MODEL BUILDER

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DECEMBER 1989

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volume 19, number 214

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Byron "Aviation Expo"

Build:

YAK 9 C/L

"WAG" Vintage R/C

Challenger 550 R/C Review

12

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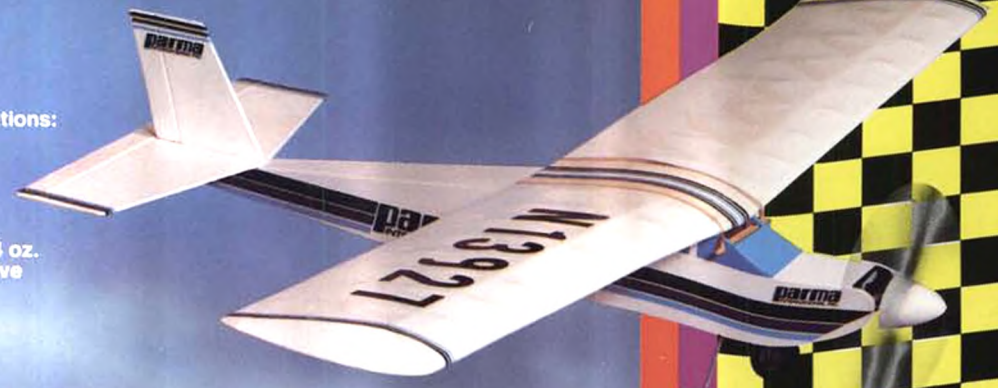

Aero Tiger Specifications:
#25000 Basic
#25100 Deluxe
Wingspan: 49½"
Wing area: 396 in.
Length: 31½"
Flying Weight: 38-44 oz.
Motor: .05 Direct Drive

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

Pair Of Aces

AERO TIGER

Parma International is proud to introduce their first two electric R/C aircraft kits, the Aero Tiger and Aero Sprint. Years of championship-winning experience in electric race cars has combined with a quality airframe design and construction to bring electric fliers a winning pair of aces! Enthusiasts who enjoy building a quality kit will appreciate the Aero Tiger. The high-wing sport/trainer, is designed for direct-drive .05 motors and features premium, machine-cut, sanded balsa and lite ply parts for ease of construction. Designed for 2 or 3 channel radios for operation of rudder, elevator and optional speed control or on/off switch, this docile flyer is a great way to enjoy clean, quiet electric flight. Available in basic & deluxe kit versions.

AERO SPRINT

The second ace in Parma's hand is the Aero Sprint ARF (Almost Ready to Fly). Perfect for the enthusiast who enjoys flying, not building, this balsa beauty includes motor, folding prop, prop adaptor, spinner, cowling, wheels and all required hardware. The Aero Sprint arrives pre-built, hinged, and covered with bold, bright colors. All that's needed to get this baby airborne is a standard 6 or 7 cell "flat" battery pack, enough glue for assembling major components, and a 3 channel radio system to operate the rudder, elevator and recommended electronic speed control. The Aero Sprint features "hands off" stability for sport/trainer use.

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MODEL BUILDER

DECEMBER 1989

volume 19, number 214

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

CONTENTS

FEATURES

CONSTRUCTION

COVER: The Cassutt rounding the pylon in the top photo is being raced by owner/pilot George Budde, a flight instructor from Midwest City, Oklahoma. Like our '72 Corvette, his "Okie Streaker" fuselage is two-toned on each side. His is blue left, red right. Ours is red left, black right.

Doug Kempf, airline pilot from Redlands, California, is the owner/pilot of "Bully Bee," the yellow and black Smith Mini Plane shown at the bottom. Both photos and commentary by Bill Northrop.

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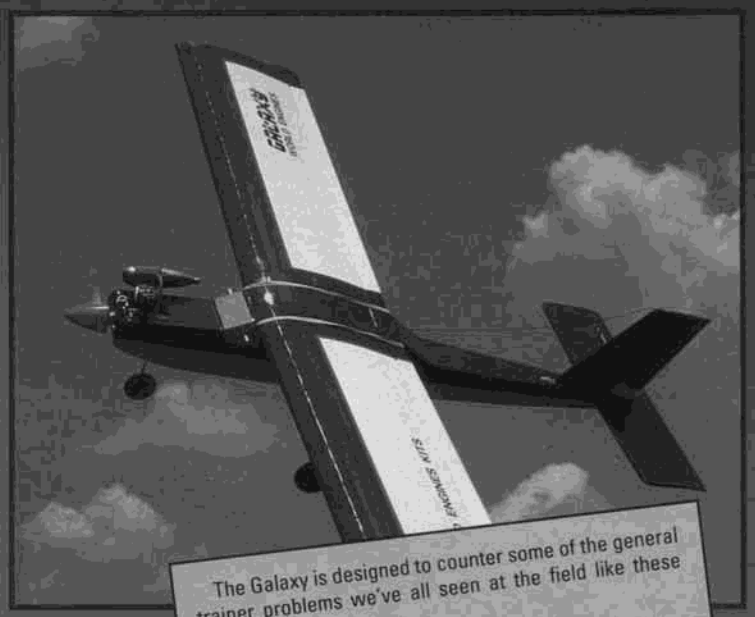

The Galaxy is designed to counter some of the general trainer problems we've all seen at the field like these examples:

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

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

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

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

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

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

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

Happy Flying!

A .40-.45 sized engine and a radio system with a minimum of 4 channels are also required.

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Wingspan; 66 inches
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Radio; 4 channels
Engine; .40-.45 2 cycle, .61 4 cycle

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One of the difficulties with an ultra-simple model is designing it so it doesn't look like a "box with wings". The Four-Star 40 uses a curvatious canopy and simple turtledeck stringers to give it a modern, aerobatic look. Wheel pants can be added to give it that final touch of class.

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from Bill Northrop's workbench

Bill (white jacket) and Walt (green jacket) Good assembled with friends at the Kalamazoo (Michigan) Aviation History Museum in August, 1989. Second from left is Bob Ellis, Executive Director of the museum. On Walt's left, in plaid shirt, is Walt Pompey (Kalamazoo), builder of RC GUFF replica above their heads. "Better built than the original," says Walt Good.

• It was very timely when Walt Good's recent letter arrived. I had just completed the introductory article for a new *Model Builder* monthly column, and wanted to talk about it here at the Workbench. The title of the column, "I Ain't Got It!", should immediately click with truly old time R/Cers who date back to the challenging radio control experiences of the mid-fifties, when rubber-powered escapements operating rudder-only and occasionally working radio gear were the standard equipment for the majority of modelers.

I had called Walt to clarify the chronological order in which some of his early designs were born, following the R/C Guff, and as it turned out, my research through old magazines actually clarified the order for him! He wrote to confirm this, and also to include the photos and information regarding the R/C Guff display at the Kalamazoo Aviation History Museum.

The reason for the call was not so much for the new column as it was for the publishing of what we thought was our ninth vintage R/C construction article . . . Walt's 1953 rudder-only model, the "WAG." However, after completing the column, we discovered an omission. In March 1985, we published an article and plans from the July 1953 issue of *Air Trails* on a 45-inch span, rudder-only scale model of air racer Steve Wittman's cute little "Buttercup" cabin job. So that makes the WAG number 10 in our vintage R/C series . . . with more to come . . . such as Dale Root's "Ascender."

IMS - MORE HOURS

Just a reminder that the Pasadena IMS show coming up in January 1990 will be open to the public for five hours on Friday afternoon, January 12, from 2 p.m. to 7 p.m. If you want to avoid the weekend rush (that is, until everyone finds out about it), order your tickets in advance (see the ad) and come on over Friday afternoon. In case you're wondering why the show doesn't open earlier on Friday, it's actually going on in the morning, and up to 2 p.m., but only for the trade people who wish to come in to conduct business with exhibitors before the public rush begins. Don't expect to get in before 2 p.m. if you're not a dealer, distributor, or otherwise directly connected with the industry. Show hours on Saturday and Sunday will be the same as in past years, 10 a.m. to 6 p.m. and 10 a.m. to 5 p.m. respectively. Big and little merchandise items will be raffled off each day, but you have to be there to claim them and lug 'em home. For that reason, new tickets will be sold each day and will not carry over.

Complete exhibit includes transmitter replica in front of covers to *Model Builder* issues that featured RC GUFF series (nice touch!), and below that, a video that shows tapes from movies of early flights.

NEXT MONTH - RENO AIR RACES

We took in our first ever National Air Race, at Reno, in mid-September (a birthday gift from the General Manager), and spent most of our time as press photographer for *MB*, along with Felix Vivas, at either Pylon 2 or Pylon 8 (the first and final turns for the long straight that included the start/finish line). We shot over 20 rolls of film as the Formula I, Biplane, T-6, and Unlimited Class racers flashed by. The sound of a P-51, F8F Bearcat, P-38, or what have you, at full bore, banked so you could look into the cockpit, about 30 to 50 feet (sometimes less!) off the deck, and not more than a couple of hundred feet away, is still drumming through my frame. We'll both have reports in the next issue, with photos, but couldn't resist putting a couple of shots on this month's cover. Stay tuned!

MYSTERY MODELER

We were beginning to wonder if anyone was going to come up with the correct name of the modeler whose photo appeared in this column in October. No, it wasn't Dave Platt, and it wasn't Ron Warring. By coincidence, the first correct answer came from someone whose photo also appeared on the same page, same issue! In the top photo, the modeler at the

far left, holding his red and yellow gull-winged Korda Wakefield is Graham Podd, a Britisher who now lives in Irvine, California! Our mystery modeler no longer puts the prop on the front of his models . . . you'll now find them on top and at the back end, as he builds helicopters! Yep, it's the head man at GMP, Gorham Model Products, John Gorham, and Graham also correctly named the model as the "Ghost." Graham wins the one-year subscription and the Uber Skiver knife set for the first correct answers.

HANDICAPPING

Reader Tom O'Brien, of Bloomfield, Connecticut, whose answer was incorrect, did, however, come up with a good idea to eliminate the handicapping of Mystery Model answers, whether in this column, the "Free Flight" column, or anywhere in the magazine. Rather than try to outguess the vagaries of the postal service, Tom suggests that we simply conduct a drawing from all the correct answers received within a certain period. The idea has merit. Instead of dropping a whole bunch of odd-sized mailings into the hat, we'll number each answer, and draw one number from a bunch of equal sized tickets or numbered blocks. We can use these over and over, just dropping in enough numbers to correspond to the number of correct answers received for each Mystery Model. Keep those cards and letters comin', we love to give away subscriptions! •

ADVICE FOR THE PROPWORN
—By Jake

Dear Jake:

If the principles of flight were learned by studying birds, why don't airplanes have feathers?

Gregory in Grand Junction

Dear Gregory:

If there is intelligent life on Earth, how can you ask a question like that?

Jake

* * *

Dear Jake:

I'm trying to develop a free flight model that will climb in a left spiral, roll out at engine shut off with no stall or loss of altitude, and glide in a right hand circle. I plan to put poly-anhedral in the wing, dihedral in the tail, and an inverted V rudder. What do you think that will do for me?

D. Gasser in Dekalb

Dear D Gasser:

I think that will give you an airplane, that if handed to anyone else, would be launched upside down.

Jake

* * *

Dear Jake:

What is an autogyro, and why are they considered dangerous?

Orson in Oak Park, Illinois

Dear Orson:

An autogyro is a submarine sandwich picked up at a fast food drive-thru and eaten in your car. They are dangerous because the belch that follows a particularly potent autogyro can blow out a windshield.

Jake

* * *

Dear Jake:

The Frankel proverse injection valve on my 1.61 cubic inch 1956 Rensenfurt left hand rotation ignition engine sticks above 6000 rpm.

Collector in Covington, Kentucky

Dear Collector:

Really? That's quite unusual on a '56 Rensenfurt. It was the 1958 model that suffered from the chronic Frankel malfarction you describe. Nevertheless, you can free your Frankel with a 1.5 milliliter squirt of Halloran's Injecto-Lube, which was available from September 1956 to July 1961 at all Pep Boys Automotive.

Jake

* * *

Dear Jake:

Congratulations on your posthumous election to the Model Aviation Hall of Fame. Imagine my surprise and delight to hear that not only had you been selected for the Hall, but that you were dead. Congratulations again and thank you for your first truly significant contribution to modeling.

Admirer in Elmira

Dear Admirer:

Thank you. It's very gratifying to be recognized after one's own time.

Jake

* * *

Dear Jake:

Why is tunnel testing of model airplanes so uncommon? Is it because it's too expensive?

Perplexed in Peoria

Dear Perplexed:

No, tunnel testing is actually quite inexpensive. It's not popular because it's very dangerous. I once tested a gas free flight in the Holland Tunnel. It only cost me thirty-five cents to get into the tunnel, but when I launched the model it hit the ceiling almost immediately. Parts fell down on me and on the passing motorists, and all in all it was a very unsettling experience. There was also a very strong and unpleasant smell of automobile fumes.

All things considered, I can't recommend tunnel testing model airplanes.

Jake

* * *

Dear Jake:

Hi, it's me, Tommy Smith. My mom is in the hospital because she had a cold. Well, she's sort of really in the hospital because I left a bottle of super glue in the medicine cabinet and she mistook it for nasal spray.

Do you know how people talk funny when they hold their nose? Well, that's how my mom's been talking for a week now. At least the glue bottle isn't hanging out of her nose anymore. That only lasted three days.

Does nose hair grow back?

Your Friend, Tommy Smith

Dear Tommy:

Sounds like your mom could use some Cyn-Off or some Cyn-Aid.

Jake

* * *

Dear Jake:

I have been reading a book by Jules Verne in which some people go exploring in a "bathysphere." What is a bathysphere?

Laurence in Lawrence, Kansas

Dear Laurence:

A bathysphere is one of those machines that washes your golf ball.

Jake

* * *

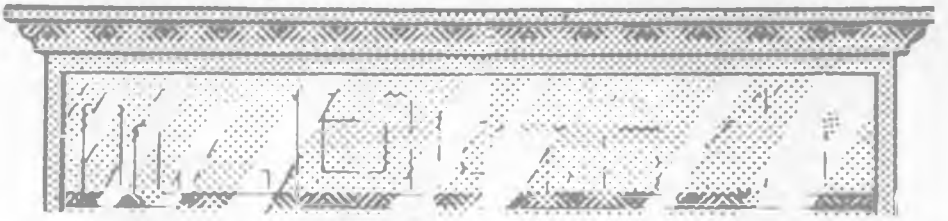
Dear Jake:

My friends and I have been trying to categorize World War I fighter aircraft as to type and characteristics. Rotary and non-rotary are two obvious categories, as are monoplane, biplane, and multiplane. Another interesting distinction is whether the aircraft came before or after the introduction of the synchronous machine gun. We have been having an argument about whether a fuselage gunner station, a pusher configuration, or a top wing

Continued on page 96

OVER THE COUNTER

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



• Zenith Aviation Books is one outfit that maintains a highly visible profile in this column by constantly coming out with new additions to its excellent library of aviation literature, and this month is no exception. *Big Bombers,* compiled by Robert Dorr and Jim Benson, is an all-color photo book of the U.S. Air Force's currently operational bombers. Included among the 80 photos are the famous B-52, F/B-111, the B-1A and B-1B, even a short piece on the B-2 Stealth Bomber. Many of the photos are truly awe-inspiring, and the rather technical captions that accompany them make for some especially interesting and educational reading.

Big Bombers is published in a 9x10-1/2 inch format and comprises 125 pages. Price is $19.95. From Zenith Aviation Books, P.O. Box 2, 729 Prospect Ave., Osceola, Wisconsin 54020, phone (800)826-6600.

* * *

Great Planes Model Distributors is coming out with what it calls its Hobbico "Bullet" line of CA glues aimed specifically at the hobby market. As with the other CA glues available to modelers, Bullet glue is offered in both thin and thick formulations, and both are available in one-ounce ($4.59) and two-ounce ($8.49) bottles. Bullet Activator, which speeds up the cure time of all CAs, and Bullet Debonder, which dissolves CA glue, will accompany the Hobbico Bullet glue line.

Also new from Great Planes are three new Hobbico battery pack chargers that are offered with a variety of desirable features. The basic unit is the Model 900 AC/DC Auto Charger ($39.95), which features a 15-minute timer, a heavy-duty transformer, a trickle pilot light, and a 24-

The latest from Zenith Aviation Books.

inch output cord with a Kyosho style connector and Tamiya adapter. The next step up is the Model 905 AC/DC Multi-Charger ($57.95), which has all of the 900's features plus a charge/discharge ammeter. For those who want the very best, Hobbico's top-of-the-line unit is the Model 910 Variable Rate AC/DC Multi-Charger ($64.95), which has all of the features of the 900 and 905 plus a current rate adjustment dial, voltage monitoring jacks, and a charge rate chart on the black anodized aluminum faceplate.

All are available now from Great Planes Model Distributors, P.O. Box 4021, Champaign, Illinois 61824.

* * *

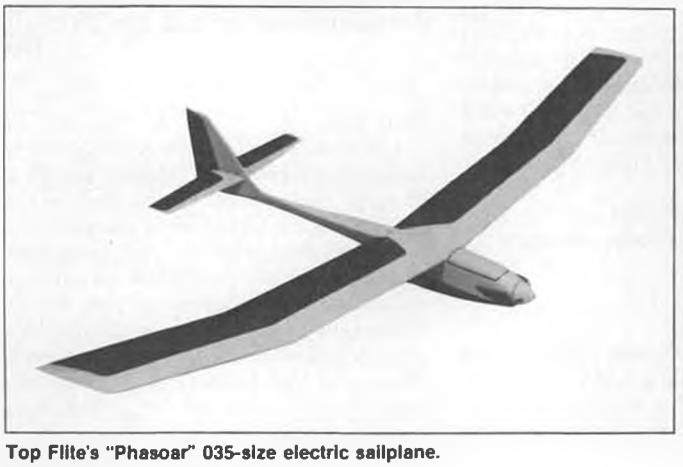
All of you readers are familiar with the great line of metal products (piano wire, aluminum and brass tubing and sheet stock, etc.) marketed by K&S Engineering and available at most any hobby shop anywhere in the country. Now K&S has something new to offer; not a new size of tubing but a handy way of measuring the pieces you've already got in your scrap bin. It's an inexpensive plastic vernier caliper that can be used for inside and outside measurements and depth measurements too. It's calibrated in both metric (.05mm graduations) and inch (1/128-inch) scales and is good for up to six inches, or about 150mm. We've seen one up close and can only say that it looks like a handy tool to have on your workbench or in your field box.

From K&S Engineering, 6917 W. 59th St., Chicago, Illinois 60638.

* * *

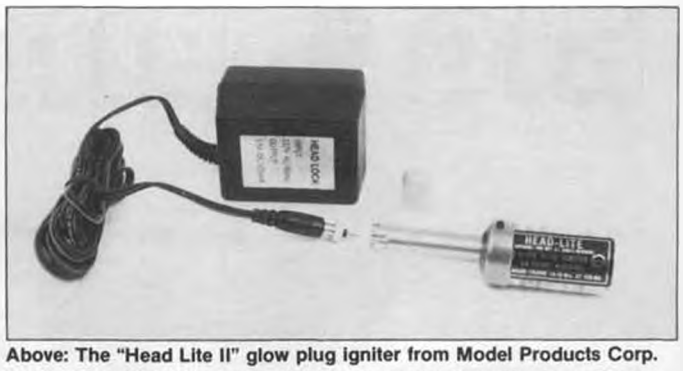
Take a good close look at the photo we've included of the highly detailed pilot bust. At first you might not recognize her under that helmet and microphone headset, but that's Hazel Sig, known throughout the hobby as "The First Lady of Modeling." It's Sig Mfg. Co., of course, that's making these 1/4-scale pilot busts available, and not only with a helmet but also with a baseball cap (for enclosed cockpits) and no headgear at all, just hair. The busts are molded of latex and weigh only three or four ounces apiece. All versions come with the jacket molded in either red or blue; Sig wing decals are included, as are complete finishing instructions. All measure 5-1/2 inches wide by 5-1/2 inches tall (5-3/4 inches for the helmeted figure). Prices range from $14.95 to $16.95. Add a touch of class to your next giant scale project by putting Hazel at the controls!

From Sig Mfg. Co., 401-7 South Front St., Montezuma, Iowa 50171.



Top Flite's "Phasoar" 035-size electric sailplane.

New Hobbico battery chargers, from Great Planes Model Distributors.



Above: The "Head Lite II" glow plug igniter from Model Products Corp. Left: Hobbico's new line of "Bullet" CA glues, distributed by Great Planes.

* * *

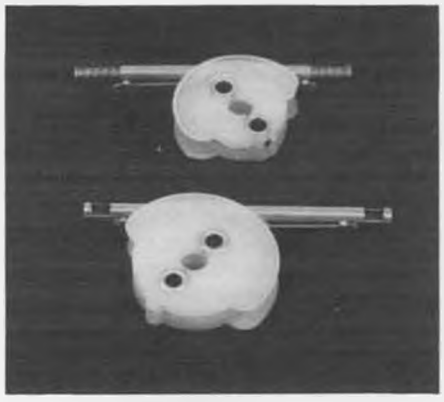
Last month we told you about Astro Flight's new "Mini-Challenger" 035-size electric sailplane. It turns out that Astro wasn't the only manufacturer to recognize the market for a small high-performance motorglider because now Top Flite is getting into the act with the new "Phasoar" electric glider, designed specifically for the Astro 035 cobalt system and three-channel mini-radios. The model has a 56-1/4 inch span, 335 square inches of wing, and a flying weight of 24 to 27 ounces. We saw a couple of small electric gliders in the Top Flite booth at Toledo a couple of years ago and can only assume they were predecessors of the Phasoar. We remember them as being very good looking and very efficient looking ships, perfect for flying out of small fields and school yards and yet with enough performance to make them really fun to fly.

pulse type.) Options such as a fifth channel and dual rates on up to three channels are offered factory installed for a nominal fee, or you can install them yourself.

As you can see, Ace has purposely made the Olympic V a very flexible system, enabling you to order or build up your own radio as you see fit. If you're interested and want to learn more, write to Ace R/C Inc., 116 W. 19th St., P.O. Box 511, Higginsville, Missouri 64037, or call (816)584-7121.

* * *

Model Products Corp. has some new and interesting items you should know about. First is the "Head Lite II," a very nicely built Ni-Cd glow plug igniter of all stainless steel construction. It's offered in three forms: without Ni-Cd or charger ($9.95); with a Ni-Cd cell but no charger ($15.95); or with both a Ni-Cd and charger ($25.95). For those who prefer to supply their own battery, the basic Head Lite II will accept any cell with the same outside dimension as a sub-C Ni-Cd. A single screw holds the battery in place.



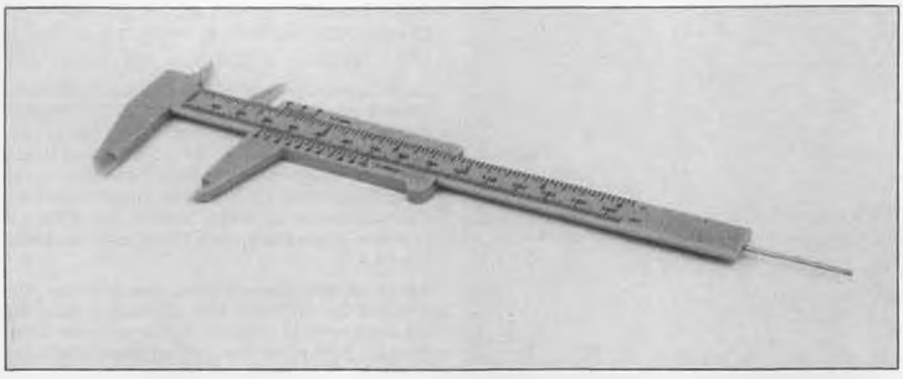
"Line Drive" by Model Products Corp., converts rotary servo motion to linear.

Exceptionally realistic pilot bust from Sig.

Also from MPC is the "Line Drive," a really ingenious device that converts a servo's rotary output to linear. The unit mounts directly on your servo output wheel with two screws. The obvious benefit of a linear servo output is that it effectively eliminates the reduced pushrod throw you get with conventional rotary control hookups at extreme servo travel. It is also said to reduce control sensitivity around neutral, making for easier trimming.

Line Drives are offered in two sizes (.475 and .580-inch stroke for 90° of servo rotation) at $7.95 each, plus one with built-in springs for throttle overtravel, for $9.95.

From Model Products Corp., P.O. Box 100, Allamuchy, New Jersey 07820. •



New from K&S, an inexpensive plastic vernier caliper for your shop or field box.

From Top Flite Models, 2635 S. Wabash Ave., Chicago, Illinois 60616, phone (312) 842-3388.

* * *

Ace R/C has something of a first with the new *left-handed* single stick Olympic V R/C system. Each control is a mirror image of what's on the standard Oly V transmitter. If you are left-handed and fly single stick you've probably long wished for just such a system.

The basic Ace Olympic V is a four-channel system with the option of adding a fifth. The transmitter is available either by itself or as a system (excluding servos) with a choice of either the standard or upscale Model 91 receivers. (No servos are included so that you can choose the ones that suit your needs best—any brand of servo will work as long as it's a positive

The new Ace Olympic V Tx for left-handers.

BIG BIRDS

By AL ALMAN

M-18 C55 MOONEY "MITE"

Got an OS Gemini Twin but no suitable aeroplane to put it in? Well then, this M-18 C55 Mooney "Mite" may be just what you've been hankerin' for.

Y'see, Marv Reese plumb ran out of patience waiting for someone to come out with a zippy model specifically sized for the OS Gemini Twin...so he started to draw up his own Mooney plans, and after a five year labor of love ol' Marv ginned up a scale set of plans for the "Mite."

Marv sez: "Four prototypes were built and flown to get the size, 27% of scale, and stability factors perfected while keeping the model totally scale, right down to the changing airfoil.

"This was the last full-scale version of the famous single-seater made, and it featured an expanded cockpit and canopy area which definitely set it apart from the straight-backed version.

"The two-page plans include written instructions as well as some construction photos and a three-view. Also included, for scale buffs, are the locations of the last 17 C55 Mites left on the FAA register. The model can be totally built up from balsa or utilize foam wings and tailgroup, which is the recommended approach (foam templates are shown).

"Specs are: span—87-1/4 inch; wing area—992.5 sq. in.; length—57.5 inch; weight—12 to 13 pounds; flaps and retracts shown as options; and engine size can be from an OS Surpass 90 to a Gemini 160 Twin.

"We finally have a tricycle geared (with retracts), low-winged Big Bird that's been sized for the original OS Gemini Twin.

"And flaps, too, with no noticeable pitch change through 35 degrees of travel.

"No snaps out of a tight turn even though we are using the scale airfoil; a 0015 at the root and a 4410 at the tip. The key, of course is the washout. Forget it and she'll snap like a Cap. Otherwise landings and overall handling are a breeze if you build it right. Suck up the gear and you'll think that you've got a P-51 at the end of your sticks. She really does move out.

"I'd probably get all warped if someone argued about scale fidelity; it's as perfect as I know how—no flaws (except for the landing gear). It honestly is the best flying airplane I have ever built. A real pussycat, until you ask for more.

"Plans and canopy are purchased as a unit for $35 plus $5 shipping and handling. Kansas residents please remember to add $2.10 sales tax. For your Mooney Mite contact Reese Enterprises, 329 N. Milstead, Wichita, Kansas 67212."

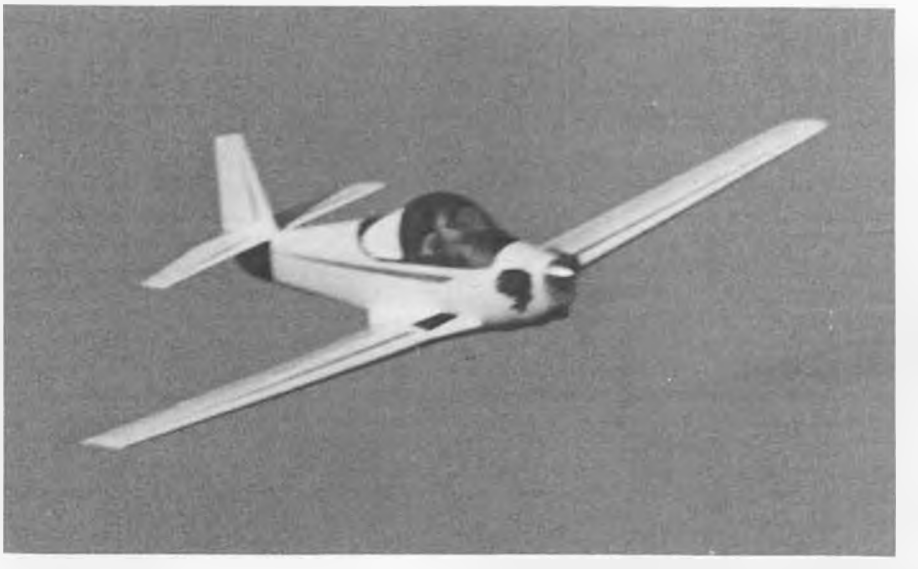
I haven't seen these Mooney plans yet, but I do know from past experience that Marv Reese turns out nice-looking models that fly. Seems as though I'm gonna have to get a set of plans with canopy and rearrange my project priority list.

UTILIZING SPACE IN YOUR VAN

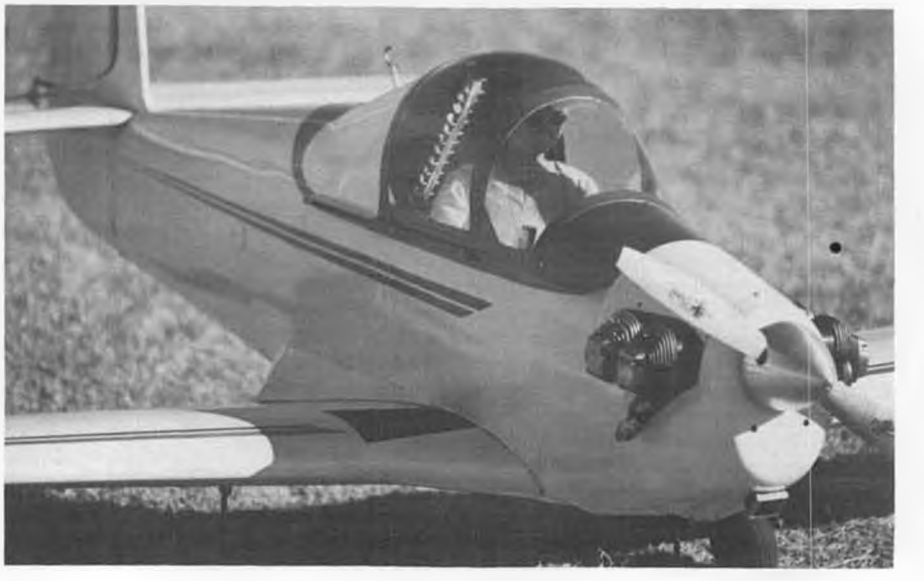
About seven years ago I took the middle seat out of my '73 VW bus because it hadn't carried people for a long, long time, and because the seat made it virtually impossible to haul more than one Big Bird safely.

But it didn't take long to realize that removing the middle seat was only part of the solution. The back seat also had to go, it didn't fold down and was wasting precious space.

The removal of both rear seats yielded the room needed for retrofitting, and so friend Kenny Rowe started sketching, and then began to saw and hammer. First, a frame (1 by 2s) was built to accommodate a 4 foot x 8 foot x 1/2 inch or 3/4 inch sheet of ply that could easily be slid out rearward or removed, and this frame was screwed to the rear part of the VW just above the



Left: Looking for something different to build for Giant Scale? Check out this Mooney M-18 "Mite," available in plans form from Marvin Reese (address in text). It's a great looking and flying machine designed especially for the O.S. Gemini twin, although she'll do well with anything from a .90 four-stroke up to the Gemini. The Mite is a rare one in full-scale; only 17 are registered with the FAA.



Below: Marvin Reese's prototype Mooney Mite has two dummy cylinders installed behind the working ones to simulate a four-cylinder Continental. Except for the landing gear details, the model is 100% scale throughout.

engine and to the floor of the vehicle about 2-1/2 feet behind the drivers seat.

When the 4 foot x 8 foot was pulled out rearwards, all the space under it was easily accessible for storing just about anything: lawn chairs, field box, an assortment of props, extra or special tools, and a cooler big enough for food and soda pop.

And this 4x8 platform also doubles as a service area when pulled out and supported in the rear by plug-in legs in each corner. Its top surface was fuel-proofed by brushing on three coats of clear marine epoxy.

To help stabilize and anchor aircraft while traveling and to prevent them from getting blown around by the wind while being assembled or taken apart, I use bags full of buckshot draped across the landing gear.

Also, notice the foam insulation-covered PVC wing racks screwed to the inner sidewalls.

Been using this new setup for about two months and find it to be a vast improvement over what I'd had. Thanks, Ken.

LOVE THOSE STEARMANS

It's hard for yours truly to ignore any big bipe, but when the two-winged machine is a beautifully scale rendition of a favorite classic like the Stearman, well, I end up drooling.

Above and below: Our columnist finally got around to finishing up the conversion of his '73 VW bus into a model transporting vehicle. The 4x8-foot plywood platform is mounted on rollers and can be slid out the back and supported by legs, forming a convenient on-field worktable. Other details described in text.

Absolutely gorgeous Stearman is the handiwork of Steve Wrona of Ludlow, Massachusetts. Model was built from Steve's own plans and flies well with an O.S. 1.08 up front.

According to Doug Macbrien (he's the guy who inks outstanding plans for great-flying scale birdies like the Kingfisher, Helldiver, Turbulent, and Delatol): "The gorgeous Stearman was scratchbuilt from his own plans by Steve Wrona of Ludlow, Massachusetts, spans about 65 inches and is powered by an OS 1.08.

"Because he's more of a builder than a flier, Steve has a trusted friend fly his models, which is too bad because if Steve was a good pilot he could be on our national scale team (even his landing gear is scale right down to the scissors)."

An interesting observation by Doug because it does seem that the majority of scale buffs can build one helluva lot better than they can fly. Guess that these folks choose to devote so many hours to building and finishing that there's very little time left for getting out to the field and practice. Also, these hand-massaged beauties are usually flown only for special events so nobody really gets to know the airplane too well.

HELP NEEDED

Received a letter from John C. Fredriksen, 69 Flamingo Drive, Warwick, Rhode Island 02886, who, vexed by his inability to find the model planes he wants, decided to write a book titled, "Flying Model Warplanes: An International Guide to Plans and Kits."

Because John wants giant scale to be represented correctly he's asking fellow modelers for addresses and information about obscure plan and kit companies in the U.S. and Europe. And most assuredly all contributors will be gratefully acknowledged.

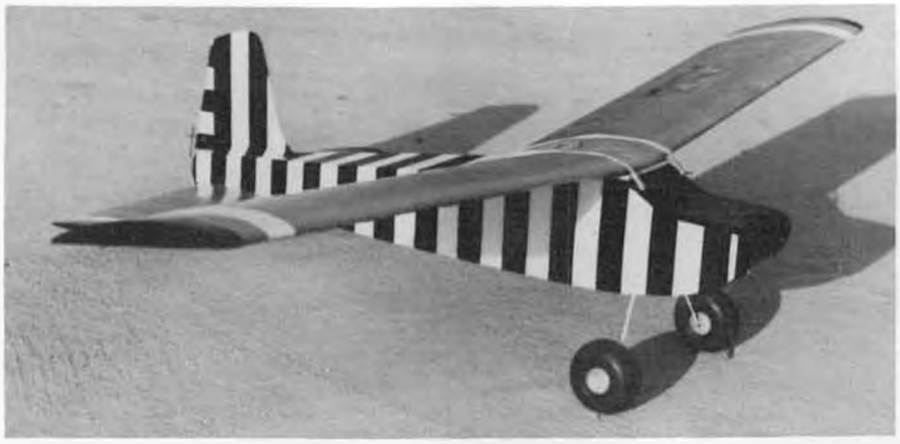
You can write to John at the above address . . . or call (401)737-7983.

CHANGE OF ADDRESS

I've recently moved so please take note of my new mailing address. Why did I move? Because, in addition to other benefits, I could have 600 square feet of workshop to roam around in.

Anyhooo . . . here's the new address: Al Alman, 1910 154th Street Court South, Spanaway, Washington 98387, (206) 535-1549. ●

This attractive Maloney 125 powered Cub by an unidentified builder showed up at the yearly potluck fly-in at Sequim, Washington.



The Electra, designed by Frank Ehling, and kitted by JASCO. Photo dated September 1956. This was before Monokote, folks, them black and white stripes was painted! Wing and tail were light lavender silk covered. Flown on pulse rudder. Don't recall what engine was used.

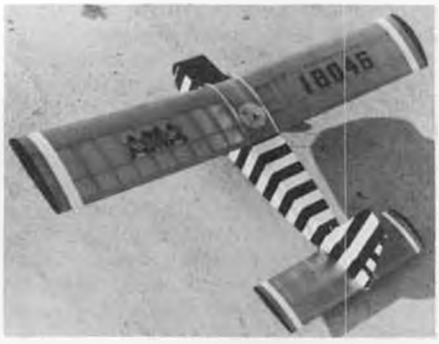
"I ain't got it!"

By BILL NORTHROP . . . With this article we open a new regular column about the early years of radio control. Much of what we take for granted today was only imaginary 35 years ago, but the challenges made it fascinating.

This is the introductory article for a new column to be featured on a regular basis in *Model Builder*. The theme is somewhat similar to an already familiar regular column in our magazine, "Plug Sparks," as it will deal with another phase of our hobby, like old time free flight, which has now been with us long enough to have a history of its own . . . old time radio control.

If the frantic exclamation used as a title for this introductory column doesn't register with you other than for its lousy grammar, then the chances are that you weren't among the few thousands of modelers who participated in radio control during the era to be covered by this column. Actually, the more familiar and more grammatically correct expression was, "I don't have it," and it simply meant that the modeler had lost contact with his aircraft through the radio system. Sure, that sometimes happens today, but the reasons . . . and the results . . .

The Gimlet, mentioned in text. Had Babcock escapement with kick-up elevator. Note counterbalance weight. Holland Hornet .049 engine. Designed by . . . that's right, Phil Kraft (10 parts gin, one part Rose's Lime Juice, right Phil?). Old AMA number. The '6' was dropped around 1960.



Decal is old "Lost Controllers" club of northern Delaware. Later became Delaware R/C Club . . . more positive thinking! I have the plans. Ribs and bulkheads not shown, but die-cut wood sheets are reproduced in smaller scale for parts identification. Hmmm. . . .

were usually not anything like the problems that develop when using today's entirely different and much more advanced radios. To finish the thought, the expression, "I ain't got it," among old time R/Cers, brings back memories of a fabled modeler from Brooklyn, New York, the court jester of R/C in that era, the late Harold "Goldy" Goldklank. His name, and some of his more memorable escapades in R/C, will come up from time to time in future columns.

As with old time free flight, and its recognized international organization SAM, Society of Antique Modelers (People still ask if the "antique" refers to the members or to their models!), old time radio control now has an organization, as announced in our October "Workbench" column. It is called the "Vintage R/C Society," VR/CS, and its era is pretty well established as beginning with the creation of the Citizens Band by the FCC in 1953. The end of the vintage era hasn't been firmly established, though one suggestion is for 1958, when again, the FCC allowed five frequencies for radio control on the 27 mHz band, resulting in the development of superhetrodyne receivers, which permitted more than one airplane at a time to fly on 27. Up to then, modelers shared one frequency, 27.255, with a merciless horde of yackety-yak CBers who shot airplanes down left and right. Actually there was another examination-free frequency available, 465 mHz, but radios were limited to one supplier, Citizen-Ship, and the excessive battery requirements were handicapping. More about that later, too. Perhaps, as in SAM, there should be two age categories, to permit a broader coverage of aircraft designs. "Antique" in R/C could include any aircraft up to the opening of the Citizens Band, and "Vintage" could go from there to the beginning of multi-proportional, which would be somewhere around the introduction of Space Control (It was said that you needed three Space Controls, at $750 a whack, in order to fly every week: one in your airplane, one at the factory for repairs, and one in the mail!).

Radio systems in the vintage era bore almost no resemblance to the radio systems that are in use now . . . not in size, not in shape, not in weight, not in components, not in MO (method of operation), and

Newspaper photo taken when club (I was president) was looking for new field. It worked! McCoy .09-powered Great Lakes on rudder-only escapement. Flew very well . . . low and slow. First construction article published in *Air Trails* June 1958. Note ground-based transmitter, also meter for checking current change that operated relay, that operated escapement.

most of all, not in reliability. In spite of the preponderance of R/C crashes these days, most are caused by pilot error or frequency management . . . admitted or otherwise. The true reliability factor of today's radios are way above that of the vintage radios. However, it must be kept in mind that today's radio is a complete unit as delivered. In the vintage era, you bought this brand of transmitter, that brand of receiver, another brand of actuator, and then you did all of your own wiring and soldering of connectors . . . which you also purchased separately. Many a radio died on the workbench before it ever ended up in an airplane!

Another big difference in radios then and now was in the results of a radio failure. In those early days, because of the limited amount of control . . . mostly just rudder, not even throttle . . . the aircraft had to be inherently stable designs, much like old time free flight, which could fly on their own without assistance from the ground. Of course, *WHERE* they flew without radio control was just like free flight . . . wherever they darn well wanted! So, when the fateful "I don't have it!" call went out, the first move was to turn on the strongest transmitter at the field (remember, everyone was on the same frequency) to try to pick up the runaway plane. If that didn't work, several friends would make a bee-line for the nearest car, and away they would go, in pursuit of the fly-away model. Hopefully this would happen near the end of the flight, when the engine was almost out of fuel. Otherwise the model could keep on climbing until it was out of sight, and/or go in a direction for which there were no roads to follow it!

There were two schools of thought regarding the consequences of radio failure. One was to allow the model to keep on flying, in hopes that it would make a safe landing and be recovered . . . somewhere. The other alternative was to rig the control system so that a loss of radio contact kicked the rudder into a right or left turn (there was no proportional with escapements, the rudder was either at neutral or at full turn, nothing in between) in which case the model would spiral down and crash . . . but you didn't lose it, and hopefully it could be repaired. One time we sold or traded a model to another club member. Twice in the space of a few weeks the model flew away from him, and each time, we received a phone call from someone who had found it. He had never removed our I.D. sticker and replaced it with his own. The second time he came to pick it up, I told him that if it flew away again and I had to retrieve it, I was going to keep it! (Remember the 'Gimlet,' Carl?)

For this first opening column, we're using some photographs of some of our own aircraft and expressing some of our own ideas about old time R/C, and there's plenty more where this came from. But this is to be a column that will collect and disseminate photos and discussions by any and all of our readers who experienced this era and would like to share it with other readers. Maybe you have some ideas

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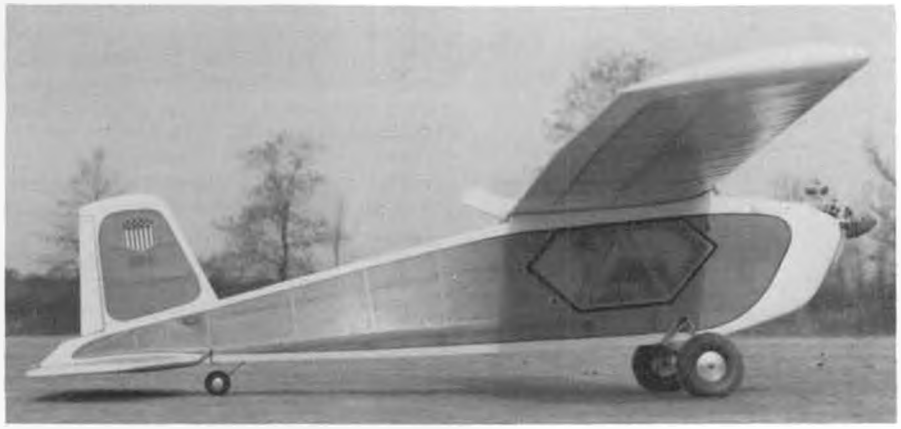
Second ever R/C was scratch-built pulse rudder-only bipe designed by late Canadian buddy, Jack Luck. I have original plans. Fine, stable flier. Later published in *Air Trails* as "Barnstormer." Whole top deck lifted off. Total engine/cowl unit came off at firewall. Yep, that's an Arden .09 with a Champion glow plug. Still have both! Love them Trexlers!



Walt Good's "WAG" (Without Drag)

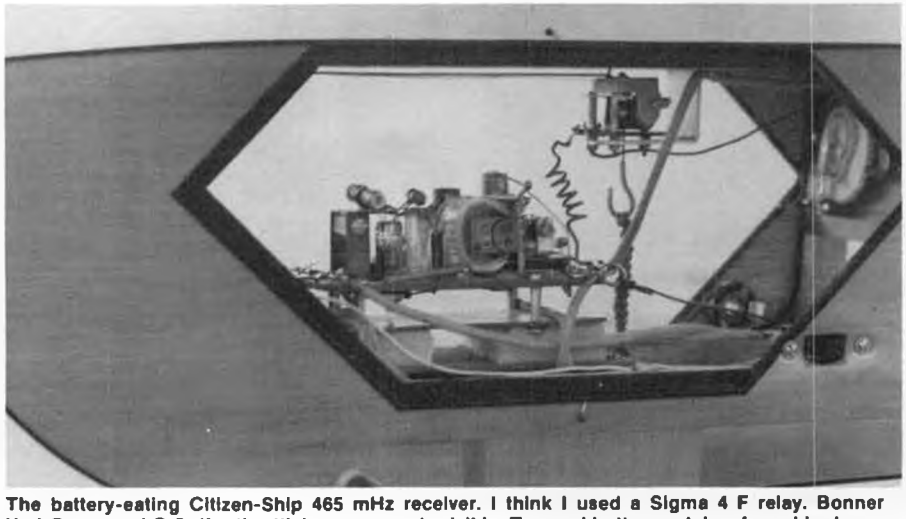
By BILL NORTHROP ... Another in our series of well-known vintage R/C aircraft. "Without Drag" denotes our own modifications to the original design.

• The "WAG" was the second in Walter A. Good's (W.A.G., get it?) "Rudder Bug" series. First came the original Rudder Bug, in 1948, the all-new successor to the historic "Big Guff" (see series of articles beginning August 1988 in *MB*) which had been retired and now resides, on display, in the Smithsonian.

The "Bug" was a "Good" airplane in more ways than one. Having been published as a construction article in the spring of 1949, no less than 11 out of the 32 R/C entries at the 1949 Nats (There was only one category back then ... "R/C") were Rudder Bugs, and one of them, guess who's, won the event.

The "WAG" was next, designed and built in early 1953 and flown to third place at the 1953 Nats, using rudder-only. It was published in the April 1954 issue of *Air Trails*, and is the subject of this construction article. It retained many of the Rudder Bug design features, including the characteristic, all-important, tip-stall killing, built-in washout in the outer portion of each wing panel.

