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ON THE COVER

Aircraft types at the 1992 Ace Float-Fly ranged from traditional Cubs to modern amphibians. Photo by Roy Inman. See David Manley's story on page 40. Inset photo: William Whitten's great flying Astro 035-powered electric Delta Vee is a construction feature, complete with full-size patterns, beginning on page 74.

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PUBLISHER	Mark Thiffault	CONTRIBUTORS	Rick Allison	<p>MODEL BUILDER (ISSN 0731-4795) is published monthly by Gallant Models, Inc., 34249 Camino Capistrano, Capistrano Beach, CA 92624. Phone (714) 496-5411. Subscriptions \$25.00 for one year, \$47.00 for two years in U.S. Subscriptions outside U.S. (except APD and PPD): Canada, \$35.00 one year, \$66 two years; other foreign, \$33.00 one year, \$63.00 two years. All payments must be in U.S. funds. Copyright 1992 by Gallant Models, Inc. All rights reserved. Production without permission prohibited. Change of address notices must be received six weeks before date of issue that new address takes effect. Send old addresses with new . . . old label preferred. Duplicate issues cannot be sent. Postmaster: send address changes to Model Builder, 34249 Camino Capistrano, Capistrano Beach, CA 92624. Second class postage paid at Dana Point, California, and additional offices. Editorial contributions are welcomed by Model Builder, but cannot be considered for publication unless guaranteed exclusive. Model Builder assumes no responsibility for loss of or damage to editorial contributions received, including but not limited to text in any form, photographs, drawings, and art work. Editorial material must be accompanied by return postage, unless return is not desired. Any material accepted for publication is subject to possible revision as may be considered necessary, at publisher's discretion, to meet requirements of its magazines. Publisher assumes no responsibility for accuracy of content, and opinions stated in published material are those of the contributing author, and do not necessarily reflect those of the publisher. Upon acceptance, payment will be made at our current rate, which covers all author's rights, title to, and interest in, the editorial contributions received as described above. Unless prior arrangement is made in writing to Model Builder, submission of editorial material to Model Builder expresses a warranty by the author that such material is in no way an infringement upon the rights of others.</p> <p>Gallant Models, Inc. 34249 Camino Capistrano Capistrano Beach, CA 92624 • 714/ 496-5411</p>
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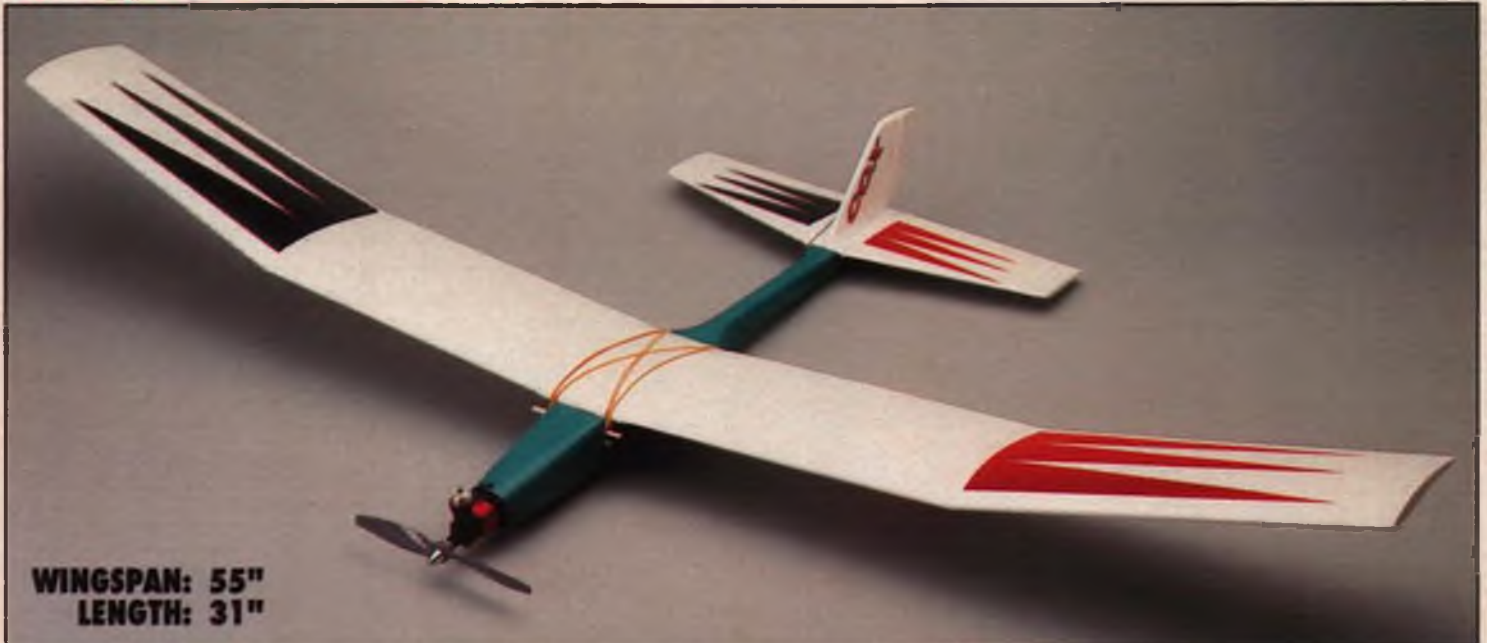
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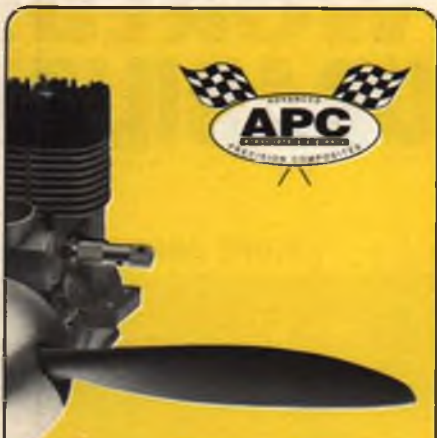


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Message From The Publisher

It's been just over a year—and what a year!—since the new/old crew took over at *Model Builder*, and I wanted to share with you where we've been and where we're going.

A year ago, *Model Builder* was on autopilot, drifting along from month to month. There was no strong editorial direction given to authors. The attitude was that whatever came in the mail was "good enough."

Not anymore. Like the phone company, I believe that "Good Enough Isn't." Thus, the first order of business was to tell our regular contributing writers that we require stories that are informative, yet entertaining. These writers are steeped in experience about their relevant specialties, and have been tasked to draw from that experience each month. When you're done with a feature or product review, we want you to say, "I really learned something from that."

I believe you'll see a stronger, better, more informative *Model Builder* today, and we're just starting.

You'll notice, also, that you get more stories from *Model Builder* than any other magazine in the field. This is because we've made a commitment that 70% of the pages will be editorial and a maximum of 30% will be advertising. As advertising increases, we'll add more pages to the magazine—not simply decrease the amount of stories for you to read.

We've also changed the content over the past year. The *MB* crew attended six model shows across the country. At each I asked for feedback from readers. You said you wanted us to bring back the full-size Peanut Scale plans; we've reprinted some vintage Walt Mooney plans, and have solicited for new ones from readers. You wanted more free flight; you'll find more and better coverage each issue. You wanted more indoor; as you saw last month, Ken Johnson and Dave Linstrum both had some good stuff, and more is coming. You wanted more construction; we try to have two features per issue. You wanted more product reviews; last month there were four. You said you wanted a better looking magazine; we have more color and produce the magazine on state-of-the-art desktop publishing systems. On and on.

What this shows is that we're listening to

you! I want to hear from you. Tell me what we could do better. Tell me what you'd like to see. I read all such letters!

The consumer shows added thousands of subscribers to our list. But we want more and are going to offer new and renewing subscribers the chance to win a whole bunch of neat products each month. Watch for details—you're gonna like it!

More than 2,130 retail stores are now selling *Model Builder*. You'll now find us in such chains as 7-Eleven, MACS Convenience Stores, Furr's Supermarkets, Uni-Marts, A&P, Albertsons and many others. This will introduce the model aviation hobby to thousands of new people, and that's good for all of us.

We have added hundreds of hobby shops to our monthly sales force, but we want more. If your hobby shop doesn't stock *MB*, please let me know; I'll contact them directly.

We've established a regular, systematic renewal program that has been well-received. Almost 70% of you are continuing with the magazine—that's well above the industry average, and tells us we're going in the right direction. Also, this program means you now can be certain you won't miss issues!

In the future, you'll see continued improvement in the editorial content, graphics and layout. *Model Builder*, unlike other magazines, is not simply an advertising vehicle. We're a consumer magazine first and foremost, and I hope you enjoy reading it. Please tell me, won't you?

