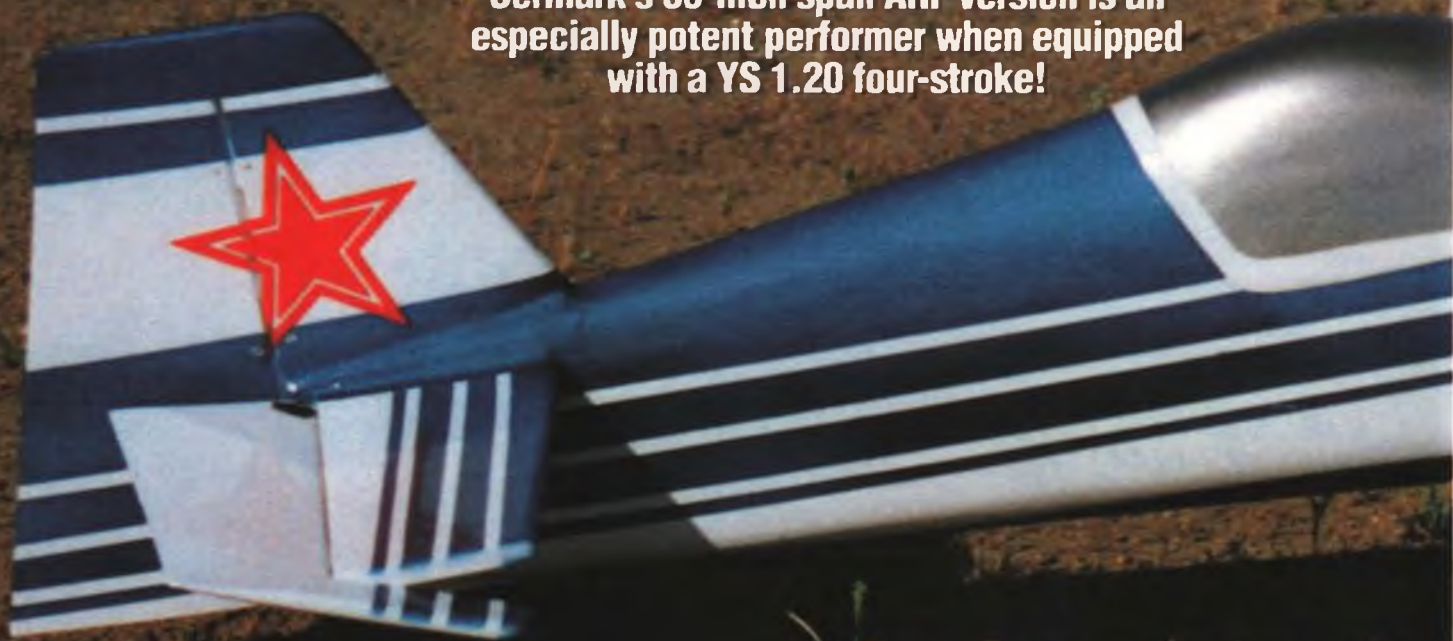
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# Cermark's Suik

The Russian Sukhoi is currently the hot ticket among the scale aerobatic models. Cermark's 56-inch span ARF version is an especially potent performer when equipped with a YS 1.20 four-stroke!



## ALL ABOUT ARFS BY ART STEINBERG





# hoi SU-26M

Cermark's Sukhoi makes a very handsome model when trimmed per the full-size aircraft. Covering is white Ultracote, color is metallic blue Coverite 21st Century paint.



Cermark's Sukhoi is even more handsome in the air than on the ground. Especially impressive is its vertical climb performance—virtually unlimited with that powerful YS 1.20 four-stroke supplying the pull.

## CERMARK'S SUKHOI SU-26M

WINGSPAN .....	56 inches.
WING AREA .....	627 square inches.
FLYING WEIGHT .....	9 pounds*
WING LOADING .....	33 ounces per square foot*
OVERALL LENGTH .....	46 inches.
POWER .....	60-75 two-stroke. 80-120 four-stroke.
RADIO .....	Four channels
PRICE .....	\$290 uncovered, \$345 covered

Available from Cermark Electronics and Model Supplies Co., 107 Edward Ave., Fullerton, CA 92633; (714) 680-5888.

\*As tested with a YS 1.20 four-stroke.

**i**n sport scale RC these days, warbirds continue to be as popular as ever, with the P-51 Mustang usually leading the pack in terms of sheer numbers. However, for a change of pace and for outstanding flyability, many RCers are turning their attention to scale aerobatic ships, as typified by the Extra 300, the Dalotel and the Ultimate Biplane designs.

The one emerging as the hottest choice at the moment is the Russian Sukhoi SU-26M, which is presently available from at least half a dozen model manufacturers, and new entries continue to appear at a rapid pace. Sukhois are presently available in sizes ranging from a .40 all the way up to giant scale, and in both kit and ARF configurations.





This particular version of the Sukhoi came covered with white Ultracote; the model is also offered in uncovered form.



The huge interior of the fuselage will accept any radio installation. Note the neatness of the all-wood construction.

Jumping into the middle of this explosion of Sukhois, we find Cermak Electronics and Model Supplies Company, which for some years has been offering a line of attractive, all-wood ARFs, most of which have been reviewed at one time or another in these pages. Cermak's new ARF SU-26M is aimed at the flier who thinks .40-size models are a bit on the small side, but who doesn't want to get involved with the burden and complexity of a giant scale model. Cermak's Sukhoi is moderate in size and is capable of being transported fully assembled.

When it comes to choosing an engine for this bird, Cermak suggests using a .60 to .75 two-stroke or .80 to 1.20 four-stroke. I consulted with Steve Chao of Cermak and told

him that putting a rip-roaring 1.20 in a medium-size airplane seemed questionable to me, but if Cermak really felt the airplane would stay together under that much power, I'd like to try it. Steve admitted that maybe it was somewhat overly optimistic to stick a 1.20 four-stroke in a plane with a 56-inch span and a wing area of only 627 square inches; he felt an O.S. .91 Surpass would be a better choice for obtaining really spirited performance from the Sukhoi.

Keeping Steve's recommendation in mind, I next conferred with my chief building and test flying team, Ofa and Jerry Kitchen. We decided to go for broke and install a YS 1.20. Of course, we would make certain that the wing center joint was well glassed and that the firewall was also

secured with plenty of fiberglass reinforcement. Additionally, because we anticipated higher-than-normal flight stresses, it was decided that the elevators would be activated by dual servos, and each aileron would also have its own servo.



The Sukhoi's belly pan and cowl are non-gelcoated fiberglass and require painting; quality is excellent.

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Cermak supplies the Sukhoi in both an uncovered version and a completely covered ARF version finished in solid white Ultracote. Both come with lightweight, built-up, fully balsa sheeted wings.