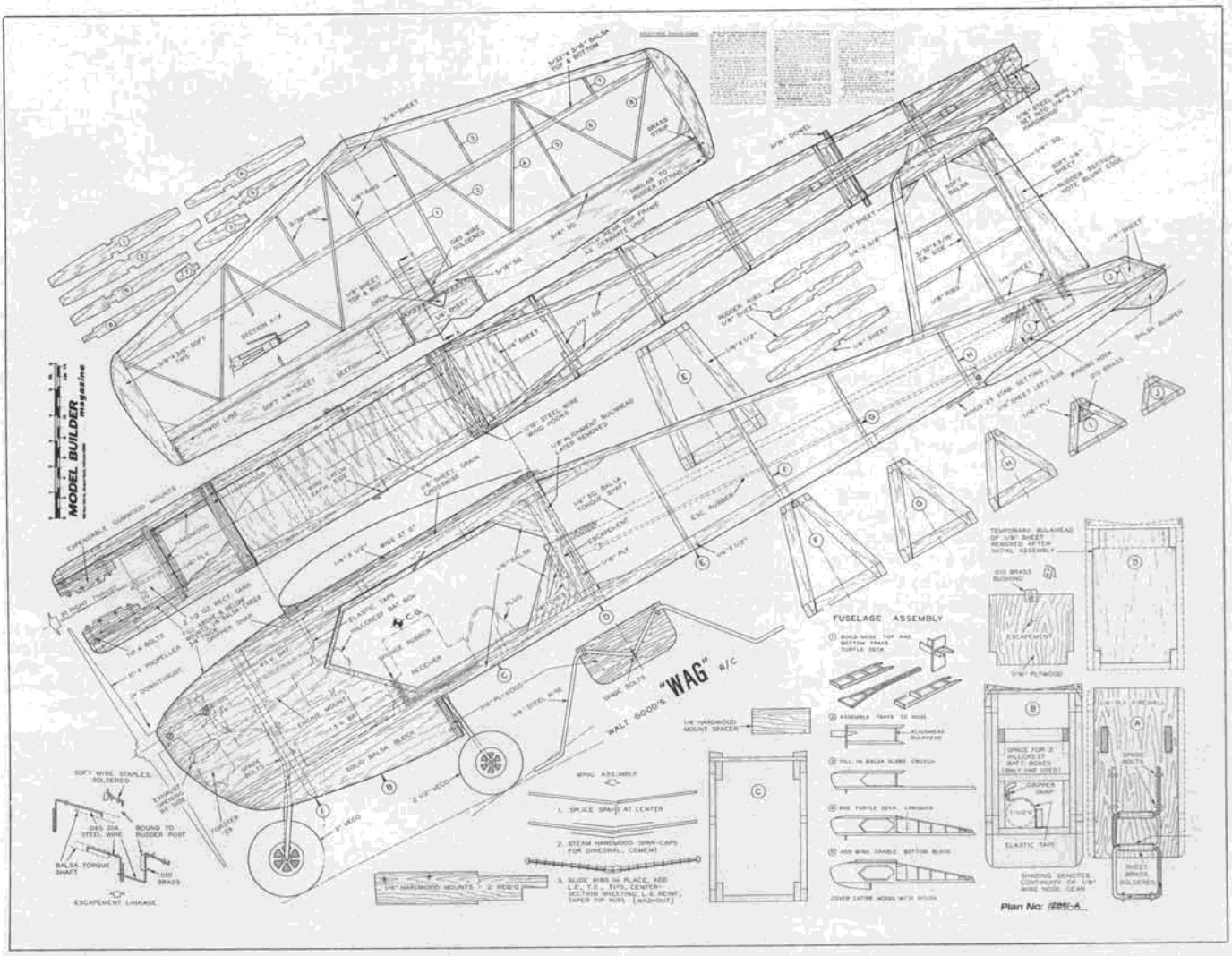
In late 1953, the "Bug" was scaled from six down to five-foot wingspan, and the first test version, it was to be called the "Royal Rudder Bug," was built by one of Walt's fellow DCRC club members, Don Clark. The Royal was also published as a construction article, in the Feb. 1954 issue of *Flying Models*, and then introduced as a kit by Berkeley in the spring of 1954. Thousands of these kits were sold all over the world, including one to this writer in 1954, my first R/C model. The main design difference in the WAG was the step-like effect in the fuselage bottom at the main landing gear location. It was Walt's intention to attempt to introduce some drag, in order to cure the typical "ballooning" experienced by most rudder-only airplanes when coming out of a turn (Remember, there was no elevator to counteract unwanted pitch changes). As you will note, this writer,

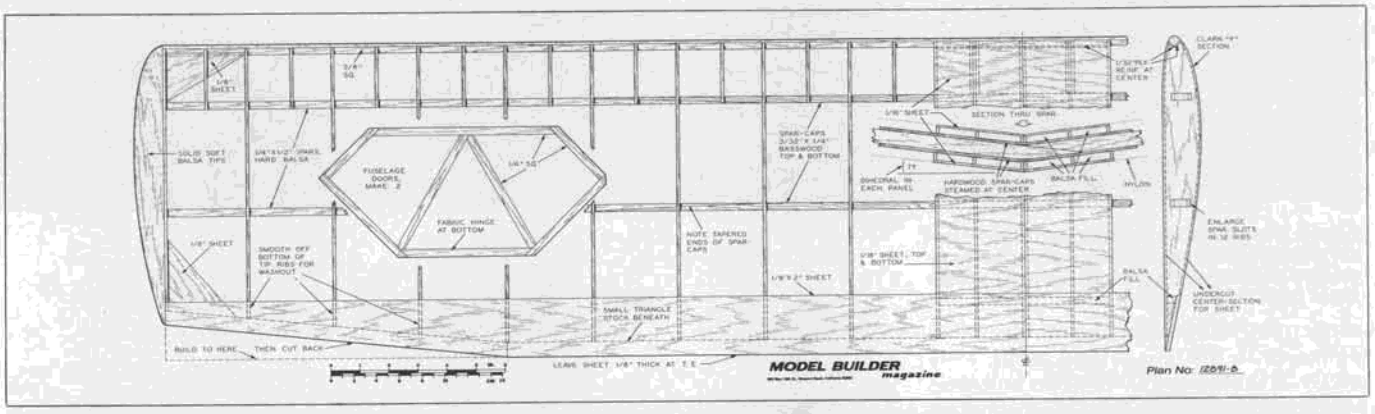


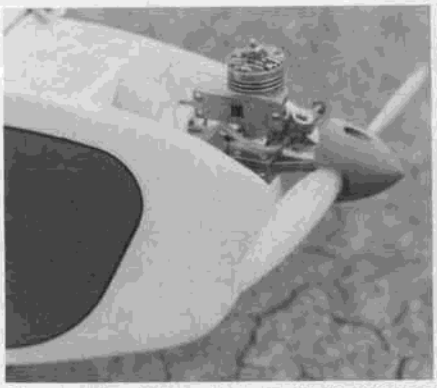
The battery-eating Citizen-Ship 465 mHz receiver. I think I used a Sigma 4 F relay. Bonner Vari-Comp and O.S. (for throttle) escapements visible. Top and bottom catches for cabin doors, no hinges.

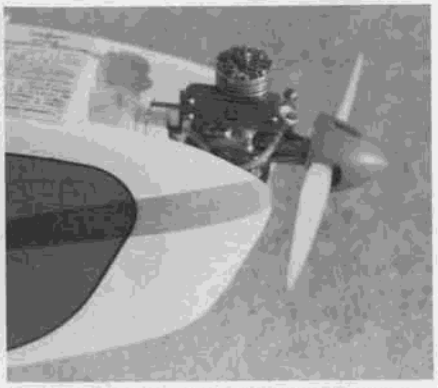
Built around 1956, model outlived many different control systems. Beautiful clear-doped bright green nylon with white trim, black pinstripe. I'm really tempted to build another one!

Citizen-Ship 465 mHz transmitter mostly hidden by model. Note unusual folded-dipole antenna arrangement. Unpopular radio because of high receiver battery drain. No rechargeables back then.









Nice-working, sliding exhaust baffle throttle, handmade and mounted on Veco .19, open left, closed at right. Had to work easily as escapements had very little power. Note I.D. tag doped on.

FULL-SIZE PLANS AVAILABLE—SEE PAGE 106

being a typical modeler, modified the design to smooth out the fuselage profile, but only after consulting with Walt, who confided that the step really wasn't that effective in curing the ballooning problem. We also switched to a tail-dragger landing gear, preferring the looks and saving of weight. It worked fine on our grass flying field.

As it turned out, the ballooning wasn't that big a deal, and what little there was came in handy when making a dead-stick (normal) landing. By setting up a glide

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ELECTRIC POWER

By MITCH POLING

Tom Edmunson, who owns a hobby shop in Seattle, Washington, learned to fly R/C (with our columnist's help) on this Futaba "Professor" electric ARF. Mitch was very impressed by the model and has lots to say about it in his column.

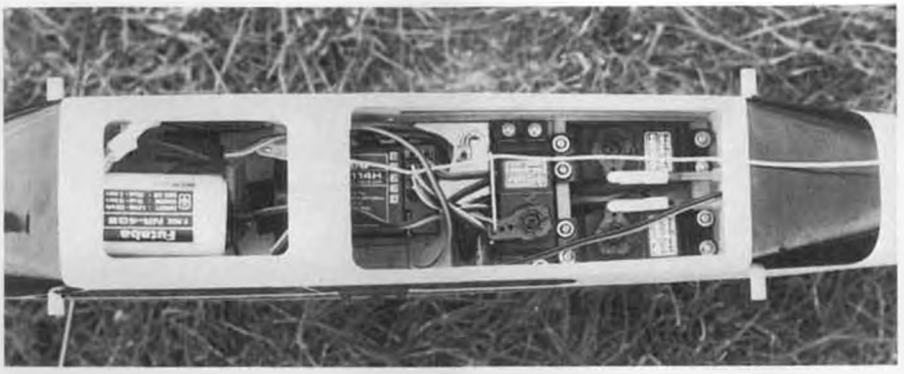
• Ed Westbrook is at it again! Ed started me off on measuring motor parameters, which then led to Bob Kopski's writings about it, and the method and results I talked about last time. Now Ed has a method for measuring k or 1/k (as suggested by Bob) directly. Ed spins the motor with a drill, and measures the voltage at the motor terminals. There is no armature current, so the voltage divided by the rpm is the k that we want to know. Simple! No equations to solve! You can measure the armature resistance by either measuring the stall current of the motor as described by Bob in his column, or you can do another run with a load on the motor and an ammeter in the line as well as the voltmeter. A car taillight bulb makes an excellent load. The voltage drop (change) from the unloaded value divided by the current value gives the rotating armature resistance. Note, this will be different from the static (nonrotating) armature resistance.

Ed uses a reversible power drill for driving the motor. In fact, he made his drill press reversible. Most small drill presses use a capacitor start-capacitor-run AC motor. You can reverse the motor by reversing the leads going to the winding connected in series with the capacitor. Ed put in a DPDT switch for this, so he can run the drill press either way. Ed measures the rpm with an optical tach, using four strips of black tape on the chuck. Use a flashlight or DC light to eliminate flickering readings from the house lights (60 cycle, 3600 rpm). Divide by two to get the true speed. The four strips give twice the value for the rpm, this in effect gives your tach better accuracy.

Ed also has a neat way to tell electrically which direction the motor is timed. He only dropped a hint of it in the letter, since he is still working on the method, but my own testing says that the motor will generate less voltage in the direction it is timed for than it will in reversed rotation. I have not done testing to see if the voltage drop

Above: This view gives a good idea of the Professor's clean aerodynamic lines. Fuselage is blow molded plastic, wings are balsa structures with sheet foam covering.

Right: The Professor pieces as they come right out of the box. Takes very little time to assemble the model and install a radio.



The Professor is really designed for miniature servos, although, as shown here, standard size servos can be shoehorned in—makes for a pretty tight fit though. Smaller servos would also be lighter.

is proportional to the timing angle. Thanks, Ed, for such good info.

I have been using a dynometer setup for measuring motor constants, and it is an excellent alternative to using a drill press. It is very simple to make. Use the following wood pieces: 5 x 3/4 x 4-1/4", 10 x 3/4 x 4-1/4", two 5 x 1 x 3/8", four dowels 3/16 x 3, and some #64 rubber bands. See the photo for the assembled dynometer stand. This stand is the right size for testing motors with propellers as well. Dimensions are not critical, and the stand can be assembled with screws or nails. The dynometer motor should be a Mabuchi 540 or similar, since it has neutral timing and can run equally well either direction. The coupling between the motors is made from a one inch long K&S 1/8" inner diameter brass tubing and two Duro 5/32" inner diameter wheel collars. A boat coupling could also be used. The tachometer indicator is a 1 x 1/2 x 3/32" wood piece with a hole through the center, glued onto the coupling. You can use a six cell Ni-Cd pack to drive the Mabuchi. I prefer a more constant voltage source so readings will be comparable. A 12-volt auto battery with a 25 to 30 foot extension cord to drop the voltage does a good job. The dynometer can be used two ways, the Mabuchi can drive the motor under test, or the test motor can drive the Mabuchi. In Ed's method, the Mabuchi will drive the test motor. I tested an Associated/Reedy stock offroad car motor, and read 10,850 rpm at 5.13 volts on the Reedy. The Mabuchi was driven by a 12-volt auto battery and 27 feet of extension cord. This gives a 1/k of 2115. I then used an 1157 taillight bulb as a load on the Reedy, and got 4.77 volts at .6 amperes. This gives 5.13 volts - 4.77 volts divided by .6 amps equals 0.6 ohms armature resistance.

These values are not quite the same as what you will get from Bob Kopski's method. For this method, I ran the Reedy motor from the 27 foot cord plus 12-volt battery, and used the Mabuchi as a load. The Mabuchi was connected to a 12-volt headlight bulb. The results were 7.67 volts at the Reedy terminals, 17,600 rpm, at 13 amps. I tested stall current with three Ni-Cd cells, this gave 20 amps at 2.01 volts for the Reedy motor. Armature resistance is then 2.01 divided by 20 equals .101 ohms, and using this in the equation for a motor, 7.67 volts equals .101 ohms times 13 amps plus k times 17,600 rpm. K is 0.003616, and 1/k is 2766.

Note the differences: armature resistance is .6 ohms in Ed's method, and .1 in Bob's method. 1/k is 2115 in Ed's method, and 2766 in Bob's method. I think this is a general pattern, resistance will be higher, and 1/k lower for Ed's method compared to Rob's. All this really means is be consistent and compare results on different motors using one or the other method, don't mix them. Does anyone know why the results are not quite the same? I am interested in comments!

Tom Edmunson owns Land, Air, Water Hobbies in Seattle (Lynnwood). This is where I have done a lot of car racing. They have a good offroad track. Anyhow, Tom had a Futaba Professor in the box at the store, and a desire to learn R/C flying. The plane looked good, so I volunteered to put it together and teach Tom flying. The Professor has a blow-molded fuselage, and very light flying surfaces made of balsa framing covered by sheet foam. It is a very attractive plane, and there is not much assembly, as the photo shows. I always take my time, so it took me about four hours to get the basic assembly done. It was all straightforward, with no misalignments or problems. Tom had a four-channel Attack with three standard size servos, which I installed for elevator, rudder, and servo controlled on-off toggle. This is where I ran into some trouble, created by myself. The radio tray is already installed in the plane, and it has cutouts for miniature servos. Since the Futaba radio had a servo tray, I decided to take out the stock radio tray and put in the Futaba tray. What a mistake! After I took out the stock tray, I found that there was just not enough room for the radio gear using the Futaba tray. I wound up putting in my own custom-built mounts (spruce). I used up another six

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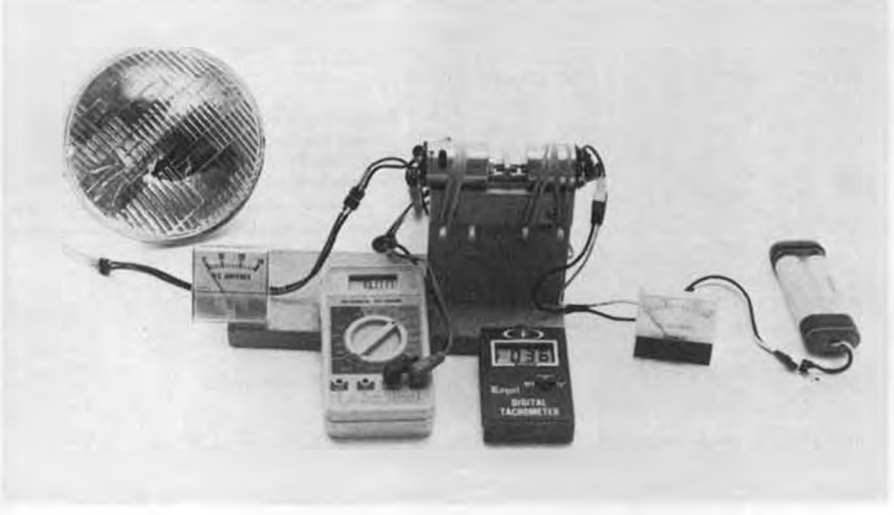
Mitch Poling's ultra-simple dynometer stand, used for measuring various motor characteristics. The four dowels are for hold-down rubber bands. See text for dimensions.



The full dynometer setup—tachometer, headlight load, two ammeters, etc.

CHOPPER CHATTER

By JAMES WANG

• Hi, folks, I just got back from the third F3C R/C Helicopter World Championships at Virginia Beach. I had a great time there, meeting old friends and making new ones. Furthermore, learned many new ideas through discussions with the pilots, observing their flyings and studying their machines. As I just got my pictures back from the local photo lab, and they look great, we decided to squeeze in the World Champs coverage in this issue. The kit reviews will resume next time. In this month's "Chopper Chatter," we will finish up the rest of the blade tip design theory, and show you a letter from a reader about his Kalt Baron 30.

At the World Champs, Lou Steller, of New Jersey, showed me a tail rotor hub that his machine shop made for the Schluter Champion and Scout. He said it is NC machined to .0005" tolerance and has accurate tail blade feathering axis alignment. It replaces Schluter part number 277. Lou claims it reduces tail boom vibration. It goes for $19.95; call him at (215)794-0314 for details. The other fellow that I really enjoyed talking to was Ernie Huber, he has always been one of my idols. He is the first person to hover an R/C helicopter upside down. He did this in November 1979 with a stock Kavan Jet Ranger. He is retired now, and when I met him at the World Champs, he was driving his motor home on the way to his new 60-acre home outside of Orlando, Florida. He will be opening the first R/C helicopter school in the U.S. It's a one week course. Four students will go to his home and live there for one week. He teaches you helicopter at his ranch, and his wife will do the home style cooking. I will let you know how to register when he sends me the final registration materials. Ernie is a man who knows helicopters!

This month, in addition to helicopter aerodynamics, our columnist talks a bit about the Kalt Baron 30. This one belongs to Bill Sewell, who relates his experience with flying it up in Alaska.

FIGURE 1. Air flowing over the top of an airfoil has to travel a greater distance than the air below the airfoil, and thus has to flow faster. This faster-moving air exerts less pressure on the airfoil's surface than the slower-moving air below, creating a region of relatively lower pressure air above the airfoil than below.

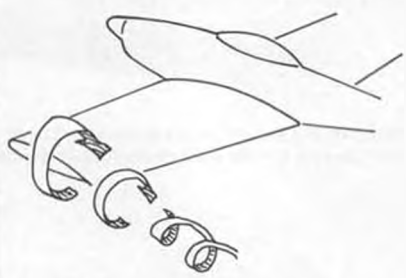
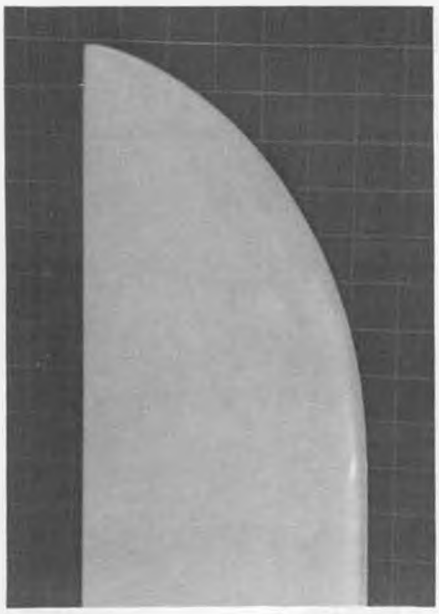


FIGURE 2. A vortex is formed at a wing tip or helicopter blade tip due to the air wanting to flow from the high pressure region below to the low pressure region above.



The highly tapered, swept tip fiberglass blade designed by Alex Gauss. Called "Whisper Blades," they are distributed by Robbe Models. This is one of the most advanced model blades on the market now.

In the last issue, we explained that a simply swept back blade tip as on the Apache AH-64, or the smoothly curved swept back tip as on the Kyosho Concept 30 blade, is beneficial for R/C models because it reduces main rotor blade induced drag. Look at the photo on this page of a blade made by Alex Gauss, of Virginia. He calls his blades Whisper Blades. They are distributed by Robbe Model Sports (who distributes Schluter in the U.S.). At $139.99 a pair, these fiberglass blades are not cheap, but they are definitely the state-of-the-art in model blade design. I am extremely impressed! I had a long talk with Alex at the World Champs. He said he got the design idea from reading the rotor blade article, *What is The State-of-The-Art Blade,* that I published in International Helicopter Magazine two years ago. He borrowed all the modern design features that were mentioned in the article. The blade has taper, swept tip, and three different airfoil shapes; a reflexed airfoil at the inboard section to reduce the nose-down pitching moment of the blade, a

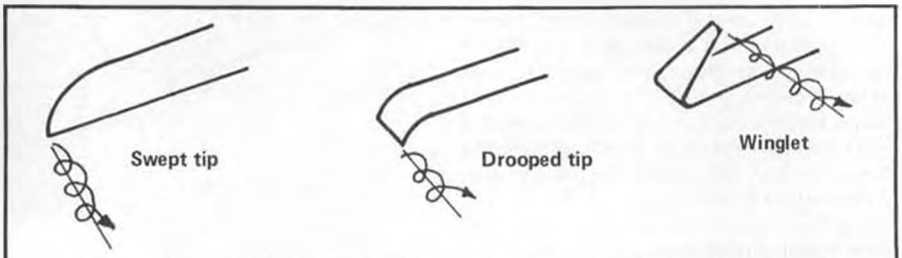


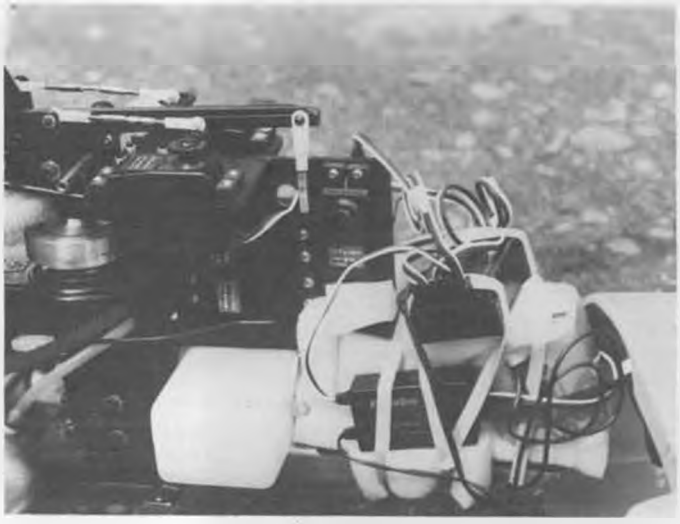
FIGURE 3. Three methods of moving the tip vortex away from the inboard section of the wing.

symmetrical section at mid-section, and a high lifting cambered, flat bottom section at the tip. If I were to design the blade I would put the cambered section in the middle and the symmetrical section at the tip. He also added the lead weight as close to the leading edge as possible to keep the blade chord-wise CG forward to maximize *lagged rate* feedback effect that was mentioned in the article. The blade has a foam core, and is coated with two layers of different weight cloth. For people who want a super hi-tech blade he even has the same blades made with kevlar instead of fiberglass cloth. What's the benefit? Just a stiffer blade. Is that better? Maybe for the ego, but not aerodynamically. The stock fiberglass blades are plenty stiff already (We shall discuss blade aeroelasticity in the future). I am presently flying a set of the regular fiberglass blades on my Magic. I think this type of design will be the future of 1990s rotor blades. Alex should be congratulated for a job well done. We exchanged some design ideas at the contest, and he said he will incorporate them into his next generation of blades. If you think you can fly a hundred flights without breaking a set of blades, then I definitely recommend you try a set.

The most important part of any helicopter, the main rotor head. The Baron 30 uses a hingeless design (described in the June '89 issue).

The Sitar brothers, of Austria, pioneered the modern fiberglass blade for model helicopters. However, after 10 years the Sitar blades are still a simple, constant chord, uniform single airfoil blade. I was always curious about the 45° sawed-off tip at the leading edge of the Sitar blades. Well, finally I got my answer. After the World Champs, the Sitar brothers, and Urs Hanselmann, the editor of a Swiss model magazine, came to Maryland to visit me. After showing them my full-size helicopter research projects, wind tunnel facilities, and my blade designs, I asked them why the 45° sawed off tip? Bernard Sitar said, "Well, that is just to make people think it's special, and it became a trademark of Sitar blades." Before then, that bugged the hell out of me for a long time because I couldn't figure out why such a small useless cut. The reason I say so is because I was aware that the Sitar brothers knew aerodynamics well. Bernard Sitar is a fluid dynamic professor at Innsbruck University. Herbert Sitar once held the world R/C glider speed record. Their original glider design reached a speed of 390 kmh, or about 240 mph. That is fast! The record was set in the Alps with a thermal glider and less than 5 mph wind. He said the ship was dived from over 1000 meter high. It has to fly through a 50-meter straight pass, and it can then soar up to get some more potential energy. But within a 1/2 hour he must make a second pass in the reverse direction. The record speed is the average of the two passes. Bernard says at 240 mph, it takes only about one second to fly through the 50-meter trap, and the air flowing over the top of the wing reached Mach 0.7 (that's 7/10 the speed of sound, around 400 mph). He added you can hear shock noises due to compressibility of air. Hmmm, no wonder the Sitar blades have been so popular in Europe for the past decade. Curious about what airfoil the Sitar blade uses? Let's just say it's a reflexed Eppler airfoil about 12% thick. If you are interested in making or selling your model blades, please check the airfoil data book instead of making a free hand airfoil on the back of an envelope, it can make a difference!

The Kait Baron 30 employs a very common and simple engine setup. This is Bill Sewell's machine, with O.S. .28 and MACS Heliball muffler.



Radio installation in the Baron. It's best to fly all collective pitch helicopters with five servos, a heli radio, and a yaw rate gyro.

The Baron 30's tail rotor blades have a strange but effective camber profile.

The length of the Whisper Blade is the same as the stock rectangular Schluter wood blade. The reason that a swept tip blade, like Whisper Blade, can reduce the aerodynamic drag of the blade is because it pushes the blade tip vortex to the very back edge of the blade tip. The farther this rotating vortex is away from the inboard section of the blade, the less damaging influence this rotating vortex can exert on the rest of the blade.

If you don't care about theory, then all you need to learn from this article is that a swept tip blade like the one in the photo can reduce main rotor drag by about one to two percent and make you fly very slightly faster, and improve hover efficiency and control response by one or two percent. Yes, we are talking small improvements. But when a full-size helicopter designer designs a helicopter, a one percent improvement in rotor thrust

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The 3rd F3C R/C HELICOPTER WORLD CHAMPS

By JAMES WANG

The Japanese continue to dominate the sport with a new World Champion and their third team win in as many years. The U.S. team came in second. This month, James reports on the American pilots and their machines; next month we'll continue with a look at the Japanese and European fliers.

• For all of you who couldn't make it to the 3rd R/C helicopter World Championship held in Virginia, you missed a great show. But you might capture some of the flavor by watching R/C Video Magazine's special report on it. I hope they have a good video on it because I would like to study the footage carefully. Call Mr. Ed Nakasone at (303) 665-8204 to find out exactly when their one-hour World Champs video will be out. After watching the pilots enjoy the contest so much, it made me want to drop everything and start intensely practicing for the next World Champs to be held in Italy in 1991.

As there is so much material to cover for the 3rd F3C World Championship, I have decided to break it into two parts. This month we will concentrate on the American team's helicopters, and next month we will present the winning Japanese team helicopters and some of the European machines. The objective here is to give you the forefront technology used at the World Champs.

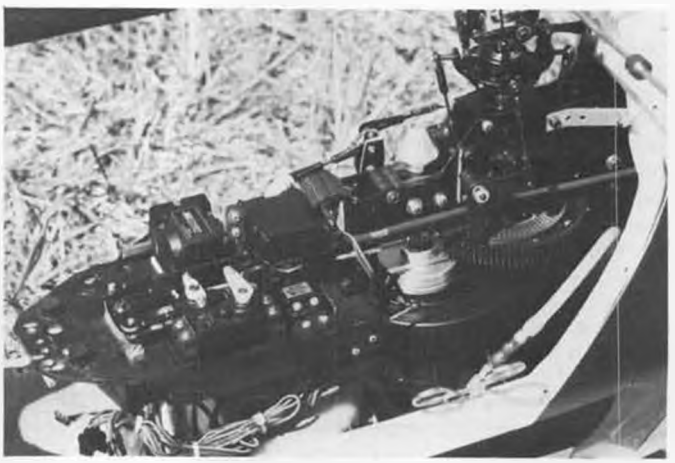
As speculated by many even before the World Championships got underway, the Japanese contention had a very strong possibility of repeating their team win. After

The U.S. F3C team and their flying machines. From left: Cliff Hiatt (team manager), Tom Dooley, Tim Schoonard, Robert Gorham, and Curtiss Youngblood.

all, they won the previous two World Champs held in London, Ontario, Canada, and Bern, Switzerland. The Japanese take this contest very seriously. They practice intensely, and the radio and kit manufacturers back the pilots with 100% support. The team members spent a month practicing together in sunny, windy, and beautiful, Hawaii. They critiqued each other and also built up camaraderie. As the majority of our model products come from Japan, we can expect the Japanese to have the most state-of-the-art equipment. The winner Yukihiro Dobashi's Hirobo mechanics with Korukawa (Black Hobby) fuselage is such an example of quality craftsmanship. Curtiss Youngblood and I were chatting, and he said that if we could swap machines with the Japanese team, then he thinks the American might do slightly better and the Japanese might do slightly worse. I think that's an interesting comment and maybe we should have done that after the meet just to see if it's really true. However, I think the different setup of the helicopter might require some getting use to.

For example, Americans run very high rpm on the main rotor (about 1700), use light weight paddles, and set the main rotor very stiff in teetering. The Japanese use very low rpm (about 1300), use heavier paddles, and set the main rotor very soft. The fuel nitro content is also very different.

Curtiss Youngblood doing the Nose-In Circle maneuver with his dad Dave calling for him. Curtiss ended up 3rd, the highest placing U.S. flier.



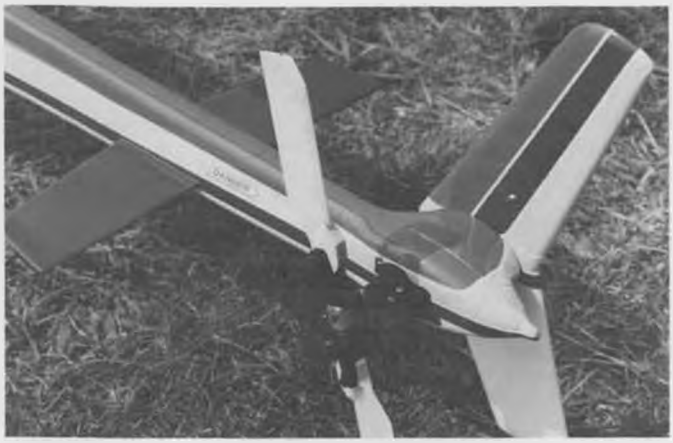
A close-up of Curtiss Youngblood's backup ship. It's a Miniature Aircraft X-Cell in a Hirobo Nova fuselage, with some mechanical parts from GMP and TSK. See text for a description of the unusual control setup.

Left: U.S. team member Tim Schoonard, 9th place, hovering his X-Cell Long Ranger at the ready box. Team manager Cliff Hiatt doubled as a caller for Tim.

fuselaged helicopter, the judges would downgrade you severely. Thus in the summer, he spent more time building than flying.

Tom said he had a very bad tail shake problem on his Long Ranger and it took him a lot of head scratching to solve it. He said his Long Ranger tail would vibrate severely up and down. He tried everything, such as Highpoint balancing the whole tail rotor hub and blade assembly, changing blades, etc. but to no avail. He said he even removed the tail assembly from his pod-and-boom X-Cell, which is known not to

Tim Schoonard's X-Cell rotor head with the new heavy-duty aluminum mixing plate. Note the gyro location, very close to the helicopter's CG.



Tim used the stock tail rotor blades on his Long Ranger. The judges couldn't help but be impressed with that slick paint job!

Japanese run 30% nitro. The Americans and European use less than 20%. All three members of the American team used tune pipes to get about 10% extra horsepower. The Japanese only use regular mufflers to avoid the pesky characteristics of tuned exhaust systems.

The three American team members were Tom Dooley, Tim Schoonard, and Robert Gorham. Cliff Hiatt was the team manager. Curtiss Youngblood was the champion at the second World Champs,

Below: Another X-Cell Long Ranger was flown to 12th place by U.S. team flier Tom Dooley, who runs a small R/C heli business from his home; call him at (404)446-9101 to see what he has to offer.

thus he automatically qualified to compete and defend his title. Tom is an accountant for Arby, from Atlanta, Georgia. He is an extremely nice fellow, very pleasant to talk to. He enjoyed this World Champs so much he said he will attend the next team trial and try out for the 1991 U.S.A. team. Tom was flying a stock X-Cell with Miniature Aircraft's Long Ranger fuselage. These lightweight fuselages, made by Bob Violet, have superb fiberglass work. Tom could have done better than 12th place if he had more time to practice. He has a full-time job and he completed his two X-Cell Long Rangers only one week before the meet. He was told that in international caliber competition, if you don't have a scale

have vibration, but once it was installed on the Ranger, the boom vibrated again. Finally, he tried the trial-and-error method of just adding some CA glue as weight on an arbitrary tail blade holder, and that made the vibration disappear. We suspect the fuselage Ranger model may have a structural natural frequency that is very near the tail rotor excitation frequency, thus the need for better tail rotor balancing became more crucial. I suggest he might next time try to beef up and add a layer of glass cloth inside the tail boom to change the natural frequency, or perhaps try adding some masses at various locations inside the tail boom to change the frequencies and vibrational mode shapes.

A close-up of Tom's X-Cell's tail with non-stock tail rotor blades. Read text to see how the fiberglass tail boom gave him fits.

Left: At 5th place, California's Robert Gorham was the highest placing U.S. team member. His caller is Dave Willis, of Tennessee.

Below: Another view of Robert Gorham's beautifully painted GMP Legend/Ranger. A paint job like this may win extra points from the judges.

Tom's Long Ranger is very similar to Tim's. They both used stock X-Cell, but with a new upgrade aluminum plate on the main rotor head (see the photo). They used JMW gyros, OS 61FSR engines, Super Tigre carburetors, and Magna Pipes. Everyone on the American and Japanese teams were using regular low-tech wood rotor blades. On the contrary, nearly all the Europeans used fiberglass blades. Fiberglass blades do not imply hi-tech, because they used the same traditional airfoils as used on the wood blades. Hi-tech blade means it must have advanced airfoil shape, and the airfoil shape varies continuously from the root to the blade tip to optimize performance in the spanwise varied rotor inflow environment. It should also have taper, and maybe just a slight amount of twist for hover and forward flight efficiency to improve thrust. However, nearly half the contestants did have a swept tip on their main rotor blades. Tim's wood blades were sanded down to give a nice parabolic shaped swept tip. I think he can probably try to sand away some more, to reduce the rotor blade's induced drag even further. Interestingly, like Curtiss, Tim is also flying with a single-stick radio. They were the only two at the meet with single-stick radios. Tom also has a very neat setup of in-flight needle valve adjustment, operated by an auxiliary channel. The photograph is self-explanatory.

Robert Gorham was the highest placed American team member, he was 5th. He and Curtiss were both flying GMP Jet Ranger bodies with GMP Elite Rotor heads, TSK tail rotor gear boxes, and OS 61FSR engines. GMP must be pretty happy that their machines placed 3rd, 5th, and 7th at the Champs. Robert was using Legend mechanics with a shaft-drive tail rotor system. The Hatori pipe barely fits inside the fuselage. Curtiss' Ranger body has the GMP Competitor mechanics. This helicopter was the same one that he used to win first place at the last World Championships. Close-up examination of Curtiss' grey Jet Ranger shows it has been through a lot. However, the mechanics is what really count and he kept every linkage nice and taut. It does not look very neat inside, but it incorporates many excellent modifications. The pitch, roll, and collective controls all have push-pull bellcranks to minimize the unsteady load transmitted back from the main rotor blade system to the servos. The photographs show Curtiss' backup ship with the push-pull modifications.

Let's see where the unsteady aerodynamic loads come from. A full-size airplane pilot flying a Cessna two-seater will feel a counteracting force when he is moving the control wheel on his plane. The force he feels is from aerodynamic forces exerted on the control surfaces as he deflects the ailerons, or elevator. The more he displaces the control, the stronger the force he feels. It is a very linear phenomenon. However, a full-size helicopter pilot flying a two-seater like an R-22 does not feel any "meaningful" force when he defects the control wheel. The reason is that there are no hinged control surfaces. When a helicopter pilot moves the control

Continued on page 57

The sophisticated GMP Elite rotor head on Robert's Legend/Ranger features an 80% Bell-Hiller mixing ratio.

Robert's machine uses an expensive but extremely precise TSK tail rotor gearbox in place of the stock unit.

MODEL DESIGN & TECHNICAL STUFF

By FRANCIS REYNOLDS

• Dearly beloved, we are gathered together to discuss model design and technical stuff. Who knows, we might even mention something of interest to you.

A TALE OF TWO ALCOHOLS
with apologies to C. Dickens

A week ago I had two glasses of light wine at a picnic, and an hour later I decided to fly R/C. The plane was a small, fast, low wing-cube loading (see MD&TS for September), low displacement loading, neutrally stable, highly aerobatic original design that my 69-year-old reflexes could normally just handle. Surprise! I couldn't handle it. It was all over the sky with me vainly trying to catch up with it. While attempting to take command, I let it get too far away and couldn't see it well enough to get it back. It landed about seven tenths of a mile away and was recovered without damage. How did I find it? With a boat. Seaplanes have lots of advantages.

But back to the story. The little bit of ethyl alcohol slowed my reflexes by one or two tenths of a secondand degraded my coordination and judgement enough so that I couldn't handle this methyl alcohol burning beast. I felt completely normal and certainly wasn't "drunk" (I never have been), but I must have been "under the influence." There was no other explanation. Later I again flew this plane a number of times with no problems. We have read of these subtle effects from just a little alcohol for years, but I never recognized them in myself before.

This all-I-could-handle (normally) plane was an excellent test. Much more sensitive than walking a straight line. The lesson: We need all of our abilities in full measure to operate vehicles and some of our toys. Alcohol may sound like it ends in "all," and it may seem to leave us with "all" our senses, but it doesn't.

TYPOGRAPHICAL ERROR

In the September installment of MD&TS I have no idea how the "8882" got into page 105 at the upper corner of the ad with the black background. RPF = WCL x DL. Forget the numerical garbage.

CONTROL RODS

In October I pointed out the importance of using long arms on our servos to minimize the adverse effects of backlash, rod expansion, bending, etc. There is more along these lines I would share with you. Push rods need to be stiff or they need to be supported at intervals throughout their length. The longer the unsupported length of rod the stiffer it must be to prevent buckling and partial loss of control.

The flexible plastic push rods with plastic outer sheaths are convenient in certain applications, but they have their shortcomings. For one thing they must be supported at frequent intervals or the control will be very soft and imprecise. They also have more drag and more backlash than rigid control rods. In seaplanes, the flex

Continued on page 80

FIGURE 1—GOOD AND BAD PUSHROD INSTALLATIONS

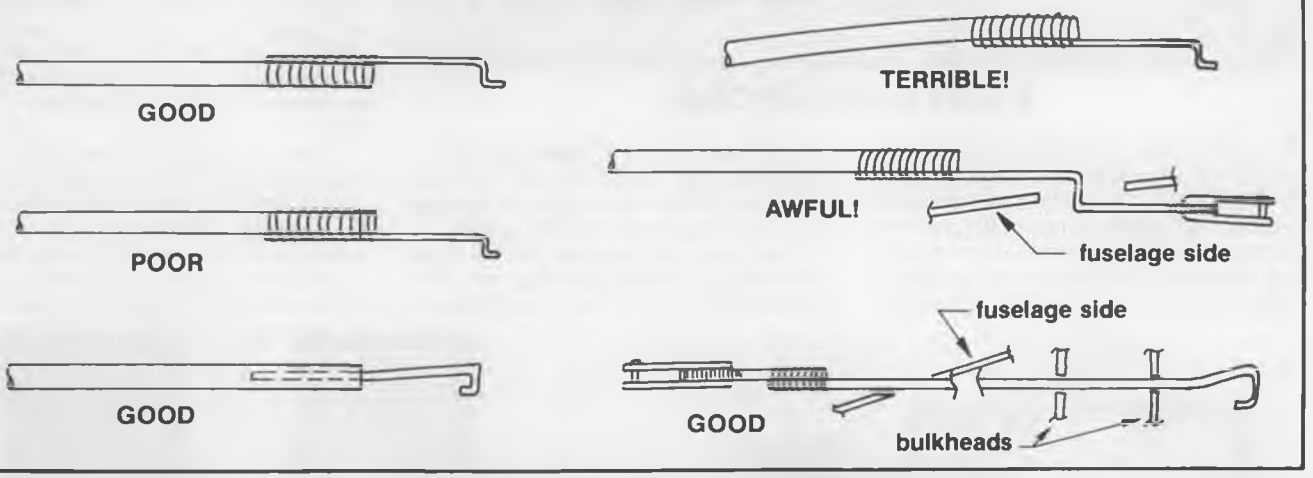
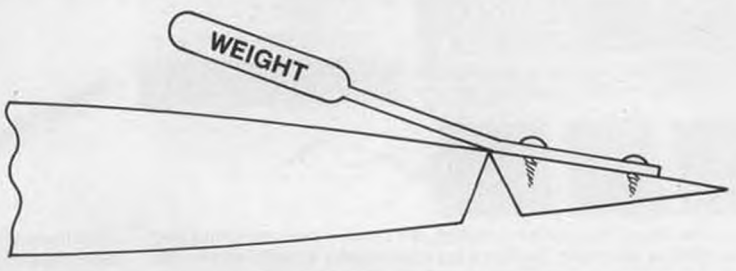
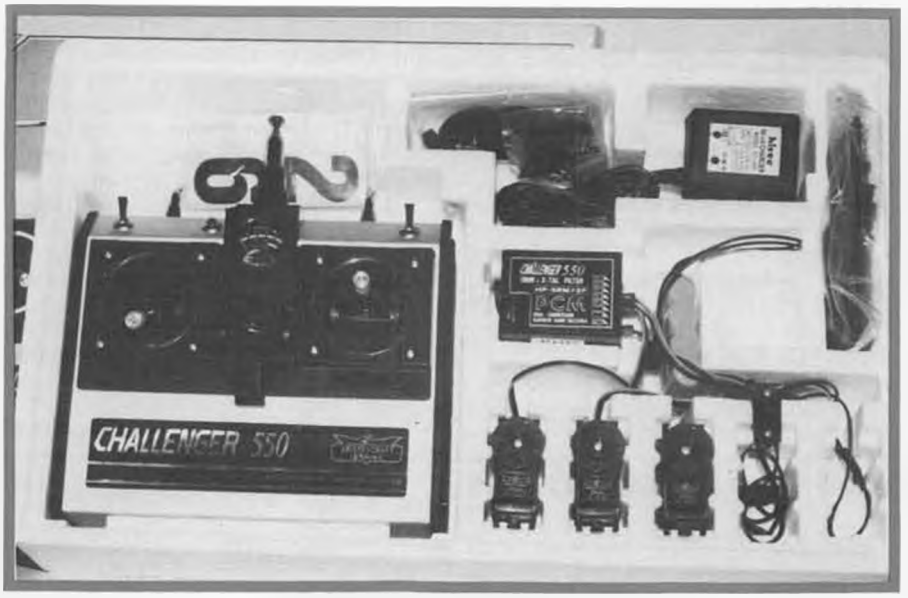


FIGURE 2—BALANCING CONTROL SURFACES TO PREVENT FLUTTER



Aristo-Craft/Polk's
HITEC CHALLENGER 550 R/C System



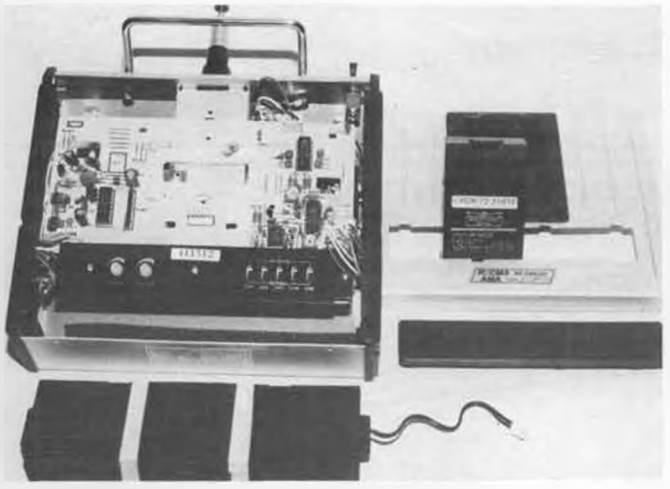
By STU RICHMOND

• Last Sunday at the R/C flying field a group of us formed the Central Florida R/C Think Tank . . . we brainstormed what we'd like to be able to buy in R/C systems. It's too bad the R/C manufacturers of the world weren't there listening! Integrated circuit technology, through high availability and lower pricing, is finding its way into our daily lives. These ICs are new high technology that are making some wonderful things happen in our R/C systems.