PHOTOS (STILL) WANTED

Just a reminder that we're still soliciting for photos from readers. The December issue, in which we first put out the call, has been out only a short time as this is being written, but some interesting stuff has already begun to trickle in. Briefly, what we're doing is setting up a new reader-involvement department comprised of photos of our readers' latest modeling projects, be they RC, FF or CL. If your photo gets used—and there's a good chance that it will, unless we get absolutely swamped with entries in the near future—we'll send you a free *Model Builder* T-shirt for your trouble. Such a deal, eh?

While you're at it, take a few minutes to jot down some details on your ship—dimensions, power, finish, etc.—as well as a short rundown on your modeling history, so we can include that information in the short write-up that will accompany each photo. Be sure to tell us your shirt size when you send in your entry; sizes in stock are L, XL and XXL only. Send your photos to *Model Builder*, 34249 Camino Capistrano, Capistrano Beach, CA 92624. **MB**

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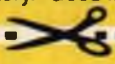


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DEAR JAKE

Advice For The Propworn

DEAR JAKE:

Why do U-control stunt ships always have such beautiful paint jobs on them?

Jeff in Ogden, UT

Dear Jeff:

U-control airplanes have nice paint jobs because if they didn't, they would be incredibly boring. I mean, let's face it, flying around in a circle is Dullsville. So to avoid passing out from excruciating boredom, the Ukie guys spend considerable time putting gorgeous finishes on their airplanes.

Pretty much explains the appearance of pylon racers, too, now that I think about it.

Jake

DEAR JAKE:

So now we're in for some control line bashing, eh? How typical of an RC snob like yourself. If it can't do rolls or fly three miles away, or if it didn't cost over a thousand dollars, then it's garbage, right?

Well, let me tell you something, Mr. Ho-lie-r-than-thou. Control line ships are beautiful because we still appreciate the art of building what we fly. We don't toss out a wad of cash for some plastic ARF like you do. We build from scratch, and when it's built, we take the time to put on a finish to be proud of. So you can take your opinions and stick 'em where the sun don't shine. It's no wonder you call your airplanes names like "The Green Manure Bucket." If you had any pride of workmanship like we do, you'd have something worth naming.

Martin Harris, Lakeland, FL

P.S. You were quite correct about pylon racers, however.

DEAR JAKE:

If that Harris guy is done taking up space, I'd like to get a word in here.

Harris is full of it! U-controls are dull as dirt. Everybody knows that. But how can you put RC pylon racers in the same category?

Pylon racing is the most exciting innovation in our hobby since radio control itself. The screaming engines, the lightning-fast airplanes, the thrill of the chase, the drama of the come-from-behind victory! It gives me chills just writing about it.

Our beautiful paint jobs are there to further enhance the already breathtaking visual excitement of our sport and to reduce surface drag for even greater speeds.

Anyone who would find pylon racing boring needs to see a doctor so he can be declared legally dead.

Speed Merchant in Sayreville, IL
Dear Mr. Harris and Speed Merchant:

As I said, b-o-r-i-n-g! Your two pursuits have all the excitement of the Best Finish competition at Toledo. What do you guys dream about while the paint dries? A particularly good circle, an especially fine oval? Spare me.

Jake

DEAR JAKE:

Me and my brother Atlee wrote to you a couple years back 'bout our cross-country distance record attempt. If'n you recollect, it ended in failure when our pickup got caught behind a cattle truck on the interstate and Atlee, who was RC controllin' the plane from the back of the truck at the time, got overcome by cow fumes and crashed her on the road right in front of the cattle truck which done run over her.

Well, we ain't no quitters, so's this year we went for the altitude record. Me and Atlee built this really jumbo plane 'cause we figured she'd be hard to see once we got 'er up high. We got some of them day-glo colors from that sissy-boy Lenny over at the art store in Shreveport and painted her up real bright. And Atlee, he knows this Harold feller that likes to watch the ponies run, so he borrowed up Harold's spy glasses so's we could see the plane better.

We waited for a clear day so's we wouldn't fly up into no clouds and launched her off at eight in the mornin'. On her way up, Atlee wondered how we was gonna know 'xactly what the altitude was on account of we didn't have no instruments. That was a puzzler, but we finally figured that when the engine quit, we would see it afore we heard it. So's we could count up the time difference between seein' it and hearin' it, and using the speed of sound (93,000 miles a hour), we could calculate the distance.

When she got up pretty high, I started holdin' the spy glasses up to Atlee's face so's he could keep both hands on the transmitter and keep on flyin' the plane. It was workin' pretty good til a big ol' mud wasp come a buzzin' up and tried to set on me. I chased it off with my free hand a couple a times, but it kept on comin' back. I asked Atlee if'n he could see good enough for a second or two without the binocs whilst I used 'em to take a swing at the dangd bug.

Well, I missed it the first couple a times and I must have got turned round somehow, cause when I took another swing, I hit Atlee right up side the head. Poor ol' Atlee was

continued on page 24

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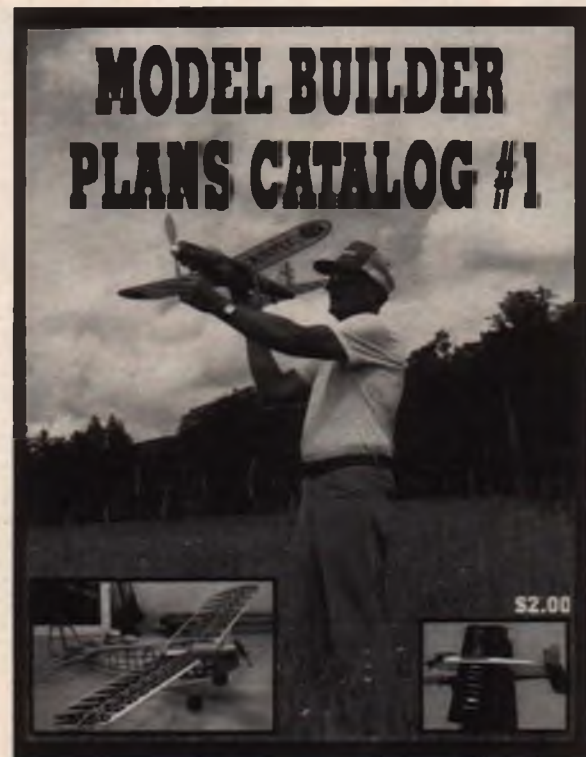
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SUPER POWER PANEL

Global Hobby Distributors is handling the new MOSFET Power Panel from Thunder Tiger Model Co. Priced at a suggested list of \$39.95, the unit features solid-state, "Super IC" integrated circuitry and a MOSFET-controlled glow driver, operates with no heat build-up and is claimed to be more reliable than standard power panels. The unit operates from any 12-volt DC power source.

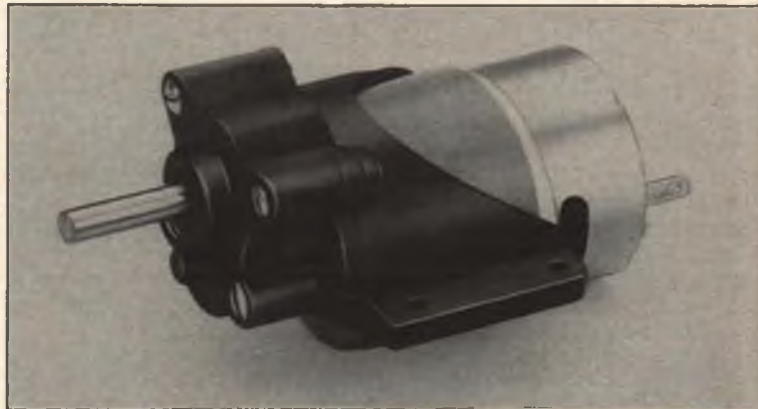
Features include outlets for an electric starter and 12-volt fuel pump, with on/off and in/out switches for the latter; and a 1.5-volt outlet for a glow plug lead. You can vary the current on the glow plug side, which is equipped with a large ammeter so you can see exactly what you're doing. The panel has a clear Lexan cover to guard against accidental shorts, and the unit is supplied complete with the necessary banana plugs.

From Global Hobby Distributors, 10725 Ellis Ave., Suite E, Fountain Valley, CA 92728-8610.

TEXAS TIMERS

Here's something for you FF competition types: Jim Summersett, the "Texas Timer" man, has added two new clockwork engine shutoff timers to his inventory—a 1/2A version of his larger ABC timer,

and a self-contained pinch-off timer. Both the ABC and 1/2A Texas Timers (seen at the top of the photo) have a thumb start tripper similar to what Bob Stalick talks about in his "Free Flight" column



this month, are set up for quick DT or auto stab functions, and feature a remote fuel cutoff. All three will run up to 30 seconds, making them just the ticket for Nostalgia and Old Timer FF events.