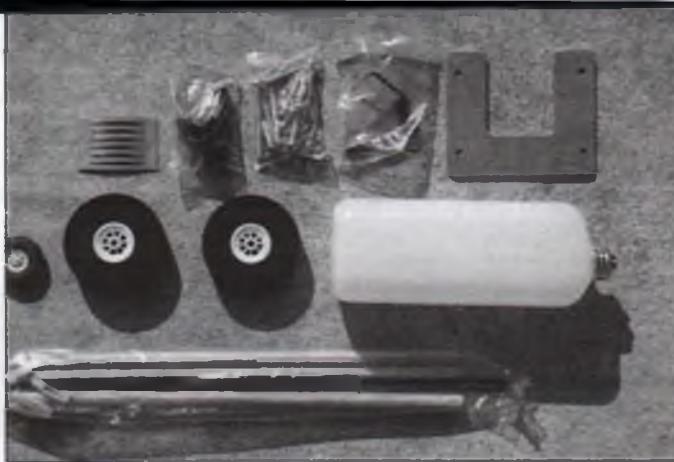
Virtually all of the necessary hardware is furnished, including wheels, and we were very impressed with the workmanship and the precise fit of almost all parts. The landing gear is a one-piece aluminum unit.

The clear canopy was an excellent fit to the fuselage, and the fiberglass engine cowl and belly pan were nicely made and almost free of pinholes. We found that the YS 1.20 fit easily between the beefy hardwood engine rails. The engine does not bolt directly to the mounts, but to an aluminum mounting plate, which is in turn secured to the beams.

The YS 1.20 is a fairly sizeable engine and did not fit completely within the cowl. A little judicious cutting allowed the engine cylinder to protrude about 3/4 inch. Had we decided to go with an O.S. .91 Surpass, the cylinder head would still have protruded about 1/4 inch.

With the radio installation completed, all that was left was to convert the solid white airplane into something resembling the full-size SU-26M. This was easily accomplished with a little masking and color spraying, using Coverite's 21st Century metallic blue paint right out of the can.





An extensive supply of hardware is included with the model. Fuel tank had to be replaced with a slightly smaller Sullivan tank, as the stock one wouldn't quite fit with the big YS 1.20 in place. Wheels were also replaced with larger ones for flying from the author's rough dirt field.



Muffler shown here is from an O.S. 1.20 Surpass and was custom installed on the YS 1.20 by Olaf Kitchin.

Adhesion of this paint to Ultracote has thus far proved to be extremely good, especially considering that the Ultracote was not roughened with sandpaper or prepared in any way prior to painting.

We weighed our completed Sukhoi and found it to be 9 pounds on the nose, which brought the wing loading up to a hefty 33 ounces per square foot. This contrasted with a design weight of about 7.5 pounds and a wing loading of about 28 ounces per square foot. It was obvious that we were putting a great demand on the original design parameters. Strangely enough, we had expected that the large 1.20 engine would make the model nose heavy, but our Sukhoi balanced right on the money,

requiring no tail weight whatsoever!

When flight test day arrived, the usual procedures were followed at the field, such as ground run-up, fine tuning the engine, and range checking the radio. Jerry taxied onto the runway, headed her into the wind and poured on the coals. What a sound! What a takeoff! He took her straight up into a vertical climb almost out of sight, then put the Sukhoi through every maneuver in his extensive repertoire. The SU-26M does it all and at lightning speed, flashing by like a pylon racer. Jerry even managed to invent a few new tricks, including something we named a "barberpole," which can best be described as a lateral spin with the wing remaining in a vertical position.

Ten minutes later the Sukhoi came in, landing fast and hot as one would expect from a heavily loaded airplane. To say that the crowd of spectators was impressed would be an understatement. I don't know of any RC airplane which flies as spectacularly as Cermark's Sukhoi when equipped with a YS 1.20 four-stroke. I'm certain that any moderately skilled flier could reasonably handle this airplane with the average two-stroke .60 or a four-stroke .90, but in the configuration in which we tested it, the airplane is definitely for expert pilots only.

A full product brochure and price list are available from Cermark Electronics and Model Supplies Company, 107 Edward Ave., Fullerton, CA 92633; (714) 680-5888. **MB**

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6.3 X 4	3	3.95	9 X 10	1.99	12 X 7	2.89	13 X 8	4.25	15 X 10	10	12.95	22 X 8	31.00	22 X 14	45.00			
6.5 X 2.9	2	3.95	9.25 X 5.0	4	3.95	12 X 8	2.89	13 X 9	7	7.95	15 X 11	10	12.95	22 X 10	31.00	22 X 16	45.00	
6.5 X 3.7	2	3.95	9.25 X 5.25	4	3.95	11 X 10	7	7.95	13 X 10	7	7.95	15 X 12	10	12.95	22 X 12	31.00	24 X 10	55.00
6.5 X 5.0	3	3.95	9.25 X 5.5	4	3.95	11 X 11	7	7.95	13 X 11	7	7.95	16 X 8	10	12.95	22 X 14	31.00	24 X 12	55.00
6.5 X 5.5	3	3.95	9.25 X 5.75	4	3.95	11 X 12	7	7.95	13 X 13N	9	7.95	16 X 10	10	12.95	22 X 16	31.00	24 X 14	55.00
6.5 X 6.0	3	3.95	9.25 X 6.0	4	3.95	11 X 12W	7	7.95	13 X 13.5N	9	7.95	16 X 12	10	12.95	22 X 18	31.00	24 X 16	55.00
6.5 X 6.5	3	3.95	9.5 X 6.5N	5	3.95	11 X 13	7	7.95	13.5 X 9	7	12.95	16 X 14	10	12.95	22 X 20	31.00	3 Blade Hub 17-19"	45.00
7 X 3	15	1.59	9.5 X 7.0N	5	3.95	11 X 14	7	7.95	13.5 X 10	7	12.95	16 X 16	10	12.95	22 X 22	31.00	3 Blade Hub 20-21"	55.00
7 X 4	15	1.59	9.5 X 7.5N	5	3.95	11.5 X 4	8	2.89	13.5 X 11.5N	7	12.95	9 X 6P	Pusher	3.95	24 X 10	38.00	3 Blade Hub 22"	65.00
7 X 5	15	1.59	9.5 X 8.0N	5	3.95	12.25 X 3.75	8	3.49	13.5 X 12.5	10	12.95	10X 6P	Pusher	3.95	24 X 12	38.00	3 Blade Hub 24"	90.00
7 X 6	15	1.59	9.5 X 8.5N	5	3.95	12 X 9	7	7.95	13.5 X 13.3	10	12.95	10 X 7P	Pusher	3.95	24 X 14	38.00		
7 X 7	15	1.59	9 X 6.5	5	3.95	12 X 9W	7	7.95	13.5 X 13.5	10	12.95	10 X 8P	Pusher	3.95	24 X 16	38.00		
7 X 8	15	1.59	9 X 7.5	5	3.95	12 X 10	7	7.95	13.5 X 14	10	12.95	11 X 6P	Pusher	3.95	24 X 18	38.00		
7 X 9	15	1.59	9 X 8.5	5	3.95	12 X 10W	7	7.95	13.5 X 14W	10	12.95	11 X 7P	Pusher	3.95	24 X 20	38.00		
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8 X 7	14	1.79	10 X 10	2.29	12 X 14	7	7.95	14 X 13.5	10	12.95								
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8 X 9	14	1.79	11 X 3	2.49	12.5 X 10	7	7.95	14 X 14	10	12.95								
8 X 10	14	1.79	11 X 4	2.49	12.5 X 11	7	7.95	14 X 14N	10	12.95								
9 X 4	16	1.99	11 X 5	2.49	12.5 X 11.5	7	7.95	14.4 X 10.5	10	12.95								
9 X 5	16	1.99	11 X 6	2.49	12.5 X 12	7	7.95	14.4 X 12	10	12.95								
9 X 6	16	1.99	11 X 7	2.49	12.5 X 12.5	7	7.95	14.4 X 13	10	12.95								
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# HANNAN'S HANGAR