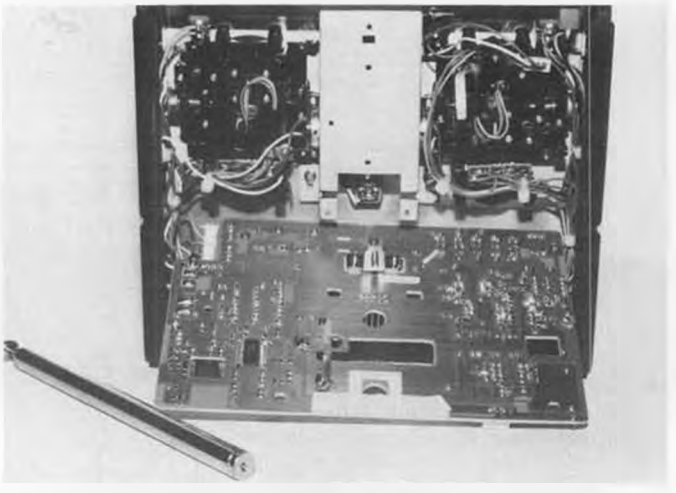
Our Think Tank agreed that the basic desirable R/C system should be either four or five channels, should use up-scale Sanyo cells of greater than 500 milliamp hour capacity and that all channels should have reversing switches. It was agreed that precise centering of servos was more important than diminutive (small or tiny) size. Although ICs can do much, it was agreed the basic radio should cost under $200 and all emphasis should be placed on high reliability of ICs and low piece count. We agreed the basic low-cost radio didn't need channel mixing, multiple rate switches, "V"-tail capability, and other whistling bells to be accepted by R/Cers. In this manner, a basic radio could be affordable and easily dedicated to one model for the model's flying lifetime . . . or to one boat in a similar manner.

Our group universally accepted that pulse code modulation (PCM) affords a strengthening of reliability in the radio link between the transmitter and receiver . . . and it should be in the basic radio. PCM adds little to manufacturing costs if it is designed from inception to be integral with the system. There are many other functions that can be had through ICs . . . but they were deemed not wanted in a basic R/C system. The Think Tank was divided on including a failsafe feature. The failsafe concept is not new . . . but recent generation radios with failsafe have fallen into disfavor locally in that it's felt that as the receiver goes into a failsafe mode (and fails to come out and return to proper functioning) that all you had was an advance notice that you were going to crash in the next few seconds. The user option of bypassing failsafe was thought to be very desirable . . . or maybe some electronic system was needed to quantify the need for failsafe. We all said "yes" to the absolute need of dual conversion modern receivers so our model's receiver saw better only the signal from our own transmitter . . . none other!

When we thought of advanced radios the inclusion of ICs was wild. We agreed that, probably to the manufacturer's complete dismay, the next most wanted features would use a single common cable coupling for battery management, transmitter-off servo driving, and a buddy-box



With the transmitter's rear cover removed, the relative non-crowding and low parts count is apparent. System uses high-quality integrated circuits from Motorola, Mitsubishi, etc. Nine-cell Tx battery in foreground.



The transmitter's printed circuit board removes similar to the old Kraft Sport Series to reveal adjustable spring stick tensioners. Assembly shows signs of much intricate hand assembly and soldering.

Challenger transmitter sports a functional, contemporary appearance. A unique feature is a variable hold electronic system that preceeds entry into user-programmed fail-safe.

battery management was much more popular!

At this point I brought out and showed the Think Tank this new HITEC 550 system and the rapid conversation went like this . . . (nobody had yet seen the 550) . . . "What's this . . . a silver Challenger 720?" . . . "What's it cost?" . . . "How's the failsafe work?" . . . "Hey, it's got PCM!" . . . "Does it come with the same lousy servos?" . . . "Hey, the case isn't all plastic" . . . "Do *you* set the failsafe?" . . . "Have you flown it yet?" . . . "Is it available now?" So let's take a close look at this Challenger 550 system made by Hitec for Aristo-Craft/Polk's . . . it's darn close to what the Central Florida R/C Think Tank decided a basic radio should be. It costs the same as the Hitec CHALLENGER 720 and also comes with three servos . . . additional servos are less than $15 each.

transmitter is changeable to Mode I (throttle on the right stick) at Polk's Service Center, there's heavy reliance on a small number of integrated circuits and this system has proven flawless in my flight tests.

TRANSMITTER

The stick assemblies use the proven single scissor mechanical stick centering with adjustable spring tensions. Dimensionally stable polycarbonate plastic is used for the centering parts except for one short steel shaft. Most other brands are still using all metal mechanics. All the Hitec trim adjusters are electrical . . . not mechanical . . . nice. Hooray! Although the Challenger 550's four trim controls are bigger and nicely ratcheted, the throttle ratchet itself is simply too non-positive for my personal feel. Most of us have the same complaint of all the Airtronics sets and the Futaba sets too. A few engineering hours must be

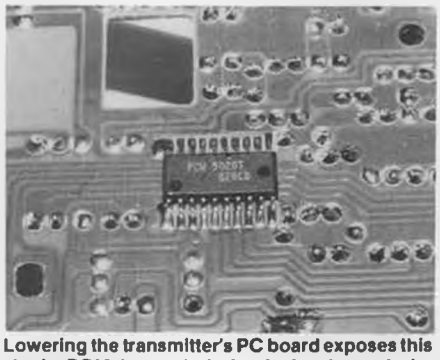
The Challenger 550 features a plug-in transmitter radio frequency (RF) module. The Hitec radios have been extensively field tested in Australia for over a year before entering the U.S. market.

The 550's receiver layout closely parallels the newest Airtronics super narrow band dual conversion receiver. All cables plug into one end—makes a neater package when wrapped in foam rubber.

to the beginner's basic radio! We also agreed better attention was needed for "on-off" switches, that only ten or twelve "clicks" of throttle were wanted, that a throttle "kill" switch was desirable. The upscale radios included end point adjustments, time-in-minutes read out as part of battery management and a multi-staged entry into the failsafe mode through monitoring in an IC. It was thought failsafe should be stored in a RAM IC. in the transmitter, without battery drain . . . and it should transmit to the receiver with "turn-on."

Basic and advanced systems were to have adjustable stick lengths and adjustable spring tensions on centering (without opening the transmitter case). Ted Noel, of the Think Tank, devised a simple way for both the basic and advanced radios, with the movement of an external lever, to be switched between Mode I and Mode II! This is brilliant; it would simplify inventory control; it could lead to an American resurgence of Mode I as so much of the rest of the world flies; it could even be done in flight!

All the multi-channel mixing and linking was reserved for the advanced radio . . . but it seems nobody wanted dual-rate switches due to their hazard potential . . .



Lowering the transmitter's PC board exposes this single PCM integrated circuit that is made by NEC just for Hitec.

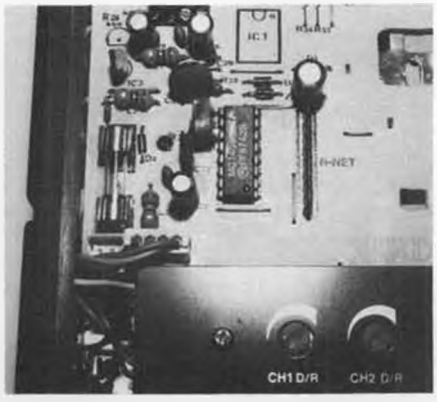
The letter from Lewis Polk that preceded the radio's arrival said . . . "We have just released our 5-channel P.C.M., and it's our best effort to date. The only missing ingredient is the new 422 servo . . . This new 422 servo has the best possible gear train and uses our own custom chip . . . we custom programmed our own P.C.M. chip as well. It's produced by NEC, but according to our programming." The set arrived with the questionable 402 servos and shortly thereafter the new 422 servos arrived, with a letter saying that henceforth the new top of the line 422 servos were being supplied with *all* Aristo-Craft aircraft radios. The

spent by all R/C manufacturers to supply variable tensioners for throttle stick movements. We don't necessarily need throttle ratchets . . . but we do need to be able to adjust the drag or force needed to keep our throttle stick in position . . . or to move the stick! If the foregoing were to be translated and FAXed to the Orient, we'll all gain.

Stick lengths are easily adjustable for customized feel. This transmitter shows extensive reliance on very few integrated circuits compared to other brands. This is a five channel PCM system, uses nine (not eight) Sanyo cells in the battery pack of 600 milliamp hour capacity, has reversing switches on all five channels (the fifth channel is a switch for retracts, flaps, or bomb drop) and weighs two pounds, three ounces. Elevator and aileron dual rates are built-in . . . I promptly dialed them out as accident prevention.

Totally unique to this transmitter and to Hitec's great credit is a further safety link in addition to user programmed failsafe . . . they have a variable hold system built into this transmitter that precedes entry into failsafe. This pair of controls appear to be, as selling features, far more important than transmitter "feel" or bells 'n whistles and other marketing gimmicks. I suspect other

manufacturers will soon copy the variable hold which the manual describes as follows: "If the interference is short (less than 0.8 second) which is 99% of the case, the servos will be on hold which is the last servo position before interference was detected. Although this is a very short period, the servos will not move according to your stick movements. It will hold just



A one-amp standard fuse in the transmitter provides charging protection. Note the Motorola IC in the center of the photo. PC board has each hole coded for assembly.

for the duration of the interference and up to 0.8 second. The user will not be able to sense this hold." (This means that if the interference is, in duration, from instantaneous to as long a variation as 8/10ths of a second, the smarts of the IC won't allow the servos to follow this wrong information.) "This may be the one feature that you will find most remarkable. The only trouble is that you will most likely never know it has this extraordinary feature because it works so subtly."

If the interference persists over 8/10ths of a second the system then enters whatever positions you elect and set by pushing the "failsafe" button to the left of the ESV battery meter . . . after 8/10ths of a second the failsafe takes over your model until interference is gone. Then normal control resumes.

If transmitter voltage drops too low a sensing system drops the throttle servo to full low and it stays there for you to notice. Then if you pull the throttle stick to full low and advance it . . . the throttle *will* advance and you can safely return for a landing.

The failsafe settings are kept in the transmitter . . . every time you turn on the transmitter the *first* thing the receiver gets and records is the failsafe data. Failsafe settings stay alive in the transmitter . . . even when the power is shut off.

RECEIVER

The receiver continuously monitors its airborne battery and another unique feature is if voltage drops dangerously the failsafe positions are assumed which in-

View of the transmitter's backside shows the removable RF module, and the cover over the servo reversing switches and dual rate controls. System comes with the gold RF sticker already attached.

cludes low throttle. You'll see and probably hear the model go to low throttle. By moving the throttle stick to idle and back up, you gain (through an ingenious computer technology power boosting system) airborne voltage sufficient to get you back to the runway and down safely. The manual says the airborne circuitry will work with voltages from 7.0 VDC down to 2.5 VDC through this boosting feature. Ingenious and smart! The receiver is built on three printed circuit boards and assembles and looks much like a top of the line Airtronics/Sanwa unit. All soldering appears hand done, and the assembled receiver is a hand made work of art without the labor-saving wave soldering, which is sure to soon come.

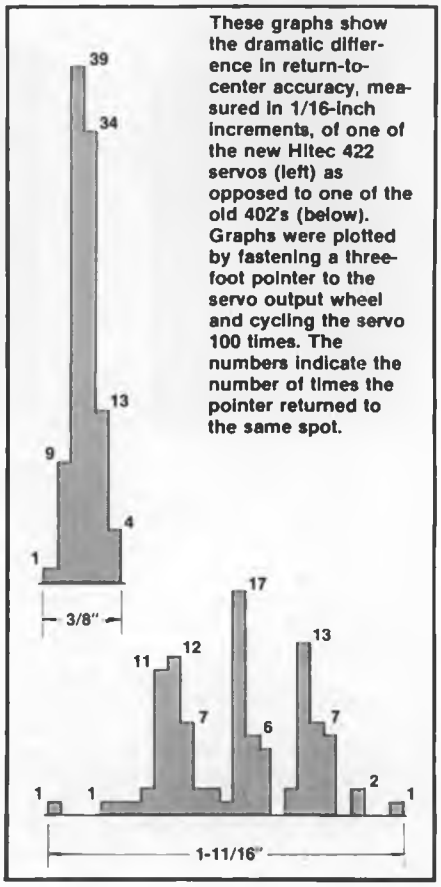
CONNECTORS

These 422 servos are second generation and the plugs also fit Futaba and JR connectors. Earlier servos had a white Molex connector unseen in the U.S. The white connectors are used internally to unplug all cables from the transmitter's printed circuit board. The Hitec 550 appears to be third generation production. One of the very first Hitec sets was used, in Australia, to fly an ultra-light aircraft . . . a nice bit of publicity during its initial field testing.

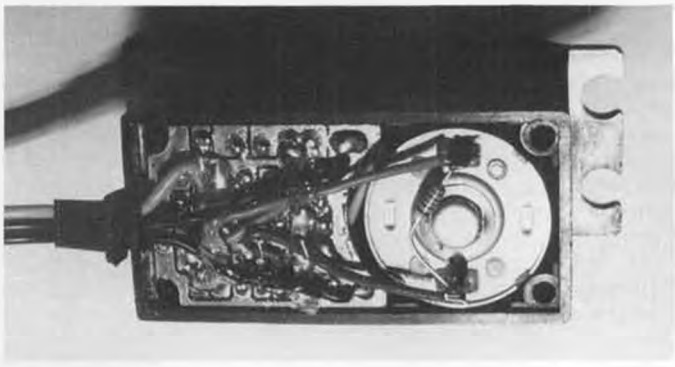
MISCELLANEOUS

The transmitter has three PC boards . . . two are punched out of the center of the big one like wing ribs from a die-cut sheet of balsa. Each hole in all the PC boards has a letter/number code for assembly. Transmitter voltage is protected by a safety diode and there's an internal one-amp fuse for overcharge protection too. The system has sufficient battery capacity for at least two hours of continuous flying before warnings occur. Frequency changing is easy with a module change in the Tx and a crystal change in the Rx. There is no surface mount technology (SMT) evident yet. The custom PCM IC can't be seen by opening the transmitter, as it is mounted on the forward side of the major PC board. The Tx module gets warm due to heat from the Motorola output transistor. The system

Continued on page 108



These graphs show the dramatic difference in return-to-center accuracy, measured in 1/16-inch increments, of one of the new Hitec 422 servos (left) as opposed to one of the old 402's (below). Graphs were plotted by fastening a three-foot pointer to the servo output wheel and cycling the servo 100 times. The numbers indicate the number of times the pointer returned to the same spot.



The Hitec 422 servos are almost identical to the final generation of Kraft servos. The old, first generation Hitec 402 servos performed so badly that Stu says they should be avoided for aircraft use.

The excellent Hitec 422 servo (right) sports very similar gearing to the Airtronics 94102 servo on the left, but uses a steel/oilite bushing at the output shaft. The yet-to-be released 425 servo will feature dual ball bearings. The 422's go for $15 each.

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CHALLENGER 455/456
A Breakthrough in 4-Channel Price and Technology

The best in ergonomically designed transmitters, it fits in your hand like a fine camera. Folding antenna, side straps, finger grips, servo reversing, dual rate, fail safe.

455 PCM	2 servos	ARI02-455	$124.95
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A do-everything system for those seeking the latest PCM technology. Equipped with servo reverse, dual rate and user programmable fail-safe system, the 550 is known for long range, smooth instant response and glitch-free signals. Comes with three servos, receiver and Ni-Cd battery pack. ARI02550 $219.95

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7 Channels, dual rate, channel mixing, servo reverse, quick change transmitter frequency module, dual conversion crystal filter receiver, you name it, the 720 has it. With three servos, Ni-Cd pack and receiver. ARI0720+ $219.95

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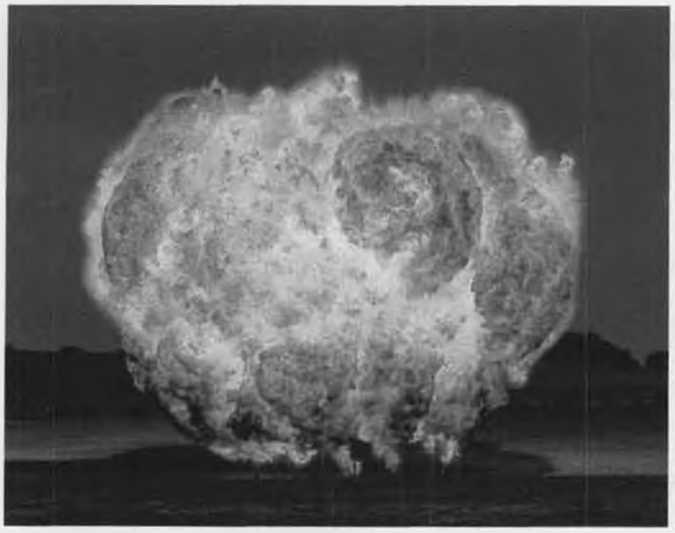
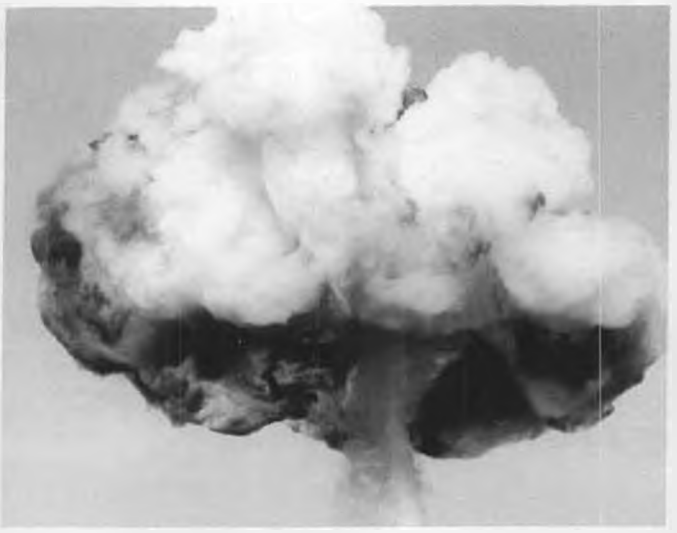


One-fifth scale (!) atomic bomb blast was so bright, Al's camera lens blinked to small opening, underexposing mid-day brightness.



See? Lens is now open, and sky exposure is back to normal. Hollywood could learn a few tricks from the Byron gang!

BYRON STRIKES AGAIN!

By AL TUTTLE . . . The 1989 Byron Originals Third Annual Aviation Expo and Sixth Annual "Striking Back Show" went off with an appropriate big bang.

• This was the third year for Aviation Expo and the sixth for the Striking Back Show. Each year Byron manages to come up with something different to please the modelers and visitors. Would you believe a 1/5th-scale B-29 dropping a 1/5-scale atom bomb? This was the frosting on the cake at the end of each striking back show. The resulting explosion was indescribable and like the rest of the striking back show, you had to have been there to appreciate it, as words cannot do it justice.

Aviation Expo is truly an international event, with visitors and modelers present from several countries. The largest was a group of fifty-five people from the United Kingdom, all of whom appeared to be having a good time. John Chadd, Ross Woodcock, and his lovely wife Margaret, from New South Wales, Australia, graced us with their presence. John was one of the two modelers who were instrumental in having Byron Originals participate as an official event in Australia's 200th anniver-

The huge B-29 takes off on one of its last missions. Went into failsafe . . . and ground, on Saturday. How about a "black box" for models!

The B-29 surveys the damage after dropping "atom bomb." Hmmm, maybe the groundhogs struck back . . . got tired getting pasted by the '29!

Steve Gooseman, Ace R/C, fires up Byron Christen Husky as Bud Atkinson holds on. New Byron Ryan ST-A in background.

From left, Ken Bryan, Australians John Chadd and Ross Woodstock, and Ken Bundt, provide size comparison of huge, ill-fated B-29.

Bob Hess, Line Chief, Omaha, Nebraska views trio of Don Niel's creations; one-third scale Gee Bee Z, Folkerts Speed King, and Davis D-1.

Byron's new one-fifth scale B-17, powered by four 4.2 Sachs Dolmers. Will be ready to go for 1990 Aviation Expo.

A closer look at Ron Niel and his Folkerts. Span 5 ft., length 7 ft., weighs 20 lbs., Sachs 3.2 with 20x6-10 prop, enamel finish.

Lynn Jorgensen, Panora, IA, Byron team, Byron P-51, Sachs 4.2, markings of Gen. Reg Urschler's "Gunfighter II." Beautiful!

sary air show held at Richmond Royal Australian Airforce Base, just outside Sydney, last October. John and his family hosted Ken Bundt, Ken Bryan, and myself, during our stay in Australia and I don't think they have recovered yet, particularly his wife Sue, who put up with a lot from us Yanks for ten days. Ross Woodcock is Australia's premier scale modeler, and has represented his country at the world championships in the past. Ross and Margaret are just some of the Aussies who made us feel at home during our brief visit. It was quite an honor to have Ross as my spotter/caller during the Striking Back shows. Ross was able to position me onto the tails of the Zeros every time, and lined me up perfectly for the strafing runs. Once again Ross, many thanks.

The full-scale air show continues to grow a bit each year. Wednesday, Thursday, and Friday, the air show consisted of the Dorsey-Montgomery wing walking act, Team America flying three Italian SIAI Marchetti F-260 piston powered aircraft, the Pepsi Sky Dancer, a highly modified deHavilland Chipmunk, flown by Steve Oliver. Steve performed a bit of skywriting each of these days. Bill Beardsley also performed with his Bud Light Micro Jet. On Saturday and Sunday, we were entertained by Julie Clark and her MOPAR Beechcraft T-34 Mentor. And, of course, the show wouldn't be complete without the superb aerobatics of the Eagles Aerobatic Flight Team.

An additional surprise was a "sneak attack" by six Japanese Dive Bombers and Torpedo Bombers which proceeded to bomb and strafe the Striking Back set. We didn't have to worry though; General Regis F.A. Urschler scrambled his P-51 Gunfighter II and shot down every one of those cowardly rascals!

Sixty exhibitors showed their wares and were kept busy all throughout the five-day show. This was a wonderful opportunity for the modeler to stock up on needed goodies plus purchase large ticket items. A pleasant surprise was to see Quadra represented. We had heard that Quadra had gone into receivership and closed its doors. Klause Nowak told me that he and a partner have bought Quadra. Klause was there with his line of engines and was kept busy answering questions and taking orders. He should be advertising in the mags by the

New B-25 replaces one destroyed in last year's mid-air. Two-tone blue, white underside. Flown by Ken Bundt.

Ken Bryan, Ida Grove, trundles his C-47 into position for Striking Back operation. Note transmitters riding on stabilizer.

Jeannie and Joe Bridi attend their booth in the manufacturers' tent. One of sixty exhibitors on hand for Aviation Expo.

Mike Pratt chows down while Hazel Sig-Hester does the twist. She knows how to enjoy life . . . and makes great fudge!

Carl Spurlock, Des Moines, IA with his Byron F-20. OS-77 power, K&B paint, 14 pounds. A long, lean, mean machine!

Bob Violett winds up his Aggressor II while Dave Ribbe holds on. We've come a long way from escapements and rudder-only!

time you read this, so if you have been wanting a Quadra, they should be available once again.

There were 255 pilots registered with a total of 835 flights logged during the five-day period from August 9 through 14. As in the past, flight time between the prop driven planes and ducted fans was ratioed according to the number of entries in these two categories.

There were very few crashes. None of which, to my knowledge, were caused by radio interference. Of the two crashes that I witnessed; one was an engine failure and when the pilot tried to turn back to the field he stalled the airplane. The other pilot flat flew into the Striking Back set!

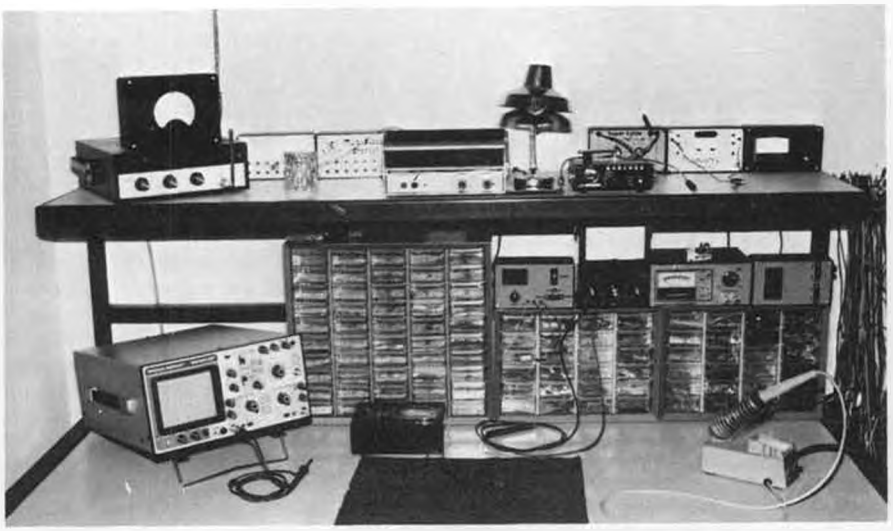
During Expo '88 there were an inordinate number of crashes, most of which were blamed on interference. Because of this, word got around that to fly at the Byron Aviation Expo was to unnecessarily risk your airplane. This was pure rubbish! The temperatures experienced in '88 were 100°F+. With the outside air temp being in excess of 100°F, what was the temperature inside the models that had been heat soaking in the sun for many hours? The inside air temp on some models was such that some of those planes that utilized pneumatic retractable landing gears were experiencing aneurysms in the air lines, causing the lines to burst while setting on the ground. The high temperatures also caused epoxy adhesives to become tacky! That is some heat! I believe that most radio gear is designed to operate in the temperature range of 0°F to 140°F. While the airplane Rx is soaking up the heat in the sun, the Tx is being kept relatively cool in the shade in the impound area. With this condition, has the Rx crystal drifted out of tolerance, causing a range problem? Could the high temperature in the Rx result in a thermal runaway with one of the ICs, causing the commands to become scrambled, resulting in the loss of control? I was monitoring the frequency during two of the interference-blamed crashes and in both cases, the only RF on the channel was that of the flier. Temperatures at this year's Expo were not nearly as extreme as last year, and as previously mentioned, there were very few crashes. Byron's computerized flight line control setup is very efficient and is designed to minimize 3IM between the fliers. This is the same system as used in '88.

Once again, ACE R/C's Paul Holsten,

Continued on page 70

The Byron Originals headquarters tent is always a popular spot. "I'll meet you at 4:30 under the F4U Corsair. Be there!"

Ed "Twelve-Twenty" Izzo with his fine flying Byron F6F, as painted for target towing, NAS Johnsville, PA. Sachs 4.2, 28-1/2 lbs., JR radio.



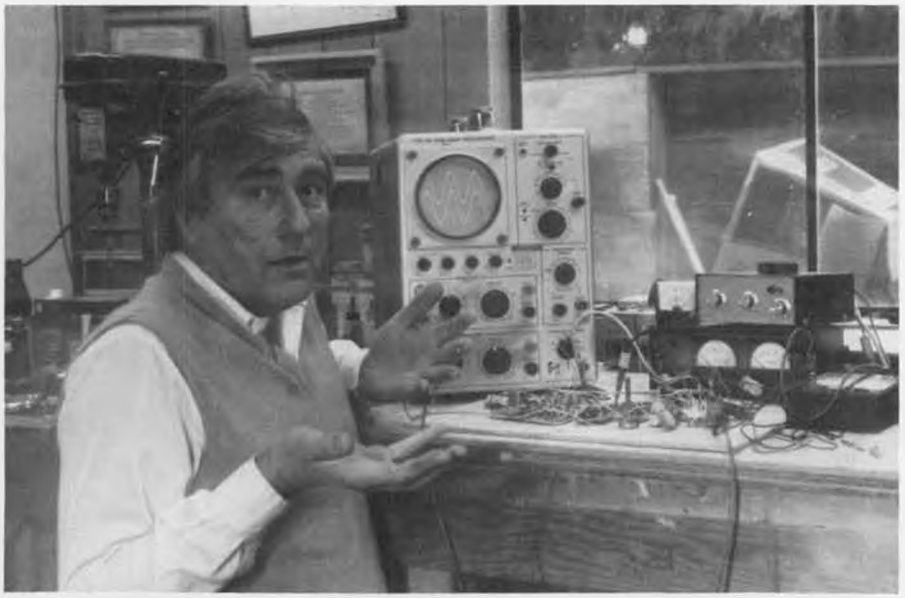
Electronics Corner

By ELOY MAREZ

• WEE R/C has not seen a lot of action here in the pages of EC the last few months. Not necessarily for a lack of interest, I can assure you, it is just that nothing worth sharing has come my way for a while. However, that just changed . . . at least where some of you are concerned . . . I have in my hot little hand a schematic diagram for the Mattel pulse transmitter. As I have had requests for this in the past, I know that there are some of you out there who need this information, and it is yours for the usual SASE to 311 Mesa Dr. #10, Costa Mesa, CA 92627.

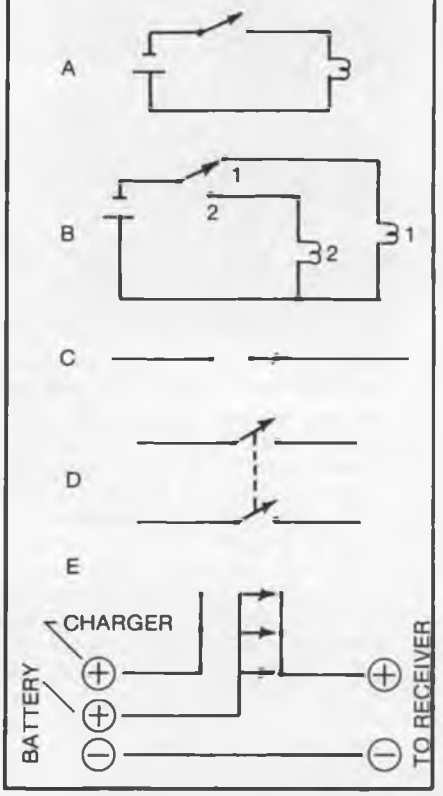
The basic Mattel transmitter is normal for that era in that it resulted in a type of proportional control by varying the width of the pulse. Additional control was sometimes obtained by also varying the pulse rate, and the schematic on hand includes a simple modification for a rate adjust. The schematic includes resistor and capacitor component values, but it does not include transistor identification, which would be a nice thing to know. If any of you Mattel owners can send along such info, I'll try to cross reference it to current or readily available types. Until more specific replacement information comes along, any of you who are trying to get one of these units working should remember that except for RF circuits, most general purpose transistors will substitute one for another, requiring only a PNP replacement for a PNP; NPN for NPN. With RF transistors. However, gain, frequency, impedances, and a number of other parameters have to be met, and it is always best to go with the original or a recommended replacement than to just pop in one of the same polarity.

Though the Mattel unit was intended more for the toy market than for the dedicated R/C hobbyist, it was one of the latest commercial pulse systems to be manufactured and is probably pretty much "state of the art" for that particular era. Again, if you can use one, your Mattel pulse transmitter schematic awaits only a SASE to be enroute to you. From past experience with similar circuits though, I find it necessary to mention that this is information regarding a unit that was commercially manufactured at one time, and does not include enough data and instructions from which to build a pulse transmitter.



Our columnist says he's had criticism about his squeaky clean workbench in the photo at the top of the page. Here, spark ignition expert Floyd Carter shows what a busy workbench should look like.

Eloy's discussion this month centers on switches; the different types, how they work, and the meanings behind the descriptive abbreviations such as "3PDT" and "SPST." Shown below are examples of how various switches are shown in schematic diagrams—explanations in text.



ANOTHER WEE R/C ITEM has arrived . . . in answer to my discussion in the September column about Shape Memory Alloys. The writer of this one is Bud Clauer; we'll let him tell it:

"Your September offering regarding in part information about Shape Memory Alloys (SMA) prompts me to tell you of a friend and club member of FLY RC, Danbury, Connecticut.

"Russ Pribanic is one of those innovative people in our hobby; currently working on a ducted fan Harrier. He is an inspiration to many with the devices that he handcrafts. For our club indoor contest each

Continued on page 86

PLUG SPARKS

By JOHN POND

• On April 5, 1920, a son was born to the newly arrived immigrants from Sicily, Vincent and Rose Taibi. The son's name was Salvatore Taibi from which has evolved the modeler's household name, Sal Taibi.

In the early days, Sal had a pretty good temper, leading to misunderstandings with his parents and teachers at school. After moving numerous times, the family finally purchased a home in Brooklyn. In 1930, Sal's father broke down from nervous tension and was unable to work. Although only ten, Sal took on the job of a breadwinner contributing to the family of six.

The first job at the bakery allowed him to take home a dozen doughnuts which eventually led to his being overweight. Surprisingly, Sal was not particularly interested in model airplanes, although his pal, Louis Canava was. As fate would have it, one of Louis' models was sat on; completely discouraged, Louis gave everything to Sal. This became his main interest to the point where he dropped out of school to take a job at a downtown furrier manufacturing firm. For 48 hours of work, he earned the magnificent sum of 12 dollars a week.

Sal was introduced to T.A.M.B.E. by Leon Shulman. In 1936, Taibi finally started to compete, and on February 12, 1937, won his first contest. In 1939, Sal learned to cut wood at Bill Effinger's Berkeley Models Shop.

In 1939, at the age of 19, Sal hit the jackpot with his Powerhouse design. The biggest shot in the arm was the write-up of the Lake Hopcatong hydro meet where his Powerhouse and floats easily distanced the other competitors.

Charles Grant, editor of *Model Airplane News*, became interested in Sal's models, publishing the Powerhouse in September 1939 followed by the Hornet, Pacer C, and Pacer B planes, the last two being kitted by Bay Ridge Models and the follow-on, Consolidated Models.

The war in Europe opened the employment gates for Sal as the National Advisory Committee for Aeronautics (NACA) at Langley Field, Virginia, opened up 500 jobs for "Under Aircraft Model Builders." One of the requirements was that the applicant have one year's modeling experience and had won at least one competition.

No sweat! Or maybe that is the wrong connotation as Sal was found to be seventy pounds overweight and had to go on an immediate diet. Photos of Sal with his winning models generally found him wearing a sweatshirt. It took perseverance but Sal made it. (A good shot can be found in August, 1942 issue of *Air Trails*.)

Sal had only been employed three months when the Pearl Harbor bombing brought the war to the USA. NACA then went from a casual research to an all out military effort in design, flight proofing and modifications. This led to Sal's appointment as an apprentice machinist, a trade he kept all the rest of his career.

At Langley, to save their research personnel, Langley put all draftable men in the Army Reserve. Langley became a hot pot of modeling which has continued to the present day.

One of his modeling friends, Frank Vollrath, just married in 1943, invited his sister, Nathalie Mary Snavely for a visit. The thunderbolt struck and Sal married Nan after a whirlwind courtship. While living in Copeland Park, Virginia, the Army began to call up the reserves in April, 1945.

After basic training, Germany surrendered and Sal was sent to Lowrey Field in Denver as a B-29 Turret mechanic. His wife joined him in Denver, took a job, and the Taibi's managed to live comfortably off base. Sal regards this time period as a second honeymoon.

When the Japanese ran up the white

1. Sal Taibi (left), our featured Modeler of the Month, exchanges notes with John Pond about the Starduster, Sal's most successful design.

2. Sal's five-foot Powerhouse has been virtually unbeatable in F/F 1/2A Texaco contests for the past couple of years.

3 (right). Not old enough to qualify as an Old Timer but still an interesting design, is the "Connecticut Yankee" by Henry Struck. The Ohlsson .60 powered version shown here is the work of George Armstead.

4. Two F/F beauties, a So-Long and Zipper as built by master craftsman Hale Wallace. Photo was taken at the big SAM 57 bash at Lawrenceville All American Airport.

flag, Sal was assigned to occupation forces in Germany, finally ending up at Landsburg AFB. This was a rather lonesome period and Sal now realizes what the Statue of Liberty means when he came back to be discharged at Chicago.

From there, he settled in Indianapolis, his wife's hometown, and obtained a job at the U.S. Naval Ordinance Plant. This lasted for five years until he was accepted for employment at the Naval Ordinance Test Center at Pasadena, California.

Upon moving to Lakewood in 1951, Sal found he had flying fields across the street where his home was located. Those were great days until the area was completely built up with homes.

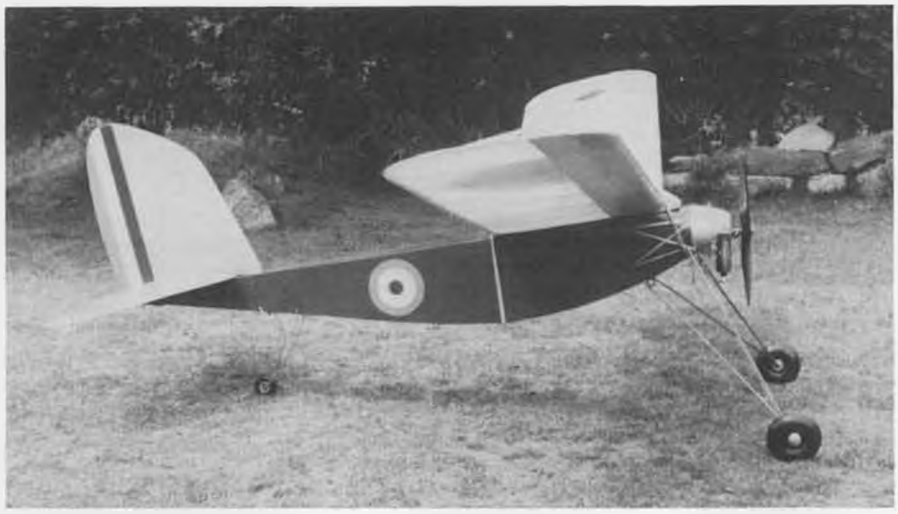
Making many friends at the time, Sal met Bill Baker who had a kit manufacturing business. This led to the design of the Spacer, as distributed by California Models. Sal indicates this was his most successful model netting him over a thousand dollars in royalties.

In 1958, Sal designed the most successful of all his models, the Starduster. This was so successful that a company was formed consisting of Ray Van de Walker, Curt Stevens, and Sal Taibi, known as Competition Models.

This columnist himself was able to obtain an early Starduster plan from Sal and for the next two to three years, ruled the roost in Class C at the NCFFC meets at Sacramento. Eventually, the advent of kits broke the string. This accounts for Photo No. 1 showing Taibi and Pond exchanging notes about Sal's Powerhouse; eighteen years later and the design is still going strong!

Just to prove his old popular design, the Powerhouse, was an excellent flyer, Sal reduced the design to 1/2A F/F Texaco size with the remarkable results that he has been practically unbeatable. Photo No. 2 shows Sal cranking up his model at El Dorado Dry Lake outside of Las Vegas.

Retiring from government work in 1970, Sal devoted much of his time to the SAM Old Timer movement, becoming president in 1984. The Competition Model Co. broke up in 1978 from which Sal founded his own wood-cutting company known as Premier Balsa. This is not to be confused with his son, Mike, as his business is known as Superior Aircraft materials. Sal sometimes comes over to maintain the machinery just to keep his hand in.



In retrospect, what a marvelous modeling life Sal has enjoyed. All modelers have been enriched by Sal's designs and his modeling activities. They don't come much better than the "Old Paisan!"

ENGINE OF THE MONTH

This month's engine is another rare engine lent to this writer for a drawing subject by Bill Thompson of San Diego. In addition to conversations with Bill, the article written by Thompson for the Model Engine Collectors Journal forms the basis of information presented herein.

The Ace Twin engine was the brainchild of John Kramer, who developed the idea of a twin-cylinder engine during the latter portion of World War II. Late in 1945, John had formulated the first prototype twin ball bearings model, later changed to bronze bearing in the rear crankcase.

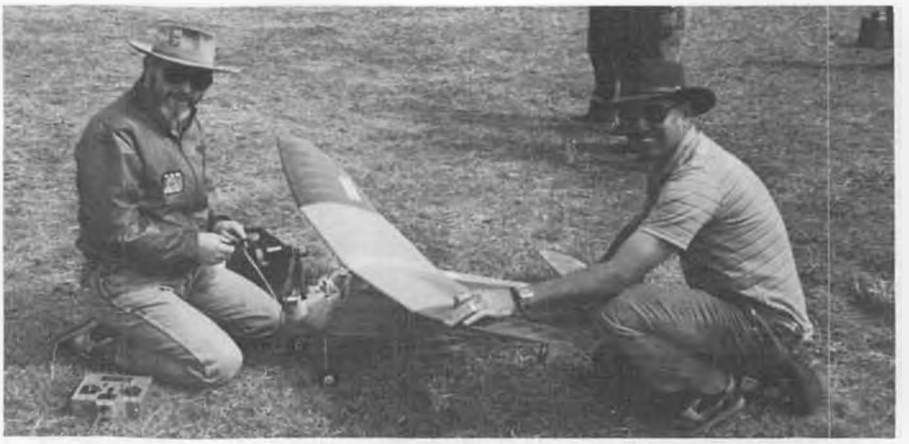
5. Violet Linden displays a "Cirrus," a 1937 Swedish rubber design built by her husband, Sven-Olov, for a one-design meet held in Sweden earlier this year.

6 (left). This is what we'd like to see more of in the Old Timer movement—models built purely for sport rather than for competition flying. England's Tony Penhall certainly wasn't thinking of competition when he built this 1935 Brooks "Skyrocket" replica with Brown Jr. power. Not a pretty design—in fact it's downright *horrible*—but it sure looks like fun!

Fuel draw for twins has always been the big bugaboo as the front cylinder will invariably run lean while the rear cylinder runs rich. John reasoned he would utilize the Evenride "Speedi-Twin" system of 1928. This did run well, but the problems of close tolerances presented financial problems; the finer your tolerances, the more

7. A Harold Coovert Berryloid Winner took 2nd place in Duration for John Sims of Dalby, Australia, at the 40th MAAA Nats. Appears to be equipped with lights for night flying. John French photo.

8 (right). John Quigley about to fire up the McCoy .60 in his Megow Super Quaker, ably assisted by John Borrill. Scene was the 1989 Australian SAM Champs at Canowindra.



expensive the product.

Deciding this type of engine was too expensive to produce in quantity, a so-called prototype second model was tried with a new shaft and rear venturi. Stroke for all models was .687 inch, while the bore was increased from .755 to .770 inch. This revised model ran well but still suffered from the lean-hot cylinder combination.

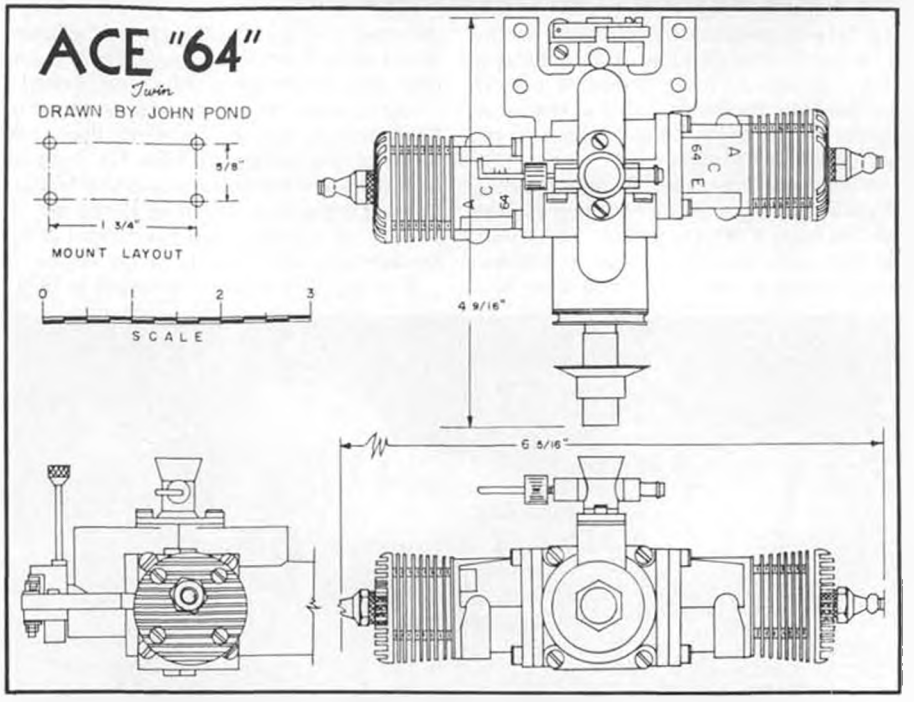
In March, 1946, John Kramer formed a partnership with Samuel E. Grow and took on all sorts of machining jobs. However, it didn't take long for Kramer to realize his latest engine. The production of Ace Twins started in June, 1947.

This production model looked much the same as the first prototype except it now sported a single rear intake with Super Cyclone parts being employed for the timer arrangement. Unfortunately, the problem of fuel feed to both cylinders still remained causing a major crisis. The engine could not be marketed with this deficiency.

Kramer experimented with several ideas and finally hit on the thought of connecting the two intake holes with a series of pipes to a box joint. The needle valve and intake tube, located in the center, now fed fuel to each end of the crankcase. Both cylinders now ran at the desired temperatures.

In December, 1947, the first batch of 50 engines were delivered to Western Model Distributors (offices in Los Angeles and Oakland). Kramer and Grow were informed by the company heads, Baliban and Kapitanoff, that they could sell all produced.

Elated by this turn of affairs, Kramer and Grow delivered another fifty engines in June, 1948. To their consternation, they were informed the sales of Ace Twin engines had not been realized. Based on this, Western Distributors could not accept another 50 engines. This about sounded the death knell of this small company, as the engines at the sale price of $50.00 represented a considerable amount of cash in those days.



As a result, the balance of the engines were sold at the Hillcrest Hobby Shop in San Diego operated by Bill Scott. Eventually all engines were disposed of, but by this time the Kramer-Grow Company had dissolved. Numerous reasons have been advanced for the lack of sales of this good running twin cylinder engine, but the main one appears to be as follows:

1. Glow plug: Again, the same problem; no one wanted ignition operated engines when the glow plug made things so simple.
2. In addition, small engines were now the rage as the glow plug made them so practical.
3. The price of $49.50 was a little too

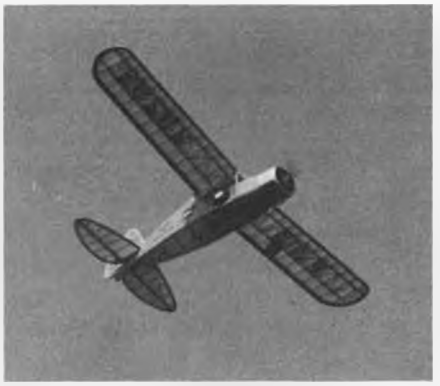
9. A group of real Australian old timers at the 40th MAAA Nats, from left: Gordon Burford, Bruce Abell, Jack Dunkerton, John Pond, and Jack Wass. Photo taken by Arthur Gorrie.

10. Bill Bell gets a good launch on his Brown Jr. powered Trenton Terror. Site is the CAAMA field in Culpepper, Virginia. Tom Schmitt photo.

steep for the average modeler. No question, the Ace Twin could have been run on glow fuel but it was too late to convert.

4. Probably the most important fact leading to the demise of this engine was the lack of advertising. To this day, there are many modelers who do not know of this precision-made engine. Truly a shame the engine failed to catch on.