Both the 1/2A and ABC Texas Timers are priced at \$27.50 each. The remote cutoff is \$4.50. The pinch-off timer goes for \$18.95. Shipping and handling runs \$2.00, and Texas residents need to add 6.75% sales tax. You can order direct from Jim Summersett, Rt. 4, Box 365K, Canyon Lake, TX 78133.

GRAUPNER GEAR DRIVES

One of the many new items listed in Hobby Lobby's Catalog 20 is the Graupner 1703 Series gear drives for small electric models, offered both with and without a Graupner Speed 400 motor, in your choice of 1.5:1, 1.85:1 and 2.33:1 reduction ratios. The gears are completely enclosed within the glass-filled nylon case, and the 4mm prop shaft runs on a sintered bronze bearing. The gear case has beam mounts so the unit can be mounted like a glow engine. The unit as pictured weighs about 3-1/2 ounces. Optional

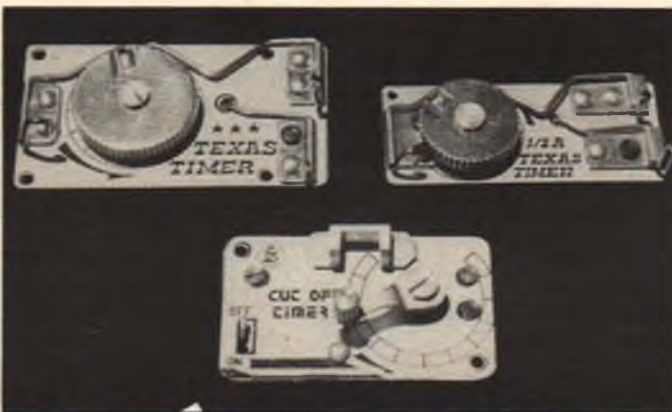
accessories include a prop adapter, firewall mount, and a flanged ball bearing to replace the stock bronze bushing.

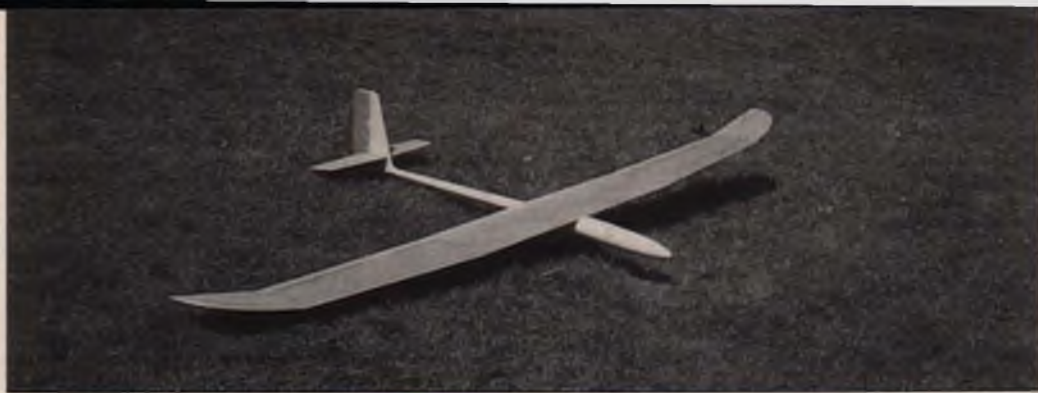
The Speed 400 motor is designed to run on six to eight cells. The folks at Hobby Lobby say the motor/gearbox combination is especially well suited to scale or high-drag models weighing 30 to 35 ounces and having wing areas of 300 or more square inches. We purchased one of the complete 1.5:1 units for a scale project we've got in the works and have to say it's a very nicely made item—typical of what we've come to expect from Graupner.

The 1703 Series gear drives are described on page 42 of Hobby Lobby's Catalog 20. Copies are available free of charge—write Hobby Lobby, 5614 Franklin Pike Circle, Brentwood, TN 37027; or call (516) 373-1444.

NSP'S "GRIFTER" ARF SAILPLANE

From Eastern Europe comes the "Grifter" RC competition sailplane, the newest offering from Northeast





Sailplane Products. Originally designed for F3J competition (the European equivalent of our thermal duration events), the Grifter comes completely pre-built, little more than the radio installation being required to get it ready for the winch line.

The Grifter's wing spans 116-1/2 inches, covers 975 square inches and sports a modified RG12 airfoil—sort of a compromise between an all-out F3B section and a thermal duration airfoil like the SD7037. The white foam cores are sheeted with maple veneer, then lightly lacquered. Ailerons and flaps come cut out and completely

construction and the fact that it comes to you completely built, the going price of \$749.95 is really not high at all. You can get more information by contacting Northeast Sailplane Products, 16 Kirby Lane, Williston, VT 05495; (802) 658-9482.

PROP PITCH GAUGE

A lot of competition indoor models these days are using adjustable pitch props so as to be able to precisely suit the conditions of the flying site, the rubber motor and the model. Indoor Model Supply has recently come out with a prop pitch gauge that allows you to



finished. The stab halves are foam, covered with balsa and lacquered. Fuselage is white gel-coated fiberglass with a slip-on nose cone, comes completely finished and ready for your radio. The all-up flying weight is quoted at 68 ounces, which translates to a wing loading of 10 ounces per square foot.

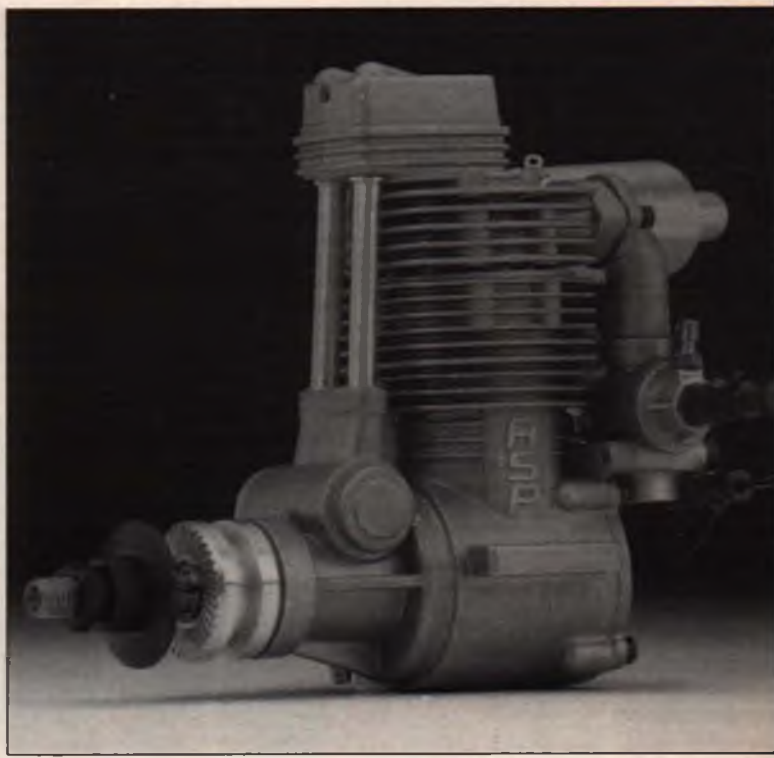
Considering the Grifter's size, state-of-the-art design and

set both blades at exactly the same pitch angle for optimum performance and to eliminate the wobble that occurs when one blade has more pitch than the other. The gauge has a height-adjustable prop holding fixture and a sliding protractor that can be positioned as needed from the center of the prop. Complete instructions are included. Priced at \$39.50 plus \$4.00 shipping and handling, from Indoor

Model Supply, Box 5311, Salem, OR 97304.

ASP FOUR-STROKE

No real details are available as we go to press, but we thought you'd like to have an early peek at the new ASP .80, that company's



first four-stroke engine. Testing by the folks at Horizon Hobby Distributors yielded a high rpm of 10,300 on a 13x6 Rev-Up. At that speed, the muffled exhaust was measured at only 93db at 9 feet, low enough for any closely controlled field.

More information is available from Indy RC Sales, Customer Service Dept., 10620 N. College Ave., Indianapolis, IN 46280; or call them direct at (317) 846-0766.