BY BILL HANNAN

**"The only people who never make mistakes are the ones who don't do anything. Mistakes are part of the dues for living a full life."**

Our lead-in quotation, by actress Sophia Loren, applies well to aviation in all sizes. Not all projects are successful, however, designs never started certainly can never fly. Build something!

## WRITE THE RIGHT WORD

From B.A. Bleakley, in the San Diego Aerospace Museum newsletter, comes a reminder that there is a difference between a "replica" and a "reproduction," in spite of common media misuse of those terms. To review, in the interests of linguistic and historical accuracy, a "replica" can only be made *with the participation of one or more of the subject's original craftsmen*. Thus, the Spirit of St. Louis in the San Diego Aerospace Museum, which was built with the assistance of some of the builders

## SPEAKING OF MUSEUMS...

There's a new one devoted to aerial record-breakers located in Sparks, Nevada, not far from the site of the famous Reno Air Races. Thanks to a report sent by Ken Hamilton, we have some details. The facility is called the National Air Race Museum and features racing aircraft, an aviators' Hall of Fame, art gallery and theater.

Representing racing's earliest era are a hot-air balloon and a Curtiss Pusher reproduction; symbolic of the Schneider Cup seaplane events are reproductions of a 1913 Deperdussin, Curtiss R3C-2, Macchi M-39 and Supermarine S-6B. The Thompson Trophy races are recalled by Keith Rider's R-4 Firecracker and R-6 Eight Ball restorations, while a Beechcraft Staggerwing pays tribute to the Bendix cross-coun-



The title of "World's Smallest CO<sub>2</sub> Engine Builder" now belongs to Rainer Gaggi of Austria. Look closely to see the tiny 2-gram, 0.75 cubic millimeter displacement powerplant and tank mounted on the indoor model's front wing mounting strut. Photo by Klaus Jorg Hammerschmidt.



Jim Clenger's marvelous full-size reproduction of Roscoe Turner's Wedell-Williams racer features a slightly increased wingspan and increased airfoil thickness to provide more docile handling characteristics. Photo by Walt Grigg.

of Lindbergh's original Spirit, is a true replica. A copy constructed by anyone else can only be a reproduction, whether it is a model or full-size aircraft.

try races. Formula One competition is ably recognized by a Cosmic Wind, Hanson Special and Stinger. For more information, phone the museum at (702) 358-0505.

## REALLY HEAVY METAL

Reader Charlie Jacob favored us with a report about the aircraft sculpture exhibited at the





Dick Howard, of Arizona, crafted this unusual Blackburn TB, spanning 30 inches and weighing 68 grams.



Jake Larson, of Florida, shared Dick Howard's research material and produced this 18-inch span, 30-gram version of the curious Blackburn TB. The model has proven exceptionally difficult to trim.

U.S. Air Force Academy near Colorado Springs, Colorado. Included are a P-51 Mustang, P-38 Lightning and the newest addition, a P-47 Thunderbolt. Cast in bronze, the P-47 spans 12 feet, weighs 1,000 pounds and is mounted on a granite base weighing 9,000 pounds.

Robert Henderson, who created the sculptures, is presently at work on two more, each of which will require about a year to complete.

### A GAGGLE OF GRUMMANS

Another labor-intensive un-

dertaking is complete: Dick Padgham confirms that four full-size, scratch-built Grumman F3F biplane reproductions by the Texas Airplane Factory are now finished and flyable. Commissioned by various museums, the F3Fs are the work of 65-year-old Herbert Tischler

and crew. Although based on authentic factory plans, they differ slightly from the originals, having more powerful engines, updated instrumentation and disc brakes. Tischler's next challenge? He has orders for five Messerschmitt ME-262 jet aircraft!

### CO<sub>2</sub> COVERAGE CONTINUED

Our Pressure Power feature in the July column prompted the following additions: Dan Rutherford, who imports the Polus CO<sub>2</sub> units and "Junior" almost-ready-to-fly CO<sub>2</sub> models from Russia, reports that both are now marketed by Peck-Polymers, Box 710339, Santee, CA 92072, and Sig Manufacturing Co., Inc., 401-7 S. Front St., Montezuma, IA 50171. Dan mentions that response has been enthusiastic, with even dedicated RC pattern and control

line combat fliers in his area joining in the free flight fun!

Other makes of CO<sub>2</sub> systems for smaller models are also popular and available through Peck-Polymers as well as Hobby Club, 23141 Arroyo Vista #210, Rancho Santa Margarita, CA 92688.

Klaus Jorg Hammerschmidt's book *CO<sub>2</sub> Motoren und ihr Einsatz* (CO<sub>2</sub> motors and their use) is now on the market in the USA. Although the text is in German, English captions are furnished for the

many photographs, drawings and charts. Included is history and information about most of the major systems manufactured in the U.S., Czechoslovakia, Switzerland, England and Russia, as well as more obscure examples. Contact Peck-Polymers or Hannan's Runway for



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Nicely made 1930s vintage five-cylinder compressed-air engine by the late Levere "Cookie" Cook has a very realistic scale appearance. Photo by Remo Galeazzi.

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ordering information.

A measure of CO<sub>2</sub> power's acceptance in Europe may be gained by noting that a recent contest for such models conducted in Austria attracted more than 50 entries, representing Austria, France, Germany, Hungary, Czechoslovakia and Yugoslavia.