For those interested in the technical description, the bore of .687 and stroke of .770 gave a combined displacement of .64 cubic inches. Crankcases were die cast aluminum with machined steel cylinders, a three-piece steel crankshaft running on bronze bearing. The needle valve was a Hornet type and timer assembly developed from Super Cyclone parts.



11. Not many Dennyplanes being built these days. This R/C version by Hurst Bowers was flown at the CAAMA fun-fly held earlier this year.

responsible for my meeting Ben Shereshaw. (Cliff died in the late sixties.) In those early days, Cliff built a Shereshaw model and took it to a big model affair at Hadley Field in New Jersey.

"I believe the model was a one of a kind type with a ten-foot wingspan powered with a Forster 99 engine. The model was silk covered. We actually doped the model on the way to the contest. (Editor's note: You haven't lived until you dope a model in a car with the windows closed to keep the inside warm!)

"Having stayed up all night, the model, of course, was untested. We made one flight consisting of the three shortest loops on record. Later, we found there was too much positive incidence in the wing.

12. In the foreground is another rare Old Timer, a Henry Struck "Record Hound" as built for R/C and Super Cyke power by Howard Osegueda, an expert builder and spark plug of the SAM 00 group. Also seen are a Saito-powered Bomber on floats, a Bombshell with an Elfin diesel, and an Ohlsson-powered Bay Ridge Topper.

13. Jack Finn built his first Clipper 50 years ago and has just finished his second, a Mk. II version for R/C. Beautiful silk job!

As best as can be determined from reports by John Kramer, the Ace Twin ran at 9,500 rpm using a 12-6 prop and ran up to 15,000 rpm with a 9-8 speed prop. When equipped with an intake throttle, the engine speed dropped to a smooth 2,700 rpm.

It is interesting to note that Kramer did quite a bit of engine subcontractor work, producing parts for the Edco Sky Devil engine. History repeated itself again when Randy Linsalato machined pistons for Terry Toups in his revival of the Edco engine.

Before closing down completely, the Kramer-Grow Co. (being gluttons for losing money) also produced excellent die cast pistons for the Dooling engine. A last gasp engine, the Ace 45, a single-cylinder ignition engine was developed, but only enough castings for four engines.

FIFTY YEARS AGO, I WAS . . .

Joseph Karpowich, 216 Mahwah Road, Mahwah, New Jersey 07430 writes to comment on the flying experiences of Art Beckington, P-51 pilot shot down in Japan.

Joe says he was a sheetmetal mechanic in the 81st Air Service Group. A portion known as the 382nd Air Squadron was stationed on Airfield #3 on the north end.

"I can remember the planes taking off for Japan and how let down we would feel if the aircraft started arriving in 4 to 6 hours. This meant an aborted mission as the complete mission was seven hours.

"As a sheetmetal mechanic, I patched more than one bullet hole in P-51 planes but eventually was assigned to install IFF equipment.

"I have been in and out of modeling since the middle thirties due to business, war, raising a family of six kids, and making money.

"Back in the late thirties, I met Ben Shereshaw, who redesigned the Cumulus design for me. Being the only one to have the rough drawings, I built the fuselage. In those depression days, it didn't take long to run out of money. Finally gave it away.

"Cliff Johnson, a Royal Navy Officer, was

When corrected, the model flew well. Natch, after the contest!"

LAWRENCEVILLE REVISITED

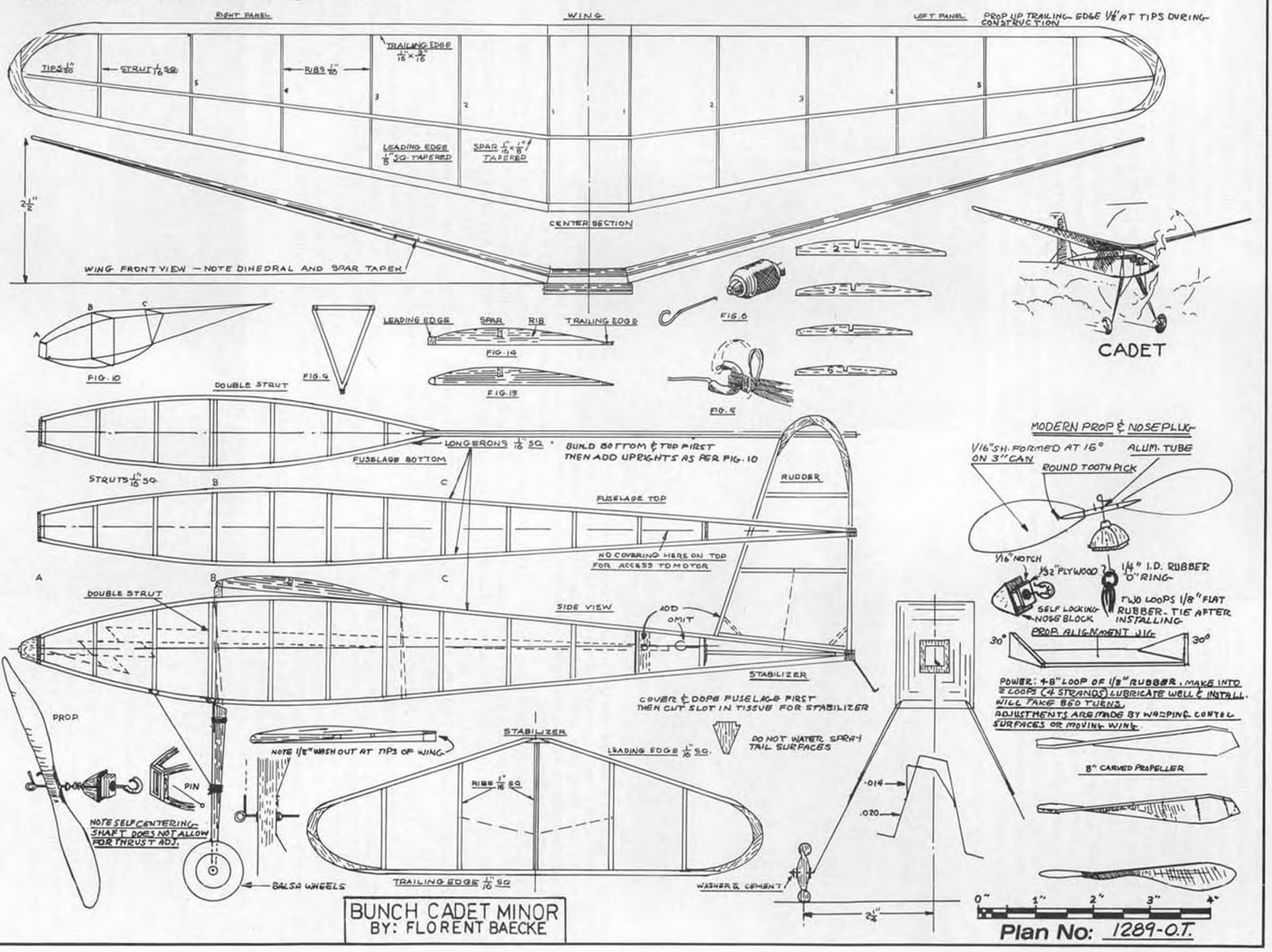
While this columnist was running around shooting a myriad of pictures (with no film!), he ran across George Armstead of Glastonbury, Connecticut, who topped this writer when he was remarking on how he redrew the Henry Struck "Connecticut Yankee" to full size.

When Henry Struck submitted this postwar design to *Air Trails*, they reduced the plan to Bantam engine size. The tip off is

Continued on page 75

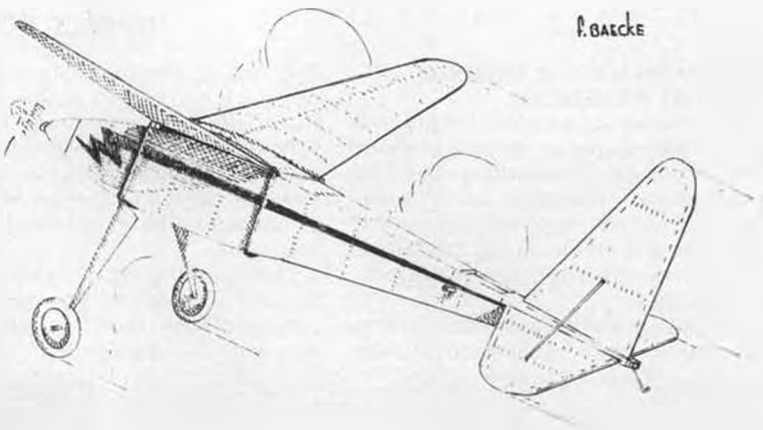
14. A neat Scientific "Flea" as built by Don Lefferts. Original was a rubber ship with a "motor noise" ratchet device, but Don built his with an O.K. CO_2 motor. Anyone interested in a CO_2 O.T. event?

MODEL BUILDER magazine
806 West 18th St., Newport Beach, California 92663



OLD TIMER
Model of the Month

Bunch CADET MINOR



Plan and Text by FLORENT BAECKE

• Prior to World War II there was a Duncan Field and a Kelly Field. All that separated them was a road called the Frio City road. The fields each had a north and south runway. They met at Frio City road. Only the road and two shallow drainage areas separated them. There was no fence around either field. When an airplane at Kelly Field needed depot maintenance it was either towed or taxied from one field to the other across the public road. The bombing of Pearl Harbor ended all of this openness. The two bases were combined shortly after that and renamed Kelly Field.

Before Pearl Harbor, model builders were permitted to park at the end of the Kelly Field runway and fly their models off of the runway. I remember a major contest being held there. If an airplane was scheduled to depart or arrive on a Sunday, a member of the military would come and direct us to clear the runway until the airplane had landed or taken off. Then it was back to flying model airplanes. It was at one of these get togethers that I saw Tex Rickard's flying wing make its first flights. It was a fast and somewhat erratic model.

It was also there that I saw my first Bunch Cadet Minor fly. A young man (teenager) would arrive riding a bicycle and carrying his model and a winder. His model would out fly any rubber powered model there and even some of the gas powered models. It had been modified by the removal of one landing gear leg and wheel. The remaining one was centered.

I was so impressed that I ordered one. It cost me $0.50. I couldn't afford the Major. It cost a dollar. A gas model cost under three dollars. A kit for Dick Korda's first Wakefield winner cost $0.29.

Well, so much for the reminiscing. My latest model is pretty much like the original except for some modern innovations.

All of the ribs are not shown on the original plan. Parts of the instructions simply rotted away (John Pond lists copies as available for both the Minor and the Major). Using the one rib shown on the plan, and the top and front view of the wing, I plotted the missing ribs. Note that the tip rib is only 1/16 sq. stock. This leads me to believe the designer was not too critical when plotting the ribs. Note also, that the wing is rather thin. This makes the model fly faster under power and during the glide.

Some of the changes I made are as follows:

a. Add 45-degree braces in the rudder . . . without them the tissue will wrinkle.

b. Use a dowel instead of a rear hook . . . this also helps prevent the rubber from bunching up in the back.

c. A bottle-formed propeller.

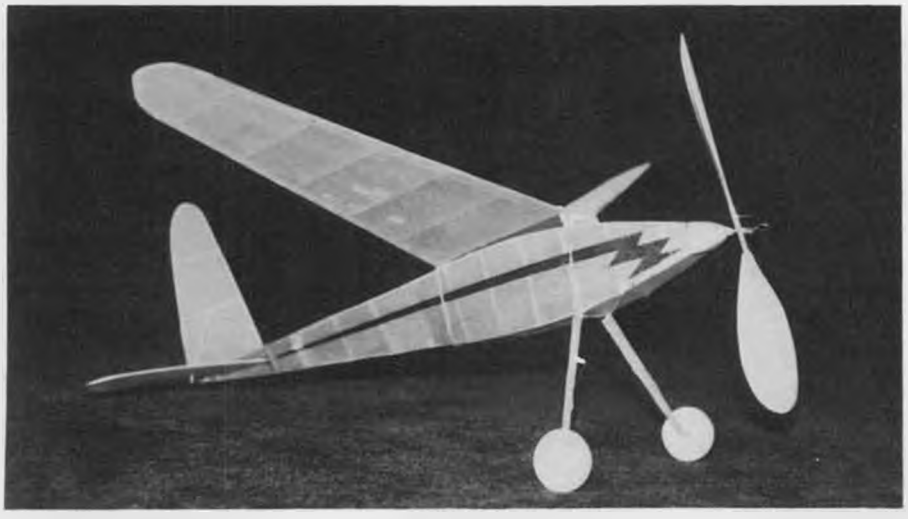
d. A nose plug which does not need a pin to keep it from falling out after the motor is unwound. (The pin can do damage to the front end during a bad landing.)

e. Don't even think about shrinking the tissue on the tail surfaces. Rather, make a frame from scrap 1/4-inch balsa or whatever wood you have available that is a half-inch larger than the tail surface. Glue the tissue to it and water shrink. If it has wrinkled, redo it. Coat one side of the tail component with diluted white glue and place it on the preshrunk tissue while it is still attached to the jig. When the glue is dry, cut out the tail component. You need to do this twice for each component. The advantages are no wrinkles and no warped tail surfaces.

f. Remember, you do not build two sides. Rather, follow the instructions and drawings on the plan. Build a top and bottom and install the uprights as per the drawings on the plan. Cyanoacrylate glue makes this easy.

For power use 48 inches of 1/8-flat rubber made into four strands (two loops) well lubricated.

The plan does not indicate a balance point or C.G., rather it says to trim the airplane so it makes a rapid climbing left hand turn under full power but does not stall. Slide wing back and forth until correct position is found. As experience is gained, trim incidence block very slightly and get wing forward to its most favorable position. The airplane is sensitive and can be turned easily by warping the rudder or by warping the wing to increase the lift on the correct side. The plans are done so you can build either the original version or mine. Why not build both just to see if it's possible to improve this old timer? •



Left: The Cadet Minor is one snappy looking little airplane. Note how the fuselage cross-section changes to triangular aft of the wing. The most noticeable change the author made was to use a modern "formed" prop rather than a carved one, however both are detailed on the plan.

R/C SOARING

By BILL FORREY

SCHUEMANN WING PLANFORM: JUST WHAT IS IT REALLY?

Wil Schuemann's last name has popped up in the past couple of years in just about every publication remotely related to model soaring. Although it doesn't seem that long, it was over two years ago that Wil wrote in to this editor setting the record straight in regard to the origins of this radical wing shape.

The thinking and experimentation that went into his remarkable discovery has been well documented in this column, and there is no room to repeat that here. Interested readers may wish to review their old *Model Builder* mags, or purchase back issues, for July 1987 and November 1987.

I get a kick out of seeing the many so-called Schuemann wing plans that get published. It seems that just about ANY wing with a straight trailing edge and multiple swept leading edges gets that very official looking title.

The most recent and most elaborate "Schuemann" wing planform I saw was in *R/C Report*, a tabloid style model magazine published in (I think) Georgia. *(Nope, Huntsville, Alabama. wcn)* The soaring editor of *R/C Report* is a gent by the name of LeRoy Satterlee. LeRoy has been instrumental in helping Culpepper Models, Inc., get started in the model sailplane kitting business.

The drawing from LeRoy's article showed different 14 dimensions in percentage of root chord that defined a half-wing with four sweeps in its LE. The five panels which made up this semispan planform looked almost elliptical. (No doubt this shape would produce a fine flying sailplane wing.)

What intrigued me most, however, was to give this particularly well-defined and complex shape the name "Schuemann." I wondered if Wil had somewhere published these dimensions, and if I had somehow missed them.

Alternatively, I thought that perhaps the name Schuemann was becoming so familiar to soaring buffs that it was becoming a technical term, like "polyhedral" or "flaperon."

I was curious to the point of taking action. So, I wrote to Wil to find out his thoughts on the matter. The following is a slightly edited version of my letter to Wil, and an unedited version of his reply.

"Dear Wil, How are you? Just a brief note to clear something up for me and my readers.

"There are a lot of designs being produced these days (since the piece on your 15 meter sailplane was published in *Model Builder* two years ago) that use your name.

"I want to REALLY know . . . from you . . . just what a Schuemann wing plan is!

"I appreciate it! Thanks, Bill."

"P.S.—Why do you suppose so many modelers are experiencing tip stall problems with this shape?"

Wil's reply was as follows. But first, his reply to the P.S.:

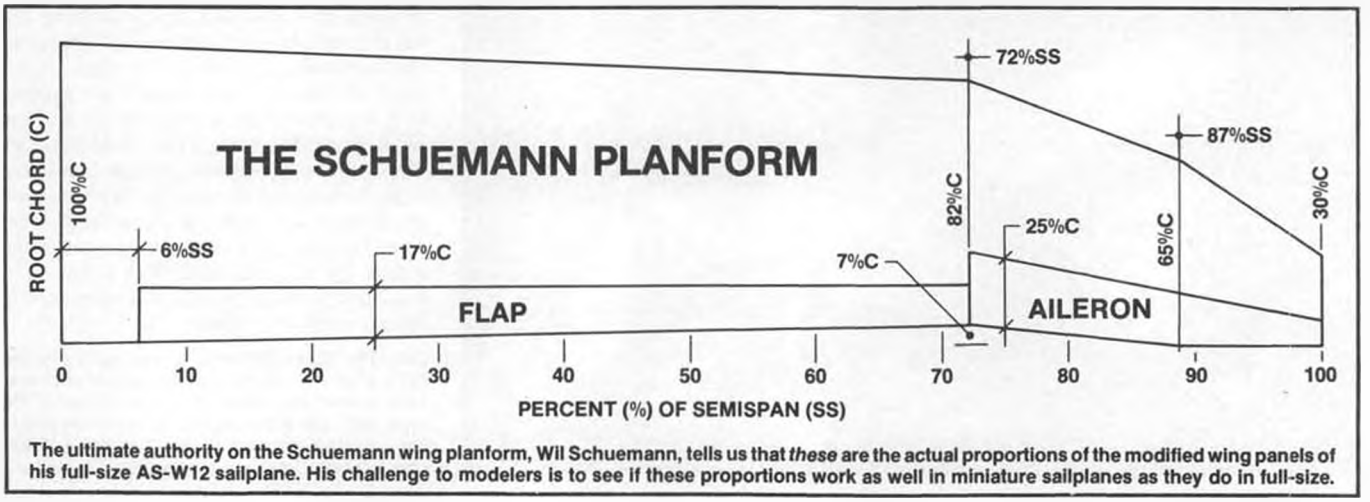
"Since my ship didn't have this problem, perhaps there is something important in the exact (?) wing planform I used."

"Dear Bill, I don't recognize the wing in the (R/C Report) article.

"I scaled the enclosed proportions off of a model I retain of the AS-WS12. The shape is a combination of theory, engineering constraints, and intuition. Since it worked so well, it would be interesting to try it on a

Skip Williams, CD of the Silent Knights Soaring Society's Spring Fling RCHLG contest held earlier this year, winds up to throw his Poquito Primero; Bill Brenchley is all set with the stopwatch!

No contest runs smoothly without a dedicated crew. Silent Knights workers, from left: Carol Williams (registration), Chuck Grady and Jim Sitko (scorekeepers and frequency control).



The ultimate authority on the Schuemann wing planform, Wil Schuemann, tells us that *these* are the actual proportions of the modified wing panels of his full-size AS-W12 sailplane. His challenge to modelers is to see if these proportions work as well in miniature sailplanes as they do in full-size.

model.

"I'm sure that I wanted a small tip chord, AND to keep the wing chord as large as possible until near the tip, AND to have the trailing edge at the tip perpendicular to the longitudinal axis of the fuselage, AND to have the wing sweep quickly aft near the tip. Another desire was to minimize pressure gradients along the aileron hinge line while maintaining a straight hinge line. Wing twist was one degree of washout, and all of this occurred in the outer 28% of semispan.

"I seem to have a talent for getting 90% on the first try, and in retrospect, I didn't say enough about the specifics of what I

Bill Brenchley is a real "spear chucker," according to CD Skip Williams. Looks here like he's posin', though!

actually built and tested, probably, because our society tends to be skeptical of the concept of 'good judgement' as it applies to science.

"I hope this helps. If you need any more info, please ask. Wil Schuemann."

Thank you Wil. Now we know what a true "Schuemann" planform looks like. It is interesting to note just how different a true Schuemann planform is from the many pretenders. Any takers on Wil's idea to make a model sailplane with this particular shape?

To help clarify the drawing, I would like to explain why all measurements are in percentage format, and why the wing drawing looks so stubby. The stubbiness is due to a stretching of the wing's chord in relation to its span. This was done to allow more room for the descriptive call outs and percentage figures. It is not to scale!

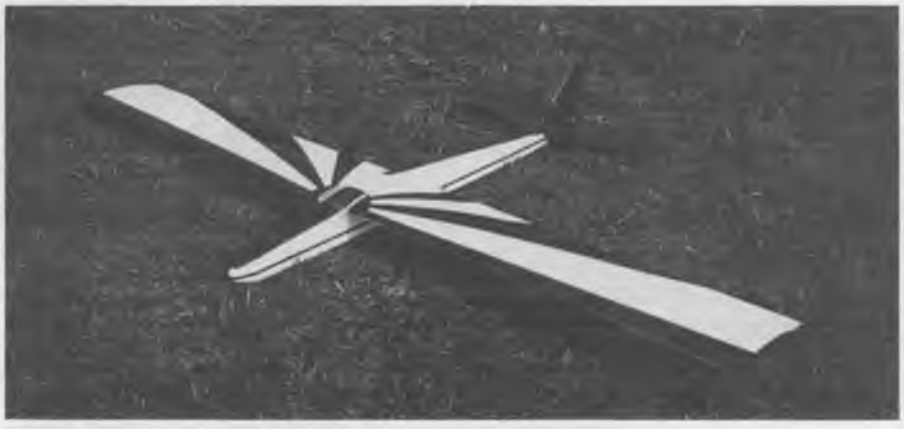
Because you are the designer of your original sailplane, the actual root chord and span of your wings are up to you. It is your chosen span and root chord that determine all other dimensions for your Schuemann wing.

Let's take a hypothetical wing and do some calculations. Let's say the root chord is 10 inches and the right wing was 50 inches long.

If you choose a 10-inch root chord, then the inner tip panel's root chord will be 82% of 10 inches, or 8.2 inches. Likewise the outer tip panel's root chord will be 65% of 10 inches, or 6.5 inches. The tip chord of your right wing will be 30% of 10 inches, or 3.0 inches.

If your right wing is 50 inches, then the main panel will end 72% of 50 inches out from the fuselage (36 inches out). The next panel would be 15% (87%-72%) of 50 inches long, or 7.5 inches. The tip panel would be 13% (100%-87%) of 50 inches, or 6.5 inches long.

Silent Knights member Stew Swanson's Ariel headed for the wild blue. Lotsa fun and good exercise, too!



The new "Banzai" slope combat sailplane from Banzai Enterprises, 2997 Anderson Ave., Port Alberni, British Columbia, V9Y 2V3. Intro price on this five-footer is $28 plus $3.50 for shipping.

To sum up this sample wing: the main panel would have a span of 36 inches with a chord tapering from 10 inches at the root down to 8.2 inches. The second panel would have a span of 7.5 inches and taper from 8.2 inches of chord down to 6.5 inches. The tip panel would have a span of 6.5 inches and taper from 6.5 inches of chord down to 3.0 inches at the tip.

Also please note that the AS-W12 that Wil cut down and modified to be a 15-meter ship has the stock main panels and Wil's tip panels. The AS-WS12 has sweep back in the LE and sweep forward in the TE. The trailing edge is NOT straight from root to tip. That little 7% near the TE at the junction of main and second panels means our sample ship will have 7% times 10 inches, or .7 inches of forward sweep at that point.

Continued on page 91

The gathering of the arms. The 3rd Annual Southwest RCHLG Contest, held in Texas, drew in 14 participants. Models ranged from Buzz Waltz Designs Poquito Primeros to Dodgson Pivots.

Cardboard control line!

YAK 9

By CHUCK FELTON

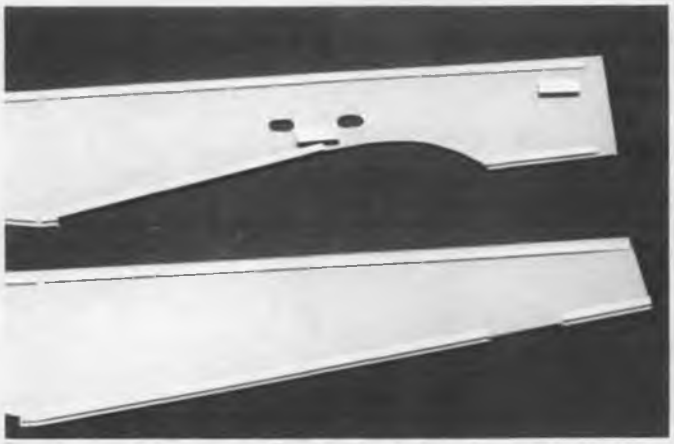
An extremely scale-like replica of the famous Russian WWII fighter, built almost entirely of corrugated cardboard, and presented by an acknowledged expert in cardboard construction. The model as presented here is designed for control line, but could also be built as an R/C ship with only a few minor changes.

• The Russian Yak 9 was one of the most popular and successful fighters of all time. Entering service just as World War II began, they continued to serve long after the war was over. They took part in the initial phase of the Korean War, fighting the P-51 Mustangs and F4U Corsairs, its one-time allies. The Yak 9 was built in larger numbers than any other Russian aircraft, and probably in the world, with the exception of the Bf 109. Because of the shortage of basic building materials, and being built under harsh winter conditions, the Yak 9 was crude compared to Western fighters, but extremely reliable. None of its opponents could match its speed or maneuverability below 15,000 feet, where the Eastern Front battles were usually fought.

Most versions of the Yak 9 were of mixed construction, including steel-framed forward fuselage and wooden aft fuselage with plywood and fabric covering. Later versions had fuselages with welded steel tube frames. The wings had two metal mainspars with wooden ribs and a plywood skin. Control surfaces were fabric covered. The Yak 9 had considerable development potential and appeared in many variants, including a bomber with internal bomb-bay for 992 lbs. of bombs, a long range version with increased wing fuel capacity plus fuselage drop tanks, and anti-tank and anti-shipping versions with 37 mm and 45 mm cannons firing through the propeller shaft.

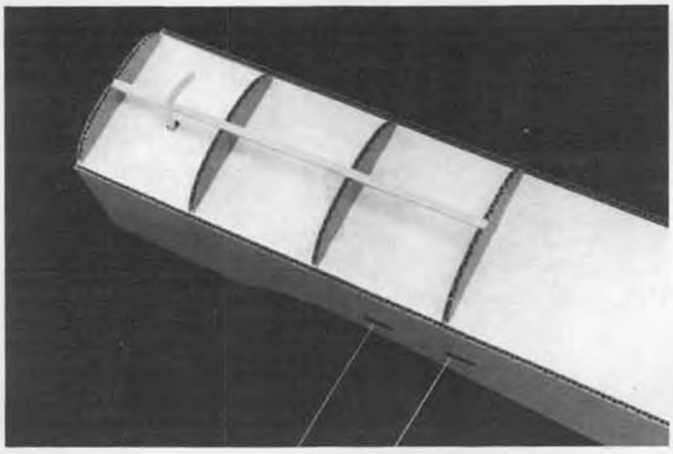
The Yak 9 was simple, inexpensive and effective. The Yak 9 model presented here captures these same qualities by using 1/8-inch corrugated cardboard as the primary building material, which greatly reduces both building time and cost. The design makes use of cardboards unique features in that it can be used in large sections and can be folded. For instance, the wing is built of two large pieces of cardboard with cardboard ribs and a single spar. The tail

Left: The Yak makes for a good looking ship, wouldn't you say? You might think that a model built of cardboard must look pretty crude, but as the photos on this page show, that's not necessarily the case.

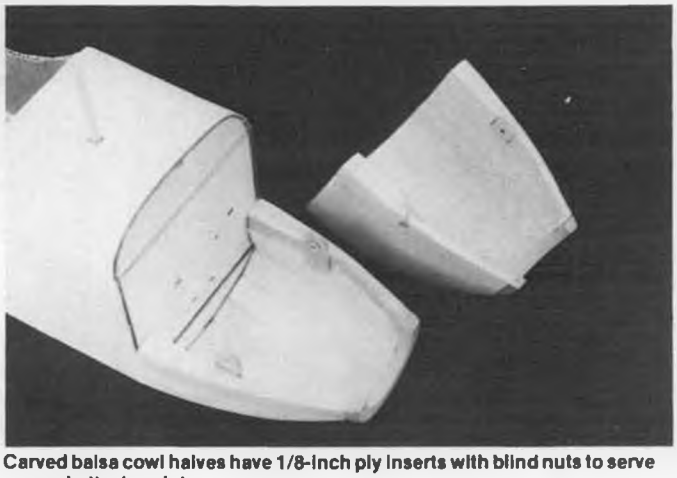


Cardboard fuselage sides are lined with balsa strips and have cardboard supports for the bellcrank and fuel tank mounts.

Fuselage sides are joined to the firewall with the fuel tank and bellcrank installed. Elevator pushrod is 1/4-square spruce.



Fuselage top in place. Cardboard formers, held with a single centerline balsa stringer, are added to the fuselage top and bottom.



Carved balsa cowl halves have 1/8-inch ply inserts with blind nuts to serve as cowl attach points.

surfaces and fuselage are primarily cardboard with little internal bracing. The result is a low cost, lightweight, fast building model that has good scalelike appearance and can take plenty of punishment at the flying field.

Cardboard varies in weight, but any 1/8-inch corrugated cardboard will do. Sources of this material include box manufacturers and local shopping centers where you can find stacks of discarded boxes. Also check the yellow pages for wholesale paper suppliers. Look for cardboard with brown paper on one side and a white finished paper on the other. The white paper on the outside of the model results in a smoother finish and neater appearance. The method of folding the cardboard and the use of gummed paper tape to seal the joints and exposed corrugations is explained in the construction hints.

The model is built to a scale of 1-3/4 inches to the foot, resulting in a wingspan of 60 inches and a length of 52 inches. The bottom of the airfoil is flat with a curved upper surface, due to the scoring and folding technique employed. Engines of .30 to .40 size can be used. Its size and stability make it a good sport flying model.

CONSTRUCTION HINTS: Before we begin, take a look at these special tips for working with cardboard.

GLUE: Water base glue, such as white glue or Titebond, is recommended. Contact cement is not recommended, as parts cannot be shifted when gluing surfaces.

FOLDING: The scoring of the fold lines is done with a screening tool available at any hardware store. It consists of a handle with a 1-1/2 inch radius wheel at one end, which is run along a straightedge on the fold line.

WATERPROOFING: Waterproofing of cardboard is quite simple and can be done to the raw material before you cut out the parts of the model. Simply mix 25% clear

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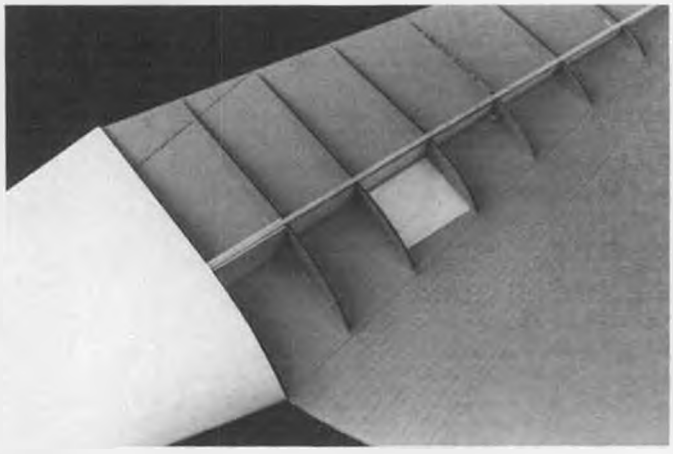
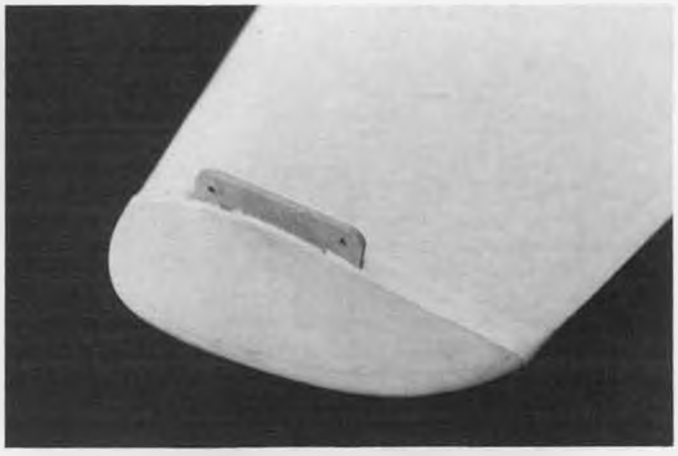
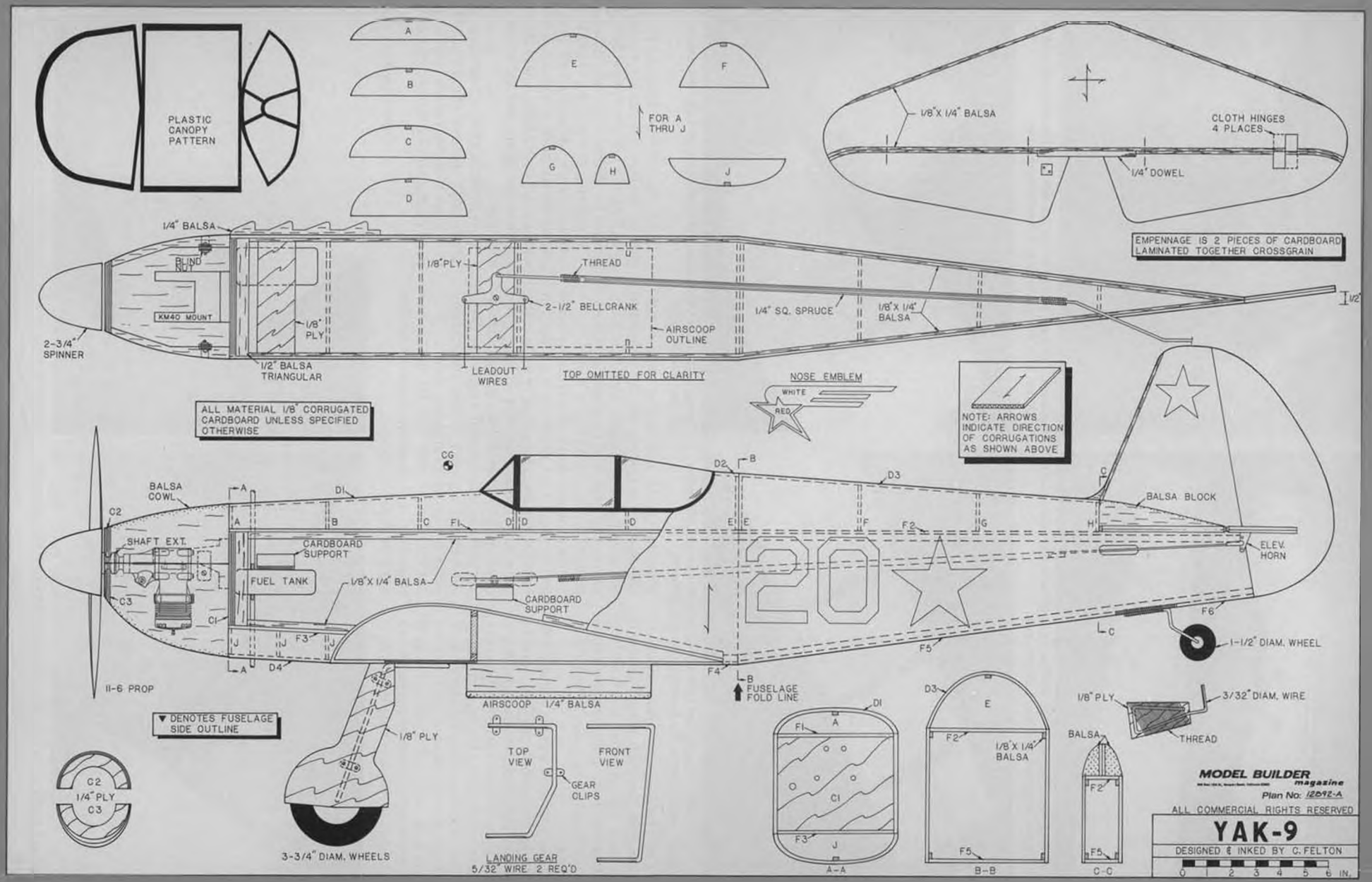


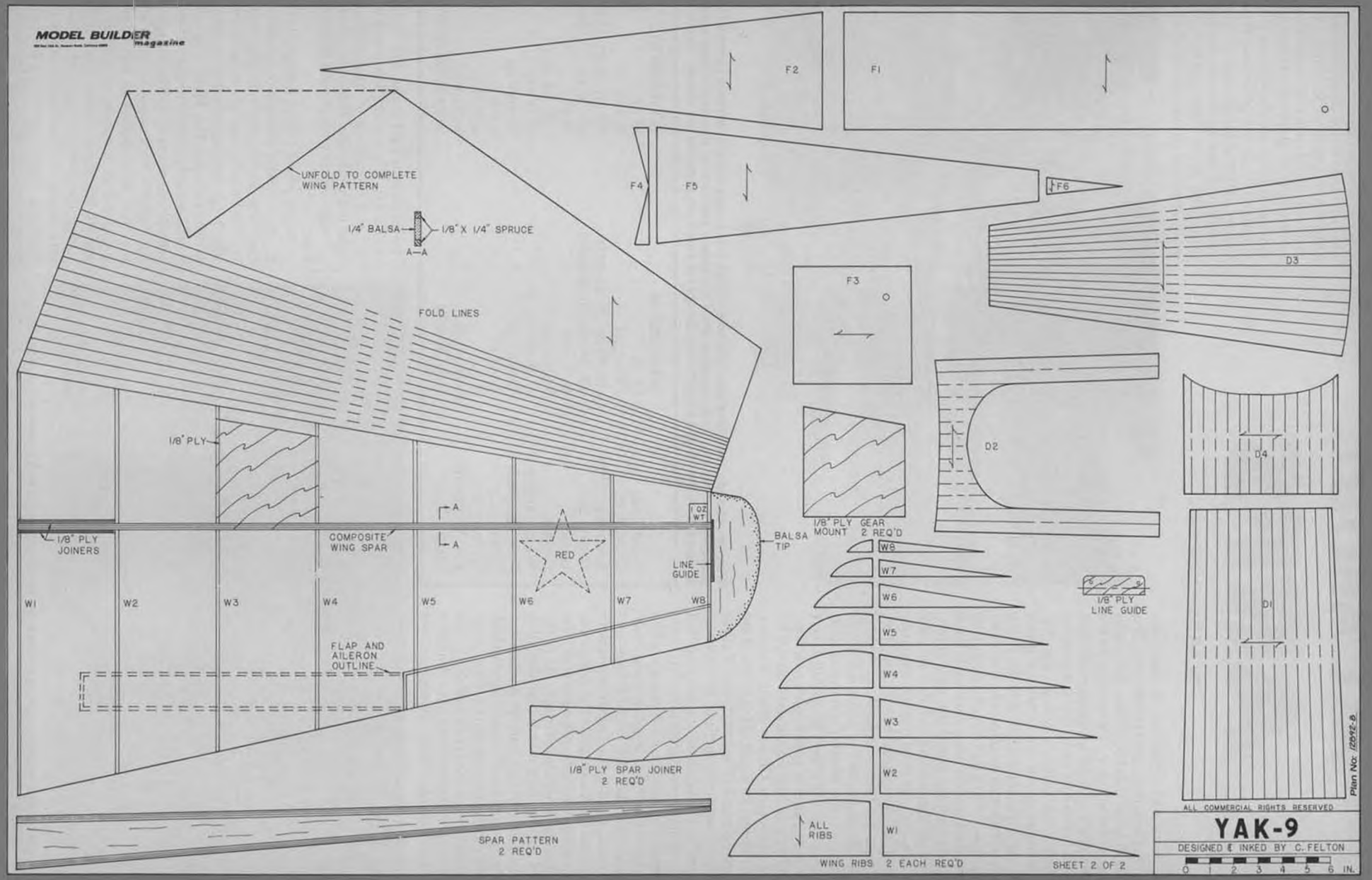
The wing has a single wood spar and cardboard ribs; upper skin is scored on the inside at the l.e. to produce a smooth curve.



The balsa wing tip with 1/8-inch ply line guide glued in place. Gummed paper tape is used on the trailing edge and at all seams.



FULL-SIZE PLANS AVAILABLE—SEE PAGE 106


MODEL BUILDER magazine
F2
F1
UNFOLD TO COMPLETE WING PATTERN
1/4" BALSA
1/8" X 1/4" SPRUCE
A—A
F4
F5
F6
D3
FOLD LINES
F3
1/8" PLY
D2
D4
1/8" PLY GEAR MOUNT 2 REQ'D
1/8" PLY JOINERS
COMPOSITE WING SPAR
A
A
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LINE GUIDE
BALSA TIP
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W8
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D1
FLAP AND AILERON OUTLINE
1/8" PLY SPAR JOINER 2 REQ'D
SPAR PATTERN 2 REQ'D
ALL RIBS
WING RIBS 2 EACH REQ'D
SHEET 2 OF 2
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Plan No. 12642-B
YAK-9
DESIGNED & INKED BY C. FELTON
0 1 2 3 4 5 6 IN.

ALL ABOUT ARFS

By ART STEINBERG

• The more ARFs that pass through my hands, the less impressed I tend to be. This is not at all to say that I don't like the quality of what is coming along these days. To the contrary, I am so used to seeing really fine products in the ARF field, that it is becoming somewhat difficult to find one that really outshines all the others. All this makes my job exceptionally difficult when I set myself the task of choosing the "ARF of The Year." Frankly, I have seen one or two models which may very well have emerged as the top gun in this year's competition, except for the fact that for one reason or another I did not have the opportunity to personally test them. Thus, the winner for 1989 is an airplane which I completely assembled in just a couple of evenings . . . one which I can thoroughly endorse as being the very finest ARF I have encountered in the past twelve months.

It all began when I received a boxed kit from Z-Planes of Crown Point, Indiana. The first thing I took out of the box was the eight-page book of instructions. Rather than a lot of written directions, the booklet consisted of crystal clear drawings, so that you could do the complete assembly without any reading ability. One disconcerting thing was the fact that what printing there was seemed to be in French! However, I quickly realized that the English equivalent was printed right alongside the French, so this turned out to be no problem at all. The inclusion of French instructions is explained by the fact that while the kit is made in Taiwan, the importer is located in Canada, where French is used a great deal, especially in the province of Quebec. Anyway, I learned a lot from building this model, such as the French for rudder push rod is "tige du gouvernail." As soon as I got a good look at the contents of the box, I realized that if the unassembled model before my eyes could only fly half as good as it looked, this was undoubtedly going to be the ARF of the year! At first glance it appeared to be a collection of parts for a standard high-winged cabin type sport trainer, much like a number of others previously reported on in this column. It went under the name "Skyward 40," and I was really attracted to everything I saw, even in the unassembled state. I immediately noted that it was completely constructed of balsa and plywood, and expertly covered in shrink film. The color scheme was basically white with snappy black and red trim.

Wow! We shoulda used this shot on the cover! The lovely young lady you guys are ogling is Danielle Stein, and in case you hadn't noticed, she's showing a comparison view of the Skyward 40 and Skyward 60 ARFs offered by Z-Planes. Except for size, both airplanes are virtually identical.

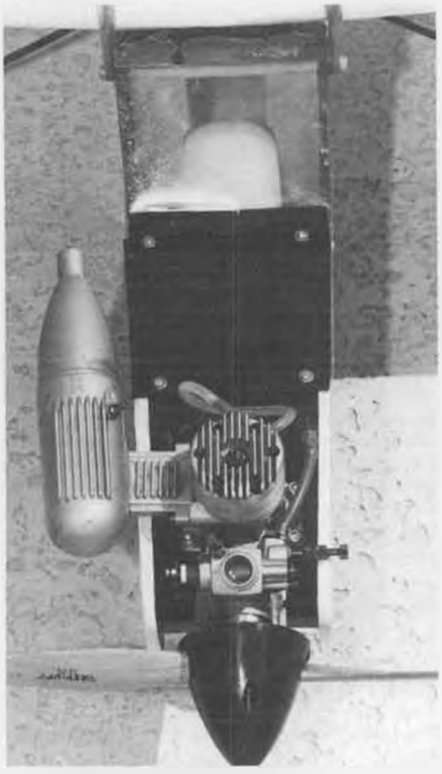
	SKYWARD 40	SKYWARD 60
Wing Span	63 in.	73 in.
Wing Area	730 sq. in.	909 sq. in.
Recommended Engine Size	.35-.45 cu. in. (2-cycle) .48-.61 cu. in. (4-cycle)	.45-.61 cu. in. (2-cycle) .60-.90 cu. in. (4-cycle)
Length	44-1/4 in.	56 in.
Weight	5 lb. 8 oz.	6 lb. 12 oz.
Wing Loading	17.36 oz./sq. ft.	17.11 oz./sq. ft.
Fuel Tank Size	10 ounces	12 ounces
Wheel Size	2-1/4 in.	3-1/8 in.
Spinner Size	2 in.	2-1/2 in.
R/C Functions	4-channel	4-channel
Model Type	Sport trainer	Sport aerobatic trainer

Our columnist performs a very slow flyby into a ten-knot headwind. The Skyward 60 is a rock steady performer at both high and low speeds.

At this point, I think it would be appropriate to spend a bit of time discussing the covering on this model. To my knowledge, it is definitely not any type of material which can be purchased over the counter in this country. The black and red color trim is actually applied to the surface of the white base material. While the plastic film itself seems impervious to most solvents, the trim color definitely will come off if exposed to acetone or similar strong agents. However, I found that if a specially strong cleaner was required, alcohol was safe to use and did not affect the finish in any way. While examining the parts preparatory to assembly, I did notice that there

was a slight sag in the covering of the vertical stabilizer, but I am happy to report that this was easily remedied with a couple of gentle blasts from my heat gun. Of course, the gun was held about sixteen inches away from the covering, and kept in brisk motion at all times. Unfortunately, as reported in some of my earlier columns, many of these ARF coverings just cannot stand up to heat tightening, so be very careful and try to do your test heat application on an inconspicuous area such as the fuselage bottom.

I carefully examined the workmanship and was quite pleased with everything I saw. I trial fitted the stabilizers and the fit was truly excellent. The package of hardware was more than complete, as many parts (such as clevises) were overabundantly supplied, and it was obvious that when the model was completed I would have a number of spare fittings for my parts bin. I liked the nicely made red plastic spinner, and the foam type wheels were of



The hefty O.S. .60FSR engine doesn't look large at all mounted in the Skyward 60. Note the easy access fuel compartment hatch and the clear view of the tank through the windshield.

top quality. Not a thing was missing, as every conceivable wheel collar, screw, nut, washer, etc., was neatly packaged in sealed plastic bags. The pushrods were furnished in the form of wooden dowels which were pre-grooved and drilled for the threaded piano wire ends. These were easily mounted and held in place with heat shrink tubing which was, of course, also supplied.