SCHOOL'S IN SESSION

January 4, 1993, marks the

beginning of Ernie Huber's R/C Flight Training Center's fourth year in the business of teaching aspiring RC chopper pilots to fly. So far, over 225 students from 40 states and nine countries have gone through the program, logging over 7500 flights. If you're really serious about learning to fly a helicopter, this is without question the way to go. You can get a free information package with class schedule by writing to R/C Flight Training Center, P.O. Box 727, Crescent City, FL 32112-0727, or call 1-800-452-1677 in the U.S.; outside the U.S., it's (904) 698-4275. You might also check out Al Tuttle's article in the April '92 *Model Builder*. Al went through Ernie's

program in November of last year and had much to say regarding his experiences there.

LET THERE BE LIGHT!

Now here's something interesting: a knife handle with a built-in penlight that illuminates the area immediately around the blade tip! King Tool, out of Bozeman, Montana, is producing this clever item, which is made of aluminum, requires two AAA batteries and carries a suggested list of under \$15. It's designed for standard #11 blades or any others that have the

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

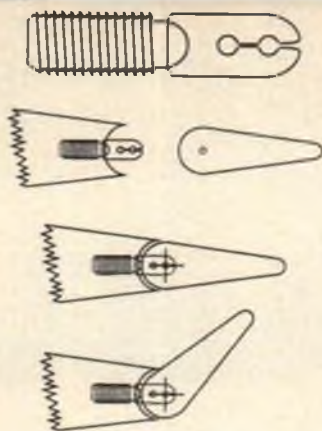
same size grip shank. We haven't seen one up close, but if it works anywhere near as well as King Tool claims, this new knife handle is bound to become a favorite on more than just a few workbenches.

Manufactured by King Tool, Inc., 5350 Love Lane, Bozeman, MT 59715.



SNAPPY HINGES

The new Snap Tight Hinge from Fourmost Products is a clever way to construct a scale-like knuckle hinge with a minimum of work. In a nutshell, the hinges snap onto short sections of piano wire embedded in your model's control surfaces. The hinges get epoxied into holes in the wing or tail surfaces—the threaded end provides a strong grip for the epoxy. Perhaps



best of all, the surfaces can be easily removed if needed, merely by unsnapping them from the wires. Complete installation instructions are supplied.

Snap Tight Hinges are produced in large and small sizes, priced at \$3.95 for a package of 12. From Fourmost Products, 4040 24th Ave., Forest Grove, OR 97116.

ENGINE VIDEOS

Everything you could ever want to know about model engines is contained in a set of videos titled, appropriately enough, "Model Engines," produced by Hobby Supply South. Due for release in early October, Volume 1 starts with

the basics, including theory of operation and powerplant families, then focuses on selection, installation, operation, maintenance and repair of two-stroke glow engines. Other volumes in the series will cover high-performance engines and modifications, four-stroke selection and operation, spark ignition, diesels, engine collecting, building a model engine in a home shop and more.

"Model Engines," Volume 1 is available for \$24.95 postpaid (Georgia residents add 5% sales tax) from Hobby Supply South, 5060 Glade Rd., Acworth, GA 30101; or call (404) 974-0843.



J-3 CUB GEAR

The pre-bent aluminum landing gear pictured here is an aftermarket item for the popular Carl Goldberg J-3 Cub. It's light but strong, and even comes pre-finished in a baked Cub Yellow paint that is said to resist chipping. From Fiberglass

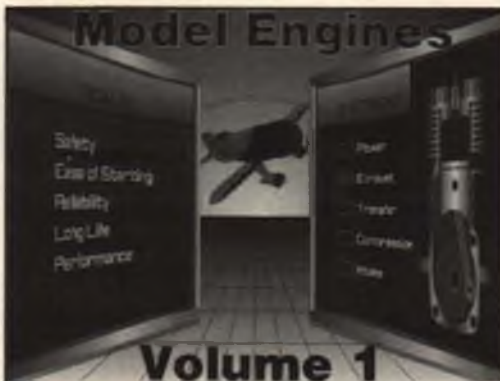
Specialties, 38624 Mt. Kisco Dr., Sterling Heights, MI 48310; (313) 978-2512.



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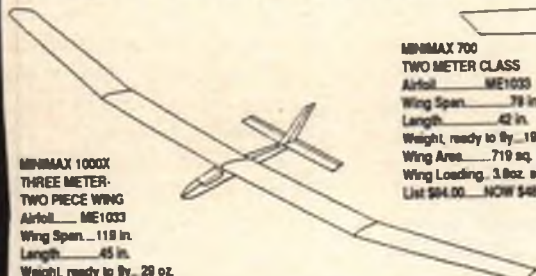
Several weeks ago we had the misfortune of folding the wing on a Great Planes Spectra electric-powered sailplane while flying at literally "speck" altitude in some pretty turbulent lift. The wingless fuselage was on the verge of going

supersonic when it bored a hole several inches deep in the playing field we were flying from. Needless to say, that motor was history, but if you've got an expensive, precision DC motor whose only problem is a bent shaft, consider sending the armature to the Arm-A-Sure Corporation for straightening. For \$16, they'll straighten it out and get it back to you within two weeks of receipt. For details, contact the Arm-A-Sure Corporation, Customer Service Dept., P.O. Box 1591, Lake Oswego, OR 97035. **MB**



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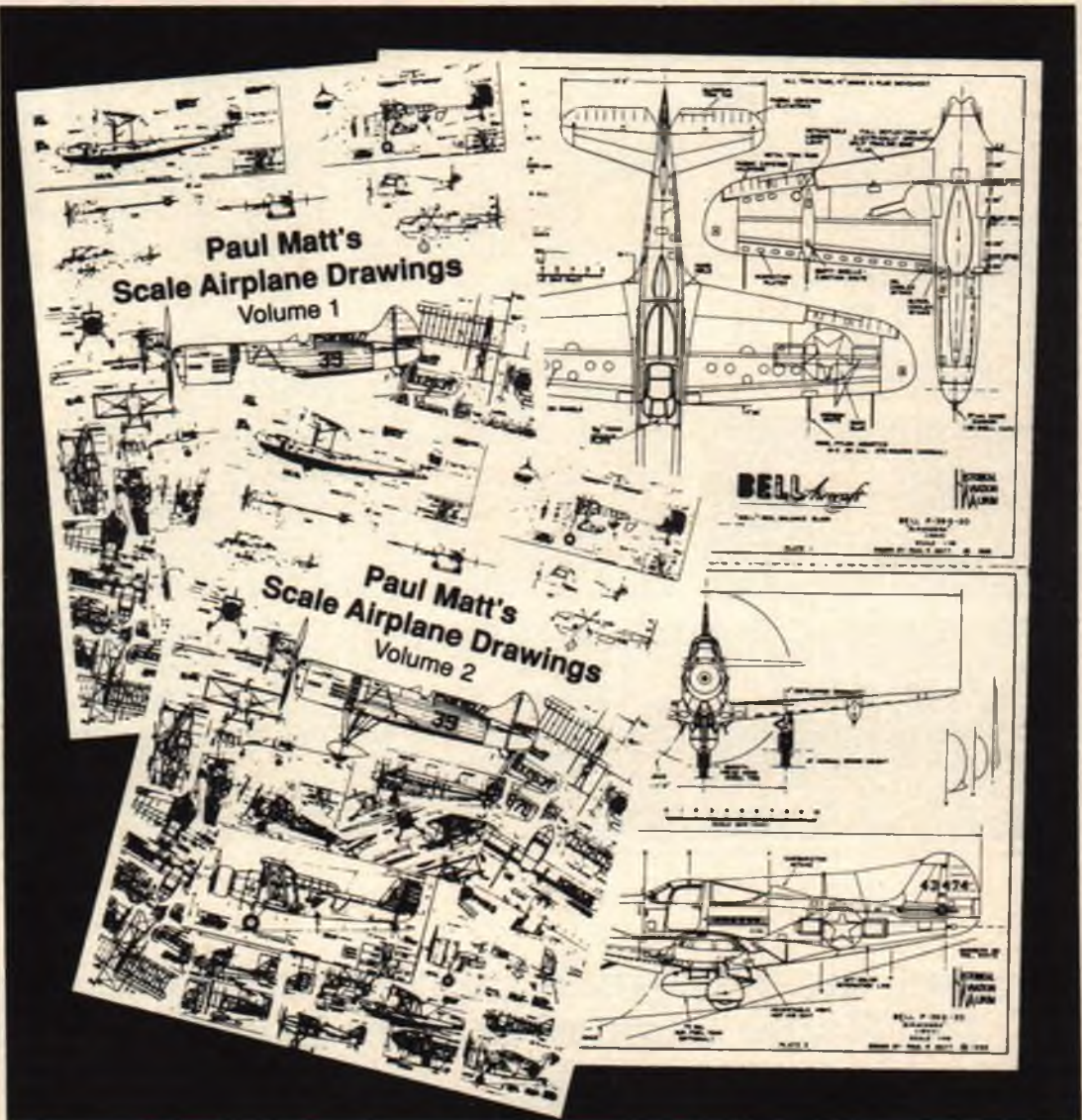
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SNAP ROLLS AND SPINS: WHAT'S THE RIGHT WAY?