### MEANWHILE, IN CZECHOSLOVAKIA

Lubomir Koutny sent in the results of Openscale '93, conducted in that country, which was supported by entrants from five countries. Held at the Brno-Medlanky airfield, the contest featured categories for rubber, CO<sub>2</sub> and electric powered scale models. The optimal flying site offered fine grass, beautiful surroundings and friendly people. Although the first day was hampered by wind, the afternoon and evening were much calmer.

The second day was perfect, with a blue, cloudless sky, warm temperatures and calm conditions plus strong thermals, resulting in three flyaways. Fortunately, the saddened owners of the missing models were encouraged by being awarded new engines, donated by the Czech and British sponsors. As is usual at scale contests, the variety of entries was remarkable, including a North American P-51 Mustang, Hawker Hurricane, Russian Utkanard, Avia BH-9, S.E. 5a, Piper Cub, Volksplane, Farman F.450, Auster B4, Swedish Thulin and Bede BD-4. It is hoped to follow this contest next year with Openscale '94.

### NEW FROM AUSTRALIA

*Glossary for Aero-Modellers* is a new publication from down under. This compact (4x6-inch) book, compiled by Merv Buckmaster, the editor of *Airborne* magazine, is essentially a dictionary of terms and definitions which comprise the language of model building. Included are abbreviations, colloquial words, aircraft nomenclature and conversion tables (inches to millimeters, square inches to square centimeters, miles per hour to kilometers per hour, etc.). The bright orange, 160-page glossary sells for \$7.50 plus \$3 surface mail or \$5 by air, from: Samaria Concepts, PMB 1798 Benalla, Victoria, 3673 Australia.



## AND IN CANADA

Peter Mann, archivist for the MAAC national aeromodeling organization, plans to author a history of modeling in his country, and is soliciting recollections and photos. Of particular importance are vintage records and reminiscences which can do so much to jog memories and keep history alive. If you can offer any help, please contact Peter at 36 Sydenham St., Guelph, Ontario, N1H 2W4, Canada.

## LAST-MINUTE ARRIVALS

The long-awaited Williams Brothers Hall Bulldog Racer plastic display model kit is now available. Based on extensive research by Vern Clements, the model is 1/32 scale and highly detailed. Intended for experienced builders rather than "instant gratification" model assemblers, it should offer considerable challenge with its complex colors and markings. Featuring box artwork by Otto Kuhni, the Bulldog joins previous Williams Brothers racing planes such as the Gee Bee Z, Gee Bee R-1, Caudron and Wedell-Williams, which should be avail-



Imagine building one of these full-size Gramman F3F biplanes from scratch. How about four of 'em! More in text. Fred Wolfe photo.

able at many hobby shops. From Williams Brothers, Inc., 181 Pawnee St., San Marcos, CA 92069.

From Hobby Supply South, a new catalog of kits, accessories and supplies. Proprietors Denny Atkins and Ray Abadie are "total airplane people," marketing everything from hand-launched gliders through complex RC scale models. In addition to a complete range of U.S. kits and accessories, they offer British Flar, Complete-A-Pac and Bowman RC kits; Keil Kraft, Veron and Mercury free flight and control line kits, and Czechoslovakian Modela CO<sub>2</sub> engines. For a complete 24-page catalog, send \$2 to Hobby Supply South, 5060 Glade Rd., Acworth, GA 30101.

## SIGN-OFF

From Walter Hamilton's book *A Touch of Glass* (for stained-glass hobbyists), this philosophical quotation also applies to model building: "Ideas are funny things, they won't work unless you do." **MB**

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# FREE FLIGHT

BY BOB STALICK

## J.H. Schneider's Mohawk Buzzard Jr. for FF Nostalgia

Sometimes the things people do live long after them. Many of them realize that they will be written about and discussed long after they have passed on. As we look about us and see those who come out to the field, a notable trend is evident. We are all getting older. Gray hair now dominates the site. We are still flying, but we are not running downwind as we once did. Nowadays we are apt to start up the old motorbike and chase via wheel instead of foot.

Our featured model for October honors a free flighter who some of us may have known, but who was never published until now. It is to the credit of Bob Pattison that we have this design and a bit of information about how it came to be.

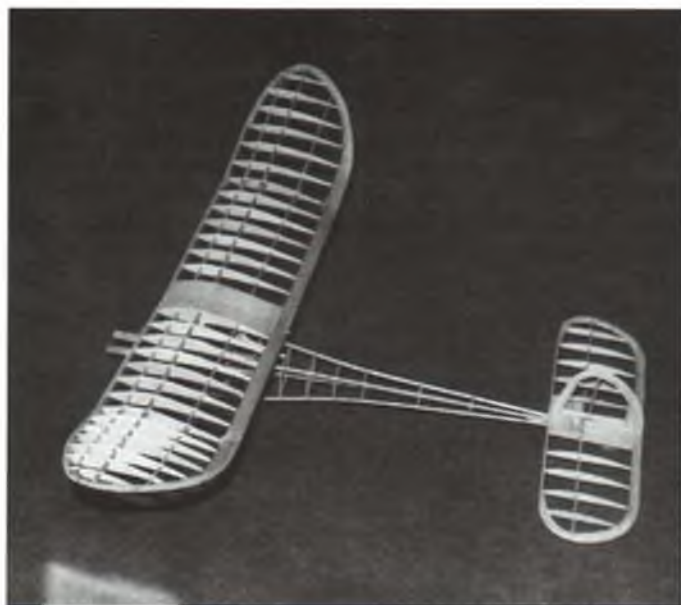


A Nostalgia-eligible Mohawk Buzzard Jr. as displayed by proud owner/builder Bob Pattison. Ship was designed in 1946 by J.H. Schneider. This month's drawing is the first public unveiling of this early postwar design.

### THE MOHAWK BUZZARD JR.

by J.H. Schneider

The Mohawk Buzzard Jr. was recently approved by the NFFC Nostalgia Committee as an eligible design for both ignition and regular nostalgia competition. The story of how it was dis-



Bare bones of the Mohawk Buzzard Jr. Fuselage has yet to be sheeted with 1/32 balsa. Full-size plans are available—see text.

covered is told by Bob Pattison:

"About 1972, we were visiting my wife's sister and her family in Schenectady, New York. At that time I was actively tracking down old spark ignition engines. I met a man named Aubrey Pearson, who used to run a hobby shop, which I believe was called Four Star Hobbies.

"I bought several engines, some planes, balsawood, silkspan and plans from him. Later, I sold some of the colored silkspan but didn't pay much attention to the pile of papers and plans. A few years later, I moved my stuff into a larger workroom, and as I looked through this stuff, I found the plan of the Mohawk Buzzard Jr. rolled up with silkspan wrapped around it.