"All this is well and good," you say, "so what's so new and different that makes this a candidate for ARF of the year?" Well, the Skyward 40 takes us a step further toward the ultimate ARF because it comes with see-through windows on all four sides! I just love this feature, as it allows me to see

Art has such high praise for both the Skyward 40 and 60 that he has voted them "ARF of the Year." Flight shots are by Gary Steinberg, our columnist's son.

inside the fuselage whenever I wish. I can quickly check and see if all my servos are working properly, if my receiver and its battery are securely in place, and most important of all, how much fuel is in my clunk tank. Being able to see the tank is a great help in a number of ways. When filling the tank you can actually see when it is full and you can stop pumping in fuel before it overflows. If you do a lot of flying, over a period of time you can save quite a few ounces of fuel from spilling out the overflow vent, to say nothing of avoiding a greasy mess all over the place. Also, after a landing, just a quick glance tells you if there is sufficient fuel for another hop, so this feature can certainly be considered a safety factor. Besides, transparent windows just look downright realistic, and if you want to squeeze a pilot into the cabin you now have the option of doing so. The windows are pre-molded of a sturdy clear material and only require simple cutting from a sheet of four windows. These are popped into the ready-cut openings in the side of the fuselage, and glued into place with your favorite adhesive. I used R/C-56 white glue, which did a great job and dried clear and invisible. The windows fit into the openings perfectly. I didn't like the appearance of the raw wood edges of the windows, so I quickly slapped some red paint on to make them blend into the color scheme, a matter of five minutes of effort. The front windshield and rear window were a snap, just requiring trimming and gluing in place. The total effect of these six windows was amazing, as the realism was enhanced immeasurably.

The wing went together in the usual ARF manner, just epoxied together at the center joint with the addition of two ply spars to reinforce the joint. A strip of white tape then seals the seam, resulting in a neat, strong assembly. All moveable control surfaces are ready slotted for the one piece hinges, and are easily mounted in

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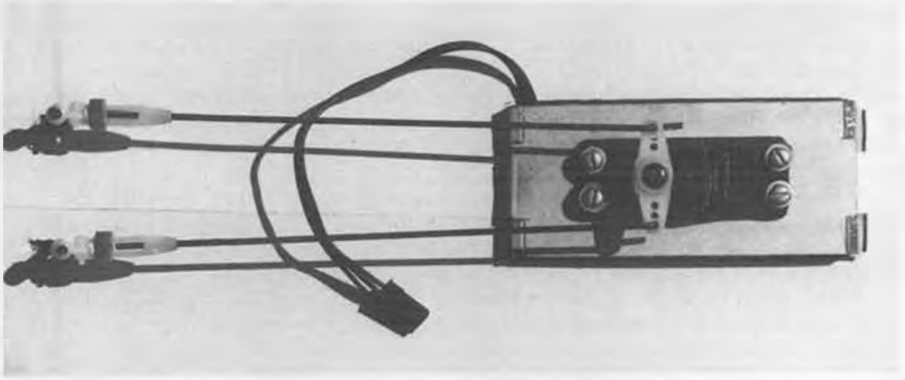
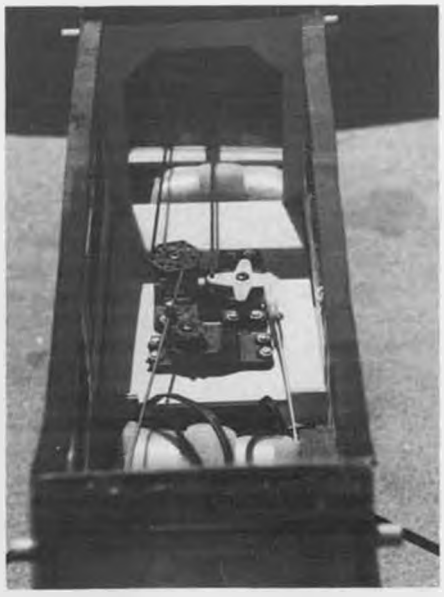
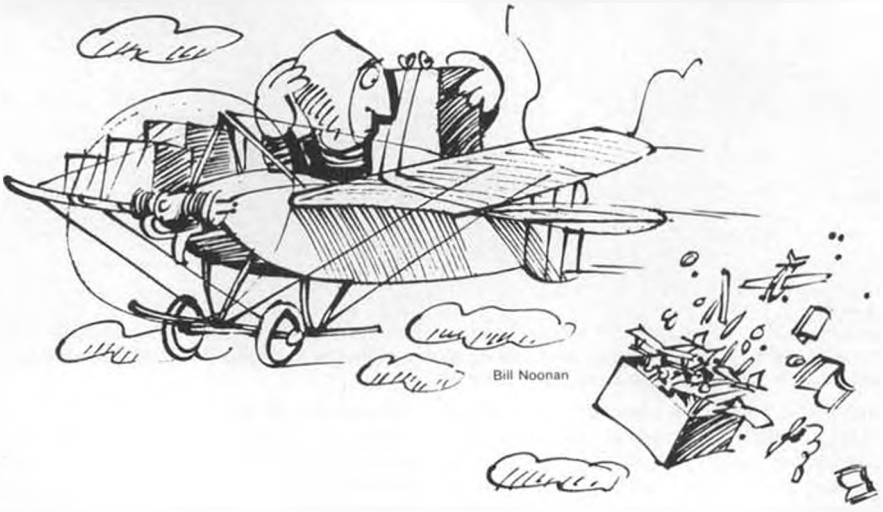


The aileron servos in both of this month's featured models are almost flush mounted in the wing, resulting in a really neat and clean installation.



Standard size servos take up practically no space at all in the Skyward 60's cavernous fuselage. For proper balance, the receiver battery sits behind the servo tray.

HANNAN'S HANGAR



"A man's reach should exceed his grasp, or what's a heaven for?"

• Our lead-in line this month, by Robert Browning, was shared with us by model builder R.F. Stevenson, of Seattle, Washington. Presumably, a heaven is also for model flying.

HANNAN'S HANGAR MOVES

After some 21 years in Escondido, California, Hannan's Hangar (and Hannan's Runway) are migrating northward. We intend to continue our *Model Builder* column, assuming Editor Bill Northrop and you faithful readers are willing.

We may be reached at P.O. Box 860, Magalia, California 95954, or in care of *MB*. Thank you

BLERIOT'S WET LANDING

Thanks to John Blagg, of England, we learned of an attempted recreation of Louis Bleriot's epic crossing of the English Channel in 1909. During July of this year, the 80th anniversary of the flight, Louis Bleriot's grandson, also named Louis, organized the flight of a reconstructed original Bleriot Type XI (serial #225 of about 800 examples which were produced), and planned to make the hop himself. Alas, the machine was too marginal on power to perform properly with M. Bleriot aboard. Thus, he appointed attractive Ms. Gloria Pullan, an accomplished aviatrix, because of her slim fuselage (weight only "seven stone ten"), according to English newspapers.

After a promising beginning, Gloria was nearing the coast of England when her vintage Anzani powerplant began to lose power, concluding in an oh-so-gentle splashdown into the fortunately calm sea. Gloria was plucked from the water without even getting her hair wet, and the aircraft was also salvaged.

Although falling slightly short of her goal, Ms. Pullan unwittingly recreated another bit of aviation history: Hubert Latham, famous pioneer Antoinette monoplane flier, had twice attempted to cross the Channel prior to Louis Bleriot's successful flight. Like Gloria, he too was let down by his powerplant (in his case a fuel-injected V-8!), and was rescued with a minimum of discomfort.

THE MODEL AEROPLANE DIET

The compiler of this column is frequently asked why he has remained so slender (skinny). The answer is simple: At a very early age I concluded that the importance of food was greatly exaggerated. This is not to deny the importance of proper nutrition, of course; a balanced diet is just as vital as a balanced aeroplane. No, the problem, as I see it, is trying to substitute *excess* food for recreation or diversion from boredom.

During the 193Os when my allowance was only 25 cents per week, I decided that my limited funds were better spent upon my hobby rather than my stomach. The options were something like this: Hamburgers and milkshakes at the time were about 15 cents each, and candy bars were 5 cents. The satisfaction to be gained from such between-meal snacks was momentary at best.

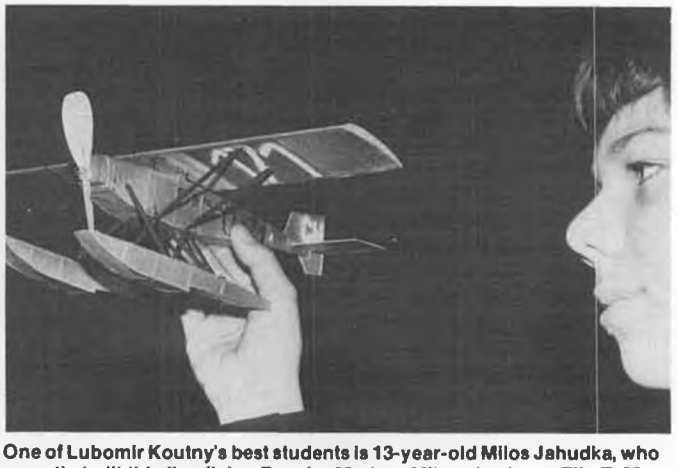
Alternatively, 25 cents could be *invested* in a copy of *Flying Aces* magazine and a 10-cent Comet stick-n-tissue kit, or a goodly supply of balsa wood. These items would yield days, if not weeks, of entertainment and satisfaction. For me, the choice was obvious. And some fifty years later, nothing has changed my mind!

Mythical Navy jet fighter is just one of the many whimsical creations built by Art Grosheider from L'eggs pantyhose containers. Like many of the others, this is a working model; it will taxi across the floor, propelled by a ducted fan!

BACK TO THE STICKS
(in the heart of the Big City)

In our previous column we featured the first part of a report by Ed Bush, of New York City, who has returned to model building after an extended absence. To briefly review, he was disappointed to find

Below: From Lubomir Koutny of Czechoslovakia comes this photo of fellow countryman Peter Mikulasek and his rubber powered Navy Wright floatplane, which consistently turns in 50-second flights.



One of Lubomir Koutny's best students is 13-year-old Milos Jahudka, who recently built this fine flying Dornier Merkur. Milos also has a Zlin Z-50m that will do 50 seconds plus.

mostly expensive prefabricated and almost-ready-to-fly models in his first visit to a large hobby shop. He managed to locate some dusty "good olde days" stick-n-tissue kits, however, which he immediately realized would fulfill his requirements for a "high putter-factor, skill, dexterity and kinetics." His story continues:

". . . I remember watching my dad build a balsa biplane back in the 1950s, and doubted everything I needed would be in the kit box. I needed glue and airplane dope, the smell of which I now remembered from years ago.

" 'What kind of glue should I use?' I asked the guy at the counter.

" 'White glue.'

" 'Elmer's?'

" 'Yeah.'

" 'I'll take some.'

" 'Sorry, we don't sell it.'

" 'How about dope?'

" 'Nope.'

" 'Do you know where I can get some?'

" 'Oh sure. Just go to the hardware store around the corner.'

"I walked into the store and asked where the paint was. No dope. I hollered over to the sales clerk, 'Hey, got any dope?'

" 'This is a hardware store. You want dope, buy it on the street like everybody else.'

" 'No, not dope dope. Airplane dope. You know, paint.'

" 'An older guy chimed in: 'We haven't sold that in years.'

"Back I went to the hobby shop. 'The hardware store doesn't have any dope,' I said, sounding like a two-bit hood in a B movie.

" 'No kidding. They used to.' When, I thought, in 1960?

"Later, at a coffee shop, I looked through the phone book and found a listing for another hobby shop. A cab ride took me to a place that looked as shabby as the first one.

" 'What do you want? We're closing in 10 minutes,' the clerk barked.

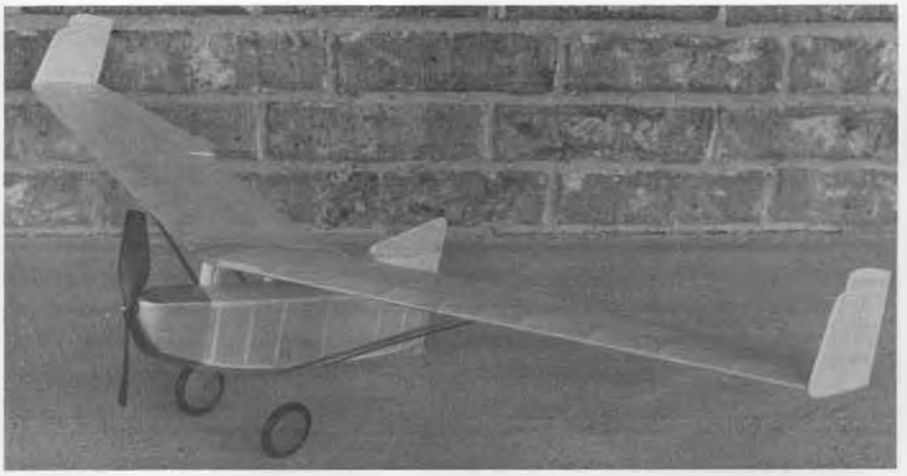
" 'I need some dope, brushes, and some X-acto blades.'

" 'Whatever dope we got is over there. I'll go get the brushes.' Is everything in this hobby dusty? I wiped off and sorted through cans of Pactra dope, ending up with some clear, some Curtiss blue, and some thinner. I also grabbed a tube of Plastic Balsa. Might have a few cracks to fill. Who knows?

"After one last stop for a roll of wax paper and some cranberry juice, I made it home.

"I cleaned off the clutter and (yes) dust from my long-unused drafting table in the spare room. I laid out the fuselage plan, covered it with wax paper, pinned down, and went to work on it. It was 3:30 p.m.

"Later, when I sat back and looked at the finished fuselage, I felt a real sense of satisfaction. This was exactly what I was looking for. It wasn't hard to do, but it took some thought and effort. When it's done, it will fly. I thought I'd have to go back to the hobby shop and buy some more kits. I doubted I'd ever find such delightful anachronisms again." (To be continued.)



Interesting electric powered 1933 Lippisch "Storch" IXb is the work of Dan Walton, of Andover, Kansas. Dan says he's waiting until the model is fully flight trimmed before adding the final details.

Dick Howard flies this 25-inch span Fokker Eindecker in Arizona. Large diameter prop features "cottage cheese carton" plastic blades.

ONE OF US!

According to *Scale Models* magazine (England) for November, 1981, famed author/philosopher George Bernard Shaw was a model enthusiast. His particular passion was model railroads, but still, he was considered a genius. Nice that he found time for a hobby.

HOW TRUE

From *R/C Scale Aircraft* magazine (England) this, extracted from the writings of Peter Russell: ". . . a good scale model takes four times as much work as a fairly good one."

And how about this quotation, attributed to Napoleon: "Assignments and orders, once determined, will remain firm—unless changed." Our thanks to Dean McGinnes, of Florida, for sharing.

DR. LIPPISCH REMEMBERED

Leroy Satterlee, of Waterloo, Iowa, was fortunate to have known famous delta-wing designer, Alexander Lippisch, who employed models in his experiments for most of his life.

"My dad built a ducted-fan-powered delta-wing test model for Dr. Lippisch. This model was built back during 1949 or 1950. It was radio-controlled (when everything worked right) and was very fast. The en-

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One in a series of delightful models built from old Ideal model plans, is this Bleriot monoplane. Builder Vern McIntosh reports it flies about 130 feet, R.O.G. Photo via Bill Winter.

Control Line

BY JOHN THOMPSON

SCENES AND HIGHLIGHTS FROM THE 1989 NATS

• Competitive model aviators attend all kinds of contests in all kinds of locations, but there is one annual contest that has a special aura about it. It's such a traditional Big Event that it's seldom that anyone bothers to use its entire name. Like every baseball fan needs only "Bo" to identify the most electrifying player in the game, every modeler knows the most electrifying model airplane contest simply as "The Nats."

The U.S. National Model Airplane Championships is not only sanctioned but organized and conducted by our umbrella organization, the Academy of Model Aeronautics. The AMA spares no effort or expense to make this nine-day event the greatest model airplane contest in the world, and it annually lives up to that billing.

The 1989 Nats in Richland, Washington, in July, was no exception. Washington's Tri-Cities (Richland, Pasco and Kennewick) were cordial hosts to the 2,000 or so Nats competitors and their entourages; in turn, the community was for the first time treated to a spectacular demonstration of the hobby of model aviation in all its forms.

(OK—If you really *don't* ever come out of your workshop, the "Bo" mentioned above is Bo Jackson, the slugging, base-stealing outfielder for the Kansas City Royals. His hobby is professional football, in which he dabbles in the NFL. Kind of like a top combat flier who dabbles in expert precision aerobatics . . . that's our "Bo," Phil Granderson!)

The time lag between the writing of this column and its appearance in the magazine three or four months later makes it timely to mention not only the 1989 Nats, but the 1990 Nats as well.

By the time you read this, AMA undoubtedly will have announced the site for 1990. The rumor mill in Richland indicated the possibility of a return to Chicopee, Massachusetts, but C/L racing superstar, Bill Lee, reported that the Houston, Texas area also has put in a bid.

It's not too early in the autumn of 1989 to be thinking about the 1990 Nats. If you plan to compete, you will want to include airplanes and equipment for the Nats into your winter building plans. Even if you don't plan to compete, the Nats can provide a full week of education and entertainment for a spectator. Most competitors who only intend to fly in one or two events will attend the entire week and watch or work at the other activities.

The Nats also provide a rare opportunity for fliers to view the other kinds of model airplane activity that they would not see any other time of the year. Control-line fliers frequently can be found watching R/C pylon racing, indoor and outdoor free-flight, and other non-C/L events. There is even a chance to get a closer look at some other C/L events, as the week long schedule allows many events to be sepa-

Ted Fancher took 5th in the Precision Aerobatics Walker Cup flyoff with his beautifully finished "Temptation." Only 15 points between 1st and 5th!

A Martin MO-1 Profile Carrier ship with K&B power. This design has been a popular choice in all the Carrier classes for many years now.

McCollum takes Fluker's pulse during the FAI Team Race final. Center pilot is a member of the Soviet contingent. Photo by Charlie Johnson.

Rat race action with Mike Shahan (left) and Bob Kerr. What a difference between Rat and Team Race. Charlie Johnson photo.

Soviet flier Alexandr Gulevskii, of Leningrad, pitted for 1st in FAI Team Race and got 6th in 1/2A Combat. Photo by Charlie Johnson.

Eduard Kosdovskiy of the U.S.S.R. getting ready to pounce on George Swanson. Ed fell to Tom Fluker in the Slow Combat final. Johnson photo.

rated in time.

You'll want to nail down your lodging reservations early in the year, no later than about April, because the Nats can virtually take over a medium-sized city. One of the magical aspects of a Nats is that everywhere you go around a town . . . stores, restaurants, etc., you run into other modelers. Motels become modeling hostels, with the doors left open and "hangar flying" going on constantly in the rooms, hallways, poolsides, and parking lots.

AMA traditionally sets up a headquarters with offices, registration facilities, souvenir sales, a public relations office, a fully stocked hobby shop, meeting areas, a trophy shop, display spaces, bulletin boards and other amenities. In addition to keeping local news media informed, the Nats public relations crew publishes a daily newspaper called the "Nats News" with results, feature articles, etc.

The Nats is one of AMA's most significant services to its members . . . a week long seminar, contest, convention, and social event that is a must for the serious modeler at least once. Many fliers go every year, and many more make the contest every two or three years, when the roving extravaganza comes close to their region.

Right: Norm McFadden made it two in a row with his 1st place win in AMA Fast Combat. His tools of the trade are his orange-and-white "Creamsicle" models.

The Richland Nats was the first visit of the contest to the Pacific Northwest, but attendance was reasonably strong and the administration of the contest lived up to Nat's standards.

The focal point of the meet was the classy Shilo Inn, where AMA had its headquarters. The Shilo was more or less centrally located in relation to the various flying venues, which were spread out over the Tri-Cities area. The control-line facilities were in two locations. Speed, racing, and precision aerobatics were at the Richland Municipal Airport, while the combat and carrier circles were five miles away at Hanford High School.

The control-line facilities varied in quality due to limitations of the area, but fliers were able to make do. A shortage of circles did contribute to an unfortunate need to spread the schedule out over a full eight days, from Sunday through Sunday, which made it a bit of a travel hardship for those who desired to be involved with all of the events; it undoubtedly contributed to a poor turnout of slow rat race entrants on

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Half-A Speed contestant Dave Williams gets set to make a run. Like event winner Charles Legg, Dave uses a homemade engine.

From left: Svetlana Filippova (U.S.S.R.), Paul Walker, Randy Schultz, Jim Casale, and Don McClure. All are top stunt fliers; Jim was top man in Precision Aerobatics. Sadly, Svetlana's model, shown here, was the victim of a control failure early in the meet.

Free Flight at the 1989 NATS

By BOB STALICK

Above: An overall view of the Badger Mountain field, site of the 1989 Nats outdoor F/F events. Photo by Al Grell.

• The 1989 Nats. This was the first AMA Nationals ever held in the Northwest, and it featured some predictable and some unpredictable results. In place of the usual fare for this column, I thought I would take this month to feature some of the fliers and the flying that took place in the Tri-Cities of Washington late July, 1989. So, if you are looking for the Darned Good Airfoil or the monthly three-view, join us again in the January issue. In the meantime, I hope you enjoy the brief description of the activities and the photos of the competitors. Now, on to those thrilling times of yesterday.

The predictables of the 1989 Nationals. When the announcement came that the Nats were going to be held in the Tri-Cities, a number of us who are well acquainted with the area were pleased and a bit apprehensive. It was predictable that a very large flying site could be found, and that if all went well, this could be a Category I contest. This would only hold true if the AMA brass were willing to hold out for a large site.

This brings us to the second predictable: windy conditions. The above site would be adequate for Category I if the usual wind conditions were not present. As most of the weather history for this region was to show, the average wind speed during mid-July was 9 mph, but the highs were above 20, and it didn't seem like the lows were ever much below 5 mph during the day.

The third predicable was that the temperature in the Tri-Cities during mid to late July would be in the upper 80s and likely into the mid to high nineties.

The fourth predictable was that the NW free flighters would rally around the needs of the Nats and volunteer to be event directors and timers for the contestants. Such is the nature of the fliers in this part of the country . . . people pitch in to help when it is needed.

To address these predictions to those who were not present, the 1989 Nats (and a large number of you weren't present), the

Original design 1/2A ship by Chuck Gode is a hot performer, makes extensive use of carbon fiber. Bob Stalick photo.

Below: Free Flight columnist Bob Stalick took first in C Gas with his K&B .40 powered C-Quell Mk. II, his first-ever Nats win. *MB* has plans for Bob's original C-Quell (plan no. 11743, $10.00). Photo by Bruce Augustus.

Larry Heagren readies his Pilfered Pearl for an official in C Gas, with assistance from Ted Warren. Photo by Bob Stalick.

site that was finally chosen was a large site . . . Badger Mountain by name. It wasn't the largest site in the region, but it was large enough that Category II meets could have been held there. The site was very adequate if the wind were to blow from west to east. It was minimally adequate if the wind were to blow from either the northwest or the southeast. As luck would have it, the wind blew from either the northwest, in which case the models left the field and flew into an orchard or a housing area, or on the best flying days, the wind blew from the southeast, and the ships drifted over a rural section of freeway. So, good but hot flying prevailed. One added note was that at the beginning of each day's competition, a vote was taken among the contestants by Sandy Frank, Free Flight Event Director, to determine whether to fly Category II or III. The vote was heavily in favor of Category III on each of the days, so we were flying two-minute maxes except for the FAI events.

It was a meet that for the most part did have adequate timer and official support, so long waits in the timer line did not seem to be a big issue. A number of the NW FF contingent did duty as either event directors or timers during the meet. This occurred even though FF Director Sandy Frank told a number of people who had volunteered their services that they would not be needed to serve in an official capacity.

Norm Peterson was the only member of the San Valeers club (Southern California) to make the trek north to the Nats. Model is a Top Banana, a Jay Jackson design. Stalick photo.

The unpredictables surrounding the 1989 Nats Free Flight Events were as follows:

1. The flying site was in the eastern path of the Mt. St. Helens volcano eruption, and the ground was still covered with a layer of fine ash. The vegetation consisted of a thin layer of something known as cheat grass and either clumps or random sage brush plants. Once the vegetation layer was broken through, travelling via motor vehicle became a real challenge as the fine sandy ash became literally impassible.

2. The second unpredictable was that on the first day of the competition, not only did the wind blow hard, it was cool, and it actually rained. It wasn't until about an hour before the end of the meet that the sun came out and the winds died down to a flyable speed.

3. The third unpredictable was that the event was run according the Contest Director time. The events were supposed to begin at 8 a.m. and end at 4 p.m. It turned out that these times were only approximate, as the C.D. would begin and end the meet according to "his" time not "Pasco" time. Contestants who were unable to guess the C.D.'s time, were usually berated on the overused and over-volumed P.A. system.

4. The fourth unpredictable was that some of the events seemed to run more for the benefit of the spectators than the contestants. For example, all of the trophies had to be picked up at AMA H.Q. and were not awarded at the site (with the exception of Indoor), and the scale judging also took place at H.Q. with time frames for entering the models quite specific and

Paul Kellas took second in D Gas behind Sal Talbi. Model was VIT equipped and a superb performer. Stalick photo.

The win in 1/2A Gas went to Dick Williamson, who flew a 1/2A Witch Doctor. Needed two flyoff flights to win. Photo by Al Grell.

Mark Sexton's "Air Express," as designed by Phil Hainer, has flying surfaces resembling those of Old Timers. Al Grell photo.

A "Country Boy," held here by Chuck Gode, won 4th place in C Gas for Ron McBurnett. Photo by Bruce Augustus.

restricted. Since the scale models had to be entered between 8 a.m. and 10 a.m., it meant that you could not begin flying other events until later. Even though H.Q. was reasonably close to the flying field, it would be close to 10 a.m. before you could get back to the field, set up and be ready to fly. Although complaints were not plentiful from the outdoor scale fliers, it was profound from those who had to enter their indoor models in Tri-Cities and then make the trek to Moscow, Idaho, where the ships could have teen judged just as easily at the Kibbie Dome. I am sure that Dave Linstrum will have some words of advice to the AMA about this faux pas.

Well, on to the day-by-day recap of flying activities.

Sunday, July 16 was A-1 Towline, C Gas, and Payload day. This was the only cool, windy and showery day of the meet. We were to set up the launch area on the side of an access road at the far western side of the site. Model drift was to the southeast toward the housing development and the orchard. However, drift was not a big concern, since very few people ventured from

The lone Soviet competitor, Juri J., flew in the A-2 glider event but did not place. Model was admitted to be seven years old and well used. Photo by Bob Stalick.

Bruce Augustus had his Taibi Starduster 900 all ready to give Sal a run for his money, but timer troubles did Bruce in. Photo taken at Taft last year by Jerry Rocca.

their cars to fly because of the weather. Winds were measured in the 14-18 mph range for most of the day. When it finally calmed down, around 2:30, the sun came out, and it actually reached about 85 degrees. Nearly all of the flying took place during the last hour and a half of the day's flying time. This was a highlight day for me, as I was able to place first in C gas with my C-Quell Mk. II, my first-ever Nationals trophy.

Monday, July 17 was Cargo, 1/2A gas, and Wakefield . . . a sunny day with the wind speed down a bit from the day before. I measured the wind speed several times this day and it was in the 10-12 mph range in the A.M. but decreased to 6-8 in the afternoon. This was one of the busier days on the field, even though drift was still in the same direction as the day before. It took a longer than needed fuse to get you off the field. Dick Williamson, another Northwestern flier, took 1/2A gas on this day with two flyoff flights. Five of the top seven fliers were from the NW. Dan Tracy took Wakefield.

Tuesday, July 18 was D gas, Coupe, FAI Power, and HLG day. Due to a change in the wind direction, the site was moved further east. In order for contestants to get to this location, it was necessary to travel cross-country. This was when all of us discovered just how fragile the ground cover was, and just how difficult it was to travel through the fine sand and ash. The winds, which were only 4-6 mph, tended to be variable but drift was usually to the northwest over the freeway. It was hot . . . about 95 degrees+, and the day that the Unofficial Nostalgia event was held, as well. This was

Dave Warren, a senior and new to the Wakefield competition scene, flew this Dan Tracy design at the Nats. Stalick photo.

a good flying day, and one in which the site would have handled a Cat. II contest; however, due to the experience of the previous two days, contestants voted to stay with Cat. III. Thermals and maxes were plentiful. Sal Taibi won D gas in spectacular fashion with his K&B 7.5 powered Starduster 900, although he put in six flyoff flights to get there. Paul Kellas pushed him right along and garnered second. Hand Launch glider was another donnybrook, and flight times were impressive . . . Stan Buddenbohm beat out Mark Sexton for first in this one. FAI power was a bust with only one contestant putting in an official flight.

Continued on page 57

Peanut Scale Construction Project

FARMAN 400

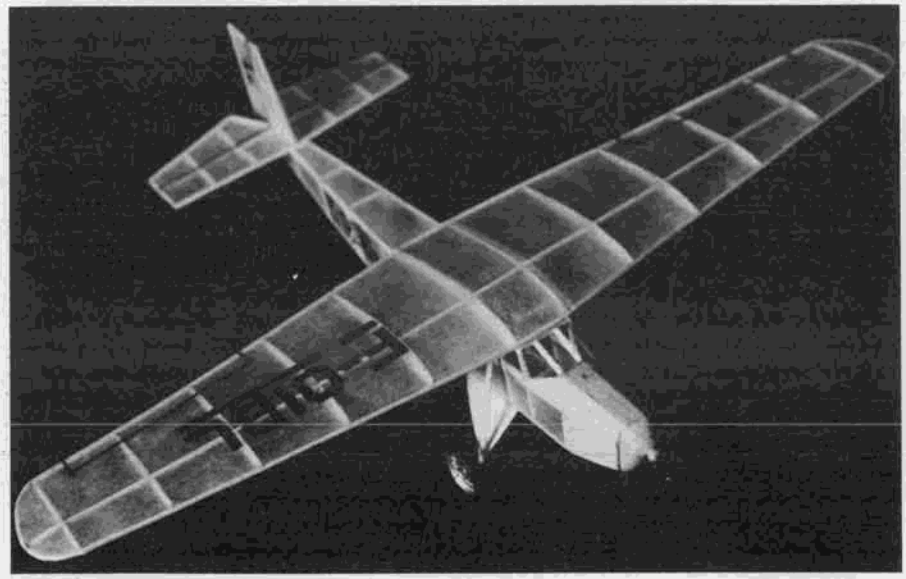
By CARL HEDLEY . . . This relatively little-known 1930's French lightplane makes a great flying Peanut. The full-size plan on the following pages includes a three-view for scale documentation.

• The Farman 400 was a three-place touring airplane of all wood construction powered by a 120-horsepower inverted four-cylinder Renault motor. The simple slab sided fuselage is easy to build. The tapered wing makes it look good and has a decent amount of area. The nose and tail moment arms are about right. It's a good subject for peanut scale . . . obscure enough to be a novelty, easy to construct and a good flier. What's not to like?

The plans, as presented, should hopefully cover any questions on construction. The top of the nose cowling is a balsa block, carved and sanded to shape. Be sure the inside is hollowed out enough for prop hook and rubber motor clearance. It is recommended to lower the thrust line slightly for more clearance and to add some downthrust (about five degrees).

The only things a novice modeler might find unusual are the laminated wing tips. They are made from three layers of 1/20 x 1/64-inch balsa soaked in water and bent around a cardboard form. They are pinned down and left to dry overnight, after which they are glued together and pinned to the wing pattern. Bending wood like this takes a little more effort, but the resulting structure is light and strong.

You may have noticed that the stabilizer is a standard split tailed type. Such stabilizers are weak and can be easily broken. In order to beef it up, an extra piece of 1/20 square was added through the center at the main spar. The small amount of extra weight is weight well spent in increasing durability.



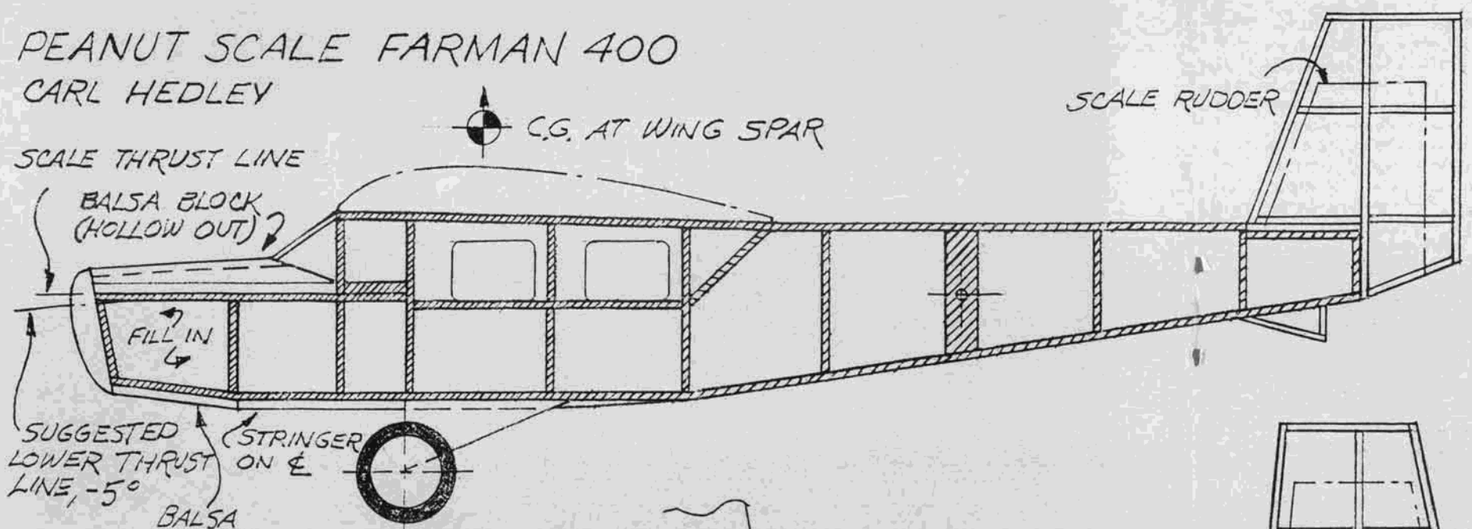
An easy way to cut out the wing ribs is to make a dry Xerox copy of the rib patterns, place the copy face down on your rib stock (1/32 quarter grain balsa) and iron the rib patterns onto the wood. Use a low heat setting to avoid scorching anything. Lift up the paper and voila . . . the rib patterns are on the wood, ready to be cut out.

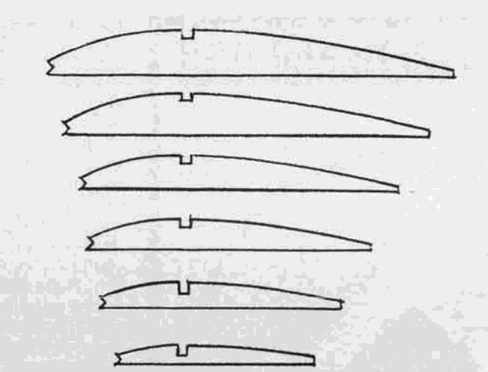
The model was built with 1/20 square sticks throughout (1/20 x 1/10 for the wing trailing edge). With Japanese tissue lightly doped, a rather sparse amount of detail and a small amount of clay ballast in the nose, it weighs in at seven grams. After some experimentation, the best propeller used so far is a four-inch black plastic Kayson prop cut down to a size which will allow the model to ROG. On the prototype this works out to 3-9/16 inch diameter. This is not much of a prop and if you elect to hand launch or lengthen the landing gear, a larger one could certainly be used. The model is still new and in the process of being trimmed, with a high flight time so far of 33.5 seconds. This was at an indoor site with a 27 ft. ceiling. A larger prop would improve flight time, but in the Miama club where I fly, we are allowed a ten second bonus for ROG.

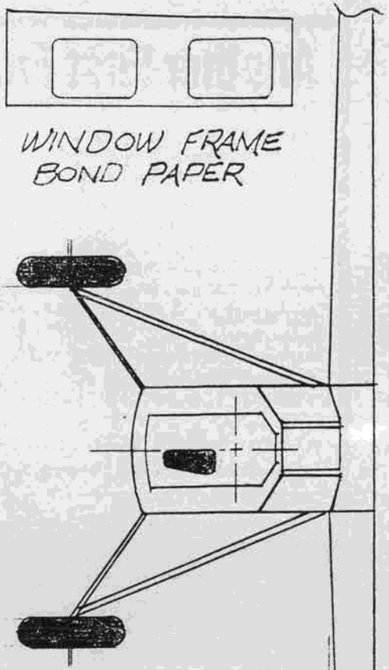
The scale information used on this project appeared in the Hangar Pilot a few issues ago. It consists of a three-view and photo which does not show much detail, but at least proves the real airplane did exist. The color of the plane appears to be light. The registrations for some F400s, according to Bill Hannan, are F-AMOA, F-AMXM, F-AMGY and F-AMHV. (Thanks, Bill.) In a feeble attempt at a pun, the model

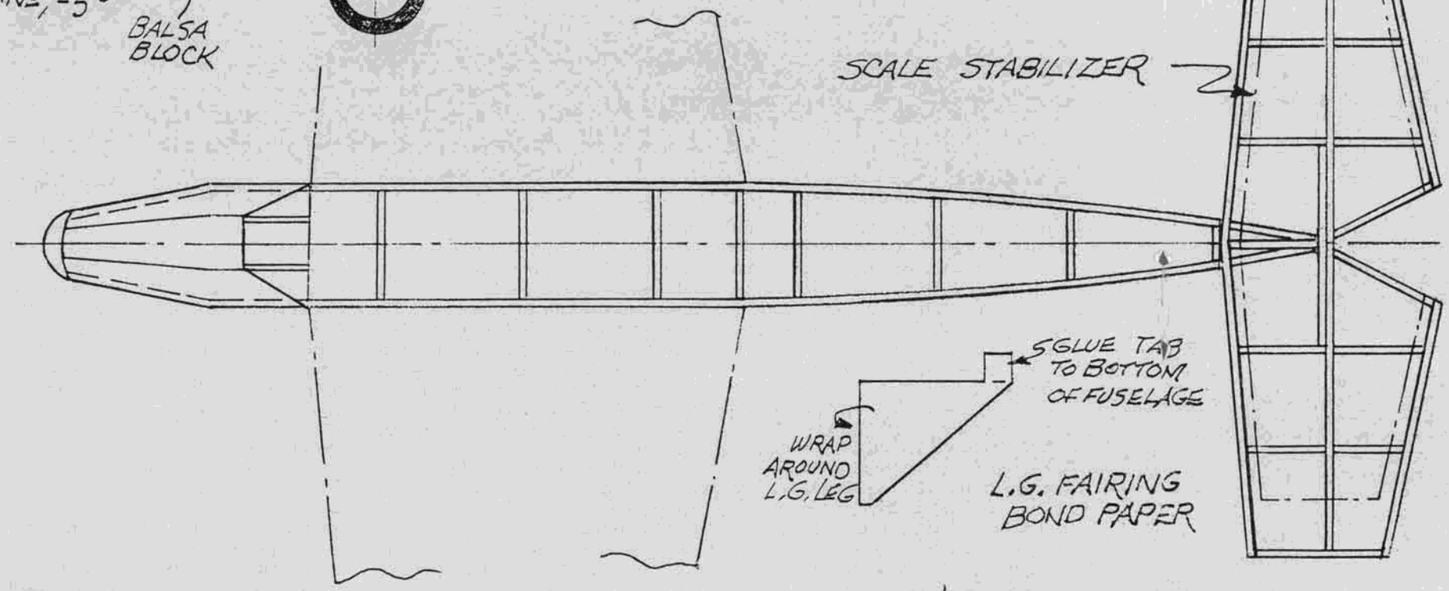
PEANUT SCALE FARMAN 400

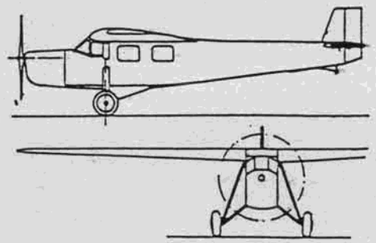
CARL HEDLEY

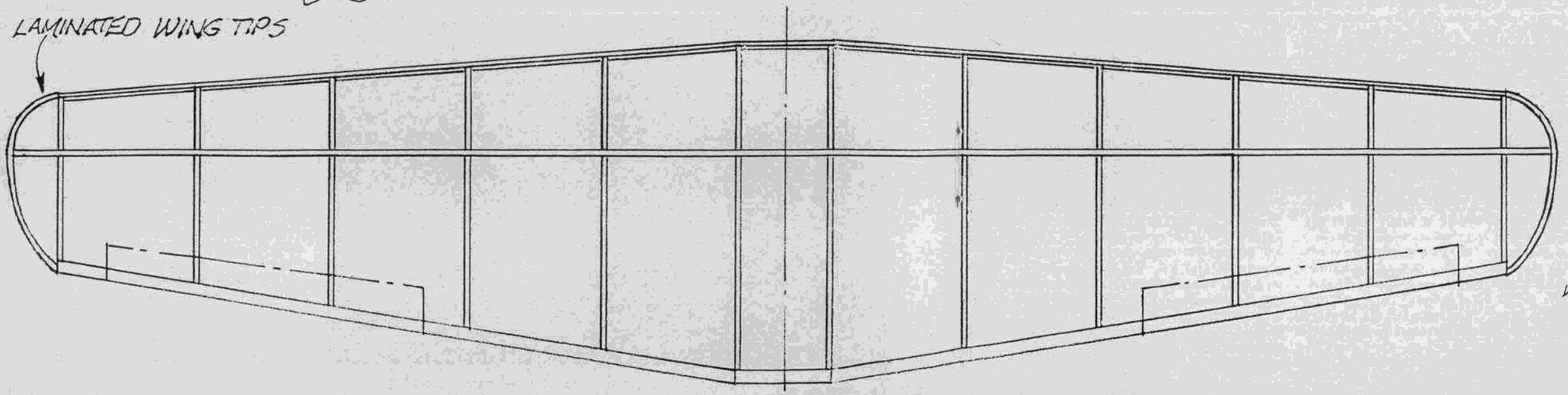


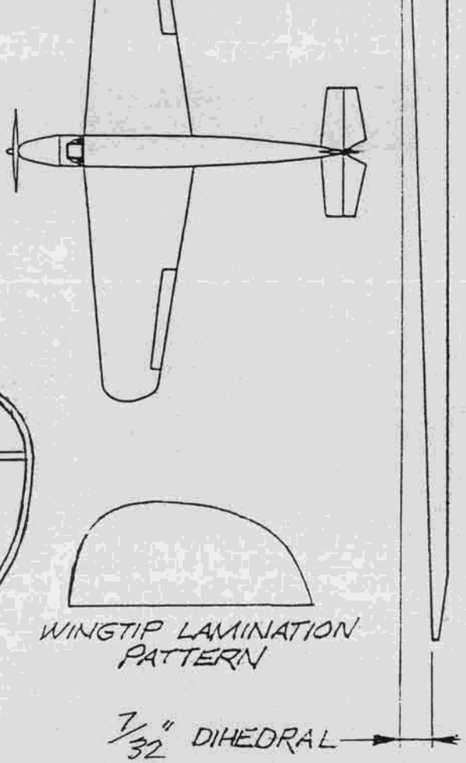












is registered as F-OIBL. Fortunately for peanuts, scale documentation is not as demanding as other scale classes, and the three-view on the plan should suffice.

Originally, the model had a rudder with an area about halfway between the scale rudder and the one shown on the plan. It was not enough to give directional stability and had to be enlarged. The model flies well with the rudder presented. Apart from that and experimenting with props, trimming the model has been straightforward. Not much power is needed, the Farman being aerodynamically clean. If yours is in the neighborhood of seven grams, start with a loop of 1/16 FAI or Pirelli rubber. The prototype flies to the left and needed a small amount of clay in the nose. A tad of washout (less than 1/16 at the tips) was put in each wing.

In doing this project I would like to thank an unknown French publication for the three-view, Alain Parametier for sending it to Doc Martin, and Doc for putting it in the Hangar Pilot. Thanks also to my friend Harvey Reinsma, a professional photographer, for taking some great pictures. Good luck with your Farman and happy landings. •

Electric .... *Continued from page 17*

hours fiddling around with this. I should have left the original tray in place and enlarged the servo cutouts. If I had, I think the radio installation would have taken less than two hours. Oh, well. As you can see from the photo, the rudder and elevator servos are in the very back of the cabin, the on-off servo is crosswise. It uses a toggle switch. Note: you must make your own wiring harness (be sure to include a 15 or 20A fuse), none is supplied. The receiver is next, then the 500 mAH Ni-Cd pack is forward. It is all in there pretty tightly, but it does fit. Futaba does recommend a mini radio system. Whatever radio system you use, be sure to provide on-off controlled by the radio. Do not use manual on-off. The plane does come out light, it was three pounds with the heavy standard radio system. A 250 mAH receiver pack and one ounce servo could have cut this to 2-3/4 lbs. The plane looked terrific, very handsome.

Now, it was time for flying lessons, Tom had MPE Avenger six cell packs, and I had some Sanyo SC six-cell packs. We fly from a grass field, so hand launches are the routine. Teaching Tom to fly on this plane was easy, it is the most forgiving and docile plane I have flown with the exception of the Brigadier and the Leisure Playboy. This is a very high recommendation! Tom took very little time to learn, he was soloing by the third flight, and doing landings by the sixth flight. This *is* a true trainer plane, and that is a very rare bird indeed. My hat is off to the Futaba/Hirobo folks for achieving this. Flight times are long, about ten to twelve minutes from a peak charged battery. The plane just flies and flies. However, this was achieved by a low battery drain, and this means a very slow climb. Both the MPE and Sanyo packs gave the same climb and duration. The first circle around the field will not clear obstacles, and this will cause beginners trouble. If the beginner uses hard commands, that is, tight turns, the plane will not climb either, and the beginner will get into trouble. I recommend an instructor who will use gentle turns and get the plane past that first circuit of the field. Once the plane is on its way, it will get quite high, and you will be glad you have on-off control. I would like to see a faster climb, but it will require more power. There is no room in the plane for a seven cell sub C pack, perhaps a seven cell 800 or 900 mAH pack would fit, I have not tried it. A hotter motor might also do the trick. If you try a hotter motor, pick one that has adjustable timing (LeMans, Astro, Speedworks modified, etc.), since the gear unit requires rotation opposite from direct drive. Stock offroad motors have locked timing, and will not do; they are set up for direct drive.