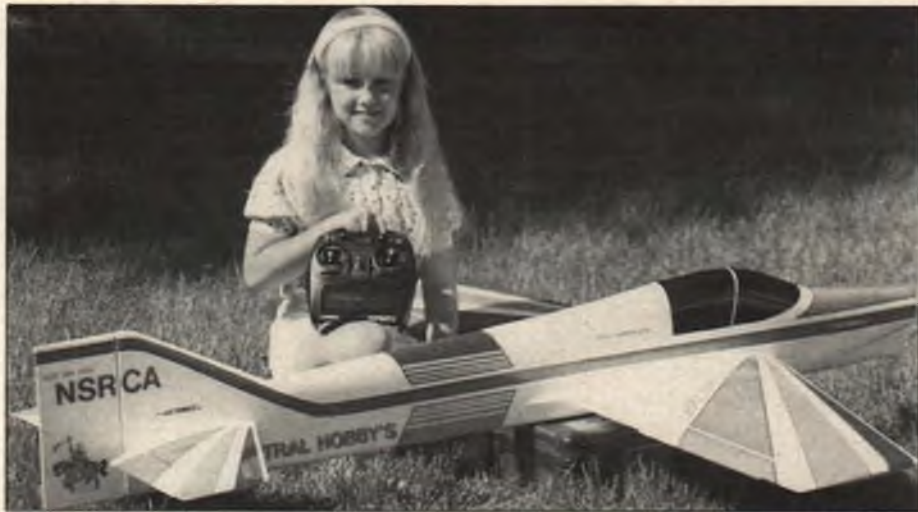
First, you have to define 'em—
not easy, with the way the AMA and FAI rulebooks are written.

Blues singer Billie Holliday once wailed soulfully to the world that "...a good man is hard to find." I'm no expert on Billie's love life, but I can tell you that the classic line about a good one being hard to find certainly applies to the snap rolls and spin entries I've seen in the FAI and Masters pattern classes this past season.

Of course, the snap/spin problem has existed since the onset of turnaround pattern, but in seasons past, it affected three maneuvers in one pattern class out of six. This season, with the old FAI schedule in use in Masters class and both the A and B schedules in use in FAI, the total is nine maneuvers in two classes out of five. Proposals before the Contest Board for 1994 would add an Avalanche and a spin to Advanced, bringing the count to 11 maneuvers in three classes out of five. If this proposal is approved, as is likely, the continuing problem of how to fly and judge snaps and spins will no longer be confined to the upper classes, but will have come to roost firmly on the shoulders of the pattern majority.



The JR MES-4721 servo lifts a 16-pound bowling ball. One powerful servo! See text for our columnist's comments.



Jennifer Hawkinson holds the new Airtronics Infinity 660 computer radio, destined to become a favorite among pattern fliers. The airplane is dad Eric Hawkinson's new Desire 1.20.

Voting down the proposed changes to Advanced would be a poor solution; the increased difficulty is needed in that class as a preparation for advancement to Masters. And in any case, the problem would continue to exist in both Masters and FAI. Any reasonable effort to remedy the situation should address the *whole* problem, not just nibble at the edges.

Why does the problem exist? I found a huge clue in the discussions under the RV awnings and shade canopies at N-PAC and virtually every other contest I attended this past season. These conversations might start on any topic from the weather, to judging, to new methods of mounting engines, but eventually, the subject would turn to snaps and spins.

In the case of both snaps and spins, the talk centered on definitions. In the case of a snap roll, it was about what a snap roll actually was; what it wasn't; how slow it could be; how fast it could be; how to tell a snap from a barrel roll; whether the nose had to pitch before rotation was started, and if so, how much and how long before; whether the tail should move in a circle; how big a circle should the CG of the airplane be allowed to describe before the snap is labeled a barrel roll, etc., *ad infinitum*.

Spin entries were much the same story.

As "snap" entries to a spin draw a zero, some of the snap roll discussion applied, before even starting on the problems peculiar to spins. These are just a few samples of the type of puzzler that would usually follow, once the snap entry discussion stalled (Who, me? Write puns? In MB?). Just how do you tell if an aircraft with a wingspan shy of two meters is truly stalled at a distance of 350 meters when it's moving away from you? Should the nose drop past horizontal before rotation is started? Does rotation have to start simultaneously with the wing dropping? If the airplane stalls straight ahead and neither wing drops before rotation starts, is it a downgrade? Because an aircraft is allowed to yaw into a crosswind to maintain a straight ground track, how much yaw is acceptable with the airplane nearly stopped before the spin is entered? Thirty degrees? Forty-five degrees? Ninety degrees, or would that make it a 2-3/4 turn spin? What does "...a nearly vertical downward line of visible length must be flown after the rotation stops..." actually mean? A half degree from vertical? Anything less than 5 degrees? Ten degrees? Fifteen degrees?

In these confabs, people tended to be very protective of their opinions and interpretations of the rulebook(s). The discussions were, for the most part, very heated

and emotional—and for good reason. Contests are definitely being won and lost on the strength of these maneuvers, and a snap that fetches a 9 in Podunkum Lake, Washington often will be zeroed in Downwind Dumps, Oregon the following week. Spin entries that play well in Sliced Cow, Montana are useless in Podunkum, and so on.

The problem isn't that the pilots can't properly fly the maneuvers. The problem is that no two pilots (or judges) seem to be in agreement with each other on what the maneuvers should actually look like! When I stated that a good snap or spin entry was hard to find, I meant one that matched *my* opinion. I believe my opinions to be founded on the rules, but all of those whose opinions differ from mine likely believe the same thing about theirs.

There can only be one reason for all of the confusion, disagreement, and multiplicity of opinion, and that is that we have done a less-than-adequate job of rule writing, both at the AMA and FAI levels.

The snap and spin rules as they appear in the '92 AMA book are virtually lifted intact from the FAI book. I know this because I was the one responsible for doing it. This was done to align both books to the same standard, not because the FAI maneuver definitions were perfectly written.

The FAI Sporting Code states that a snap roll "is a rapid autorotative roll where the model is in a stalled attitude." A bit further on, the statement appears that "...the attitude and flight path must show a definite break before rotation is started. If the stall does not occur and the model barrel-rolls around, the maneuver is zeroed." And that's all of the guidance we are going to get on the subject.

On spins, we do a bit better, but the same ultra-spare approach applies: "In order to spin, the model must be stalled. The entry is flown in a near-horizontal path with the nose-up attitude increasing as the speed decreases. The nose then drops as the model stalls. Simultaneously, the wing drops in the direction of the spin.

"If the model does not stall or if the model is snap-rolled into the spin, the maneuver is zeroed."

The AMA book follows both definitions closely, but leaves out the FAI snap requirement for a "definite break before rotation is started," stating only that the attitude and flight path must show a "definite break." This was done because many people, myself included, felt (and still feel) that the FAI requirement for a break "before" rotation commences was totally unjudgable in model scale at 150-175 meters without the benefit of stop-action or slow-motion photography.

The FAI Sporting Code also lists as a judging criteria for snap rolls that they must maintain "...a constant flight path through the maneuver." This was left out of the AMA book because no one could explain just what was meant by the statement.

Regardless of whether the AMA or FAI



The Breene Aircraft Throw Meter, a handy setup and trimming tool, shown clipped to the aileron of Dennis Breene's Flashback II. The Flashback is Dennis' own design for 1.20 engines.



From N-PAC: Nice Hanson Runaway by Jason Shulman. YS 1.20, Futaba 9VAP.



Dave von Linsowe's USA Star lands during the N-PAC F3A finals. Dave was 2nd with the huge airplane.

book is used, the pilot gets little help from the definition, and the judge gets even less. People are operating on opinion and subjective impression ("Well, it looked like a snap roll...") because they have been given all sorts of room to do exactly that. Even the new AMA judging video, which is absolutely excellent in most other areas, isn't a

great deal more help than the rulebook with snaps and spins because the definitions used are the same, taken word for word from the FAI book.

What is needed is a definitive rewrite of these rules at the FAI level that answers all the questions and addresses the gray areas. Most importantly, the rules and definitions



Also from N-PAC. Mike Harrison's Obsession. YS 1.20 power, JR PCM-10 radio.

should be written with the idea of judgability in mind. Give the judge a hook to hang the score on. Let the pilot know *exactly* what is required.