"When postwar ignition models started to take off (haha), I showed the plan to Bob Larsh. He got it OK'd for Nostalgia Ignition and said, 'See what you can find out about the designer of the model.'

"The model was designed by J.H. Schneider. I called Aubrey Pearson, but his wife told me he had passed away. J.H. Schneider had also passed away. Mrs. Pearson gave me a couple of phone numbers, but

all I could find out was that Mr. Schneider had been a carpenter and had lived on Mohawk St.—hence the name of the model. These fellows both were members of the Schenectady Aeroneers Club.

"In the papers I received from Aubrey Pearson, there were a number of large drawings explaining the building and flying of model airplanes. I could see that this club had an active program to teach the young fellows the basics of flight. Schneider was active in the training program, as there were drawings by him of basic models to get started on.

"Something I have thought about: This plane is called the Mohawk Buzzard Jr. Was there a Mohawk Buzzard Sr.?"

This model was intended to be powered by a .19 to .23 spark ignition engine. Bob Pattison has completely redrawn the plans from the original sketches and has them available for purchase. As of this writing, only one copy of this design has been recently built—by Bob himself, and I have included a couple of pictures with this column. There is much to learn about the Mohawk Buzzard Jr. It is a very sleek model, particularly with the single re-



tractable landing gear.

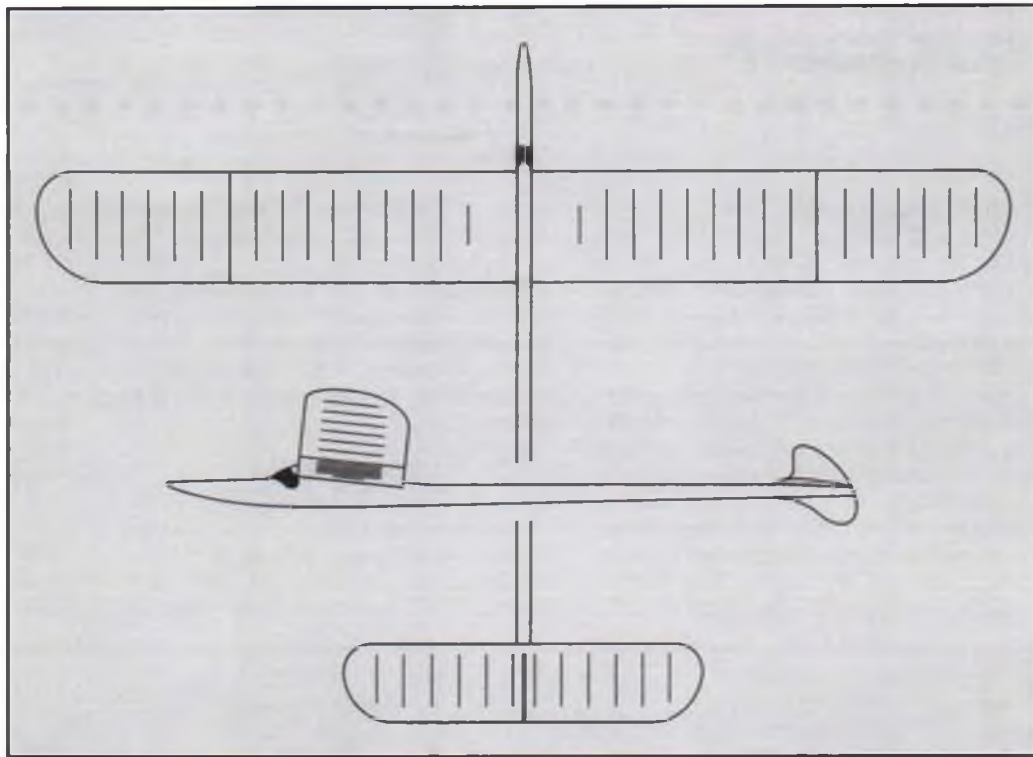
The cost of the full-size plans is \$5.50 postpaid. Write to Bob Pattison, 7778 Walnut, Jenison, MI 43428. You may be the first one on your block, in your state or in your region who has a Mohawk Buzzard Jr.

## OCTOBER MYSTERY MODEL

This month I have a unique one. It is an A-1 class towliner and was designed by a famous free flighter from the '50s and '60s. What is distinctive about this little ship is the cabin-type outline painted on the fuselage. This is about the only obvious difference from the common towline glider of the late 1950s. This model was featured in a prominent model magazine and was available as a full-size plan.

If you know the name of this model, you can get in on the Mystery Model competition. Send your guess to *Model Builder*. The winner is determined by a drawing from among the correct entries and gets a free one-year subscription to the magazine.

Frequent FF column contributor, Harry Murphy, also flies Old Timers. This is his 20-year-old "Spectre" as designed by Jerry Brofman and published in *Flying Aces*. Power is an O&R .19.



MYSTERY MODEL

## JULY MYSTERY MODEL WINNER

Which vintage model bears something of a resemblance to Brofman's Super Sunduster, Struck's Record Hound, Shulman's Zomby, Ullenberg's Vee for Victory, Ehling's Tri-

angle, and the Japanese MM-12, but is none of the above? We had guesses for all of these but, surprisingly, none for Shulman's Wedgy, which we thought would be the most obvious choice. The model is actually Gordon J. Rae's "Snorky," a 36-incher powered by an Albon Arrow 1.5cc diesel (must have gone up like a rocket!), originally published in *Aeromodeller*, April 1951. Ian Anderson of Surrey, England was one of only three correct entries and wins the one-year MB sub.

## THE .010 SCENE

Speaking of *Model Builder*, if you have last month's issue you will have already seen the magazine's first-ever .010 free flight model featured as a full-size centerfold plan. This may not be the last. If you have a good performing .010 ship, you can forward it to *Model Builder* for centerfold consideration too.

This is the last time we'll be able to advertise the MiniPower Postal Meet before it takes place. If you have an .010 ship and are planning to attend an AMA contest between the time you read this and October 15, 1993, send me a letter (enclose an SASE) asking for the rules for competition. There is no cost to enter, and there are some nice

prizes, including Cox .010 engines, *Model Builder* T-shirts and subscriptions, certificates and the like. Do it now. Send your request to Bob Stalick, 5066 N.W. Picadilly Circle, Albany, OR 97321.