The blow-molded fuselage is easy to damage, and there are no instructions on how to repair it. This is another good reason for having an instructor. CA glue does stick to the plastic, so you can probably repair it with plastic, cloth, or 1/64 plywood. UFO (Satellite City) CA glue works with styrofoam, I recommend it. In the worst possible case, you could build a fuselage from 1/8 inch sheet balsa. The landing gear is fragile and breaks out easily. I finally installed some reinforcing blocks inside the fuselage, which reduces this problem but does not eliminate it entirely. Strap on landing gear (Hallco, etc.) would be the best answer here.

I recommend the Professor for beginners, once it is at altitude, it is among the best beginner trainer type planes I have flown. Follow the guidelines described here, and you will have some good flying. Thanks, Tom, for the opportunity to do this testing, and happy flying!

The Fifth Annual Southeastern Massachusetts Electric Fly will be at beautiful Cape Cod on October 28 and 29. There will be regular fun-fly events, plus AMA events 610 and 611. This is a very scenic area, and in one of the most scenic months. Elegant dining is available at the Webster Inn. This will be a classy event! Contact Charles Sylvia, 31 Perry Street, Middleboro, Massachusetts 02346, (508)947-2805. The info sheet is excellent, with a map, so you

won't get lost! Charles is CS Systems, so he sent their latest electroflight catalog. It is well worth sending $2 for it. Till next time, do it with class, fly electric! •

Free Flight . *Continued from page 52*

Wednesday, July 19 was A-2, A Gas, P-30, and CO-2 day. We stayed at the same location, off the main road and over the sandy terrain. Once again it was a hot day, with temps in the high 90s. Wind speeds were generally light and variable . . . I measured it at 3-6 mph, but the direction had shifted more to the southeast, back toward the orchard. This was a more challenging day to find lift, but a big flyoff did occur in A Gas, meaning that if you didn't max out, you were out of the trophy hunt. Marty Thompson, who had lousy luck in FAI the day before, took first in A Gas closely tailed by Jack Moreland. P-30 had some good competition as well, in all age classes. It is apparent that this event has become very popular. Old hand, Clarence Mather took first. Nordic glider featured one of the Russian fliers, Juri J., but he wasn't able to place in the money. CO_2 drew limited interest and only two official fliers. However, Bob Nichols piled up 1080 seconds to take first place.

Thursday, July 20 was Mulvihill B Gas, Electric, and FF Scale. It was also the worst weather day of the bunch. The launch site moved back to the western part of the field. Winds were in the low 20s with higher gusts, and the temp was in the 90s again. I did not get the official AMA results, so who won what is not available in this article. As with all of the other events, I am sure that the AMA will publish them in an upcoming issue of *Model Aviation*. The scale events were moved to a different location, and I understand that only two or three contestants actually flew their models for fear of damage.

So, as I mentioned at the outset of this article, it was a meet filled with the predictable and the unpredictable. As it is difficult for me to attend the Nats at locations other than those held at Western venues, comparisons are useless. I like Sal Taibi's assessment of the site because his is based upon his 50 years of Nats attendance, "This is the best Nats site since 1941."

An observation is in order, I believe, that the Nationals has lost much of its All-American flavor. Most of the competitors this year were from the NW. Few Californians made the trek north, and fewer still came from parts east. If this is a trend, perhaps it is time to rethink the notion of one big Nationals. Free flight attendance was down from what I recall at Reno (my last Nationals), with somewhere around 200 officially entered. I would like to comment upon the indoor flying, because all of the comments there would be positive, but that's Dave Linstrum's domain, and I am sure he will state his case well.

ADIOS, TAFT . . . WELCOME, LOST HILLS

I understand that the Taft F.F. site is now being considered as a major federal prison location, and will soon be only a memory for literally thousands of free flighters worldwide. I have also heard that thanks to the efforts of Doug Galbreath and some of his friends, a new site has been located some 30-35 miles north of Taft at a place known as Lost Hills. Although some of the SoCal fellows may think it is too far away, for those of us who live further north, it's actually closer. These things depend upon your point of view.

Eye witness accounts paint a nice picture for Lost Hills. It is much larger, and without a kitty litter factory in the background. In addition, it is easier travelling the terrain by motorbike. I look forward to flying on it.

THAT'S IT DEPT.

That cuts and ties it for another month. I hope you like the pictures of the fliers and the events. If you miss the usual stuff, come back and pay us a visit next month. A new surprise is in the works in the form of a newly approved Nostalgia FAI ship by Don Wensel. Tune in to find out the details. In the meantime, I plan to catch a few thermals for myself. •

Heli W/C . . *Continued from page 22*

wheel he is actually changing the main rotor blade pitch angle. Thus, the force he feels is the twisting action of the main rotor blade transmitted back to the pitch arm, then through the swashplate to the joystick. As the blades are rotating at 300 rpm the whole time, the loads transferred back to the pilot's stick are a garbled mix of the blades' pitching moment. Therefore, a pull-back on the helicopter joystick does not give the same force feel as you would get on an airplane.

In fact, even in trimmed hover when you are not moving the controls, you will feel the stick shaking. The exact source of the load travelled back to the helicopter joystick is from the pitching moment of the main rotor blade. Symmetrical rotor blades do not have pitching moment, which means they will not rotate by themselves. Non-symmetrical blades in general have a nose-down pitching moment that wants to pitch the leading edge down and trailing edge up, and this is the force that transmits back to our little servo. Thus, full-size helicopters designed before the 1970s

all have symmetrical airfoils to minimize control load. Modern real helicopters have assisted control like power steering, therefore higher lift cambered airfoils may be used without problems.

The point that I am making is that using push-pull controls like on Curtiss' machines reduces the wear rate on the poor servos. Model helicopters in aerobatics generates all sorts of unsteady aerodynamic forces and moment, especially when the blades stall. Eventually they take their toll on the servo shaft and reduce your hover precision. I hope this also answers the question as to why, after an aerobatic forward flight, your trim settings all suddenly change slightly.

The photograph of Curtiss' machine is of his backup ship which is a conglomerate of various helicopter parts. It is an X-Cell hidden inside a Hirobo Nova body, but with a GMP Elite main rotor head and mixing unit, and a TSK tail gear box.

I think I had better end here, otherwise the editor is not going to print all of the detailed photographs of these American machines. Next month, we will resume our World Champs helicopter discussion, on the Japanese and European machines, with dozens of photos of Dobashi's winning Black Body helicopter. •

Vintage R/C *Continued from page 13*

on setting up some competition rules (hate that word 'rules,' but you gotta have 'em), what radios to use, and how, if possible, can we make modern radios produce the old style "bang-bang" control to make the flying more authentic, albeit more reliable. The VR/CS is just getting under way, and needs to establish some basic aims, hopefully ones that will create more fun and activity than controversy. To join the VR/CS, send your name, address, and $15.00 to Joe Beshar, 198 Merritt Drive, Oradell, New Jersey 07649.

If there's room in this issue, we will publish plans, photos, and a brief construction article on the 'WAG,' one of the Rudder Bug variations designed by Walt Good, as originally published in *Air Trails*. Incidentally, this will be the ninth old time R/C model for which we have plans available. The others are as follow:

The original Rudder Bug by Walt Good, Plan No. 5783, $11.00.

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If you have a good set of plans for a favorite vintage R/C model that you would like to share with other vintage R/Cers, let us know. Maybe it can be copied and made available to everyone. If it's a kit plan, make sure that all sheet parts, such as ribs and bulkheads, that might have been supplied as printwood or die-cuts, are also shown on the plan. Kinda hard to reproduce the model without 'em.

Until next month, don't forget to wind that escapement rubber! •

Hannan.... *Continued from page 47*

gine, if I recall correctly, was an Ohlsson and Rice .60 with a homemade aluminum fan of about 5-inch diameter. The radio was a large box which sat on the ground, and the transmitter antenna was a large 'Y'-shaped device which stuck up on top. The control was a bicycle handle-grip on the end of a long cord with a push-button mounted in the end of it.

"The receiver had tubes, and employed relays and escapements to control the elevons. The fan and engine were mounted in a duct which had an inner diameter only slightly larger than the fan. The inside of the duct was airfoil-shaped and the fan-blade tips were at the airfoil's thickest point.

"We didn't have a hard surface from which to fly, nor did the model have wheels for that matter.

"A 12-year-old kid, (me), just couldn't run fast enough to launch that thing, although I tried many times. Our solution to the problem was to employ a device which resembles today's 'High-Start.' Just had to write and relate this little account to you, which brought back a small memory of my boyhood.

"A group of us now fly indoors every Saturday during the coldest part of Iowa's winter. I drive 140 miles (round trip) to participate, and enjoy every minute of it. I'm currently flying an I.M.S. Aeronca ¢K,' and a Peanut MiniMax I designed myself from my Dad's full-size plans (yes, at age 74, my dad has just finished a MiniMax ultralight plane)."

FLORIDA KEYS ROW MEET

Millard Wells, sponsor of the Second Annual Rise-Off-Water contest conducted in the Florida Plantation Key bay, reports that fifteen models were entered, ten of which managed successful water takeoffs. (If you've never tried this, you should; it is quite a challenge.) Among the entries was a scale Whitman Tailwind by "Mr. Insider," Dave Linstrum, which was nicely proxy-flown by Millard.

Judging, ably provided by Walt Everson, was scored on the basis of 10 points for charisma, 10 points for take-off, and 10 points for landing. Jody Miller won the non-scale event after an all night building session in his motel room. George Nunez was the winner in the scale division, flying a 24-inch-wingspan Aeronca "K" equipped with Bill Noonan-type floats.

The accent was purely on fun, with Jeanne Wells hosting morning coffee and Walt Everson providing a pizza party aboard his yacht. Plans are afoot for another such event during 1990.

Oh yes, one of the meet's highlights was what is thought to have been the world's first documented ROW takeoff by a Pistachio Scale model. While the tiny Lacey M-10 zoomed skyward and the spectators cheered, Pistachio Promoter "Doc" Martin, builder of the model, bowed deeply in the ankle-deep water.

THAT FLYING FLAPJACK

Noting our report about the Zimmerman-designed Chance Vought V-173 "Pancake" a couple of columns ago, recently retired Aerodynamicist/Hydrodynamicist/Modeler Bruce Carmichael mentioned having seen it in person: "I saw what at first looked to be a blimp hovering over the factory, but was told it was Boone Guyton, demonstrating the V-173's capabilities. I later saw it in the hangar and it was awesome to stand under it as it towered over you. An inspection panel on the belly was open so I poked my head in. Never saw so many spruce strips and gussets, all stabilized by diagonal-running cloth strips.

"Its designer, Charlie Zimmerman, returned to NASA after the demise of the XF5U-1. At the time of the Sputnik he was ordered into the space program, and after a six-month trial he wanted to go back to airplanes. He became known as the 'first man back from space.' "

AND SPEAKING OF SPACE

Florence Bakken favored us with an item from a Eugene, Oregon newspaper, which says that Pan American still has a waiting-list of people interested in making passenger trips to the moon. Originally inspired to offer reservations by an Australian journalist, Pan American World Airways never discontinued the idea, and now has a backlog of some 93,000 prospective passengers! Sounds as if the moon may eventually be as crowded as certain parts of earth.

HOW'S THAT AGAIN?

The Williams Brothers, manufacturers of, among other things, small pilots for model aircraft, received the following letter from a customer: "I recently purchased one of your scale Standard Pilots. Upon opening the package, I found that the goggles were missing. Would you please send me a new pair? The pilot's complaining about getting dust in his eyes."

But here's the remarkable part: the customer was Dr. Kenneth A. Kronick, of Culver City, California, an optometrist!

ERRATA DEPARTMENT

Gremlins at work in the column again. The "David Backer" quoted in our October Column is really David Baker (although in his English accent it sounds more like David Biker, and the town in Washington where the "No-Doc" scale meet is conducted should be spelled Snohomish, not Snowhomish, according to Friday Harbor resident, Clive Wienker. Ah well. . . .

MODELS GALORE

Michael Patti favored us with information regarding a most remarkable collection of static-scale models. Col. E.M. Gyerman, USAF Reserve, retired, has constructed some 400 1/72nd-scale models which he displays at various events. Mostly scratchbuilt, the unusual aspect of Col. Gyerman's armada is that he models not just a single example of a given aircraft type, but many variations. For example, he exhibits twelve different B-24 subtypes! Typically, he adds about twenty-five new models to his collection each year.

For information regarding the location of forthcoming exhibitions of these models, Col. Gyerman may be contacted at 316 McKinley Drive, Belleville, Illinois 62220.

THOUGHT FOR THE DAY

Joe Martin says: "Everyone I know who has built 'the perfect workshop,' has stopped building models!"

SIGN-OFF

We thought the sign posted atop a local water-softener firm seemed quite appropriate advice for model builders: "Good enough seldom is!" •

YAK 9 ..... *Continued from page 41*

polyurethane with 75% paint thinner. The latter can be the cheapest hardware store variety, which is thoroughly mixed with the clear polyurethane. Brush the mixture liberally onto the cardboard sheet and allow to dry for 48 hours. This adds no appreciable weight to the material and renders the cardboard completely waterproof. In addition, when you start to cut the treated cardboard, you will find that it is as crisp as wood and cuts sharply and cleanly.

FINISHING: Cardboard gives a solid surface with no open areas to cover and is non-porous. The easiest finishing method is to put on two coats of clear dope, sanding lightly between coats with #400 sandpaper, followed by three coats of color dope. However, a wide variety of finishing materials may be used on the cardboard. Coverings such as Solarfilm, MonoKote and vinyl paper can be used. With any of these, it is recommended that the surface not be doped, which will result in a better bond.

PAPER TAPE: All seams, joints and exposed edges of the model are covered with strips of gummed paper tape. Obtain a one inch wide roll from a stationary store. Simply cut a thin strip to length, dip it in water and smooth it over the seam.

CONSTRUCTION: Cut out all cardboard and wood parts using the template outlines. Be sure to note the direction of the corrugations. Score and fold cardboard parts as indicated on the plans.

EMPENNAGE: The fin, rudder, stabilizer, and elevator are each made from two pieces of 1/8-inch cardboard laminated together crossgrain to give 1/4-inch thick surfaces. Add a 1/8 x 1/4-inch balsa strip to the fin leading edge and round off. Add 1/8 x 1/4-inch balsa strips to the stabilizer leading and trailing edges and round off. Glue the elevators to the 1/4-inch dowel. Add 1/8 x 1/4-inch balsa strips to the remainder of the elevator leading edge and round off. Seal all raw edges with gummed paper tape. Hinge the elevators to the stabilizer with cloth hinges at four places.

WING: Make the wing spar by capping each 1/4-inch balsa spar half with a 1/4 x 1/4-inch spruce strip top and bottom. Join the spar halves together with 1/8-inch ply joiners front and rear at the centerline. Glue the 1/8-inch ply gear mount into each wing panel. Glue the right side of the wing spar onto the right-hand wing panel. Glue all cardboard ribs into the right wing. Add a cardboard doubler over the ply gear mount between ribs W3 and W4. Glue a one ounce weight to the right wing tip.

Glue the left wing panel to the left spar in a similar fashion. Add the ribs and gear doubler to the left wing. Apply glue to the top of the wing spar, the top of the ribs and the trailing edge of the wing. Fold the top wing surface down and pin securely in place until dry. Add the balsa tips to the wing. Make a line guide from 1/8-inch ply. Cut a slot in the left wing balsa tip and glue the line guide in place. Cover the trailing edge and all seams with gummed paper tape.

FUSELAGE: The fuselage sides are outlined with a triangular symbol on the drawing. Line the upper and lower edges of each fuselage side with 1/8 x 1/4-inch balsa strips, as shown in the fuselage side view. The strips are recessed 1/8 inch from the fuselage edges. Bevel the strips at the aft end of the fuselage so that the cardboard sides will come together. Add cardboard supports to each fuselage side above the fuel tank and below the bellcrank.

Make the firewall, C1, from 1/4-inch ply. Locate the mounting holes for a KM-40 motor mount on the face of C1. Drill the mounting holes and install blind mounting nuts on the back side of C1. Drill a hole in C1 for a fuel tubing exit. Line all four back edges of C1 with 1/2-inch triangular balsa for bracing.

Glue C1 to the right side of the fuselage. When dry, glue the left side of the fuselage to C1. Attach the fuel tank to the 1/8-inch ply support. The fuel tank may be attached to the support with rubber bands. Make a pushrod from 3/32-inch wire and 1/4-square spruce and attach it to the bellcrank along with the leadout wires. Install the tank and bellcrank assemblies by gluing the ply supports to the cardboard supports on the sides of the fuselage. Glue the fuselage sides together at the tail. Glue F1 and F2 in place to cover the top fuselage. Be sure to bring fuel tubing fill and overflow lines out during all covering operations. Cover the bottom fuselage with F3, F4, F5, and F6.

Add bulkheads A through H to the top fuselage, adding 1/8 x 1/4-inch stringers.

Cover bulkheads A through D with D1, which has been scored and folded. Cover bulkheads D and E with D2. Cover bulkheads E through H with D3. Add the three J bulkheads, with stringer, to the forward bottom fuselage and cover with D4.

The cowl is built-up from 1/2-inch balsa sheet as shown in the top and side views, and hollowed out. The top half has the 1/4-inch ply C2 glued to the front. The removable bottom half of the cowl has C3 glued to the front end. Sand, carve, and hollow the cowl to shape. Eighth-inch ply pieces are added to the inside of both the top and bottom halves at the cowl sides, as shown in the cowl top and side views. A blind nut installed on the inside of the top cowl ply and a 4-40 bolt through the bottom cowl ply form the cowl attach. The top half of the cowl is then permanently glued to the nose of the model. Test fit the engine in the cowl and drill mounting holes in the KM-40 mount. Use a shaft extension to give adequate spinner clearance. Cut holes in the cowl block for the cylinder head, exhaust and needle valve. Apply epoxy to the inside of cowl and front of firewall.

Glue the stabilizer to the fuselage. Add 1/2-inch triangular balsa to bottom of horizontal at fuselage intersection for bracing. Glue the fin to the fuselage. Add scrap balsa bracing between fin and stabilizer intersection and round off as shown in view C-C. Add the rudder to the fin with the trailing edge offset 1/2 inch to the outside of the flying circle.

Make the tailwheel gear from 3/32-inch diameter wire. Bend as shown, place on the 1/8-inch ply support, wrap with nylon thread and smear thread with glue. When dry, glue in place in the bottom fuselage cutout. Add scrap balsa wheel fairings. Make the main gear from 5/32-inch diameter wire as shown. Make gear fairings from 1/8-inch ply and attach to the gear with nylon gear clips. Attach the gear assemblies to the 1/8-inch ply supports in the bottom of the wing with nylon gear clips.

FINISHING: Now is the time to paint and trim the the model before final assembly. The color scheme is camouflage green and brown on the top surfaces with white undersurface. The lettering and insignia are made from Monokote. Make the canopy from thin plastic and epoxy to the fuselage. Outline the canopy with strips of black MonoKote. The aileron and flap outlines are also made of black MonoKote.

FINAL ASSEMBLY: Glue the wing to the fuselage. Make the airscoop from 1/4-inch balsa and glue to the bottom of the wing. Add balsa exhaust stacks to both sides of forward fuselage. Pass the leadout wires through the wingtip line guide and tie off. Attach the nylon control horn to the elevator and hookup the pushrod. Attach 3-3/4 inch diameter wheels to the main gear and a 1-1/2 inch diameter wheel to the tail gear. Attach a 11-6 prop and a 2-3/4 inch spinner to the engine. Your ship is now complete. Be sure to balance the model at the point shown on the plans.

If you have any comments, suggestions or questions concerning the cardboard Yak 9, please write to me at the following address: Chuck Felton, 19009 Laurel Park Road, Space 86, Compton, CA 90220. (213) 639-2711. •

ARFs ..... *Continued from page 45*

place. I especially liked the servo tray, as it fit precisely into the notched formers in the fuselage, and the servo openings were just perfect for my equipment. There was all the room in the world for the receiver and battery, and I found it a pleasure to do the radio installation. Another great touch was the ingenious plywood tray for the aileron servo. This fits beautifully into the wing and produces an almost flush mounted servo. The aileron hardware is just another example of first rate quality, and was complete in every detail.

The fuel tank was also supplied in a plastic bag, along with the clunk, stopper, metal tubing, and fuel line for the internal pickup. Normally, I throw away any fuel line that comes with a kit, but this one seemed to be really tough and flexible, so I decided to use it in the installation. I'm glad I did, as it is functioning perfectly after many flights. The tank is ten ounces in capacity, just about right for a .40 powered model, and the way it slipped into place was perfection itself. The neck of the tank is supported by the firewall, and the rear is

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held securely by a plywood bulkhead. Although not strictly necessary, I sealed the tank neck to the firewall with some clear silicone sealer, in addition to thoroughly fuel-proofing the tank and engine compartments with a thin coat of slow-setting epoxy.

After another two or three hours of enjoyable work, and I use the term "enjoyable" because I encountered no hitches and no poor fitting parts which needed correcting, the Skyward 40 stood completed on my Number Four work bench (I have a number of workbenches with multiple projects going on at once). The O.S. .40 FSR which I use as my standard test engine in .40 size airplanes, sat nestled comfortably in the nose, secured to the hefty wooden beam mounts. These are my favorite mounts, because it is my sincere contention that wood mounts transmit vibration least, glass mounts come in second, and metal mounts transmit the most vibration of all. Any other opinions out there? I'll be happy to listen to any reader comments on this subject. The exceptionally wide fuselage contained the electronics with plenty of room to spare, and not having to work in tight quarters added to the pure pleasure of assembling the Skyward 40.

A quick measurement and confirmation of the specifications showed that the model had a generous 63-inch wing span, with a wing area of 730 square inches. Though the manufacturer doesn't specify a weight, it tipped my scales at 5 lb. 8 oz., resulting in a comfortably light wing loading of 17.36 oz./sq. ft. With its flat-bottomed airfoil, I expected a very stable and responsive model, and the first flight proved that to be the case. A really notable feature of the constant chord wing was the sharp looking, red Horner wingtips. The manufacturer maintains these contribute to greater stability, and I have no reason to doubt that this is actually the case.

As it took off the ground on its initial flight, there were no surprises of any kind. The balance seemed just right, and this was achieved without the need of any ballast. All control surface throws were set exactly as recommended on the last page of the instructions, and this produced gentle and predictable responses in all maneuvers. As in most stable models, I found that increasing control surface throws and moving the balance point rearward could easily turn this model into a very snappy sport plane, and certainly the more powerful the engine used, the more exciting the performance will be. As it was, I enjoyed the way it went together, I was highly pleased with its appearance, and I found it to be an outstanding sport trainer. There is no doubt that one could use the Skyward 40 as a basic trainer, but it really shines in the hands of a pilot who is past the novice stage and ready to refine his flying skills.

Back at my word processor, I was sitting down to write about the Skyward 40 as the "ARF of The Year," when an even larger box arrived from Z-Planes, containing its latest model, the Skyward 60! My jaw dropped in disbelief, I cleared off workbench Number Four, and rolled up my sleeves. This version was an exact copy of the Skyward 40, so this time I didn't even need to look at the instructions, and the work went very, very quickly. Of course, the .60 sized model was larger, but I did expect to find some slight differences in the components and assembly procedure. No such differences were found, as the two models were identical except for one inconspicuous dissimilarity. The Skyward

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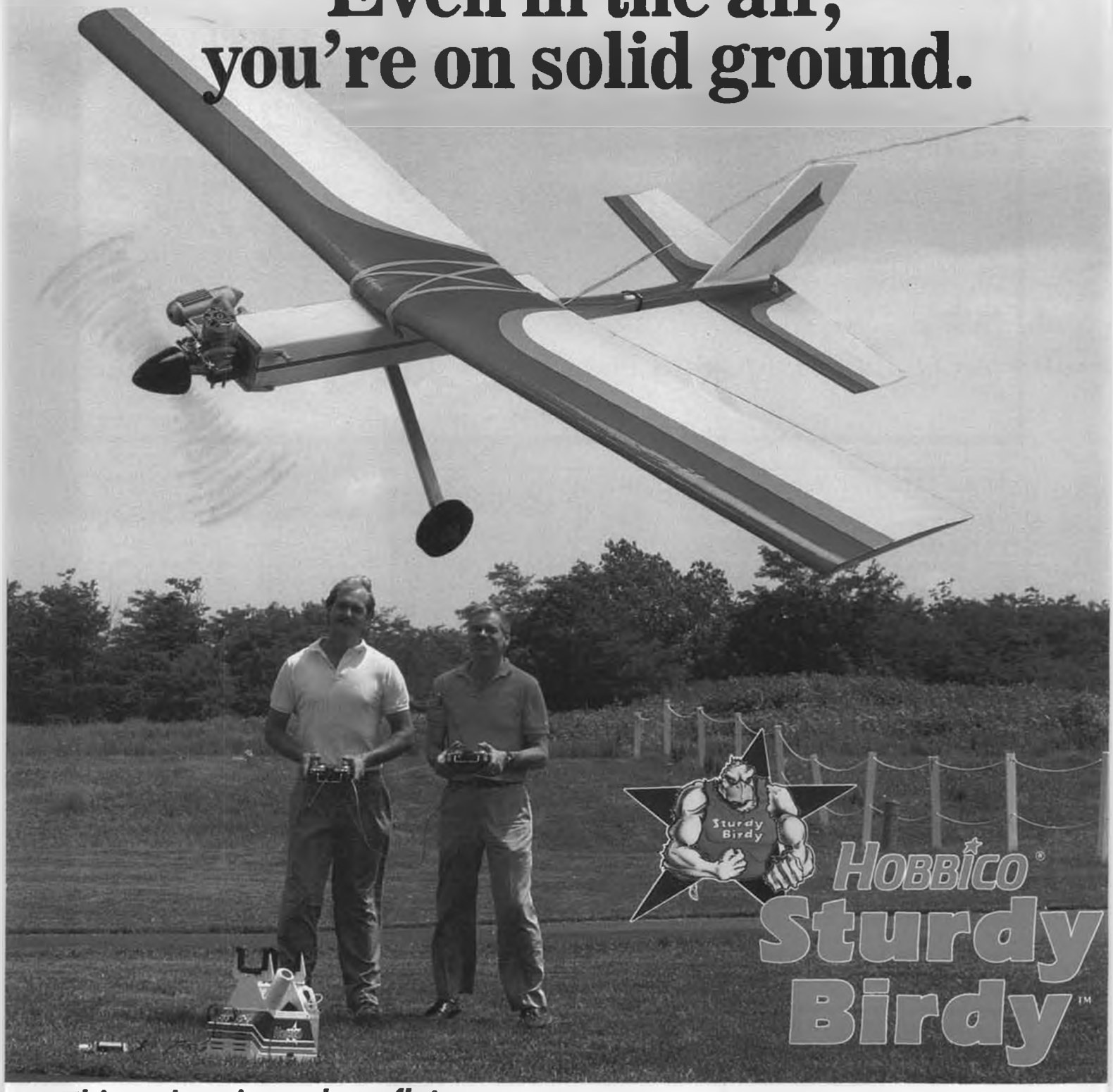

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Unlike the other tough trainer kits on the market, the Sturdy Birdy is built to do more than take a fall. It's made to fly! With a 53" wingspan, generous wing area, and light wing loading, the Sturdy Birdy is stable and predictable, and self-recovers from most in-flight mishaps.

And every inch of this trainer is so rugged that it will survive the worst punishment. From the molded foam wing and PVC fuselage to the aluminum main channel/tail boom, the Sturdy Birdy is tough. The chance for prop breakage is even minimized by extra-tall landing gear.

Requiring only 6-10 hours of assembly time with the included, photo-illustrated instructions, Hobbico's new Sturdy Birdy clears the way for successfully learning to fly a radio-control model. Even after takeoff, you're on solid ground.

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60 had a semi-symmetrical airfoil! While the model appeared quite capable of flying satisfactorily with a good strong two-cycle .40 engine, I took the manufacturer at his word and installed an O.S. .61 FSR ABC powerplant which I expected would really put this sizable airframe to the test. On completion, I checked the specifications of both models, and made a comparison chart (see elsewhere).

I was pleased to note that excellent Horner type wing tips were included on both models, though I wish that some consideration had been given to a bolt-down wing instead of the rubber band arrangement. The Skyward 60 in particular is a real attention getting airplane in an "important" size, and is really not deserving of being encumbered with greasy, ugly, rubber bands.

After a thorough hangar check, everything appeared to be in good order, so no time was wasted in getting over to the field for a test hop. Though the sky was a bit overcast, there was no wind at all, so preparations for flying commenced immediately. The usual radio range tests were carried out, and all control surfaces were checked for the tenth time to assure that they operated in the proper directions. The capacious tank was filled with Byron's sport fuel containing 5% nitro, and the O.S. .61 was primed, then hand-started on the first flip of the prop. After a few seconds of warming up, I taxied the Skyward 60 to the center of the runway, turned her due west, and started gradually feeding in throttle. By the time quarter throttle was achieved, the model had reached sufficient flying speed. Nevertheless, I continued to apply throttle until the engine was putting out maximum power. A slight pull on the elevator stick and this dandy airplane took off with real *authority!* This is a term we use in my flying circle for a no-nonsense model that goes where you want, and gets there immediately. What more can I say? I can't vouch for four-strokes or smaller two-strokes, but with a strong two-cycle Schneurle ported .60 engine, the Skyward 60 climbs straight up, rolling all the way, until you decide to level off. I really pulled out all the stops on this one, doing rolls immediately after takeoff, climbing out inverted, doing twenty or thirty consecutive outside loops, and flying knife edge maneuvers with almost no effort. Amazing! It kind of brightened up my whole summer of flying, and I really relish zooming around flat out, dazzling the spectators.

Now, the very nicest part of all this is that the Skyward 60 also is just as outstanding at low speeds, floating in for feather-light landings every single time. The springy torsion bar landing gear seems to settle the airplane in without any bounce at all, though I am sure some credit must go to

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the cushioning effect of the large foam rubber wheels. Furthermore, when the wind finally did come up, it had virtually no effect on the flight performance, as the big model just sails along doing exactly what you tell it to do. I used the recommended control surface throws for the initial flights, and I was so satisfied with this airplane's flying ability that I saw no reason to alter them. However, I finally ended up with a substantial increase in the elevator throw, as I like to have plenty of surplus elevator control available for my landings.

So there we have it, a most unusual situation. The airplane I had first chosen as the ARF of the year gets knocked down to second place by an almost identical larger version from the very same manufacturer! One reason is that I firmly ascribe to the "bigger is better" school of thought, and the 73-inch wingspan with its semi-symmetrical wing section really impressed the heck out of me. However, the sparkling performance just had to give the edge to this fine ARF. Now, faithful readers, whether you opt for the Skyward 60 or the Skyward 40, you will be a most happy R/C flier. I just happen to lean toward bigger models when given the choice. And to cap this report, no sooner had I completed my evaluation of the Skyward 60 than along comes an announcement of the Skyward 25, just a little too late to compete for the title. Anyway, I'm having too much fun with my Skyward 60 and my Skyward 40. If you want one of these models, the cost is $134.99 for the 40 size, and $184.99 for the 60 size (with free shipping included) from Z-Planes, 1659 W. 98th Place, Crown Point, Indiana 46307, telephone (219)662-1355.

Well, it's a tough job, but as the saying goes, somebody has to do it, so I better head back out to the old flying strip and check out a couple of new airplanes. And speaking of models, let me know what you think of Danielle Stein, our gracious and lovely swimsuit model of the year. You can send her fan mail in care of me, Art Steinberg, 2267 Alta Vista Drive, Vista, CA 92084, telephone (619)726-6636. Please remember to include a stamped, self-addressed envelope for a personal reply. •

Byron ..... *Continued from page 30*

Steve Gooseman, and show team member Paul "Elmo" Edmunds, processed transmitters during the course of the week, and most looked good. Many of the PCM systems that were checked were operating in PPM mode and with the fail safe disabled. Perhaps it is time for some one (AMA?) to write an article explaining the difference between TRUE PCM and the term PCM as advertised by the radio manufacturers. This article should include the actual modulation used by each manufacturer and should be done in layman terms. This article, or paper, should be carried in all the model pubs, and sent to all AMA clubs. Right now, 99% of the R/C modelers do not understand what the AM, NBFM, PCM, PPM thing is all about and it would be nice to attempt to clear the air. I realize there have been articles on this subject in the past and that there is a video tape available. However, it would be nice to have a ready reference available to help one select a radio when the need arises.

ACE R/C's service manager, Steve "Goose" Gooseman, flew a Byron Christen Husky with their prototype microprocessor-controlled transmitter. The plane was flown several times during the week and the new transmitter appeared to perform very well.

As usual, there were some beautifully rendered scale models, most of which were flown regularly to the delight of all present. There were the usual number of hangar queens that show up each year but are never flown. Apparently, the owners

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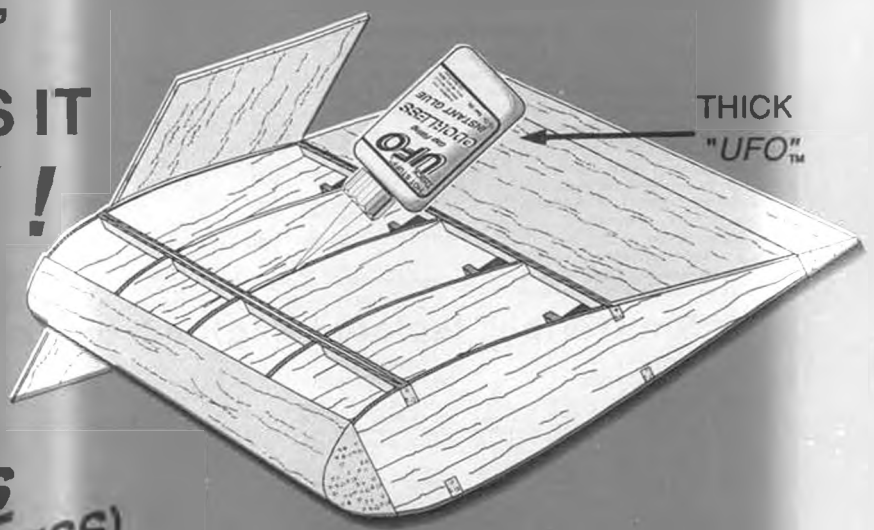

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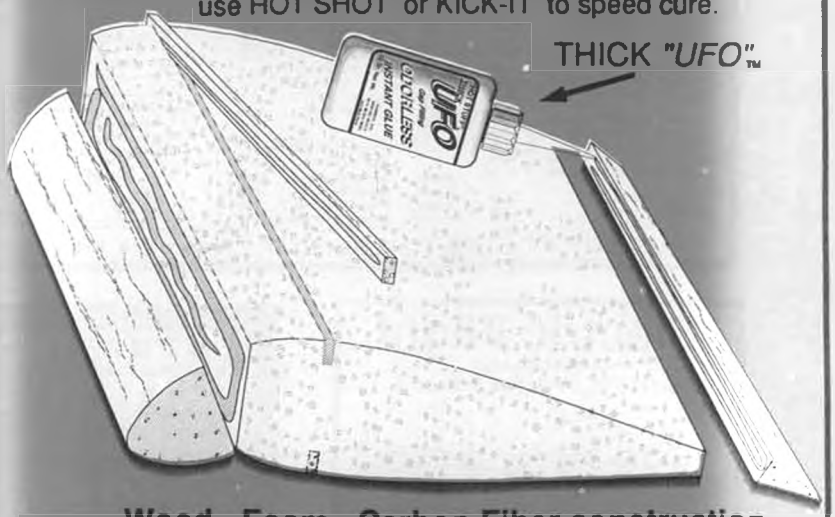

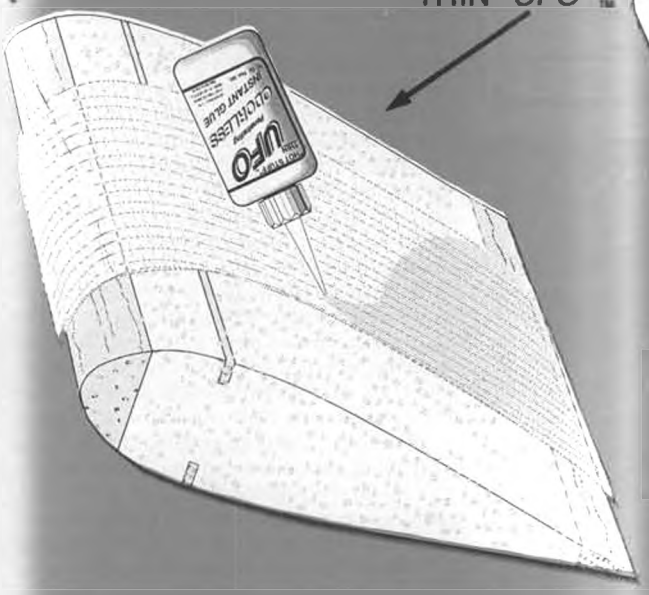

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just use them to get a pit pass for a good seat. This is a shame, because of the limited space available, there are a lot of modelers who would love to fly at the Expo but cannot because of these characters. This is a sad situation and I do not know of an equitable solution. Having been a member of the Striking Back Show Team for the past five years, I have seen and safety-inspected one certain airplane four of the past five years. The same plane and owner was here again this year and I have yet to see him fly the model!!!

There was one airplane that really turned this writer on, and that was Don Neil's fantastic 1/3-scale version of the Folkerts Racer. Wing span is five feet with a fuse length of seven feet. It is powered by a Sachs 3.2 engine with a 20x6-10 prop, enamel finish and it weighs 20 lbs. Don did not have the retracts installed, but even with the fixed gear, it was a beautiful sight to see in the air. It is FAST, yet it slows down nicely for landings. Don is the prolific designer and builder of the 1/3-scale Gee Bee R2 (?), Wedell Williams Special, and the exotic Hall Springfield Racer. All of these beauties are excellent, stable fliers and plans are available from Don.

The Byron Originals new Ryan ST-A was flown by Dean Copeland. This is a pretty plane, and is an excellent performer with an ST-3000. The kit will be available in both the in-line and radial engine version. I heard that the long awaited Seawind is scheduled for release soon. Perhaps in time for this winter's building season.

The Cloud Dancers from Florida were back again, wowing the spectators with their formation flying using the Byron Originals ducted fan F-15s. Their R/C sky divers are fun to watch and Don Muddiman blows everybody's mind with his wild Flying Machine, especially his landing approach where he takes the plane up as high as he can see it, shuts off the engine and then proceeds to dive the plane straight down, only pulling up when disaster seems certain and then landing with the plane coasting up to his feet. Don is an excellent pilot and he makes it look soooooo easy!

This is the time of year that we show team members approach with a love-hate feeling. We enjoy flying in the show (where else can you entertain thousands of spectators with an R/C scale model?), but hate to see any of our models damaged or destroyed during the course of the show. The show is time line choreographed and each team member has to be airborne at a given time, fly an assigned task, and land at a given time. Some of us fly more than one airplane, which means having to land, grab another Tx, fire up the plane and get airborne in the time allotted. Ken Bryan flies three: C-47, B-25, and the B-29. This takes real expertise to accomplish successfully and he does it every show! Naturally the adrenalin is pumping and many times caution is thrown to the wind and one tries to make a plane do something it is not capable of doing. During this time, Fred "Boom-Boom" Anderson is trying his darndest to shoot you down with his flack gun that fires explosive rounds. A hit by one of the flack rounds can be damaging and you could very possibly lose your plane. Fred nailed the C-47 during one of the Expo '88 shows that put holes through one of the flaps. He got me at one of the shows in '86 and blew a three-inch diameter hole in the bottom of my P-47 fuselage just aft of the wing trailing edge. Fortunately it didn't hit any of the vital parts.

There is another hazard and that is the resulting fireballs from the bomb explosions. Fly through one of those, my friend, and you never know what is going to come out the other side! On several occasions' the finish has been blistered and the planes covered with soot. Last year, team member Lynn Jorgensen flew his P-51 through a fireball which melted the covering material from his control surfaces. Fortunately, Lynn was able to get his plane down in one piece. The heat and concussion from the explosions will toss the planes around, so the pilots have to be constantly on their toes. Last year we had a mid-air collision between two of the three B-25s because of the low visibility caused by the smoke from the explosions. Ken Bryan was able to save his, but Ken Bundt had no chance at all because the collision placed the plane into a non-recoverable attitude. A new B-25 was built during the winter for this year's show and is painted a beautiful two-tone blue. Needless to say, it really stands out from the drab war-time colors of the other planes in the show. Because of the intense action, each team member has to put com-

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plete trust in his own spotter as well as the other team members flying abilities. One just doesn't dare take his eyes off his plane.

The show team members do not get paid and they have to take vacation from their regular jobs. The models and equipment are furnished by Expo. However, each team member has to build and maintain the models as well as keep the radio equipment in working order. Because it is a five-day show, it is required that each team member have at least one back-up plane and preferably three. It requires a tremendous amount of time and effort to accomplish this. After the show, the models are inspected for damage, and if repairable, made ready for the next day. If you have been lucky and sustained no damage, then it is party time! However, if not, you can count on spending the evening doing repair work. Length of time depending on the amount of damage. Of course, if the damage is too great, then you revert to your back-up model. If you have run out of back-up models, then you have no recourse but to work as long as necessary in order have a plane ready for the next show. In addition to flying in the show you are expected to fly and demonstrate the numerous factory models throughout each day. This isn't too bad, 'cause if you have a problem here, then a Byron Originals employee can be called upon for help. (If you can find one that isn't up to his ears with other duties.) Even though being a show team member is a lot of work, and a lot is expected of you, it is something that I look forward to each year, and I know the others do or they wouldn't keep coming back. It may sound a bit corny, but to me it is a great honor to be a part of Aviation Expo, and I'm looking forward to flying and participating in Expo '90, scheduled August 8, 9, 10, 11 and 12.

On Saturday, August 12, 1989, the Byron Originals 1/5-scale B-29 "Double Exposure" crashed and was destroyed shortly after take-off. All four engines suddenly went to idle for a couple of seconds, back to full power than back to idle. The aircraft then went down in a field approximately one half mile east of the Striking Back set. Probable cause of the crash had not been determined when I left Ida Grove the following Tuesday. This was a magnificent plane to see in flight and for those of you who were not fortunate to have seen it fly . . . cheer up, Byron's 1/5th scale B-17 that was on display during Expo '89 will be ready for action at Expo '90!

IT'S ABOUT TIME . . . Byron Godberson was awarded the Academy of Model Aeronautics "Distinguished Service Award" for his many accomplishments in the model industry. Byron, with his endless enthusiasm, expertise, dedication, and innovations, has brought R/C model aviation to the forefront of public awareness and out of the "toys for grown boys" attitude. His

Aviation Expo draws thousands of spectators daily. On Saturday, there was an estimated crowd of between 10,000 to 20,000, which shows the tremendous amount of publicity that has been generated by this exposition.

I know that I have missed mentioning a lot of the activities such as the daily modeling seminars, etc., but this show is growing to a size where it is impossible to cover in one edition. The answer to this is to attend the show in person. Words and pictures cannot do it justice. Start making plans right now and we will see you in Ida Grove next August! •

Plug Sparks *Continued from page 35*

the size of the model and engine used in comparison to the size of Henry Struck's.

On that basis, this writer drew up a 78-inch version (1.3X of magazine plan) and proceeded to cut out parts but not in time for the NFFS Nostalgia Champs. Upon meeting Armstead, George immediately pulled out his version of the Connecticut Yankee as seen in Photo No. 3.

Seems like George had found out that Henry Struck still had the original tracings and lent them to Armstead. George was proudly showing this to one and all. The writer exacted a promise from Armstead to send a copy. Having received same, the major difference between the original plan and the redraw is an 80-inch wingspan. Some changes are in order!

Lest we be accused of ignoring the O/T F/F end of things, this columnist was able to pick up a photo (No. 4) of models by Hale Wallace. Seen are some excellently built models, a So Long and a Zipper. These shots, taken on the runway (where everyone parked), shows the high degree of fidelity so prevalently found in old timers; i.e., silk, dope, trim, etc. Actually, Hale needs no introduction as he previously was into flying scale with all the master craftsmanship required for that event.

SAM ACTIVITIES

Sweden

One of the foremost contributors from Sweden, Sven Olov Linden, sends in Photo No. 5 showing his wife, Violet, holding a "Cirrus."

This was a 1937 design by Stark and Andersen that was built for a one-type contest. These type of meets seem to be gaining in popularity every year. Of interest is that this model won second at the June 4, 1989 contest.

England

Tony Penhall, 62 Gordon Rd., Little Paxton, Cambridgeshire, England PE19 4NB, writes to send in Photo No. 6 showing an English design known as the "Skyrocket." Tony writes for *Radio Control Model World* and feels our basic interests lie on the same line. Tony sends this report:

"My father, E.G. Penhall, flew here in England during the late pre-WWII era when I was nothing more than a twinkle in his eye. He flew three models before joining the RAF with the resultant posting to the Middle East for the duration.

"I have photos of the good-performing model that my dad flew at the Hampshire Southern Counties Challenge Cup held on July 5, 1938 at the Gosport Aerodrome located on the south coast near Portsmouth. Competing with eleven other modelers on a very windy day, EGP won by a narrow margin. Dad used a 90-inch "Skyrocket," designed by A.E. Brooks, powered with a now very rare 18cc Comet engine. The trophy, which was in the family until the late seventies, vanished much to my regret as it was a prestige event.

"Not knowing the model design, I decided to find out. During 1976, I was able to obtain permission to look through the *Aeromodeller* files in Hemel Hempstead, Herts. It took me most of the afternoon to

locate details of the events that Dad had entered. During this search, I suddenly realized Dad was quite an accomplished flier. Digging deeper, I found he built Col. C.E. Bowden's 'Blue Dragon' followed by the Brooks 'Skyrocket.'

"I was determined to draw and build this model. My replica first flew in 1977 with a Bunch engine (the very first ignition engine I ever owned). The model flew quite well but was underpowered. I eventually came to own a Brown Jr., Model D that has proved to give satisfactory flights time after time."

Tony goes on to say he has since built other old timer English designs. The most outstanding was a 52 inch C.E. Bowden 1936 design known as the P.L.W. No. 5 (Petrol Low Wing No. 5). Tony welcomes one and all to write him at the above address as he does have ten plans of old English designs available.

Australia

We have been receiving photos like mad from SAM 1788, Australia, mostly from Colin Borthwick, Basil Healy, and Trevor Boundy. To take some of the pressure off this writer, we offer the following:

Photo No. 7, showing a Berryloid Winner as designed by Harold Coovert at the MAAA Nationals, Amberly AFB. The model, built by John Sims of Dalby, flew very well, placing second in the Duration Event.

For those not familiar with Australian Texaco O/T rules, four (max) ten-minute flights out of five attempts are required. Then the fly off at the end of the meet. Would you believe 18 in the fly off?