As an example, take the matter of a snap roll entry to a spin. If a snap roll entry were defined as taking place when the up-going wing exceeded the vertical plane (90 degrees of rotation) before the nose dropped below the horizontal plane, then a judge would have a hard-and-fast criterion to go by, and the pilot would have a rule to live by. No doubts, no problems, no room for opinion, and no arguments.

Similar approaches could be taken to clearing up the other snap/spin questions. Instead of "rapid autorotative roll," perhaps we could use a precise requirement, such as a minimum of 360 degrees per second of rotation. If the CG of an aircraft being snap rolled describes more than a two-meter (or one-meter, or one-wingspan) circle, maybe we could call that a barrel roll, and end

some arguments. And so on.

If the FAI rules were to go in such a direction, I am more than sure that the AMA rules would follow suit. Will this happen? Well, we can always hope! In the meantime, the best advice I can give the large number of you who have asked for it is to fly well within the rules. Make the snaps rapid and fairly violent-looking. Take pains to show the judge a definite stall break on the spin entry. Make the vertical and horizontal exit and entry lines as near perfectly vertical and horizontal as you can. Don't show a yaw at all on the spin entry if you can help it.

Don't get close to controversy. The zeros and the big downgrades happen when a pilot starts to push the edge of the maneuver envelope a little bit, to make it easier to position the maneuver, or come out on heading, or stop the rotation precisely. Don't give the judge an excuse to pull that opinion out of his or her mental pocket. It might not be the same opinion that you hold. In

fact, given the staggering number of differing views I've heard expressed, the chance of that occurring would be very slim.

On the new and improved pattern products front, I have a pile of goodies to talk about. For the northernmost position on your Christmas wish list, I nominate the JR NES-4721 servo from JR Remote Control, now available at your hobby store, courtesy of the fine people at Hobby Dynamics/Horizon Distributors. The NES-4721 is the RC equivalent of a monster truck. It looks normal, but it can turn some awfully big wheels! This pint-sized powerhouse has been around for about a year, but has gone largely unnoticed.

The 4721's specifics are: coreless motor, double ball bearings, 119.63 oz./in. torque, .22 second/60 degrees transit time, 1.72-ounce weight, and the same exterior dimensions as the NES-4131. Designed for large models, it is an excellent choice for rudder servo duty, and would be a great all-round servo for 1.20-sized pattern ships. I have been using the 4721 on rudder all year, and the improvement in rudder maneuvers such as snaps and point rolls is very significant. Control surface blowback just doesn't happen with the 4721, and it centers like a Mercedes Benz door closes: very precisely, and with great authority.

The lovely young lady in one of the photos is Jennifer Hawkinson, and the radio she is holding is the new Airtronics Infinity 660 computer radio. Jennifer's dad, Eric, not only built the very nice Desire 1.20 shown, he is putting together the User's Manual on this new radio system, and was kind enough to send along the followings specs: four-model memory, two compensation mixers, four snap roll options, trim memory, exponential on all flight channels, throttle curve programming, and all of the other now "standard" computer features. The Infinity 660 is due to hit the stores sometime in October or November, and should fit nicely in Santa's sack with a not-so-large price tag of around \$400.

Available now through the AMA, the new pattern video "Judging and Flying RC Precision Aerobatics" is a must-see for every pattern junkie. The price is \$24.95 for 45 minutes of indispensable coaching for pilots and judges. This is a thoroughly professional offering, produced by NFL Films. I give it four stars and two thumbs up. Order from AMA, 1810 Samuel Morse Dr., Reston, VA 22090.

Last and not least, but still incredibly useful is a new little control surface throw meter from Breene Aircraft. It clips onto the surface anywhere, the centering is adjustable so that the airplane doesn't even have to be level, and it provides accurate, repeatable results. It goes in your flight box and is invaluable for field setup and trimming. The price is \$7.00. Buy it direct from Breene Aircraft, 109 So. Orange, Exeter, CA 93221; (209) 592-6708. One of these would make a great stocking stuffer. **MB**

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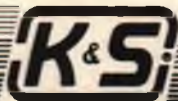


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THE 18TH ANNUAL

SIG FUN-FLY



A SIG-NIFICANT SUCCESS

PHOTOS AND TEXT BY RICH GRAHAM



Above: Beautiful 1/3-scale Sig Spacewalker owned and built by Carlos Perez and Scott Dingman. This plane is detailed after Hazel Sig's full-size Spacewalker, which is hangared at Sig's own flying field. Left: Close-up of the cockpit on the Perez/Dingman Spacewalker reveals flawless workmanship and close attention to detail.

Anyone who has dealt with Sig Manufacturing knows their reputation for hospitality and friendship. Their 18th Annual Fun-Fly, held June 20-21 in Montezuma, Iowa, proved that that reputation is well deserved.

This was truly a "fun" fly with some friendly competition thrown in. There was no entry fee for the fliers and Sig provided a supper for all contestants and their families at the local American Legion Hall. The weather on Saturday threatened to be cold and windy, but cleared around noon. Though the wind persisted, there was no lack of sunshine.

Most of the fliers had Sig kits that they used in the competition. There were several Morrissey Bravos, Kougars, Cadet Seniors, and Cavaliers. A pair of U.S. Air Force B-52 mechanics from Ellsworth Air Force Base traveled from their duty station in Rapid City, South Dakota, to take part. Carlos Perez and Scott Dingman had a 1/3-scale Sig Spacewalker duplicating Hazel Sig's full-sized plane. The two have so far spent about 300 hours on the plane, and plan to spend another 75 hours to finish the project. They have been meticulous in replicating

the cockpit of Hazel's Spacewalker, even down to duplicating her plaque, which reads: "I must remember, to make the houses look smaller, pull back on the stick!"

Both Perez and Dingman are members of the RC Aces Flying Club in Rapid City. Dingman was amused when he saw Hazel's Spacewalker, because he had recently finished painting the head covers on his plane black, while Hazel just had hers chromed. Looks like it's time for the two fliers to invest in some silver paint!

Mark and Ryan Shad, also members of



This 1/4-scale Morrisey Bravo is powered by a Quadra 50 and is owned by Chris Kramer from Dyersville, Iowa. It's built from the Sig kit, naturally!



Orv Shields' Sig Cadet Senior is powered by a K&B .65 Sportster. Orv customized the plane by making it a taildragger and adding ailerons, giving it an appearance reminiscent of Duane Cole's famous full-size clipped-wing Taylorcraft.



Another Morrisey Bravo, this one owned by Mark Shad from Rapid City, South Dakota. The ground handling and flying characteristics on this model are said to be superb, making it an ideal choice for low-time pilots.



Dean Maupin, from Davenport, Iowa, competed with his intricately detailed Byron Originals Christen Eagle. Dean is a member of the Erie RC Club.

the RC Aces, made the 700-mile jaunt with Scott and Carlos. Ryan, 15, placed second in the Climb and Glide category for low-wing planes with a time of 3:41. He also received an award for Best Performance by a Junior Flier.

The Sig Fun-Fly hosted about 200 participants from around the midwest, Arizona, Nebraska, and Minnesota. Ken and Sue Merrill made the five-hour drive from Bellevue, Nebraska, with their two dogs, Lady and Tramp. Lady was the hit of the Fun-Fly when she gave birth to four puppies

on Saturday. Ken, who owns three Sig kits, finished second in the Advanced Monoplane class.

The two-day Fun-Fly consisted of five competition events: Cadet Senior Mark II and Cub Class, Monoplane, Biplane, Giant Scale, and Climb and Glide. Each class had Sport and Advanced categories. Except for the Climb and Glide, each event had four rounds.

During the first round of each class, fliers were required to perform a set of mandatory maneuvers which included an inside

loop, inverted flight, 1/2 Cuban 8, horizontal roll, stall turn, and landing. In the last three rounds, pilots picked from a list of aerobatics to perform for the judges.

Both Hazel Sig and her husband, Maxey Hester, were at the Fun-Fly, mingling with fliers and their families. Both were responsive to questions and comments about their planes and offered technical advice for the participants.

The 19th Annual Sig Fun-Fly will be held June 19-20, 1993, in Montezuma. Don't miss it! **MB**

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SATISFACTION GUARANTEED

DEAR JAKE continued from page 8

cold-cocked a good one, and when he keeled over he dropped the transmitter. I bent over to pick it up and the damn wasp stung me right on my dairy-air. I lit out for the pond to cool my bun fire and clean forgot about our record breakin' airplane flyin' around up there somewhere. When Atlee come to, he couldn't see it no more and we ain't seen it since.

Next year we're gonna go for the speed record.