## DO-IT-YOURSELF DECALS

One of my many interests includes Old Timer models, in particular the Miss America design by Frank Zaic. I have a copy of the plans as drawn by Joe Wagner. In the drawing, Joe refers to hand-made decals for the American flag which graces the fuselage. Never being bashful, I contacted Joe for some further information on making these decals. The process is quite simple, and it works. Here are the directions as I interpreted them from Joe's explanation:

If you can find blank "decal paper," buy it. If not, you will need to get .002-inch thick self-adhesive transparent plastic with a matte surface that accepts pencil and paint nicely. The method consists of taping a full-size line drawing of the artwork onto a glass surface with a light underneath. Over this, tape down a piece of decal paper that has had two coats of clear dope pre-applied and then lightly scoured with "Pounce"



# FREE FLIGHT

or dry Dutch Cleanser.

With a Rapidograph pen loaded with India ink, trace the black outlines. Then paint within these outlines with colored dope to suit. All dope used was Aerogloss because it dries translucent enough that the outlines can be seen through it.

After all painting is finished, use a very fine (#00 or #000) brush to finish any detailing. When all of the paint is dry, go back over the outlines with the Rapidograph pen to smooth any irregularities and cover up spots where the paint overlaps the outline. Two sprayed-on or lightly brushed coats of clear dope will seal everything. After a couple days drying time, the decal is ready

to use. Total time for the Miss America decals was about an hour for each, excluding drying time for the dope.

The decals can now be applied like any other decal. Just soak it in warm water, slide it off the paper and place it on the model. After squeegeeing out all of the air bubbles, let the decal dry for a day or so, then fuelproof it.

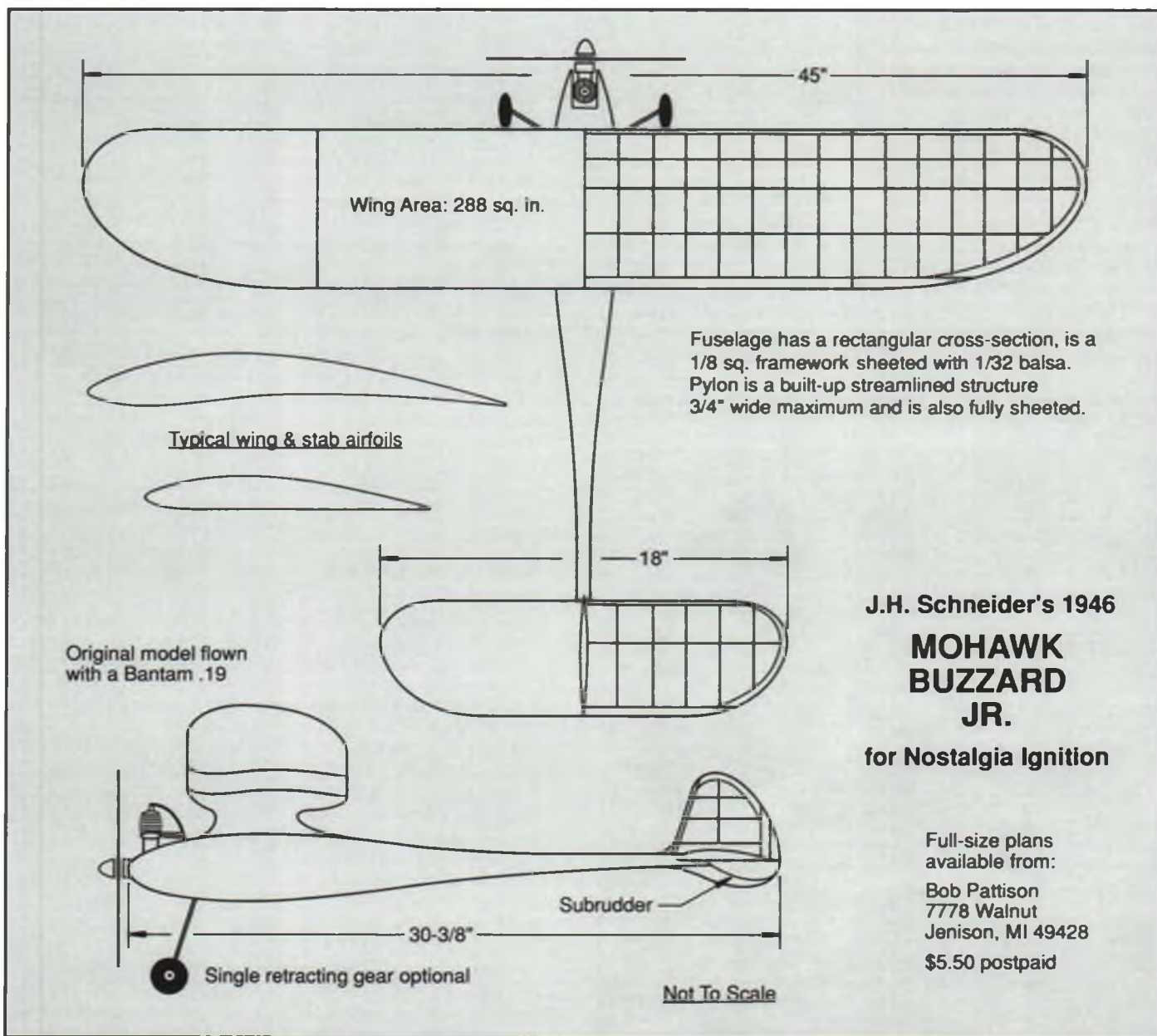
## LYNCH'S F1J COMPONENTS

Bill Lynch, who is one of the main proponents of the F1J event here in the U.S., is also the sole importer of the AD .06 engine. What some of you may not know is that Bill

also provides some serious machined aluminum parts for F1J and similar-sized models. The latest is a front end assembly for the AD and a VIT assembly with bunt for small models. Both of these units are complete and extremely well engineered and executed. Contact Bill at 11137 Creekhaven Ct., Auburn, CA 95602. The complete VIT system with bunt can be purchased for \$24 plus \$2.50 S&H). The AD engines and related equipment are also available.

## NEW HOBBY SUPPLIER ON THE SCENE

I received a nice catalog and letter from Hobby Supply South. Although their pri-



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Stafford Screen came all the way from Jollie Olde England just to fly this F1J model in the Sierra Cup, held near Sacramento. Model is powered by an AD .06 engine. Photo by Lyman Armstrong.

many audience appears to be the RC crowd, there are a number of interesting offerings that will interest free fliers. Some CO<sub>2</sub> motors are offered, as well as scale supplies for rubber and small gas. Notable are the British kits from Keil Kraft, Veron and Mercury, and the unusual Complete-A-Pac line. So, if your tastes lean toward these esoteric British offerings and you are tired of sending overseas for the latest, I suggest you order a catalog from HSS, 5060 Glade Rd., Acworth, GA 30101. The catalog is priced at \$2. Tell them *Model Builder* Free Flight sent you!