John Quigley, last year's SAM V-P of SAM 1788, is seen in Photo No. 8 with a McCoy 60-powered Super Quaker. This is the very model Pond used at the Amberly Nationals. Quigley, having repaired the motor mounts, took out the SAITO 65 and replaced it with the hot McCoy 60. This shot was taken at the SAM Champs held in April at Canowindra. John is assisted by John Borrill. Although he didn't win, Quigley is always a threat to win.

AEROMODELLER VETERANS GATHERING

Here is a good idea that the Americans could take from the Australians. As pioneered by Bruce Abell, Airborne glider columnist, this idea was to invite all old timers to get together for an informal gathering and fun-fly.

The dinner that celebrates this occasion is also a vehicle to introduce and feature talks by famous aviation people. This year's guest was Nancy Bird-Walton, who kept the audience enthralled for forty minutes talking about the early days of Australian Aviation.

Nancy was the first woman to fly an airplane commercially when she was retained by the Bush Nursing Service in the early thirties. She completely captivated the

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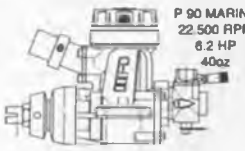

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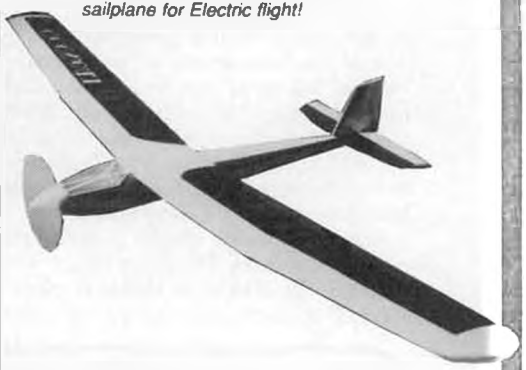

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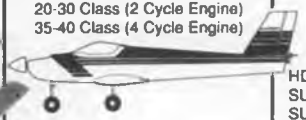

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audience as she regaled them with stories of flights to the isolated properties and settlements in the N.S.W. "outback." She was a true pioneer of Australian history!

Weather wise, things couldn't have been worse as it rained and rained for two months prior to the gathering. This was one of the most extended wet seasons in history! Matter of fact, Friday saw a downpour of one-and-a-half inches and washed out the creek crossing into the flying field!

Undaunted, Bruce and the boys rebuilt the crossing only to see more extensive rain during the following week.

Inasmuch as the dinner was the main event, we will skip the flying results which was strictly "FUN" in the first place. It seemed so appropriate to award trophies such as "Ouch Award," "Where Did It Go Cup," "Don't Do It Again Plaque," "Howdja Start This Engine," and finally, a "Beginner Award," the latter designed to bring in the newcomers.

Although the numbers were down due to inclement weather, the quality was voted to be exceptional. Bruce had such a good time, he didn't have time to take pictures. However, Photo No. 9 taken at the MAAA Nationals, Brisbane, Queensland, shows the typical group of veteran fliers.

Seen are Gordon Burford, Bruce Abell, Jack Dunkerton, John Pond (honorary Ozzie), and Jack Wass, while the photo was taken by another well known old timer, Arthur Gorrie. Claims are made the photo represents almost 300 years of modeling experience. How about that!!

CAAMA DOINGS

Under the dynamic leadership of Jack Bolton, 3433 Lyrac St., Oakton, Virginia 22124, the "Fun Contest I-89" turned out to be a huge success with over 30 entrants for a low-keyed meet where no one keeps score.

CAAMA (Capitol Area Antique Modelers Assn.) is a very diverse club featuring all forms of free flight: SAM, NFFS, AMA, FAI, or whatever pleases you. The fun-type contests are not intended to publish a list of winners. It is enough for the members to fly and possibly compete.

Photo No. 10 is an excellent example of the fun showing Bill Bell (with a beard now!) launching his Brown Jr. powered Trenton Terror. His partner, Bob Bissett, can be seen on his knees . . . praying?

As can be seen, the area at Culpepper, Virginia, is a good 2-3 minute field, something that is quite rare back East. In that respect, we couldn't resist Photo No. 11 of Hurst Bower's Dennyplane looking for all the world like a Fairchild 24, Warner-powered version. All he needs is to add the struts and the resemblance will be startling.

Based on the startling success of the first fun-fly, CAAMA has scheduled "Fun Contest II-89" for later in the year. A big crowd is anticipated.

Bolton also goes out on the limb to say that the use of auto-rudder and VIT setups are ruining the hobby. It is his claim that the amount of work, time, and money needed to successfully fly this type model will lead to the demise of free flight as we now know.

Bolton says the skills of fabricating all the gadgetry will lead modelers to simpler subjects such as Old Timer and Nostalgia Events. This should bring in a considerable amount of "new blood," something this writer is extremely interested in. Food for thought, men!

SAM ACTIVITIES

SAM 00

Here is a new club that is growing by leaps and bounds under the aegis of Howard Osegueda, president. Meetings are held the first Tuesday of each month at Howard's home, 7000 Utica St., Dublin, California 94568. Meetings are extremely informal with Howard acting as an emcee rather than president. Howard is extremely interesting to listen to. Matter of fact, he could qualify as a stand-up comedian in model stuff.

Howard has just completed a Henry Struck "Record Hound" as seen in Photo No. 12. Powered by a Super Cyclone, this model brings a sparkle to this columnist's eyes as it is a real performer. To-date, in three contests it has never placed out of the money.

For those who haven't built this type of model, the Record Hound is an exceptionally clean model and climbs like an arrow. Needless to say, the glide is also superlative. The color scheme, red, white, and blue, is out of this world with the lettering being applied by Dave Steinl, an artist of some repute. Matter of fact, this model forms the logo for their club T-shirt!

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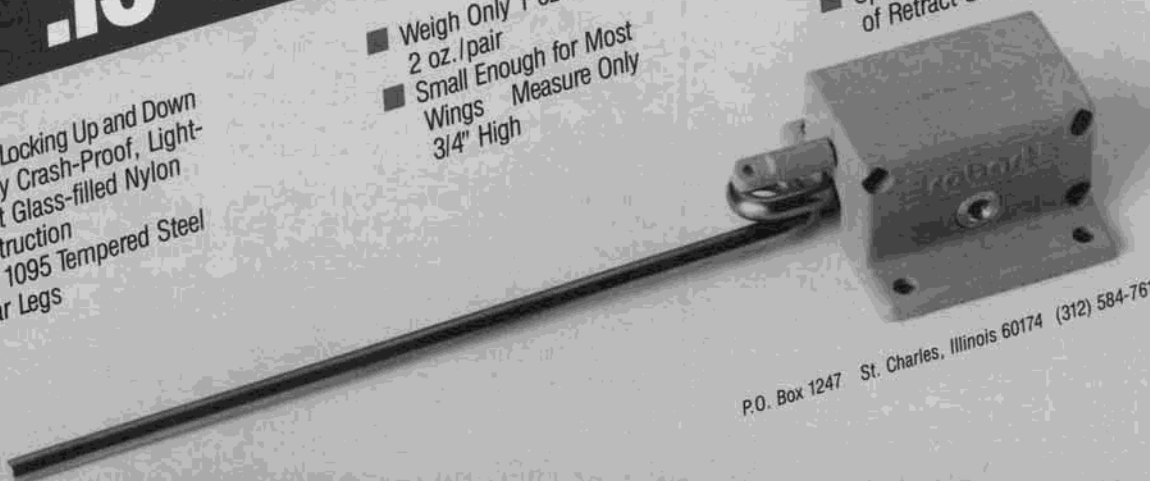

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READERS WRITE

Received two photos from Jack Finn, 368 Hampden Drive N.E., Cedar Rapids, Iowa 52402, showing him with a Comet Clipper MKI powered by a Baby Cyclone back in 1939. Jack was eleven years old then and this was his first gas model.

Photo No. 13 (the one we selected) is a shot 50 years later of Jack with a MKII Comet Clipper covered with yellow silk, trimmed in red and doped with Aerogloss. A Veco 19 is used for power.

Of course, with tall corn border to border, the model had to be R/C as there are no F/F fields. Jack has been building models since the fourth grade in all forms: F/F, C/L, R/C, etc. Being retired, he now plans to build a flock of old timer R/C models.

MORE R.W.

An unusual photo (No. 14) was received from Don Lefferts, P.O. Box 83, Ridgefield, Connecticut 06877, showing a 1937 Scientific Flea. This rubber model (as readily can be seen) is based on the old gas powered Red Zephyr model. Don says rather than use the ratchet device that made a motor noise, he installed an O.K. $C0_2$ engine.

This is strictly a fun model as it does not conform to being rubber powered nor is it allowed in the gas powered events. Perhaps one of these days SAM will start up an event for $C0_2$ powered old timers.

OBIT NOTICE

The wrap-up for this month's column is another obituary, this time noted old timer modeler, Walt Getsla. Walt suffered from surgery complications that strained the heart too much, dying on August 14, 1989 at the age of 76.

Walt will be remembered for the article SAM 35 did on him during his visit to England for one of the 50th Wakefield Contests. Walt was one of the Wakefield Team members in 1934. Getsla had anticipated the poor weather and lack of thermals. His gearing system worked well until one of the solder joints gave out. Replicas of this model have shown that Walt probably could have won or placed high that year.

Getsla was awarded the Carl Goldberg "Vital People" Award this year. He served as Oakland Cloud Duster Secretary for many years. He has participated in their indoor activities acting as Timer, Official, C.D., etc. The OCD boys are going to miss Walt Getsla. •

Tech. Stuff. . .*Continued from page 23*

rods have two more disadvantages. When water gets between the rod and the sheath the drag increases, and water will sometimes make the rod expand in length, which upsets the trim setting. I've used my share of flexible rods in both wings and fuselages, but rigid rods are now my choice, for solid crisp control, even if it means adding bellcranks.

Rigid rods must be straight. If there is any bow in the rod there will be a tendency for it to bow further when the control load puts it in compression, and to straighten out when there is a tensile load.

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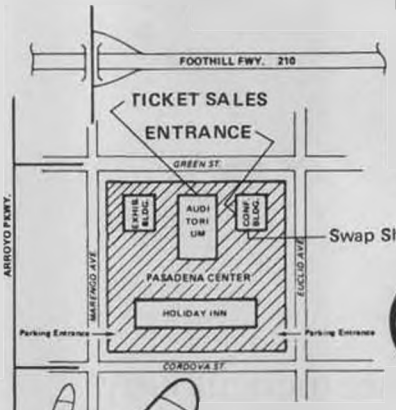

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If a rod has a bow in it, it can sometimes still be used if we put a support at the middle of the rod which is aligned so as to eliminate the bow. Just as bad as a bowed rod is the installation where the modeler puts offsets in the rod terminations, resulting in a "load path" that is not straight. In such a faulty design, the control loads will tend to bend the rod proper and degrade the control even if the unloaded rod is perfectly straight. Figure 1 shows several variations of this error, and correct ways to do it.

Note the sketch showing the J-shaped rod end instead of the more common "Z" bend. I prefer the "J" end because it is easier to bend and because it has less chance of fouling with a servo arm or cable. It is equally easy to install the servo arm on the rod with either style end. The J or Z end eliminates the need for a plastic keeper in conjunction with an L rod end. The Z or J requires that we remove the arm from the servo to install the rod, but it is more secure. I haven't used an L end and a keeper for years. Naturally we put the threaded clevis at the control-surface end of the rod, to permit easy adjustment in the field.

Rigid control rods have been made of many materials, including balsa, birch dowel, square spruce, fiberglass or carbon tubing, aluminum tubing, and music wire. The name of the game is to get as much stiffness as you can for the weight. The tubings are excellent for larger models.

For medium-size models, I like to use 1/16th steel wire for the push rod itself, supported at each fuselage bulkhead or wing rib. Bend the J termination for the servo end right in the 1/16th rod itself. Butt a short length of 2-56 threaded rod against the other end, for the control horn clevis, and silver solder them together. If you don't silver solder, lap the rod and the threaded rod for half an inch and soft solder them, or roughen the rod, bind them with thread and CA them.

I use 1/16th steel gas-welding rod instead of piano wire because it is easier to cut, bend, and solder. It is also cheaper. It is just as stiff as the piano wire but not as hard. Welding rod is available from any welding supply house in your yellow pages. Also get some 3/32 inch and some 1/8th inch welding rod while you are there. The stuff is very handy for making all kinds of model parts and tools.

The big bird boys sometimes use pull/pull control cables similar to the installation in full scale planes. This is a good system and it also has potential for being lighter. As there is no rod in compression, there can be no buckling, but the lines must be tight to prevent backlash.

The electrical conductivity of metal or carbon tubing pushrods or wire could in some cases reduce the radio range due to interference with the receiving antenna. I have never had range trouble, however, with metal elevator and rudder push rods, with the antenna inside the fuselage and parallel with the rods. The only time I have had range trouble was when I put the antenna inside a wing which had aluminum tubing leading and trailing edges and aluminum tubing upper and lower spars.

Ask for trouble hard enough and thou shalt receive.

FLUTTER

If our models fly fast enough they may experience control surface flutter, especially in the ailerons and sometimes in the elevator. If your plane is flying fine at low speed, then you open up the throttle or go into a dive and a buzzing sound suddenly comes from the plane, you have a case of flutter. The model has exceeded its flutter-onset velocity. Slow down *immediately!* It may already be too late, but often you will be able to fly normally and land without further flutter, *if* you keep the velocity down. You may not notice any change in the flight of the model while the flutter is

being heard, because the violently vibrating control surface(s) are deflecting equally in both directions from the trim position, so there is little or no change in average trim.

I say "often" you can get it down safely, *if you slow down now,* but not always. The destructive forces during flutter are huge. Hinges may be ripped out, control horns torn off, clevis pins sheared, push rods broken, and servo gears stripped. There will be at least one failure in a matter of seconds if flutter is allowed to continue. Throttle back! Also keep the glide path fairly shallow.

We won't get into aerodynamic flutter theory, but we should know the factors that produce it or make it worse, if we are to prevent or cure flutter in our models. Flexibility in the control system is usually the culprit. The control surfaces needs to be sufficiently rigid in torsion, the backlash in the control system must be low, and the push rods must be stiff. In other words, minimize springiness. The faster the model is going to fly, the stiffer the control systems must be, if they are not balanced.

The basic cause of flutter is lack of balance of control surfaces. Most control surfaces are completely unbalanced. That is, the weight is all aft of the hinge line. This produces flutter instability. One could compare it to an aft cg position producing pitch instability of the airplane. A control surface which is balanced ahead of the hinge line is stable and will not flutter. So a case of flutter is usually most easily cured by balancing the offending control surface.

If the hinge line is well aft of the leading edge of the control surface, or if a portion of the surface extends forward for aerodynamic balance, the forward portion may be weighted so the surface balances on or ahead of the hinge line. With conventional control surfaces the only way to balance them is with an arm extending forward from the surface and a weight on the end of the arm. (See Figure 2.)

A number of arms and weights distributed over the length of the control surface would be optimum, but normally a single arm and weight located at the center of the surface is entirely adequate. By the way, make this arm quite stiff, or the weight will stay still while the surface continues to flutter. Some of the welding rod you just bought is ideal for the arms. Hammer one end flat to assist in mounting it on the surface.

Elevator balance weights can sometimes be hidden inside the fuselage. Wings are usually too thin to hide aileron balance weights so they normally hang out in the breeze. Putting aileron weights inside the fuselage would be messy and might not help much because the torsional flexibility of the ailerons might let their outer ends flutter anyway. We could put slots in the wing for the aileron balance weights to swing through, but it doesn't seem to matter if we don't put the balance weight on the horizontal centerline of the surface. Simply orient the arm so the weight clears the wing surface at extreme aileron deflection.

If the arms and weights are placed on the bottom of the wing, they will show less, but recognize that the arm and weight make a hook which may snag in tall grass. Oh yes, don't try to figure out which aileron is fluttering and balance it only. In all probability both ailerons are fluttering. Balance them equally. Did you ever see only one tine of a tuning fork vibrate?

The more rigid the system on an unbalanced control surface, the higher the velocity required to induce flutter. Unfortunately, if we make the control surface more rigid we probably also make it heavier, making the mass unbalance problem worse. At any rate, avoid thin sheet-stock ailerons and elevators. Such control surfaces are light and maybe strong enough, but they are not stiff enough to prevent flutter in a fast model.

For a hot job, the wise thing is to build in balance weights at the time of construction, but if you risk it with unbalanced surfaces and flutter develops in flight, the weights can be easily retrofitted. I make the length of the arm about twice the chord of the control surface, so the weight to be added is small.

Frequently there will be so much hinge friction that even with the push rod removed, it will be impossible to tell when a surface is balanced. In this case, over balance. Nose-heavy surfaces will not flutter, and the excess weight added to the plane as a whole is negligible.

On a recent original design of mine I had small aileron balance weights already

on the model and was flying with no trouble until I installed a larger engine. The greater speed then produced aileron flutter in spite of the weights, showing that the weights were too small. The ailerons were still tail heavy. I increased the size of the weights and it is now flutter free at full bore.

WING TORSION

A bit related to flutter is the problem of insufficient torsional rigidity in our wings. (My wife says I don't have any wings, because I'm not an angel.) Structural engineers speak of aeroelastic deflections in an airplane. For instance, the pitching moment on a wing in flight will cause the wing to twist slightly. If the wing was properly designed this twist is so small as to be of no consequence. But, if torsional stiffness wasn't considered in the design and construction, and the plane is a fast one, there may be a major problem.

In some cases a "soft" wing will twist at high speed in such a way as to make the plane unstable. In other cases we may get "aileron reversal." Here the plane usually acts normally at low speeds, but responds strangely at high speed. When the ailerons are deflected during high speed flight, the forces which are imposed on the wing by the ailerons twist the wing so that the angle of attack is increased on the wing panel with the up aileron, and decreased on the panel with the down aileron. As you can visualize, the roll force generated by the twisted wing is opposite to the roll force from the deflected ailerons.

These opposite forces may approximately cancel out at high speed, so aileron effectiveness just disappears. If the wing has even less torsional rigidity, the differential in the angle of attack between the wing panels will cause a greater roll moment than the ailerons. Now it rolls opposite to what we command.

The cure for this intolerable condition is to build a stiffer wing, or to fix the wimpy one. Model and full scale designers have known for the better part of a century, that the lightest and easiest way to build a torsionally-stiff wing is to sheet or "box in" the forward part of the wing from the leading edge to the main spar, the so called "D section." Sheeting the entire wing over a foam core, as in most R/C wings these days, of course also produces excellent torsional rigidity.

Making a D-section wing takes a little longer, and it weighs a little more than a built-up wing with no sheeting, so I have tried to sneak by without it on several of my designs, and sometimes regretted it. I just finished D-section sheeting an old wing that developed aileron reversal at high speed. While I was about it I ran some torsion tests and got the following data for us:

The wing is 66 inch span and 13 inch chord, and is used on a seven-pound airplane powered by a schneurle .60. The wing without sheeting, as originally covered with fabric, had a torsional stiffness of 50 ounce-inches per degree of twist on each panel. When I took the fabric off, the bare frame tested only 16 oz. in./degree. When 1/32nd balsa D-sheeting was applied, the torsional stiffness went up to 160 oz. in./degree. I then recovered the wing with Micafilm. The final stiffness is 380 oz. in./degree! Needless to say, it no longer develops aileron reversal. I will talk about Micafilm some day. Good stuff!

By the way, to be effective, a shear web must be used on a D-section wing. A "C" section has almost no torsional rigidity. A closed box will give not only torsional rigidity but a much stronger spar for its weight.

MODEL SUPPLY SOURCES

I am in the habit of dealing with both my local hobby shop, and with mail order companies. Ken Hunter's R/C Model Shop in Bellevue, Washington, always gives me excellent service. So do some of the mail order houses, such as Tower. I had a recent problem with another mail order house. I placed an order with them for a Fox engine. They cashed my check promptly.

After a month without hearing from them, I phoned. I phoned again after another month, and again after the third month. In each case the response was, "I'm sorry, that is one of the items we have trouble getting. We don't know when it will be in." Meanwhile, they advertised the same Fox engine in the next three issues RCM just as though they had them to sell. "Our advertising copy has to be in to the magazine months ahead." I assumed that the items advertised are all in stock, even though the small print at the bottom

of the page says, "Availability, specifications and prices subject to change without notice." Some of my assumptions are false.

I finally requested my money back, which I received promptly. If I thought this particular company was unique in advertising unavailable items and in failing to notify the customer of the status of the order, I would identify it for you, but I suspect this is fairly common practice. Beware. Check availability by phone first.

I am getting an increasing number of queries as to whether this column is in book form, requests for back issues of the column, etc. *Model Builder* tells me that they can sell you back issues of the magazine for $4.00 each, postpaid. I do intend to have the column published in book form, but it probably won't be available for a couple of years. In the meantime, as a service to recent readers, I will mail individual back copies of MD&TS for $3.00 postpaid, or a complete set of the series, from its beginning in June 1988 to date, for $25.00 postpaid. This will include the text, figures, a table of contents, and a cover.

Remember, designing is more than planning the color scheme. Francis Reynolds, 3060 W. Lake Sammamish Pkwy N., Redmond, WA 98052. SASE please. (206) 885-2647. •

Electronics. . *Continued from page 31*

winter, we always expect something unique, a clutch brake for rubber power, CO_2 motors, valves and tanks often of his own design; turbocharger experiments, to name a few.

"Relative to your column on SMAs, two or three years ago Russ Pribanic built an excellent kit of a biplane from Hunt Models in Dassel, Minnesota. He added CO_2 power instead of rubber and R/C using SMAs as control rods. The wingspan was perhaps 18 inches. It flew very well in that gymnasium . . . red and white, beautifully done, nice fat prop and chubby tires."

Didn't I tell you that if it was at all possible, somebody would figure out how to do it? The only thing left is for Bud to do some arm twisting (How big is this guy Pribanic, Bud?) and convince Mr. P to share the results of his experiments with us. To me, if he likes, or if it is something that is within the abilities of less than an electronics engineer to duplicate, I am sure *MB*, aka Bill Northrop, would accept a complete how-to article. *(Yes indeed. wcn)* I still think it is an interesting concept with many applications in modeling. How about as a dethermalizer? It seems to me you could cook the proper length of this stuff on the ground, remove the current as you launch, and at a predetermined time, after it has changed back to its normal state, could trigger the D/T device? Think about it!

Bud also neglected to mention he has been to New Zealand, and that we have a mutual friend. In my discussion of "Nitinol" (pronounced Night & All), one of the brand names for SMA, I mentioned that the name reminded me of a girl I knew down there. And Bud says in his letter, "beautifully done, nice fat prop and chubby tires." That's her all right, small world, isn't it?

I'VE TOLD YOU BEFORE that the nicest people in R/C-land read EC. The latest nice guy heard from is Robert Kleinstuber, of Lancaster, Pennsylvania, who writes:

"It seems that in the model magazines I am always reading 'Do not use toggle switches for R/C, use slide switches.' Well, as you can see, I am enclosing one that appears to me to be the answer to the R/C

modeler's prayer. Apparently a very good quality switch, with three gold plated contacts that may be wired in parallel. I'm also enclosing the catalog in which it appears."

Well, as stated, Bob sent along a sample of a nice switch made by CW Industries, a name I know of from my travels through the electronics component jungle. It is a 3PDT switch . . . more about that later . . . rated in the catalog at three amperes at 125VAC, certainly more than ample at the 4.8 volts in R/C applications. Admittedly, the switch is a little larger than normally seen in R/C equipment, being 11/16 inch wide with 1-1/8 inch mounting centers. But in spite of the size, or more correct, probably because of it, it is an ideal choice for making up high current switch assemblies for those big airplanes using servos by the dozen and running abnormally high currents, or for electric powered airplanes.

This is a quality switch, with many desirable features. It is listed as No. 7502, at a giveaway price of two for $1.00. The only fly in this particular bottle of ointment is that there is a $10 order minimum, so unless you have a lot of friends needing switches, you are going to be set with them for the rest of your R/C modeling life. Or maybe, you'll find other interesting things in the catalog, which includes everything from keyboards to transistors. The name of the company involved is R & D Electronics, 1224 Prospect Ave., Cleveland, Ohio 44115, (216)621-1121. I did call to confirm the current availability of this particular switch and to ask for a catalog newer than the one Bob sent, if one was available. A sweet sounding voice promised "Yes" in all cases . . . you are welcome to try YOUR luck!

NOW FOR THAT 3PDT BUSINESS! As in 3PDT switch! Switch catalogs are full of those "P" and "T" abbreviations, and can be confusing to the uninitiated, but at least they are industry standard abbreviations and not someone's pipe dream as I was talking about a few months ago. The "P" in this case stands for "Pole"; the output terminals of the switch, while "T" stands for "Throw"; the mechanical motion possible for a given switch. The combination of letters, and sometimes a number if the quantity is more than two, for which "S" for "Single" and a "D" signifying "Double" is used. The 3PDT above then stands for "Three Pole Double Throw," but let's go further back to the real basics of standard switch terminology.

The simplest of all switching requirements is that of turning on and off a single conductor, simply making and breaking of one set of contacts. Such a switch is used to turn on simple devices, such as a light, as seen in Sketch A, which is an actual schematic drawing, and in this case also denotes the physical action taking place inside the switch. Note that the switch has one moveable part, i.e., one pole, and though it moves into two positions, only one of them is live, one throw. In the vernacular, this is a SPST (Single Pole, Single Throw), probably

the most common, most used of all switches.

Lets expand on this basic idea to use a single switch to select one of two lights, Sketch B. Note that we still have the single moveable part, the one pole, however instead of having an inactive position, it makes contact in both of them. It is still a SP switch, but it has now become a DT (Double Throw) version. Note that in position 1 of the switch, light 1 is lighted, while in position 2, the switch turns on light 2. Only one of them is or can be on at a time with this particular switch.

From here on the switch designation scheme should become fairly obvious, as the number of poles or throws are increased, with the many possible combinations, the letters and ultimately the numbers are changed to denote the switching action. Schematic-wise, things often change a bit in order to keep drawings clear and easy to follow. The SPDT switch is often seen drawn as in Sketch C, though obviously the action is the same. Whenever a DP switch is used to switch widely separated parts of the circuit, the individual sections are drawn with their associated circuitry, and the two (or more) poles are connected with dotted lines to indicate a mechanical linkage and simultaneous operation. In such instances, the switch sections are labeled as shown, S1 being the first switch in the schematic, composed of sections A and B.

Now for the physical side. No, we're not going back to that girl in New Zealand, we're still on the subject of switches! Most of them that we R/Cers are exposed to are the toggle, slide, and pushbutton switches, per those sketches. But these are only the tip of the iceberg, they also come in rotary styles, with as many as 24 positions. For special applications, rotary switches are often seen ganged into monstrous multi-poled, multi-position arrays. There are switches with rocker actuators, and some with paddles, and for security purposes, those that work with a key. And within each family, there are variations, such as toggles with short or long actuators, round or flat actuators, and those that you have to pull up on to switch positions. The simple pushbutton too, can complicate your life, being available as Normally Open (NO), or Normally Closed (NC), meaning that the NO type will complete a circuit when you push it, such as to turn ON the light in our original circuit. The NC switch in that circuit would keep the light ON at all times, until you pushed the switch, at which time it would open the contacts and kill the light.

In the pushbutton series, there is also the Push On - Push Off types, in which the contacts alternate from open to closed each time the switch is pressed, without the necessity of keeping it depressed.

I think you get the idea, there is just one more point to cover, the Micro-Switch. Basically, this name is erroneously applied to all usually small flat switches which are actuated by a very small force on a small protruding head, though sometimes an integral lever is the actuator, in turn applying pressure to the head. We have here a NiCad/NiCd, refrigerator/frigidaire-type of situation, in that while a lot of these types of switches are in fact manufactured by the Microswitch Company, along with many other types of switches that they make, there are many other makes of such switches, generally referred to by their makers as snap-action switches.

Electrical characteristics. Well yes, as any other electronic component, switches have their ratings. Sometimes, these ratings are engraved on the side of the switch, at other times you will have to resort to the maker's literature, but in all cases, maximum current and voltage figures are to be found. These parameters are the maximums under which that particular switch can work at its expected life. Except for mechanical failures, the only enemy a switch has is internal arcing, which is greatly accelerated at higher than recommended currents, and voltages which will often cause premature failure. In most cases, switches are rated at 125 volts AC, which used to be the most required rating at one time. However, that has changed with the almost complete takeover of low-voltage DC powered solid-state electronics, but few switches are rated for those conditions.

This fact is probably a problem to the engineers and designers; for our purpose it is perfectly safe to assume that a part rated at 1A 125VAC is going to be completely reliable at five or ten volts at a couple of hundred mils. What we do have to consider is contact resistance, and mechanical reliability. At the relatively low power levels involved, we can not afford much loss, and a high resistance switch can easily be the cause of those funnies we all experience from time to time. Paralleling switch contacts is one way around this, and you will find that most better quality R/C equipment in use today does exactly that with a DPDT switch. Refer to Sketch E, in which we have used Robert's 3PDT switch. Notice that only the positive battery lead is switched, in this case between the charger on one side, and the receiver/servos on the other. The negative lead is common and simply goes through the switch. The same thing is done commercially, with the exception of the use of a double pole switch.

The use of the ganged contacts also as-

sures added mechanical integrity; there is less chance of multiple contacts getting dirty or becoming intermittent. As Robert stated, the use of slide switches is always recommended over toggles, as the latter depend only on pressure of two points for continued circuit contact, while the slide switch uses metal fingers that slide over a fixed element. This sliding action exerts a cleaning and polishing action every time the switch is actuated, adding to the reliability of the switch.

Stay away from other than slide switches, the more expensive the better. Consider that feature when choosing your R/C equipment; do all switches operate smoothly and positively. Poor switch action kills as many airplanes as that other great killer, pilot error! A few months ago I read a recommendation to replace the slide switch with a switching audio jack, of the type you find on small radios in which plugging in headsets cuts off the internal speaker. In this case, the plug was inserted to turn the R/C system off, removed for flight. Bad, bad, bad! The switching elements in those jacks are extremely poor at best, minimal contact area and pressure, and with none of the self-cleaning action discussed. Fortunately this appeared in a glider column, and might not have caused the demise of too many models as gliders do not have the vibration levels of engine powered craft. But I can safely state that some of the gliders that were equipped with this device crashed because of it, and MOST engine airplanes that used it did also. Yeech!

All of this just scratches the surface on the subject of the many switches and switch types on the market, but at least now you won't be completely lost when you run into SPDT, et al. Tell me, did it turn you on??? •

WAG ..... *Continued from page 15*

approach that was a little off-center, I would hit right or left rudder when the plane was about five feet off the deck (rudder response was slower in the glide than under power). When the model was

about 12 to 18 inches from touchdown and centered on the landing strip, I released the rudder to neutral, then immediately punched in opposite rudder for just a moment. The result of those last two rudder applications was to increase the glide speed, which would lift the nose up into a perfect flare attitude as the wheels made contact. How sweet it was to see the expressions on the faces of the multi reed fliers who had elevator control available, but couldn't do any better!

Incidentally, Howard McEntee, the R/C editor for *Air Trails'*, and writer of the "Everything Under Control" column, dubbed our model the "WAG Without Drag" when its photo was published in the magazine.

One other bit of history on the original WAG. In 1956, Walt developed his famed TTPW radio system, which was one of the first, if not THE first multi-proportional control system. The WAG was selected to be the test bed for this system, which was later published in *Air Trails* for radio experimenters to build their own, and Ace Radio Control offered it in kit form. The TTPW actually stood for Two Tone Pulse Width, but being a little tricky for modelers who weren't too familiar with the intricacies of electronics, the TTPW soon became better known as "Too Tough to Piddle With!"

Our WAG started out as rudder-only with an exhaust slide baffle for throttle control, operated . . . most of the time . . . by Citizen-Ship radio on the little-used 465 mHz frequency (no longer available for R/C). Next, a Kraft single-channel radio, built from an Ace R/C kit, was used, along with two cascaded Bonner Varicomp escapements, giving right and left rudder, and up and down elevator, plus a three-position O.S. escapement for throttle. Yes, Matilda, all of that from a single-channel radio . . . but it took some fancy button-pushing! That was followed still later by Galloping Ghost (proportional and simultaneous rudder and elevator using a crank system that you had to see to believe), with throttle operation from a P.O.D. (Pulse Omission Detector), both of which are a whole story in themselves. Right now I can't recall what finally became of the WAG W/O DRAG, but it had to be just about my most favorite model of that vintage period, and together we must have logged at least several hundred flights in the various control configurations, with only minor, easily repaired mishaps. It may also have been the first ship I flew on six meters when I passed the Technicians License exam (just barely) in 1962.

Construction of the WAG is pretty much conventional. There are a few notes on the plan, with particular reference to following the fuselage construction sequence shown in the sketches, except that somewhere between Steps 2 and 3, it should mention that you build the main crutch, out of 1/4 x 1/2 hard balsa. You can hardly do without it! If you wish to build our W/O Drag version, simply add two 1/4 square longerons to the bottom, running them back to the leading edge of the stab and gluing them to the crutch at that point. Add ap-

propriate 1/8 x 3/8 braces and crosspieces, bowing the longerons slightly toward the front so they fair into the solid block under the nose. You can make a 1/8-inch bulkhead, using the pattern for the 1/4-inch ply main gear mounting bulkhead and cutting notches for the longerons.

It is very important to follow the correct procedure for building the washout into the wing tips. Simply build a rectangular panel, then cut away the tapered trailing edge. Finally, trim the bottom edges of the outer four ribs to fair into the trailing edge, adding the small bottom wedge to fill the gap from the ends of the ribs.

Note that the elevator and rudder trailing edges are left blunt and squared off. This was done purposely to improve control response without requiring much deflection. It was almost overkill, as Walt explains when he applied rudder on the first test hop!

Our ship was covered with light green nylon and clear doped with thinned butyrate. The trim was white, with black pinstriping. It showed up well in the sky, with or without cloud cover, and the white trim made it easier to find that one time we forgot to wind the escapement rubber and the ship took off on its own for a three-day vacation! •

Soaring.... *Continued from page 39*

The AS-WS12 has a 15.3% thick airfoil from the root out to Wil's modified tip panels. From this junction, the airfoil tapers in thickness from 15.3% down to 12% at the tip. Will suggests that perhaps a model's airfoils could taper from 8% down to 6%. (I think this might prove difficult to execute, strength-wise, unless carbon fiber spar caps and full width balsa shear webs are utilized. Better off sticking with 12 to 9% thick airfoils, is my thinking.)

HAND LAUNCH FLYING AROUND THE NATION.
FIRST STOP, THE NEW ENGLAND AREA

In the mailbag are a couple of letters from clubs which are holding R/C hand launch contests similar to the one I wrote up a couple of months back. The first one comes from Skip Williams of Elkton, Maryland. Skip writes:

"Dear Bill, here are some color photos. I hope you can use them. Do what ever you need to the write-up. We all read your articles regularly. Keep up the good work. Thanks, Skip."

"The Silent Knight Soaring Society is a group mostly from Delaware, some of us are from Maryland and Pennsylvania, but all have a prime interest in soaring. A year ago we held our first HLG meet called the 'Spring Fling.'

"Now, most of what you read on the HLG scene is which plane is the best, and its airfoil, and its overall performance, etc. . . . But what you get is only part of it. Hey, man, this is a meet for 'Spear Chuckers!'

"This year we had our second annual 'Spring Fling' on a flat school yard, and with no help from the weatherman, had an absolutely beautiful day for HLG. This meet is as simple and easy going as possible with two classes: 1.5 meter, and larger than 1.5 meter, which was sort of taken advantage of by many by adding half-inch tips to their 1.5 meter ships. Next year it will be 1.5 meter and 2 meter HLG.

"We allowed three rounds of HL for each class with a limit of 20 minutes each, and no limit on the number of tosses, but total only the three best times per round. The 1.5 meter class was also allowed two shots on a short hi-start with both times counting.

"Getting back to the 'Spear Chuckers,' Charles Fager is a quiet fellow, a very smooth flyer with sort of a thin, long-limbed figure similar to that of a baseball pitcher. He flew a Pivot. When you put all of these features together you have a winner, and that's what we had here. Charles won first place in both classes.

"Bill Brenchley and Bruce Miller are both similar in build and weight, and both fly (Bridi) Castaways. Bill is the taller with much additional experience in free-flight HLG. There were times on launch when one could hear wings flutter.

"Bruce is working in electronics, but was brought up working on the railroad, so he is in really good shape. Bill took second place with Bruce a close third. The spread on the next three places was only a few seconds.

"In the larger class, Bill Patton, tossing a Flit, was second only to Charles. Bill was seen charging after the plane, red-faced and dripping with sweat. He would pick it up and toss it again just barely giving the

timer enough time to record the previous flight. Stew Swanson ran a close third with his (Davey Systems) Ariel.

"Now for the planes. There were three (Bob Dodgson Designs) Pivots entered, one of which cartwheeled in, putting it out of contention early. One really good feature of the Pivot is its ability to cover lots of ground searching for lift, and a very smooth pilot such as Charles could take maximum advantage of this.

"The Castaways were there with good recovery after launch and good slow speed range, but the ability to keep them flying on step and not mushing really made a difference.

"The Ariel was good at covering ground and launch recovery. The Flit, which is a Woody Blanchard design, seemed to have the best climb at high speed and round over into slow flight, but still the need to keep on step to cover ground.

"Also seen here were: the small Buzz Waltz' Design Poquito Primero, a Larry Jolly Model Products Flinger (also an *MB* plan), Bridi's Tercel, and a Stylus from RCM plans. Any of these in the hands of a cool smooth 'Spear Chucker' could have won the meet. The planes have come to a state of the art where the real difference is the person doing the chuckin' and then holdin' her in there with a steady hand.

"Sailplane kits and goodies were donated by interested manufacturers like Airtronics, Top Flite, Pierce Aero, Ace R/C, Sig, and Cox. All the kits and goodies were given away in a raffle which helped pay for the greatest cost of the meet after trophies, the Port-a-Pottie.

"This big drawing climaxed the beautiful day and shortly afterward, the front moved in which the weatherman had been wishing for, and we moved out."

Sounds like a great time was had by all, Skip. Thanks for sharing it with us!

NEXT STOP, TEXAS:
HLG THE LONE STATE WAY!

Next we have a letter from Richard A. "Bud" Black of Richardson, Texas, who signs off his newsletter article by saying, "Good lift and keep your arm limber." Spoken like a true RCHLG'er!

"Dear Bill, enclosed please find our August newsletter containing my write-up of our Third Annual Southwest RCHLG Contest, and a few pictures from the event. Hope you can use any of it." *(We sure can! wrf)*

"Hopefully next year will produce more out-of-towners, but if we could get all of our locals (about 26 aircraft), we could have one heck of a contest. Sponsor participation was light, but it was about on par for past events.

"The enclosed pictures are (1) of the contestants and their aircraft, (2) the pilots meeting conducted by myself, (3) our junior flyer, Michael Gibson, being assisted by Jim Truitt, and (4) Carrol Moffatt's Poquito Primero coming in for a landing.

"I look forward to your monthly article as you seem to give more hand launch coverage than any other publication.

"Sincerely, Richard A. 'Bud' Black, Richardson, Texas."

What follows is Bud's newsletter article.

THIRD ANNUAL SOUTHWEST RCHLG CONTEST

With 14 contestants, we did improve our participation over last year. As usual, our out-of-town fliers were missing. Whether this was because the Cross Country contest was rescheduled to the following Sunday, they don't like the format of our contests, or for whatever reason, they were rather conspicuous by their absence.

We did have one out-of-towner, Michael Gibson, from Colleyville. He is a junior flyer and had a ball with his original design. I believe the foam wing was from a Cardinal. This was his first contest.

We will try again next year with the Fourth Annual Contest. The date will be July 8. We may move the contest from U.T.D. to Richland.

U.T.D. did get part of the field mowed, so we did have ample room. Gusty winds and very spotty thermals did much to keep the scores rather low.

In the 10 minute time slot events, high times were: Round 1 (longest flight wins): Henry Bostick with 1:33. Round 2 (5 minute max): Bob Whipple with 1:18. Round 3 (most 2 minute precision flights): Bob Whipple with 4:29 total for 5 flights.

Times in the 1, 3, and 5 minute precision were not much better. In the one minute only, Michael Gibson had a perfect flight (60 seconds, plus landing) for 66 points. Several went over one minute.

In the three minute precision, only Pancho Morris had a perfect flight of three minutes plus landing for a score of 198. Michael Gibson also hit three minutes but missed the landing. Several were within four seconds over or under.

In the five minute precision there were no perfect scores. Bill Masserang had 5:01 with no landing and Jim Truitt had 5:04 with no landing.

Speaking of spot landings, out of 84 flights, only 27 were within the 25 foot circle. Several made the circle only to have the wind flip them over.

Final Standings and ships flown were:

1. *Bob Whipple (4005) Tossette (plans from Jan/86 Model Builder)*
2. *Jim Truitt (3873) Flinger*
3. *Bill Masserang (3778) Wristocrat*
4. *Jack Hamilton (3740) Yellow Bird (a modified Lupperger BODST)*
5. *Hal Ussery (3504) Air Shark (a modified Flipper)*
6. *Mike Amundson (3279) Chuperosa*
7. *Henry Bostick (3274) Chuperosa*
8. *Pancho Morris (3209) Poquito Primero (modified from Buzz Waltz' kit)*
9. *Dan Doyle (3191) BODST*
10. *Chuck Fisher (3163) Flinger*
11. *Mark Hoffman (3059) Flinger*
12. *Bud Black (2843) Chuperosa and Wristocrat*
13. *Michael Gibson (2329) original design*
14. *Carrol Moffatt (2127) Poquito Primero*

Hard luck stories of the day: Carrol Moffatt whose lead wire on the battery broke, and Mark Hoffman (Murphy's Law: a tree will attract a glider!) Both would have finished much higher in the standings.

Many thanks to our sponsors. Without them we would not have much of a contest. They have supported us so let us see if we can support them.

They are: Ace R/C; Airtronics, Inc.; Al-Tec Products; Coverite; Culpepper Models; Dodgson Designs; Dynaflite; Flying Models Magazine; Carl Goldberg Models; Hobby Counter; Hobby Lobby International; Model Builder Magazine; R/C Modeler Magazine; Satellite City; S.R. Batteries; Inc.; Top Flite Models, Inc.; and Tower Hobbies. (Gee, that sounds great, Bud! -wrf)

A special thanks to Jack Hamilton for supplying the souvenir coffee mugs. And a special, special thanks to Tim Keifer for taking over the registration and keeping score. A point of interest: of all the local hobby shops, only the Hobby Counter was a sponsor.

All in all, it was a very good contest. Hope to see more contestants at the Fourth Annual Southwest RCHLG Contest next July.

Hey Bud, give me your announcement next year, and I'll try to squeeze it into a column. Give me at least three months warning. That goes for any of you CD's out there!

INCIDENTALLY, HLG INCIDENCE COMMENTS CONFIRMED

"Hey, Bill Forrey, I gobbled up every word of your hand launch article, September, 1989 *Model Builder*, like a hungry pup!

"When I was in dental school in the area in 1986, I was a member and flew with the ISS (Inland Soaring Society) at their HLG contest. I've been hooked on HLG ever

since.

"I just finished an Off the Ground Models Tantrum and am building a Midway Models Gnome HLG. The Tantrum suffered from the incidence problem you described, and I can't wait to get home to adjust it.

"Dentistry has taken me now to Arizona, a land where hobby shop owners do not believe stories about HLG. But widespread 'hat-sucking' thermal boomers keep me building 'little guys' and driving down the highway, eyes looking skyward, in spite of institutionalized disbelief.

"Thanks for your article. Good lift, Kevin Shuster"

F3B COMMENTARY: READERS WRITE IN

Normally, I stay away from my own personal commentary on "political" issues. However, as many of you may recall, I broke with tradition in my August 1989 column entitled: IS F3B STILL A VIABLE EVENT? In this section, I made some observations and comments in regard to the recent surge of interest among R/C soarings writers in "Sportsman F3B."

I only received *three* letters in reply from readers out there. This doesn't surprise me, because I believe most people just nodded in agreement as they read, and didn't bother to pick up pen and paper to say they agreed. Usually, it is the guys you OFFEND by what you say that write in. They are the ones with the motivation. Nevertheless, as you will see, the letters were almost totally in AGREEMENT with what I wrote.

In one letter, the first one following, I believe there was a misunderstanding. I believe the writer thought I was making EXCUSES for the poor showing of our national F3B teams. Not true. I was merely pointing out that the interpretation of FAI F3B rules and the judging by on-field and committee FAI jurors, are notably and demonstratively anti-US. (See the original article.) This makes international competition by some of our more inventive and original thinking F3B fliers extremely difficult at best.

Here is what readers have written in so far. First we hear from John Bitzberger:

"Holy Cow, Batman, them evil Europeans beat us at the ballot box, not in the air. B.S!!!!!!!!

"I was around in '85 where we beat ourselves before we even left for Australia and the rancor continued through '87. Heaven only knows what the excuse will be this year. But, I'm sure one will be found."

(I never denied our teams are typically every-man-for-himself. That is part of our national problem with F3B! As a nation, we are too spread out geographically to foster good teamwork. The 1989 team may have been the first F3B team since the first worlds in 1979 which had an actual team spirit. Those three guys, two from the same club, flew together regularly. -wrf)

"As far as I'm concerned the 'great winch war' is a side issue, and merely hides the real reason for the American lackluster performance in international competition of any kind, which is a distinct lack of a single-minded desire to be the best. *(I do not believe this is true of the US teams we have mustered so far. -wrf)* That demands sacrifice, and not everyone can make it.

"The financial outlay for F3B is less than $1000 including the radio, but you have to have talent, and like any competitive endeavor you have to be willing and able to devote time to developing your skills to an international level. Nobody said it was for everyone."

(Maybe HERE is the problem. The Sportsman F3B proponents ARE trying to make it more appealing to everyone without changing the basic structure of F3B. -wrf)

"Frankly, I'm a proponent of Sportsman F3B since I believe it will raise the overall skill level of the soaring population. It's been my observation that as soon as new members of a club start participating in contests given by their club, their skill level increases to at least a point where you don't have to have an instructor watching every move made by a novice. Those members who refuse to participate in club contests are the pilots who continuously have trouble developing their skills.

"As far as contest running is concerned, any kind of contest requires the participation of a lot of people from winch masters to landing judges to scorers. Somehow we

manage, though.

"I believe we Americans have an attitude problem. It's an attitude problem when we complain about the rules instead of figuring out how to best live within the rules and do our very best. It's an attitude problem when we go to a contest with a Gentle Lady and complain because the winners all flew Windsongs. It's a real attitude problem when we go to a contest and we either condone the complainers or chime in with their chorus.

"Have a good one and keep smiling, John Bitzberger, Walnut, California."