Hugo Baphrume in Douville, LA
Dear Hugo and Atlee:

I'm sorry it didn't work out for you. It sounds like you put a great deal of effort into the attempt. Take heart, though. Based on the following, I'm pretty sure you made it to at least 19,000 feet:

(AP) Sep. 11, 1992—New Orleans—Captain Wendell Maltbie and three of the flight crew on Continental Flight 1022 out of New York reported a near miss with a "brightly colored unidentified flying object" at 19,000 feet during their descent into New Orleans. Captain Maltbie described the object as "about the size of a barn door and flying erratically." Lenny Finch, an art dealer from Shreveport and a passenger on the plane, saw the object from his window and confirmed the near miss, adding, "but the colors were simply divine."

Jake **MB**

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MODEL BUILDER VISITS DCU

A behind-the-scenes look at one of the country's largest suppliers of fiberglass model aircraft parts, plus a quick review of the company's own glider kits.

Deep in the heart of Anaheim, California, about a mile or two from Disneyland, rests a 5,000 square foot magic kingdom of modeling delights called DCU. Behind the glass doors of this three-unit dream castle of balsa dust and fiberglass slivers lives a serious, hard-working, Teutonic perfectionist of many talents by the name of Mark Hambelton (that's the Germanic spelling of his olde English name).

This stalwart young man is extremely gifted and excels in designing, crafting, finishing, tooling, and molding any sailplane, jet, prop plane, helicopter or boat that he desires. He is often commissioned to create limited-run, custom models from balsa, foam, epoxy resin, fiberglass, obechi, even welded aluminum. However, the majority of his business is contract work for

some 30 OEM clients. Five of these are model boat manufacturers, three are helicopter, four are ducted fan jet, and several more are sailplane manufacturers.

Then there is the commercial, aerospace and movie work. Among other things, DCU manufactures control panels out of epoxy fiberglass (and other stuff) for Apache helicopter gun simulators. Also, you've probably seen Mark's handiwork on the big screen or TV without realizing it. He built six 1/5.5-scale, flyable A-6 Intruders for the movie "Flight of the Intruder." The movie company gleefully blew up the models in flight and special effect sequences. He also built models for the "Iron Eagle" and "Iron Eagle II" movies.

Mark is driven by an almost self-destructive, nearly obsessive energy to produce exceptionally high-quality products in a

quick and efficient manner. And he is not alone in his efforts. His skilled staff of nine model makers who do the mass-production work share his ideals. Over the years, Mark has gradually devoted more and more time to management work, including business promotion and sales. Business has been good; Mark has succeeded in an industry where many fail and many more just barely manage to survive. Perhaps his success is due to his diversification; perhaps it's his serious, all-business attitude; perhaps too it's his abilities to juggle management and production demands without going insane. Who knows...it works for him!

To give you some idea of the sheer volume of work in molded fiberglass parts alone, DCU consumes a 500-pound drum of epoxy resin every month and three 125-yard, extra-wide rolls of fiberglass cloth



DCU's Mark Hambelton flies the Wind Weasel at a slope in Yorba Linda, California. Text tells where you can buy the kit for this unique, attractive ship. Inset: Mark Hambelton outside one of his three industrial units in Anaheim, California. He holds the prototype of his 115-inch span Wind Storm, soon to be released as the fifth of his company's sailplane kits.



Mark poses with his company's Super Dragon Fly, a 70-inch version of the 50-inch Dragon Fly that DCU also kits. Resting on the display stand on the left is the Stryker, and suspended from the ceiling is one of the huge A-6 Intruders built by DCU for the movie, "Flight of the Intruder."

each week. In a two-week period, DCU averages 250 glider fuselages. We're not talking fly-by-night here. Mark keeps up the pace!

SO... WHAT DOES DCU MAKE IN THE REALM OF SILENT FLIGHT?

In all likelihood, you have owned or flown a DCU fuselage already without even knowing it. DCU is a behind-the-scenes manufacturer for the most part, and Mark likes it that way. However, DCU does have four models which it makes all for itself: the Dragon Fly, Super Dragon Fly, Wind Weasel and Stryker. Let's take a quick look at each one and another that is on the horizon.

Dragon Fly

The Dragon Fly was Mark's first commercial sailplane kit. It's a small, aerobatic slope sailplane for two-channel RC. It has an epoxy fiberglass fuselage that is really tough. With Mark at the controls (I'm innocent!) and the wind fading to almost nothing, I saw the Dragon Fly take two consecutive straight-in hits into a hard, dry California hillside without sustaining damage.

The model's canopy is longer than most, as it goes from the nose area to the trailing edge of the wing. Removing the canopy not only reveals the battery, receiver and mini elevator servo, but the mini aileron servo as well.

The Dragon Fly has a wingspan of 50 inches and a wing area of 257 square inches. This relatively high aspect ratio (9.73:1) makes it seem like a bigger plane. Its small span allows it to fit inside the smallest of cars without disassembly.

The Dragon Fly's wings are built from foam cores which are to be sheeted (by the modeler) with balsa. Full-span strip ailerons do the job of roll control. Balsa parts are machine cut for quick, accurate assembly of the built-up vertical and horizontal stabs. The kit includes hardware, full-size plans and step-by-step instructions.





This photo gives an idea of just how massive those 1:5.5-scale Intruders really are. DCU built six of these giant gliders for the movie.



The Wind Weasel is a slick little Class A RCHLG that features a pod-and-boom fuselage and a pylon-mounted wing. The fiberglass pod/pylon is done in one piece and comes with a slip-on nose cone.

Super Dragon Fly

The Super Dragon Fly is a larger version of the Dragon Fly. It is a performance-oriented slope ship which "challenges the expert-level pilot, yet is forgiving enough for any beginning aileron flier." It flies in very light lift, yet is capable of high-speed, stable flight and aerobatics. The Super Dragon Fly is quick to construct, as it is relatively simple in design.

The kit features a lightweight epoxy fiberglass fuselage, foam wing cores, machine cut balsa and plywood parts, extensive hardware, full-size plans, and step-by-step instructions. Wingspan is 70 inches, wing area is 560 squares, aspect ratio is 8.75:1, and the ready-to-fly weight is 38 to 42 ounces.

The Super Dragon Fly would be a great choice for a wide variety of slope conditions and flying skills. It would be hard to go wrong with such a well-rounded, classic-looking, nothing-really-exotic sailplane.

Stryker

This is where you find the exotic. Looking like a futuristic, stealthy, highly maneu-

verable fighter, the Stryker is somewhat a cross between an F-18, F-14 and a YF-22.

In fact, Mark views it as his "concept plane," as it uses actual new-fighter design features. By blending the wing into the fuselage and flattening the fuselage profile, Mark achieved exceptional speed, responsiveness, and wind penetration. Its lightly loaded wings let it fly in light lift conditions, too. The Stryker is fully aerobatic.

Features of the Stryker kit are foam core wings, epoxy fiberglass fuselage; vacuum-formed cockpit, clear canopy and tail fillets; machine-cut/sanded balsa and plywood parts, full-size plans and written instructions.

The Stryker has a wingspan of 50 inches, a "lifting area" of 400 square inches, a length of 37 inches, and an all-up flying weight of around 30 ounces.

Wind Weasel

The Wind Weasel is a lightly loaded, 60-inch span, 375 square inch, polyhedral hand launch or slope glider. It was inspired by Mike Charles' "Ultra" HL design featured many years ago in this column in my

annual ISS RCHLG contest coverage. That design was so different and so intriguing that I still get requests for non-existent plans and photos.

What sets the Wind Weasel apart from all other kit HLGs is its pod-and-boom fuselage and V-tail. Mark used the same NACA low-drag, laminar airfoil profile that Mike Charles used in his Ultra to form the fuselage pod. To this he added the same kind of wing pylon mount to remove the wing from airflow interference at the fuselage, thus reducing parasitic drag. The final additions were a removable nose cone and a stiff fiberglass boom.

The wing is built up from superb quality machine-cut/sanded ribs with the famous Selig 3021 airfoil. The wing builds quickly and easily, and mounts onto the pylon with two bolts. The V-tail surfaces are built from lightweight balsa sheet.

Flying the Wind Weasel was a very enjoyable experience. Our late afternoon/early evening test flights over a Yorba Linda (California) slope were really impressive. This plane is so aerodynamically clean it takes hardly any lift at all to stay airborne. Faint thermals and light slope lift were all we had to work with, but they were enough. There were times I didn't think there was any lift, yet the Wind Weasel managed to stay up.

The Wind Weasel kit features all hardware, all machine cut/sanded balsa and plywood parts, epoxy fiberglass pod-and-boom fuselage with slip-on nose cone, full-size plans, and step-by-step instructions.

Wind Storm

This model is scheduled to be available in the near future. As of this writing, it exists only as a prototype, but is well on its way to kit status.