## THE NEW FAI "TAN" RUBBER

Just spoke with Andy Tagliafico, who recently returned from the Johnson City U.S. Indoor Championships. Among other newsy items, Andy noted that FAI Model Supply has a new rubber strip that is an improvement over the current standard tan rubber. It's a lighter colored tan and has a higher torque curve at the power burst than old tan. Andy says it is both "torquier and stretchier" than the old stuff. Takes some getting used to in order to make it work, but it holds a great deal of promise. Cost is \$16 per pound, and it is available in the usual 1/4, 3/16, and 1/8-inch thicknesses. Contact Ed Dolby at FAI Model Supply, P.O. Box 3957, Torrance, CA 90510.

## OLD MAGAZINE ARTICLE SERVICE

I recently placed an ad in the MECA Swap Sheet to locate some Old Timer stuff. One of the requests was to get a copy of the magazine article for the "Go Getter," an unusual O.T. ship. I received nu-

merous responses, but the most helpful one came from Gene Wallock, the official SAM Librarian, who has a complete collection of *Model Airplane News* magazines from 1932 through 1956, a nearly complete collection of *Air Trails* from 1936 through August 1956, and a large but incomplete collection of *Flying Models (Flying Aces)* beginning in 1933 and continuing to 1943 with occasional issues beyond. What is special about Gene's collection is that he will send you a full-sized copy of any article from any magazine in the collection for \$2.00. It's a really nice service. Contact Gene Wallock at 220 LeRoy Ave., Arcadia, CA 91007.

## THE END

I just received two production VA .049 engines from Dan Rutherford, and I'm anxious to try them out. The primary noticeable difference from the prototype I received two months ago is that these production models have a natural aluminum finish. I'll keep you posted on my experiences with these lightweight little jewels as time goes by. **MB**



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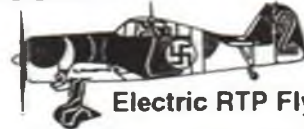
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*Electric modeling is rapidly growing in the northwestern U.S. This year the Evergreen Model Aircraft Club and the Portland Area Sailplane Society again joined forces to host their third and biggest meet yet.*



■ LEFT: Jerry Holcomb's Piper Pawnee, which he describes as "close to" scale. This is the same model he displayed uncovered last year. Span is 63 inches, with a weight of about 7 pounds. ■ RIGHT: Jamie McBride showed up with his sporty-looking Porterfield Special, modified from an Astro Flight Porterfield Collegiate kit. Jamie increased the span and added a host of ingenious small details. Power is an Astro 40.



*The Third Annual Celebration of*  
**SILENT**



If it's springtime in the Northwest, it must be time for the Celebration of Silent Flight! For the third year running, Barry Kurath and Jerry Holcomb have put on an event that has taken its place as the area's first organized gathering of the season for electric flight. On Saturday and Sunday, May 8-9, 31 pilots registered to fly at the Fern Prairie Modeler's Field in Washougal, Washington.

As was the case in '91 and '92, both sailplane and electric flight activity was planned. This year the electrics outnumbered the sailplanes by two or three to one. With this in mind, and because my interest and expertise lie with electric



■ LEFT: Holcomb's Piper Pawnee in flight. Model is powered by a geared Astro 40 running on 21 cells, and features flaps that can be operated either independently or coupled with the elevator. ■ RIGHT: Our author was very impressed with the performance of Bernard Cawley's Ace Whiz40/Astro 40 combination. This airplane will be the subject of an electric conversion article in an upcoming issue of MB.



■ LEFT: Rick Fischer (right) and Jack Aldridge (left) help Randy Smith's new Goldberg Cub conversion—his second one—ready to go. This one has ailerons (his first one didn't) and earned him the "Best Scale" award. ■ RIGHT: Our author was back this year with one of his Astro 15 powered Tigerkitten prototypes. Fresh out of the shop after a complete re-cover with Sig Koverall fabric and paint job with Sig dope. The Tigerkitten is scheduled for release later this year as an Ace R/C kit. Photo by Jerry Holcomb.

BY BOB BENJAMIN

Charlie Nelson powers his float-equipped Great Planes ElectricCub with a Model Electronics Sport Combat motor and BEC throttle system. The background gives a good idea of typical Pacific Northwest spring weather... green and mild, but be prepared to get wet!

# FLIGHT



flight, I am going to focus this report on the latter. I'm also going to concentrate on the airplanes that indicate the direction in which electric flight is growing. Dedicated electric modelers are regularly flying airplanes that look and fly "just like gas models." Taking a close look at these more challenging airplanes will give those of you who are already enjoying electric flight a chance to see what your friends in the Northwest are up to, and for those who haven't yet tried electric flight, should provide an interesting look at what is has become routinely practical.

Last year we saw several out-of-the-ordinary models that typify the trend to-

ward higher performance, more complex, interesting designs. These models were all back, better than before, and this time they brought friends! C.D. Jerry Holcomb's Piper Pawnee Ag plane showed up in 1992 as a bare-bones project, ready for covering. This year the Pawnee, finished in gray and yellow Ultracote after a local full-scale job, put in a series of beautiful flights on the power of a geared Astro Cobalt 40 running on 21 Panasonic 1700-mAH cells. Flaps are set up to operate either independently or coupled to the elevator. In the latter mode the Pawnee becomes capable of non-scale but very impressive aerobatics.

Roland "Pete" Peterson of Model Elec-

tronics brought a prototype Bell P-39 based on an all-foam kit intended for "slime power"; this will be a stablemate to the foam Spitfire he already has on the market. Pete is concentrating on getting maximum performance out of small motors running on seven to nine cells and is doing it extremely well.

Randy Smithhisler showed up last year with a newly completed Goldberg Cub, converted to use a geared Astro Cobalt 25 on 14 cells. Randy built the model with rudder and elevator controls and has put lots of time on it. He likes it so well that this year he showed up with another, this time equipped with ailerons. The new Cub, modified to look like a PA-11 (cowled engine), is finished in bright red Coverite 21st Century fabric. Not surprisingly, it is a super flying machine, handling wet grass and rough air easily and doing scale-like aerobatics effortlessly. Randy says that the major modification to the Goldberg kit is to substitute light 3/32 balsa for most of the lite-ply. Randy got the "Best Scale" award on Sunday for his craftsmanship and consistent flying.

Last year, your reporter returned with both his Astro 40 powered Tigerkit prototype and one of the prototype Tigerkittens, having given each a recover with Sig Koverall and matching red and cream Sig dope finishes. Both continue to be fast, maneuverable and yet stable airplanes that handle wind and rough air with ease. Those of you looking for an electric design that is a little more challenging than those high-wing trainers will be pleased to know that Ace R/C has recently arranged to add the Tigerkitten to their kit line, probably to be released later this year.