Next we have a letter from Bill Pettigrew, a former Canadian F3B team member:

"Dear Bill, I am writing to compliment you on your summary of F3B and the current state of the art, juxtaposed with a review of the 'new' F3J event introduced this spring.

"Your article in the August issue was the first I've read which presents the reality of F3B past and present, in a cool objective way.

"I was a member of that 1981 Canadian team at Sacramento which began the current winch wars. This was not to our credit, but was, and still is, extremely in keeping with the true nature of F3B competition. Any event which decides a world championship brings out the best and the worst in people . . . even Americans, I might add . . . but then the best and worst is often a matter of opinion. While we knew the probable negative direction we were taking F3B with the winch, none of us could have cared less as there was a world championship to win. Those who live by the sword, die by it, etc., etc., etc. We got what we deserved, a lot of press and little else. F3B is not unlike many other high-tech events. All aspects of auto racing are full of similar stories and history. It is the nature of the competitor . . . cut throat. That is why I think the utter simplicity of F3J (relatively speaking) will make it successful. I've watched F3J BARCS in England and it works. It's a lot like soccer football around the world. All you need is some grass, a ball and a couple of goal posts, but the complexity is endless.

"I've always enjoyed reading your columns. Keep them up and thanks.

"P.S. For the record, the winch concept was Dave Wright's—a standard 12V Ford motor driven by three Sears Diehards, i.e. 36V, through one(!) solenoid (yikes). The second motor was for relaunches.

"Bill Pettigrew, Montreal, Quebec, Canada."

Next we have a letter from Brian Molloy, Florissant, Missouri:

"Bill, after reading your August article addressing the current state of F3B, I thought that I would send you a copy of a letter I sent to Don Edberg in response to his 'Sportsman Class F3B' proposal (probably not what he wanted to hear but Tuff S).

"I couldn't agree more with your ob-

servations! A Sportsman Class only renames the problem and does not in any way address the real issues. Multi-task soaring is exciting and challenging, but as currently defined by FAI F3B, is not supportable at the grassroots level.

"Maybe our message would be acknowledged if the U.S. did not send teams or otherwise support F3B! Too overreactive or otherwise unsportsmanlike? I don't know. What else can be done? The consensus from the community is that what we have now is not acceptable.

"F3J sounds like an interesting concept except for the hand towing requirement. Bill, you know that after a short while some countries will be developing super-athletes to tow up their aircraft. Then there will be allegations of blood supercharging and also don't forget the expenses associated with steroid testing." *(It hasn't gone that far in England where F3J was developed 15 years ago! -wrf)*

"Maybe the best solution is to establish a specific definition for winch construction." *(Sounds like an F3B problem! -wrf)* "An international standard which identifies the motor by model number, the exact drum dimensions, battery voltage and capacity, etc., etc. I don't know the answer but we have to find one.

"I know you have a lot of mail to sort through so I'll sign off. Keep up the excellent work! Your article is my top source of soaring information.

"Almost forgot, if you have the space, can you repeat some of your specials like winch plans, vacuum bag techniques, airfoils, etc. New modelers would benefit and frankly, I could fill a couple of voids in my collection of your articles.

"Thanks and good lift. Brian Molloy, Mississippi Valley Soaring Association, Florissant, Missouri."

Thanks guys for your letters! I don't want to be dogmatic about any one hot-potato subject like F3B, so your comments are welcomed.

Anytime I can be of help finding past articles, give me a call and I'll search them out for you. Back issues are available from the publisher. However, Brian, you aren't alone in your request, so I will see what can be done to repeat some of the more often asked for columns!

TIME TO FLY!

Please address any newsletters, letters, or contributions to Bill Forrey, 3610 Amberwood Court, Lake Elsinore, CA 92330. Any questions, I prefer phone calls, (714) 245-1702. •

Jake ..... *Continued from page 7*

mounted gun was the most common characteristic of pre-synchronous airplanes. What would you say was the single most representative feature of aircraft produced before the invention of the synchronous machine gun?

Aviation Buff in Butte, Montana

Dear Buff:

Shot-up propellers.

Jake

* * *

Dear Jake:

Allow me to tell you what happened to me at our second annual fan fly.

The weather was gorgeous, the turnout was impressive, and the quality of the aircraft on hand was spectacular. My Byron F-86, which I had spent hours and hours on, was rather ordinary compared to some of the beautiful ships that were there.

The day started out well enough, with a pancake breakfast, pilot's meeting, and a photo session before the flying began. By two o'clock I had flown twice and was preparing for my third flight. Unknown to me, but later described by an eyewitness, a chain of events that would cost me my airplane was set into motion.

Shug McConnell has a little farm and keeps several cats around for rodent control. Whenever he drives his pickup out to the flying field, it's like as not to have a cat or two in the back. Well, Shug and his truck were at the fan fly. So was a Mrs. Hester Cheswick, whose husband, Carl, was flying in the event. Hester didn't much care for the noise of the airplanes, so she stayed in the motorhome with her parakeets.

Well, the Winnebago's pot must have been out of order because Hester went looking for a porta-john. One of Shug's cats saw this as an opportunity and went in to check out the parakeets. About this time I was firing up the F-86 prior to takeoff. As I taxied out, all hell was apparently breaking loose in the motorhome. Just as I broke ground, a flock of budgies with a cat in hot pursuit crossed my path.

I know commercial and military jets occasionally have problems with bird ingestion, but this was ridiculous. I blew so many feathers out the tailpipe it looked like a Three Stooges pillow fight. The engine flamed out and my poor F-86 went down in a heap. What a way to go, and needless to say, when she got out of the can, Mrs. Cheswick was none too pleased either.

Some days it just don't pay to get out of bed!

Herb in Effingham, Illinois

Dear Herb:

Bird strikes are a serious threat to all forms of aviation. An acquaintance of mine worked at the Air Force's Vehicle Equipment Laboratory where windshields were tested for their resistance to bird impact. This was done by firing supermarket chickens (whole fryers) out of a compressed air cannon at instrumented aircraft windshields.

One day, after loading the cannon and setting up a test, the group broke for lunch. Upon returning they resumed the test, and shot a very surprised, and somewhat annoyed cat, through the windshield of an F-4. Seems the stray tabby had crawled into the cannon barrel to sample the chicken.

This may sound like an expensive fiasco and the waste of a good windshield, but the Air Force now knows, with test data backed up certainty, exactly what will happen if an F-4 flying at Mach .85 at 30,000 feet hits a cat.

Jake

* * *

Dear Jake:

What's an alligator clip?

Clinton in Cliffside Park

Dear Clinton:

His toenails and coupons for Gatorade.

Jake

Choppers .. *Continued from page 19*

means a three percent increase in payload capacity. The reason is that the payload usually accounts for about 1/3 of the gross weight on a transport helicopter. Assume the helicopter is not modified, therefore its gross weight is not changed, then the one percent increase in thrust can be used fully toward increasing the payload. For example, we have a seven-pound heli-

copter, and the helicopter is sling-loading a three pound watermelon. Then the gross weight is 10 lbs. In order to hover, the rotor has to generate 10 lbs. thrust. If we can increase the thrust by 10%, which means to 11 lbs., then it can now sling load a four pound watermelon. This shows the sling load capacity has increased from three to four pounds. That's a 30% improvement.

At the F3C World Championships, I was very surprised that almost one fourth of the contestants used some type of swept tip main rotor blades to reduce drag. Reducing the induced drag also means an increase in thrust, and improved cyclic control response. Control response improved because cyclic control depends on periodic variation in main rotor blade lift as the blade swings around. If the blades can generate lift more efficiently, then of course the cyclic control response is improved proportionally. The bottom line is this . . . is this minute improvement in rotor performance noticeable? Maybe not to the average fliers, but to these cutting edge competitors, probably yes. For instance, after I introduced the Delta-3 article in International Helicopter Magazine two years ago, Len Mount, the top seeded British team pilot, says he has played around with different Delta-3 angles, and he observes changes in helicopter stability when the Delta-3 angle is changed by only 10°. I usually don't notice changes until 15° to 20° modifications are made. These subtle changes are only observable when you start to fly precision patterns as in the F3C contest, because you must practice the same nine maneuvers day after day, and week after week, thus any small deviation would be picked up.

But on my Concept 30 I did notice a drop in flight performance after my foam Concept blade tip was scraped off after a minor incident. Now I am flying my Concept with the outermost half-inch cut off, and there is quite a noticeable loss in capability. Beside sweeping the blade tip, German helicopter designers have incorporated sweep as well as droop on the new full-size 1990s German army transport helicopter rotor blades. This new blade design has not been flown yet, but it was displayed at the 1989 Paris Air Show.

Even though the vortex generating mechanism was discussed in the last issue, let's delve a little more into detail. First, let's study how lift is generated. A wing, or rotor blade produces lift because it is set at a positive angle-of-attack. Figure 1 illustrates in this situation that the air molecules flowing over the top of the wing are traveling a greater distance than air flowing beneath the wing. In order for the air flowing over the top to reach the trailing edge at the same time as the air flowing below, the molecules flowing over the top have to move faster. As Bernoulli pointed out a hundred years ago, faster moving air creates a lower pressure region. Thus, the wing feels a lift because the higher pressure air below the wing pushes the wing upward, or you can also think of the lower pressure region above the wing as sucking the wing up.

Now let's see how vortex is associated with lift. It should be intuitively obvious that air will always want to move from a high pressure environment to a low pressure one. Figure 2 illustrates how the high pressure air below the wing, or rotor blade can only curl up, and flow into the lower pressure region above the wing at the tip of the wing, or rotor blade. This roll up action, combined with the oncoming air stream forms a helico flow pattern which we call vortex. If the wing is infinitely long, then air can never roll up from beneath the wing to the upper surface, then no vortex would be formed.

As shown in Figure 2, this rolled-up vortex is bringing air from beneath to the top and ramming it down onto the inboard part of the wing. It is like the air is ramming down on the wing to reduce the lift force

that the wing is feeling. Hence, we would like to minimize, or move this counter-productive vortex as far away from the inboard section of the wing as possible. Solution A is to use a tapered, swept tip to move the vortex to the very back tip corner. Solution B is curve the blade tip down like on the German blade design, or on some Cessna aircraft wings. Solution C is to use a winglet as on some commercial transport aircraft. Even the new Boeing 747 transport aircraft wings start to sport winglets that extend as high as six feet above the wing. However, only solution A seems feasible on helicopter blades because a winglet, or a large curved down tip would encounter air flow problems in forward flight.

Well, we will continue rotor blade discussion in the future. Let's now read a letter from Bill Sewell, in Alaska, about his experience with his new Kalt Baron 30 helicopter. Isn't it great that as far away as Alaska there are modelers flying R/C helicopters and reading *Model Builder*? Bill seems to be extremely enthused about his new toy.

Before we read Bill's letter, let me give you some history on the Baron 30MX. The original Kalt Baron 28/30 came out about 1981. It was the only 30-size collective pitch helicopter on the market at that time. I have flown the original version, and I really liked its docile control characteristics. Its compact size, low cost, mellowness, and ruggedness almost made it an ideal trainer. At that time I thought it was one of the easiest to fly collective pitch helicopters. Other manufacturers must also have noticed it, too, because it is the forerunner to today's popular pint-size, ready-to-fly Shuttle and Concept. Don't be surprised if six months from now I show you a review of maybe a new Kalt 30 heli to battle the Shuttle and Concept.

The two major features that make the Baron very smooth and docile are the big and heavy Hiller paddles, and the very soft flapping, hingeless rotor design. The Kyosho Concept 30 DX is very stable for the same reasons. The DX has heavy aluminum paddles that make the Concept 30 DX so stable that you wouldn't be able to execute a roll. To make the Concept more aerobatic, the SE version has much lighter paddles. To speed up the cyclic control response further on the Concept, you can also buy a set of stiffer flapping restraint rubber dampers to increase rotor moment transfer ability. For people who like to make the smooth Baron 30 even more aerobatic, you can try a set of Concept 30 SE light weight paddles, and also buy an extra Baron 30 steel hub plate and add it under the existing steel plate to double the blade flapping stiffness.

Three years ago, the 28 got upgraded into the present 30MX kit. It now features autorotation bearings, and Bell-Hiller mixing as standard issues. Now, even advanced pilots can have a ball with it, too. And the Baron 30 always had a very nice double-bearing tail rotor blade grip for minimal slop. For the dedicated Baron lovers, TSK Products of Japan carries a variety of ball bearing upgrades for the Baron 30. For instance; ball bearinged Bell-Hiller mixing arm pivots, bearinged seesaw assemblies, and bearinged control bell cranks. These should be available at your local hobby shops or from Hobby Dynamics, or from a place called Hawaiian Precision, in Hawaii. Amazing, not only people from Alaska fly choppers, but also from Hawaii, too! Nick Nicholas is the knowledgeable guy in charge at Hawaii Precision. He has all sorts of imported Japanese upgrade parts for all Kalt helicopters and the Baron 30 to make it contest competitive. For example, he carries carbonfiber CG corrected blades, machined metal clutch, K&S aerobatic paddles, elevator and roll linkage sets, K&S

tuned silencers, preformed metal servo trays, etc. Give him a call and say aloha to him at (808)949-7849, and tell him *Model Builder* said aloha, too. By the time you read this, they will have a branch store in Garden Grove, Southern California. I will tell you their new number as soon as I get it.

The old Baron 28 has only Hiller control, which means the cyclic control is accomplished by changing the Hiller paddle angle to produce an aerodynamic force to tilt the flybar, which then mechanically tilts the whole rotor disc. The Cricket fixed pitch helicopter is also a Hiller control-only helicopter; so were the very old Hirobo Falcon 505 and old Baron 50. All the modern collective pitch helicopter kits, including the 30MX, sold on the market now have Bell-Hiller mixing. Bell-Hiller control means that when a cyclic command is implemented, the main rotor blade pitch angle will also vary cyclically to help tilt the main rotor disc. Therefore Bell-Hiller control helicopters are twice as responsive as compared to Hiller-only system. The flybarless Legend does not have Hiller paddles, so it is Bell-control system only. But it does not imply the flybarless Legend with Bell system only is half as responsive as the Bell-Hiller controlled, flybarred models. In fact, the flybarless Bell control Legend can be made even more responsive because it does not have the flybar to dampen the helicopter rotors gyroscopic action. OK, I will elaborate all these in a dedicated article in the future. Before I make this column too long, let's devote the rest of this column to Bill.

The Kalt Baron 30 MX is my first venture into a collective pitch machine with all the trimmings and so far has proven to be an excellent choice for my long overdue jump from fixed pitch helicopter flying. So for obvious reasons all my judgments and comparisons of the Baron are weighed against my experience with fixed pitch machines flown on plain four-channel radios and without a gyro. To complete my Baron, I chose an O.S. Max .28H for the power plant and Futaba's 5NLH radio with the 154 gyro. The 5NLH has just enough helicopter goodies on it to really make me appreciate them without going overboard with too many bells and whistles. Building the Baron was a lot of fun and I had no trouble at all with it. The instructions are to the point but not overly detailed. The only setup instructions are one page from Dan Melnik. The kit itself has the typical numbered bags; hardware Bag One and component Bag One correspond to instructions on sub-assembly one. A blown-up schematic drawing accompanies the instructions to identify parts and proper locations should any questions arise. The only painting required is the wooden servo beds and to reseal the root ends of the rotors after they are shaved down for the blade reinforcements.

I don't have a lot of dislikes but a few things stood out for me; the wooden servo bed for pitch and roll servos needs to be of thicker plywood; I found that on the pitch servo side it would flex up and down a bit. The roll servo is not affected as the servo bed for collective/throttle and yaw is glued very close to its mounting point. Another gripe was shaving the blade roots. I guess this really isn't a big deal but if you're not careful you could ruin a nice set of blades. Last of all, the linkages from the cyclic servos to the bellcranks are done with "Z" bends. Initially I used this method but found things were getting sloppy after a few flights (I may not have made the "Z" bends small enough). Anyway I put ball links on them and all is well.

Overall, my likes far outweigh the dislikes, for starters; drilled and tapped channel aluminum motor mount, prebuilt hingeless rotor head, easy glow plug access from the rear, vertical tail fin long enough to protect tail rotor from ground strike, ball link type connection from tail rotor bellcrank to the pitch change wire, high visibility prefinished canopy, prefinished rotors, ah yes, and wire driven tail rotor . . . no belts. Also no rubber bands on the fuel tank or canopy! I must have spent more time mounting five servos, the linkages and radio than I did putting the mechanical part together. By the way, with a gyro and 1200 MA battery pack there is no room for the instrument console to be mounted in the canopy. The one page of heli notes from Dan Melnik are for setting up the collective range with the O.S. .32. I set the blades as described and found for hovering it works great, however, at the top end my

.28 would lug down with the last degree of pitch applied. A paper pitch gage is in the kit for setting up the main blades and at first I had no intention of using it. After all I had a $25.00 pitch gage for that job . . . however, my $25.00 gage did not adjust down far enough for the short chord on the Baron's blades so I traced out a paper pitch gage and modified it so I could flip it upside down to check both positive and negative pitch. I can't complain, tracking was very close . . . only half a turn on one blade.

Now for the best part, flying the Kalt Baron 30 MX! All my initial settings were only a few clicks on the trim tabs before it was up and hovering! Right away I started appreciating both the Baron and the 5NLH radio. At first, the relation between blade pitch and engine speed made for uncomfortably fast response . . . especially when coming down . . . no problem, I added a few clicks of blade pitch from my radio until collective response was swift enough to suit me without being sluggish. The tail is very responsive without the gyro on (actually a little on the twitchy side), so on this little beast a gyro is very desirable. Once turned on, the tail becomes very mellow to handle. The 154 gyro has adjustable sensitivity and I fly the Baron with it at 70%. The nose will sometimes drift left or right without the gyro having any idea what's going on while hovering, but any faster changes and it's right there keeping the tail in line. I would do a circuit around myself at high speed, ending it by doing the helicopter version of slamming on the brakes and drop into hover. Never once did I lose tail control. The Baron handles very solidly and seems so amazingly easy and relaxing to control! Compared to the fixed pitch machines I have flown the vertical response is unreal . . . being able to drop from 15 feet and gently touch the skids down without bouncing in about three seconds has me impressed.

I've been out in 25 mph wind with the Baron, and I must admit that's pushing it, but I still felt comfortable with it. However, I came close to a real forced auto landing on that windy day. I had only been out flying in fast forward flight with it one day before and I had not put full collective to it. I had been too busy marveling at how easy it was to fly and had not tested everything out fully. On the windy day I was using full collective off and on but couldn't detect the tone difference in the engine that would have told me to call it good until it finally lugged down far enough that drastic things started to happen. I finally put it down and called it good for the day. Next time out it was a mild day and I had intentions of doing my first autorotations, as well as loop and roll the Baron. I've only seen two autorotations done and that was on an R/C Video Magazine playback. My

approach to doing auto was similar to the way they do them in the full size ones. Full size chopper pilots don't practice autos all the way to the ground, they recover with power before touchdown and end up hovering instead. So this sounded like a safe approach. I took the Baron up about 70 feet, turned around and dropped the collective and established auto rotation. After about 10 tries I was flaring consistently at two feet . . . finally one approach looked too good to pass up, I popped the throttle hold and touched down rather nicely.

The Baron's looks appeal to me as well, it's long, low and sleek, and looks great on a low pass down the runway! No question in my mind that I have a lot of skills to be sharpened and it will be a long while before I truly need a bigger, better machine.

Now here's another great subject: crash survivability. I've had two first-hand experiences, the first was with a beginner's Baron with a .32 in it. The chopper was used and the first few flights were spent debugging the setup until it was handling reasonably well and a few short flights 20 feet up were made. With the Baron back on the ground and my hands off the sticks, we were discussing what to do next, when the transmitter battery went dead! Then the fun really started; the chopper jumped into the air and started spinning toward us while we were busy running from it! The chase only lasted a few yards before the mad machine bit the ground . . . looked pretty sad with its guts spilled out all over the place. One or two control links from the head were missing, the blades were dinged a bit but not broken. The flybar looked like a wet noodle, tail fins and blades were broken along with the shell and canopy, and last of all the tail boom and support clamps were bent. Dismal as it looked, the guy I was with had it ready the next day; the only things replaced were the tail blades and the missing links to the head. Everything else was straightened or glued and patched back together. Matter of fact it looked a little better after the mishap, as he took extra time tidying up a few more things while he was at it. We ran it again, tracked the blades and finally he got to get his hands on the controls.

The next pile up was with my prize machine. I was demonstrating autorotation descents and how the cyclic pitch would control descent speed when the disaster struck. After flaring out I had turned around and was climbing up for another auto when one link from the swashplate to the rotor head popped, I thought it was a radio failure because the only thing I really noticed while it was in the air was that I had no response to my control inputs. What actually happened after the link popped off was that the one main blade fluttered, causing loss of lift and lots of drag which put it into a spin on the way down. The results were not that bad, the landing gear

absorbed most of the impact and it had minor damage to the shell and a boom strike. About 45 minutes later it was running again and we were tracking the blades. The reason the link popped off is of real interest. Later that evening I found that it only took one finger to pop the flybar link from the ball on the swashplate; the swashplate and the balls are molded in one piece from what looks like glass-filled nylon and has a matte finish. That matte finish acted like sandpaper and literally ground the insides of the links out until one popped off. The balls on the head are smooth metal and those links show little sign of wear compared to the links on the rotating side of the swashplate. It took about 60 flights to develop this problem so it's not like you have to start worrying right away but it's something to keep in the back of one's mind when you're flying.

One last thought as far as learning to fly is concerned, I watched my friend with the Baron practicing in a parking lot. I think the collective pitch must have saved about 8 sets of blades in that one session. The machine had oversized plastic landing skids that absorbed the hard landings so every time he got into trouble he would drop out the collective (it was set a -3 at idle), and the Baron would suck itself to the ground and upright from some pretty precarious attitudes! I was impressed! •

Control Line *Continued from page 49*

the final Sunday.

Speed and racing activity was tightly confined, with only two circles available, though the surfaces were fine and the AMA did an excellent job providing safety netting around the circles. The circle limitations left racers basically with no official practice area.

The precision aerobatics/old time stunt/scale area was limited to four circles . . . a considerable reduction from the vast area of precision aerobatics practice that normally is available. However, after the expression of some initial concerns, the stunt and racing fliers were able to find enough practice areas on and off the site. The precision aerobatics site had to have some full-scale aircraft tie-down holes filled in order to provide a smooth landing surface. Fortunately, the Hanford High School site had vast acreage of closely-cropped grass, suitable for practice circles for most planes.

Perhaps the most exciting aspect of the Richland Nats was what came to be referred to as, "the Soviet invasion."

A contingent of control-line competitors who came from Leningrad, U.S.S.R. to compete at the U.S. Nationals became the celebrities of not only the control-line contest but the whole community. They dominated news reports of the contest and were constantly surrounded by U.S. modelers.

The group was assisted in overcoming some travel difficulties from Washington, D.C., by some Northwest fliers, including sponsorship of some travel expenses by combat aficionado Bob Carver. Dan Rutherford, Spencer Sheldrew, Howard Rush, and others, helped to smooth the group's arrival in the Seattle area and their arrangements in the Tri-Cities. AMA arranged for local families to provide housing for the delegation, which was greeted with a large party at a local restaurant. During the course of the week, both the visitors and the American fliers became experts in communication by sign language.

The group included precision aerobatics, racing, speed and combat fliers. Combat became a particularly interesting spectacle, as the U.S. fliers supplied the Soviet team with enough airplanes and ground support to have an entry in Slow, 1/2A, and AMA fast combat, in addition to the Soviet fliers' own top-quality preparation for the FAI combat event.

As a result of the cooperation and their own skills and preparation, the Soviets took first place in FAI team race, second in FAI speed, second in slow combat, and second in FAI combat. The team proved to be excellent craftsmen and fliers with top-quality, well-prepared equipment. The only sad moment was the loss of Soviet precision aerobatics flier Svetlana Filippova's airplane in a crash during her preliminary rounds, the result of a mechanical problem.

The Soviet delegation either gave away or sold most of their combat equipment. Soviet planes and engines became real treasures for U.S. fliers to take home and

study.

As a competitor as well as a member of the modeling press, it was impossible for your columnist to be everywhere all the time during the Nats, so this report will not be comprehensive; rather, it will be a smattering of some highlights and observations of the 1989 Nats.

The contest got under way for control-line people on Sunday, July 16, with speed planes being the first control-line craft to take to the air, in the 1/2A and 1/2A proto classes. Overall speed turnout was good, especially for a Nats considered to be in a "remote" region. FAI speed planes also were out testing on Sunday.

Across the airport, stunt fliers began their practicing as field crew workers scrambled to patch holes in the circles. Combat fliers began tuning and trimming at the high school, and the air was electric with the excitement about the arrival of the Soviets.

Speed flying is one of those competitive activities marked by occasional lulls as contestants tinker with their equipment and try different combinations in search of that perfect combination of plane, engine, prop, fuel, needle setting, and pilot. But when somebody actually hits that magic combination, the results can be positively riveting.

So it was that all eyes and ears were directed at the circle during a few moments of that first Nats Sunday, when Charles Legg's tiny 1/2A speed plane set off on a flight that had all the sights and sounds of a "winner." The stopwatches confirmed what everyone knew the instant the plane was airborne: Legg had won 1/2A Speed with a time of 143.36 mph, just a shade under his national record of 144.17 mph. Legg, of Council Bluffs, Iowa, uses a homebuilt engine.

Jason Youck of Calgary, Alberta, won the senior 1/2A Speed class with a time of 67.84 mph.

In the 1/2A proto class, where airplane restrictions make high speeds much more difficult to obtain, Warren Kurth, of Davenport, Iowa, topped the century mark at 100.95 mph for first place. Nelson Bartle of Santa Ana, California, went 70.55 mph to win the Junior class and Jason Youck topped the Seniors with 66.6 mph.

The Soviet team jumped into competition on Monday as Dan Rutherford supplied Eduard Kosolovskiy with a fleet of top-quality models for slow combat. With Rutherford and Spencer Sheldrew in the pit crew, Kosolovskiy showed that the Soviets are no strangers to combat, advancing through the rounds to second place. Along the way, he had excellent hard-fought matches with Jeff Rein and Tom Fluker, displaying the international style of following and nibbling at the streamer end, a perfect approach to no-kill slow combat.

Fluker, a former FAI combat world-champion from Deer Park, Texas, came out the winner in the final match with Kosolovskiy. Corina Byerley of Spanaway, Washington, was the top junior slow combat flier, and Greg Machen, of San Pablo, California, was the winner in the senior class.

Meanwhile, over at the speed circles, FAI, A and .21 sport speed kept the circles burning all day.

Carl Dodge, of Richmond Heights, Ohio, screamed to a spectacular 185.08 mph to win FAI speed, with Soviet flier Alexandr Guievskii second at 169.01 mph. It was a closely bunched field, with Chuck Schuette of Vancouver, Washington, at 168.76, and Chris Sackett, of Vancouver, B.C., at 163.1.

Ron Salo, of Burnaby, B.C., turned 176.05 to capture A speed, edging out Len Adachi of Osaka, Japan, who turned 171.7 mph. In the unofficial event, 21 sport speed, Chris Montagino emerged victorious at 145.69 mph.

Over at the stunt venue, the competition was in the unofficial event, old-time stunt, but Filippova's practice sessions also drew a crowd.

John Wright was the winner in old-time stunt with a score of 279.3, but Don Hutchinson captured the Concours award for appearance with his Yates Dragon. The "Spirit of '52 Award" for best representation of old-time stunt went to Jim Levell and his Super Zilch. OTS was the nostalgia buff's delight as beautifully built and finished planes from the early 1950s were everywhere to be seen. *Model Builder* was

again the trophy sponsor of this nostalgic event.

Monday also was the day that the C/L scale competitors displayed their airplanes at the Shilo for static judging, with flying to follow on Tuesday.

Charles Bauer of Norridge, Illinois, emerged the winner in the precision scale category, narrowly edging out Orin Humphries of Lynnwood, Washington. In Sport Scale it was Michael Welschans of Ferndale, Michigan, with the winning entry.

Speeds started to soar on the go-fast circles as Bill and Rich Wisniewski of Bellflower, California, hit 199.977 in B Speed and also topped the Formula 40 crowd with 163.27 mph.

After the unofficial events quieted down, Northwest racers took to the circles for unofficial running of Northwest Sport Race and Northwest Super Sport Race events. Kevin Collins of Redmond, Washington, carried off the first-place trophy for Northwest Sport Race (sponsored by Northwest Hobby Supply of Tacoma, Washington) with a time of 10:35. The Nitroholics Racing Team from Oregon (John Thompson/Mike Hazel) captured Northwest Super Sport Race (sponsored by Motors & Memories of Seattle) with a time of 7:54. The Nats also was a point of discussion and refinement of the NWSS rules change, then under consideration, that would allow restricted sport .40 engines to run alongside the current plain-bearing, single-bypass .36 engines.

The weather turned hot on Wednesday and so did the speeds as the big block engines came out. Incredibly, it was possible to go more than 200 mph and *not get a trophy!* Frank Garzon of Central Islip, New York, took first place with 210.93 mph, followed by Akeshi Kusumoto of Nishikyoku, Japan, at 206.81; Bill Hughes of Bolingbrook, Illinois, at 206.1, and Len Adachi at 205.87. Several others broke the 200 barrier as "also-rans."

Not to be outdone, the jet jockeys also smashed 200, with Bill Nusz of Carmichael, California, hitting 205.16 mph, and Jerry Thomas of Puyallup, Washington, going 202.39.

Competition was hot in the FAI combat circle as well, and for much of the day the attention was again on Fluker and Kosolovskiy, who had two tremendous matches during the contest. However, the self-described "old man" of the contest, Howard Rush of Bellevue, Washington (who also doubled as the able combat director for the entire week), bested Kosolovskiy in the final.

The Soviet team presented an autographed plane to Rush, their host and the contest winner.

Official flying began in the stunt circles and would continue through Saturday's Walker Cup Finals. Over all the venues, officials had what was probably their hardest day on Wednesday, as the sun, which had been shielded by some cloud cover early in the week, began beating down in typical midsummer Eastern Washington fashion.

Stunt flying preliminary rounds continued on Thursday as the speed circles gave way to racing and the small-bore engines changed the tone of things at the

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combat circles.

In the racing area it was scale racing (Goodyear), where those .15 engines made by Nelson and Rossi put out their high-pitched screams (ear protectors required equipment!) and the speeds were impressive.

John Ballard of Louisville, Kentucky, showed his many years of experience by taking the win with a 5:48.74 final in the open class. James Singleton of Point Mugu, California, won the junior class with a 6:15.47.

Jim Womack of Stockton, California, won open 1/2A combat, besting Glenn Salter of Duvall, Washington, in the final. Alexandr Guievskii of Leningrad, made it to sixth place. George Hartsgrove of Vacaville, California, won the senior class, and Joel Braby of Richland, was the junior champ.

Official flying got under way on the Navy carrier deck, though windy conditions held down the number of flights. Pete Mazur of Aurora, Illinois, took the open championship with a score of 286.8. Margo Carlson of Las Cruces, New Mexico, was the junior winner at a good score of 202.8.

Advanced stunt fliers settled their shoot-out on Friday and the top 20 open stunt fliers battled it out down to a final five for the Walker Cup flyoff.

Mike Pratt of Montezuma, Iowa, used his 473-point score to win the advanced class, an opportunity for fliers who don't quite feel they can make the top five to still compete for trophies at the Nats level. Pratt is the designer of the successful Sig Magnum kit. Sharon Garrison of San Mateo, California, bested junior fliers with 27 points. Polished young "pro," Nat Gifford, was the senior champ with an impressive 507.5-point flight.

The top guns pulled out their weapons at the combat circles for the event listed in the rule book simply as "combat," and known to the fliers as "fast combat" or, in the minds of many, "the real thing." The preliminary rounds on Friday had plenty of spectacular matches and enthralled local spectators. Open combat continued into Saturday, but Corina Byerley was declared the junior winner on Friday.

Racing took on an international flavor as the FAI team racers hauled out their exotic craft. Valentin Alachine of Leningrad, showed the Soviet strength in this demanding event with a win at 8:30.3 for the 200-lap feature.

Scale classes had the carrier deck on Friday, and Bill Melton of Las Cruces, New Mexico, screamed and floated to a 386.3 score in Class I Open. Rick Humphries of Spokane, hit 157.5 for first place in the Senior class and Margo Carlson won the Junior class with 279.3. Melton repeated his success with a 392.9-point win in Class II, and Margo Carlson hit 192.5 to win the Junior class.

The "mice" gnawed their way onto the racing circles and Paul Gibeault of Calgary, Alberta, scampered to the top of the heap with a 5:15.75 final in Open Class I Mouse Race. Corina Byerley continued her sweep in the Junior class by winning mouse with a 3:20 heat, and Denny Hart of Corona, California, topped the Seniors with 2:47.6

Saturday was the culmination of the contest in three of the "top gun" control-line competition events: precision aerobatics, combat, and rat race.

An incredibly close precision aerobatics Walker Cup flyoff wasn't decided until the final flight of the third and final round, when Jim Casale of Paterson, New Jersey, nailed down the day's top single-flight score, 546.2, to build a total of 1093.4 for his best two flights and edge longtime star Bill Werwage by 6.4 points for the Cup. Werwage was second with 1087, Paul Walker third with 1084.8, Windy Urtnowski fourth with 1082.2, and Ted Fancher fifth with 1078.4 . . . a spread of only 15 points from first to fifth!

There was no less excitement at the combat circles as the number of contestants dwindled and Pacific Northwest fliers threatened to make it a local sweep.

The matches were spectacular, but perhaps the best was saved for last, as defending champion Norm McFadden of Lynnwood, Washington, slugged it out with Greg Davis of Vancouver, B.C., winning 3-2 on cuts. McFadden became the first person to repeat as fast combat champion since Sherwood Buckstaff in 1976. Only Mike Petri of Redwood City, California, prevented the regional sweep by taking fourth place. Bob Carver of Woodinville, Washington, was third, comeback flier Ron Scoones of Issaquah, Washington, was fifth, Glenn Solter of Duvall, Washington, was sixth, and Gary Byerley of Spanaway, Washington, was seventh. Just for the fun of it, McFadden and Corina Byerley flew an "overall Nats championship" match, and the impartial judges declared Corina

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the winner.

Dan Rutherford was awarded a sportsmanship award . . . the second time in as many contests . . . partly for his assistance to the Soviet fliers but mainly for his "protest" in which he insisted that the judges correct an error that had inadvertently awarded Rutherford an undeserved cut that changed the outcome of a match in his favor. Your columnist somewhat sheepishly accepted an award for "combat free flight" related to a flyaway plane that ended up floating down the Columbia River. Our thanks to a kind off-duty Richland police officer who went out of his way, in his motorboat, to fish out the wayward airplane . . . which was recovered without a scratch.

Entry was low but times were spectacular in rat race, as Robert Fogg of San Diego, California, turned a 4:31.87 feature (140 laps, or 10 miles). Fogg's times for the 70-lap heats (five miles) were 2:13.62 and 2:14.52.

Only one event remained to be flown on Nats Day 9, when most of the contestants had headed homeward. The intrepid slow rat race fliers stayed around to show their stuff; John Ballard captured the win at 5:35.32.

The Nats are an excellent forum for examining control-line competition and getting a look at the level of competition in different regions. There are many positive signs in C/L competition at present, and a few disturbing signs, some of which are not new but are growing more and more evident. Here are a few observations:

- Precision aerobatics is thriving with its stable rules, its well-thought-out class system and its generally professional way of conducting contests. PA fliers have devoted much attention to bringing beginners along and to giving fliers of all levels a chance to compete. The new advanced class has been a tremendous boost to Nats competition. The attention to builder skills, appearance, and general "impression," also make the event a favorite among spec-

tators.

• Contrary to what the *Model Aviation* speed columnist has written in recent months, speed flying is strong and growing, primarily through the efforts of the North American Speed Society. Entry was strong in the Richland Nats and competition was excellent. Speed fliers seem to be speaking with a unified voice and working to bring in new people and keep the far-flung areas in contact with a good newsletter. It's unfortunate that the mainstream speed fliers have been unable to maintain a meeting of the minds with their chief spokesman through the AMA magazine.

• Combat continues to be a crowd favorite and a strong attraction to new fliers. Again, stable rules, a national organization, and some very hard work by a few dedicated flier/officials has held this event together. On the down side, the rules are in one area perhaps too stable. It is clear that safety has become a major concern among virtually all responsible fast combat fliers and a dominant topic of conversation at contests; unfortunately, the fliers are not unanimous on how to solve the primary safety concern, which is the sharply increasing number of flyaways. Increasing the line diameter to .021 is the strongest suggestion advanced to date, and it may soon return as a safety proposal if some other interim attempts are unsuccessful. At least one major contest in 1990, the Northwest Regional Controline Championships, has already announced plans to require the .021 lines. Other areas of discussion have been; reducing the size of the center circle, and much stricter enforcement of pilot conduct rules. Also suggested has been a venturi restriction designed to slow planes down to the 100-110 mph range to reduce the pull to which lines are subjected in tangle situations. These alternatives are viewed as more desirable and less disruptive than a reduction in engine size, which also has been discussed. Look for action from within the combat community; combat fliers in the past two years already have initiated a mandatory safety thong rule and a mandatory engine-restraint wire rule to solve specific safety problems.

• Racing, long one of the most popular events for new competitors, casual dabblers, and dedicated experts, is flourishing in regional "sport" events and the small-bore mouse classes, but dying on the vine in the premier AMA classes. Curiously, the reasons seem obvious, but the racing fraternity has not been able to come to agreement on basic changes that could rescue the event. One problem is the lack of a national organization or newsletter since Control Line Racing Pilots & Mechanics (CL-RPM) died around 1980. A much bigger problem is that the events have been allowed to evolve unlimited to the point of eliminating most competitors. At the 1989 Nats, there were 10 entries in rat race . . . the same 10 entries as there always are, flown by the same three pilots. No other major racing event except for hydroplanes is entirely unlimited . . . and there are only 10 unlimited hydroplanes, more or less. Every other event . . . NASCAR

stock cars, Indy cars, Formula I, etc., . . . is severely restricted and rules are repeatedly adjusted. The cure for C/L AMA racing ills is obvious: reduce rat race to .21 size engines (leave all other rules the same as now). This would reduce the weight and pull of the airplanes measurably, leaving them pilotable by the average expert flier, while retaining the unlimited feel and relatively high speeds of present rat race. Slow rat's solution lies in engine and fuel system restrictions . . . the best and least disruptive solution would be to retain the present airplane rules, require outboard tanks, ban centrifugal carburetors, and switch to a venturi-restricted sport .40 such as used in the Texas Quickie Rat event. If you are interested in racing but fed up with AMA's outdated rules, now is the time to write your Control-Line Contest Board members (listed in the Competition News section of *Model Aviation* magazine) and express your views. Otherwise, we'll all have to wait until the last three rat pilots die.

The C/L mailbag is getting heavy, so next month we'll dip in and answer some questions and pass along some tidbits from the far reaches of model aircrafting. Hopefully, we'll also have a report on the Washington State C/L Championships in Seattle, one of the West's major meets.

Send your hints, tips, photos, contest schedules, and reports, to John Thompson, 1520 Anthony Ave., Cottage Grove, Oregon 97424. Because of the heavy volume of mail received, it is appreciated if the questions can be of a general interest nature so that they can be answered in the magazine column. I try to answer as many individual letters as possible but the volume does cause a backlog to build up occasionally. •

Polk's ..... *Continued from page 26*

uses a number of Motorola ICs and parts. In 1988 Motorola won the Quality Award . . . their semiconductor defects, once measured in parts per thousand, are now measured in parts per *million*. Many mechanical features of the transmitter, receiver and servos parallel features of Airtronics/Sanwa upscale radios. The servos and battery plugs fit into the end of the receiver rather than the top . . . easier to wrap in foam. In flight, I was able to *fully* retract the antenna and fly full flights . . . like the old Kraft sets did . . . without going into failsafe. This set exceeded specified range test distance.

SERVOS

It's the servos that do the work. The performance of one of the older 402 servos on the hundred cycle test shows how poor the first generation was typically. The new 422 servos use a custom made Mitsubishi IC and a smaller all metal Mabuchi motor so that the mounting dimensions are unchanged but the newer servo is 5/32" less in height. The inside of these new, very fine and precise servos physically looks exactly like the final generation of Kraft servos internally. Spare 422s cost under $15 and, for slightly more, the coming 425 servos will have dual ball bearings. Of notable interest, the Hitec 550 system drives its servos a full ninety degrees from the control stick for the three flying axis. Most current sets are turning far less from other manufacturers. The full 90 degrees, plus trim, is highly desirable, as it minimizes the effect of gear "backlash" or "slop" considerably. The old 402 servos weigh 52 grams . . . the new 422 weighs 42 grams (28 grams = one ounce). The servo cables are nine inches long and the servos have plenty of strength and power. It was planned to do destructive testing on the gears for comparisons, but that's off for awhile, although interest seems high in the results. The new 422 servos are so excellent, and the original/older 402 servos are so poor that I would not buy a Hitec set unless the new servos were included.

IN CONCLUSION

This R/C system is imported by Aristo-Craft/Polk's and is their stock number ARI02550 selling for $219.95. Your local hobby shop can order one for you if he doesn't already have one in stock . . . tell him you read about the Challenger 550 in *Model Builder*.

South Korea is gearing up their auto industry to produce two million cars a year starting in 1990 for the American market. I bet Hitec in South Korea is gearing up to produce more of these gold-stickered Challenger 550 systems for us too. •

FOUR BY FOUR.

THE ATTACK 4NBL

Our newest 4 channel system has something for everyone. In fact, the Attack 4NBL is such a versatile performer we've customized it for all kinds of radio control fun.

ATTACK ELECTRIC

The 4NBL/MCR system is destined to become a favorite with electric flyers. This Attack system comes complete with our new MCR-4A integrated receiver/speed control. This remarkable device incorporated a four channel receiver and a MOSFET speed control into one very compact, very light and very efficient package. It also incorporates BEC to eliminate the need for, and extra weight of, a receiver battery.

Hooked up with a pair of S133 micro servos, this system is perfect for electrics like our Hirobo/Futaba Professor.

The MCR-4A four channel receiver/MOSFET speed control weighs just 1.5 oz. and can easily handle 280 to 540 size electric motors. 1.24" x 2.92" x 0.63".

SILENT ATTACK

There's a 4NBL system for sailplane flyers, too. With the Attack glider package you get a pair of S133 servos, R114H four channel receiver and a 250mAh NiCd pack. Again, when size and weight of the airborne package is critical, Attack is the answer.

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RECEIVER	SERVOS	BATTERY	FREQUENCY	TYPE
MCR-4A	S133(2)	BEC	72MHz	Electrics
R114H	S133(2)	NR-4K	72MHz	Sailplanes
R114H	S148(3)	Dry Case	72MHz	Aircraft
R114H	S148(3)	Dry Case	75MHz	Truck/Boat

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The ergonomically designed T4NBL transmitter features comfort contoured case and adjustable length control sticks.

No matter which 4NBL system you choose, you'll also get our new four channel Attack transmitter.

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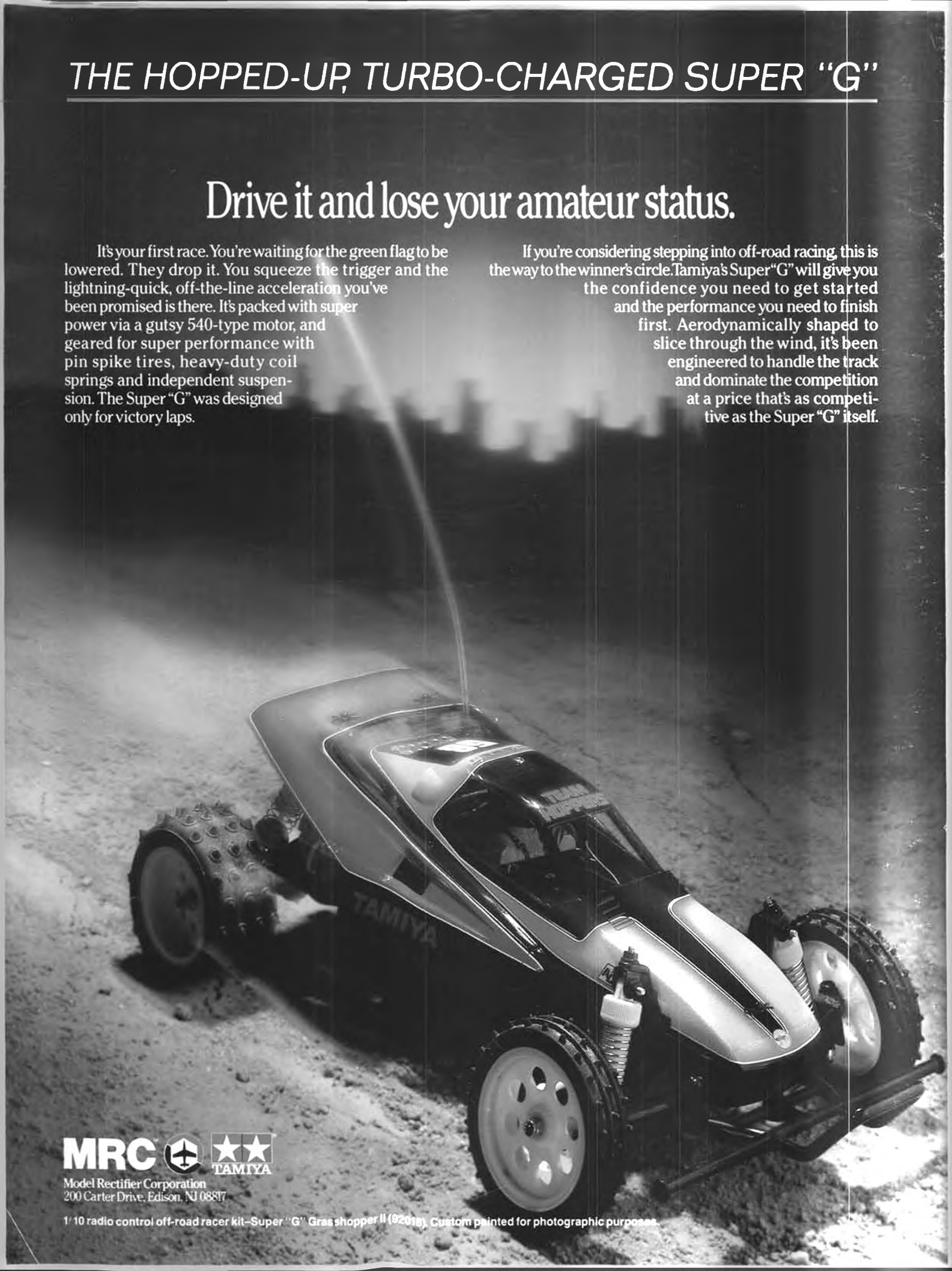

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1/10 radio control off-road racer kit–Super "G" Grasshopper II (92018). Custom painted for photographic purposes.