I also brought along the prototype of the Schneider Sport Electric, a totally re-engineered version of the glow-powered Schneider Sport kitted by Stream Inc. This test model for a possible future kit release flies equally well on either wheels or floats and will appear in the near future as a *Model Builder* construction article. Watch for it!

Fellow club member and friend Jack Aldridge is just getting involved in RC flying. He showed up with a brand new Sig Seniorita converted, per Bob Kopski's recommendations, to a geared Astro Cobalt 25, using 14 Panasonic 1700-mAH cells. Jack is using an Astro 207 throttle and one of the first production Astro Model 112PK chargers. We got together at our local club field the evening before the Silent Flight weekend to test fly the Seniorita, which needed only a touch of rudder trim to fly perfectly. It rewarded Jack for his careful building by providing effortless hands-off cruising flight at about 1/3 throttle. Even with a partially broken-in battery pack, he is getting flights of seven to eight minutes with power left after landing.

Frank Mossman brought a really unusual model that grabbed the attention of everyone who saw it, and walked away with the



# Hobbycon East

## 1993

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"Best Electric" award went to Frank Mossman and his Astro Cobalt 15 powered FanTrainer. Motor turns a modified APC 7x6 prop inside the shroud. This model flies like it looks—fast and exciting.



■ ABOVE: Follow the leader. . . or is it formation? An Astro Porterfield, possibly belonging to Stan Barta, follows an electric converted Goldberg Eagle 63. This shot typifies the relaxed but controlled, competent flying that was taken for granted at the two-day meet.

■ LEFT: Bob Benjamin's Schneider Sport Electric gets ready to settle onto the grass. Power is an Astro 25. This upcoming *Model Builder* construction feature is equally at home on wheels or on floats. Photo by Jerry Holcomb.

"Best Electric" award on Sunday for his efforts. Frank enlarged plans for the "FanTrainer" by 150 percent, added a bit of span and tapered the leading edge to produce an exciting airplane that moves out impressively on an Astro Cobalt 15 running direct on twelve 900-mAH cells. He uses an APC 7x6 cut to 6-inch diameter to fit within the prop shroud. The MonoKote-covered model weighs in at 4 pounds 5 ounces and flies the way it looks—fast!

Bernard Cawley brought a conversion of the Ace R/C Whiz 40 trainer, which he flies on a geared Astro Cobalt 40. This model was converted from the standard gas kit to electric to serve as the basis of a future *Model Builder* article. Bernard has also

flown it on one of the Marx motors imported by Hobby Lobby. When he offered me the chance to fly it, I found it to be a solid, predictable airplane that totally belies any notion that electric flight has to be a lightweight, limited power proposition. There was just no way other than by the lack of noise and mess that you could tell there wasn't an alcohol-burner pulling that model around the bumpy, cloudy sky.

When Bernard finally got the transmitter away from me and started doing consecutive outside loops with the Whiz 40, we all knew he was really onto something good! Bernard also brought the first Ace R/C Puddlemaster I have had the opportunity to fly. I have been in touch with designer Scott

Hartman since before the kit was released, so I knew what to expect, but it was still a pleasant surprise to see how capable and steady an airplane the little Puddlemaster is. Lacking big enough puddles, we hand-launched with the tip floats removed and landed on the grass.

I'll let the photos tell the rest of the story about the airplanes that showed up. Hopefully they will get the word out on what electric fliers already know; that electric flight is long past the days of lightweight, low-powered models that float around on calm evenings. We just spent a super weekend doing the same things the wet power fliers do, but without the noise, mess and starting problems. It's great! Come join us! **MB**

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## AEROBATICS continued from page 15

difficulty during layup and building. Spectra, in particular, would not yield any great increase in strength unless combined with glass or carbon fiber. Kevlar is useful when added to high-stress areas, as is carbon fiber tow, and both of these materials are commonly used in pattern fuselages.

That brings us to the subject of using obechi wood for wing sheeting. Obechi isn't "new" at all. I recall seeing RC ARFs on the market in the early '70s with obechi sheeted wings. It is cheap, strong for the weight, more dent resistant than balsa, and easily available almost everywhere but in this country, although I understand this situation is changing. It is a good modeling material, even excellent for many uses, but for a pattern model wing it is not as good as contest balsa. Pound for pound, balsa is the strongest wood in the world, and 1/16-inch balsa has greater strength in compression than .027-inch obechi (the common thickness), particularly across an open, unsupported area such as a honeycombed wing.

The wing skins for my recently completed Python wing panels weighed about 35 grams each. Obechi skins would have weighed nearly double that, and wouldn't have been as strong in this application. The only pattern wing I've seen fold up in flight (anywhere but a poorly glassed center section) was on an English ARF sheeted with obechi. It folded while performing a square loop with 1/2 rolls, and the break was directly across the wing, just outboard of the wheel well.

So, in answer to George's question, "new" isn't necessarily better. To put it another way: what is sauce for a high aspect ratio goose on a maxed-out gorilla winch launch won't always keep a 1.20 powered 10-pound gander nailed together in a 10-G square corner. And vice versa, I'm sure.

## NEW GOODIES DEPARTMENT

Under the heading this month are some very welcome items. Topping the list is JR's new X-388S radio, an eight-channel, 1024 PCM version of their already popular x-347 computer radio. The new X-388S will do about 90 percent of everything that the top-of-the-line JR PCM-10S will do, for about 60 percent of the money. Make no mistake, this is a serious radio for pattern purposes, with six programmable mixes, eight model memory with internal copy function, four switchable snap roll settings, dual rates on aileron, elevator, and rudder, auto dual rate rudder, trim offset and subtrim (servo centering) functions, and a pair of very high quality stick assemblies which are adjustable for height and tension and feel suspiciously similar to the ones in the PCM-10S. It even has a feature lacking in the PCM-10S—a programmable trainer system—and comes standard with the slick little NER 649S nine-channel ABC&W PCM "credit card" receiver. Combined with a high-quality coreless servo such as the JR 4131, this radio gives away almost zip to the "pro" models, and gives you back enough change to buy an engine. Your local hobby dealer can fix you up with this item, and probably the engine as well!

A second little goodie is a new four-cycle engine mount from CAN-AM Aero, the Super B/Mount. I have acquired one and am currently using it in my Python. It is proving to be a very serviceable, high-quality unit. The beautifully machined, lightweight (15 grams) nose limiter ring provided with it is available separately, and is probably worth getting and retrofitting no matter what mount you are using. The cast aluminum beam mount is supported by five 70 durometer isolators, total weight is less than 5 ounces, and so far, the arrangement has been bullet-proof. CAN-AM Aero does business at 2597 Marine Dr., West Vancouver, B.C., Canada V7V 1L5; (604) 926-3750. **MB**



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R148DF receiver and S133 servos fit the slimmest of fuselages



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