The Wind Storm is a thermal competition sailplane for AMA Unlimited (Class D) contests. It features a 116-inch wingspan and 1,030 square inches of wing area; and an obechi sheeted blue foam core wing with the "ultimate" thermal airfoil, the SD7037. The all-balsa stabs feature the ultra-clean and effective SD8020 airfoil (or something close to it!).

The Wind Storm's flaps are of the type known as "Fowler" flaps. They feature Robart Hinge Point style hinges which hang

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Look at all the fiberglass parts! What you see here represents two weeks' production by DCU.



"You want it WHEN?!!" When Mark learns how to say "NO" he might just become normal again!

down below the bottom surface of the wing. When lowered, the flaps leave a slot behind which bleeds air, spills lift, and creates more drag than "normal" tape hinge flaps. The results are more accurate landings and (hopefully) higher landing point bonuses at contests! When closed, there is no gap at the flap, nor is there an exposed flap pushrod. The pushrod pushes from above the hinge line, yet below the top wing skin.

The model uses pull-pull cables for the rudder, which reduces weight and increases control throw accuracy. The all-flying horizontal stab is pushrod-and-bellcrank actuated (all parts will be supplied).

Another Wind Storm feature is the "user friendly" elevator and rudder servo tray. This plywood tray mounts to the upper

fiberglass flange in the forward fuselage bay; four (or more) screws hold everything in place and are easily removed. A slip-on nose cone hides everything in an aerodynamically clean way. The molded epoxy-fiberglass fuselage is Kevlar reinforced for extra toughness at the landing tape.

What is yet undetermined is whether the Wind Storm will have a two-piece or three-piece wing. Mark is leaning toward the two-piece wing with a center keel to hold the wing rod to the fuselage and tow hook. The wing would also bolt to the fuselage with four nylon bolts, but these bolts would mainly keep the wing panels from sliding apart at the center.

HOW TO GET DCU KITS

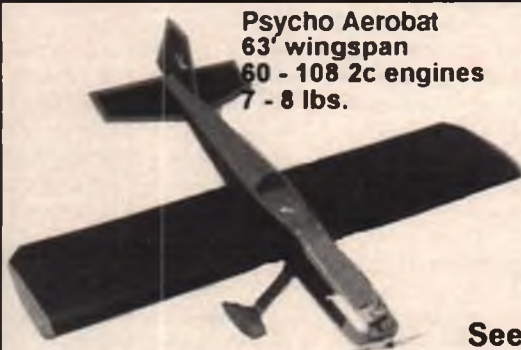
DCU kits are sold through a network of

dealers and national mail order companies. In Southern California, Hobby Shack stores (and mail order) carry the line, as do other dealers. Northeast Sailplane Products also mail orders DCU kits from Vermont. Don't be shy to ask your local dealer for a kit! If he says he doesn't have what you are looking for, ask him to order it for you! Inquiries regarding DCU kits should be directed to DCU, 1556 S. Anaheim, Units C,D,E, Anaheim, CA 92805; (714) 535-6969.

• • •

Bill Forrey, 3610 Amberwood Ct., Lake Elsinore, CA 92530; (909) 245-1702. To reach me, please call between 6:30 p.m. and 9:30 p.m. California time (Pacific Standard). I prefer calls to time-consuming letters. **MB**

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ELECTRONICS CORNER

BY ELOY MAREZ

• Reed relays revisited • Soldering NiCd packs • A look at two new JR servos

Well, I did it again! "It," in this case, is going back to Costa Rica—see *MB* October '92 for details of the first 1992 sojourn. This second trip was to reward my two youngest granddaughters, Sara (11) and Lauren (12), for excellent school grades, exemplary deportment and for just being all-around superkids. And because I love them! Though they wore out both me and my American Express card, a wonderful time was had by all.

While enroute home, we were treated to a most interesting tour of the cockpit of the Skybus 320 we were traveling on—one of the latest generation of fly-by-wire airliners. Gone are all of the familiar clock-looking instruments and most of the now old-fashioned cockpit clutter we are used to seeing. In fact, even the control column with its steering wheel is gone; it has been replaced by a pull-out table on which the pilots rest their manuals or eat their lunch.

The only thing vaguely re-

destination. It then adjusts altitude, navigates, and if that isn't enough, lands at the other end.

Now for the interesting part—it is all PCM! Yep, Pulse Code Modulation, just like our RC systems! As I have stressed here a number of times, PCM is *not* some magical radio control transmission method invented in Japan. PCM is data encoding only. The actual transmission by the PCM RC transmitter is done in FM. In the 320, all required control information is transmitted to electro-hydraulic servos via wires, in PCM format.

What happens should the computer develop one of those viruses we hear about? Well, I didn't ask, but I'm sure there are backups to the backups—at some point the computer must go into some sort of failsafe mode and give the pilot a digitized: "Houston, we've got a problem!" type of warning.

REED RELAYS— OMT!

Also in the October issue we related the woes of one Jordan Flakser, who is having some problems with a piece of equipment I am not familiar with. It uses reed relays, which he suspects are the cause of his problems, and I asked for help from those who might have some knowledge of the subject. Said help came in the form of a letter from Phil Smith, K8HCL, of Adrian, Michigan:

"1. Check the reed contacts with your ohmmeter. The contacts should be open. If not, slam the unit on the bench. This usually will break the contacts loose and you are back in business. Reed contacts tend to weld closed with a small amount of capacitance load. If the circuit design will allow, insert 100-1000 ohms in series with the contacts. This will eliminate the contact welding problem.

"2. Solder joints can occasionally go bad after time. If solder joints are contaminated or not cleaned after soldering, moisture and years can result in a bad connection. The cure is

to reheat all the solder joints, adding just enough solder to get a good heat transfer. Use a 50-watt soldering iron and really heat up the solder and components.

"3. Radio Shack has a 5-volt reed relay that should replace the 4-volt relay. Reed relays often pull in at 1/2 their rated voltage, so the 5-volt relay should easily replace the 4-volt original."

Well, we are still batting a thousand—I have yet to ask for help with any subject without getting it from somewhere out there. *MB* readers are great!

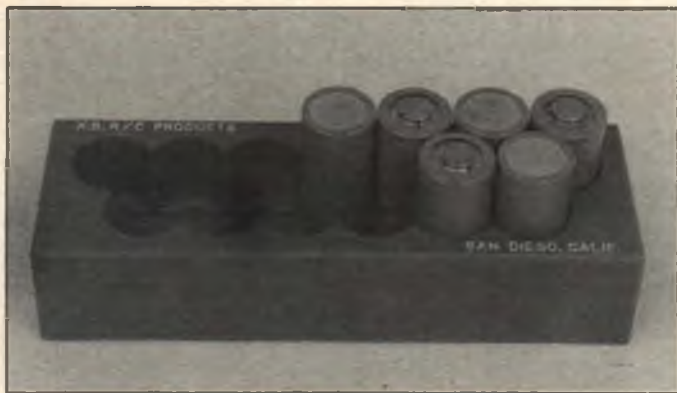
On the subject of troublesome solder joints, Phil is right in that they can be the cause of equipment malfunctions, especially on older hand-assembled and soldered equipment. I seriously doubt that we will see similar problems in the same time frame, considering that equipment being currently produced is under much tighter control. All high-quality electronics are now soldered with completely automatic equipment, which monitors both solder and board temperatures and all related phases.

I do strongly recommend the use of solder paste—in very small quantities—when re-doing a solder connection. Even a recently made solder joint, from which all the original flux has been evaporated, will be better, shinier and more secure if treated to some solder paste.

BUILDING NICD PACKS

Soldering NiCd cells into battery packs has become rather commonplace with the advent of electric power. Like so many other tool-related jobs, there is a correct way to do it. If you don't have the proper equipment and/or the patience, I strongly suggest that you leave the job to those who do, and stick to the ready-made variety.

Even though the purists will tell you that battery packs connected together with their spot-welded straps are inefficient and will not carry current as well as soldered straps, etc., they are



The K.B. R/C Products "Battery Block" is a useful device used to hold NiCd cells straight and solid while they are being soldered into packs.

sembling a control stick is a short version mounted on a shelf at the pilot's side, about leg high as he sits. It can be used to maneuver the big bird, though normally it is all done by computer. *All* in this case means just that, from running the checklist (including individual tire pressure and brake temperature), to a complete engine and control check. The computer then takes off, flies a programmed departure pattern, and points the nose towards the

better than a poor solder joint. In the same category is the practice of "hard-wiring," the connecting of the battery directly to the motor without plugs. You might get 20-30 more rpm over the low-loss connectors now available, but in the greatest percentage of installations, I am sure that poor soldering results in losses far greater than even the worst of the popular connectors.

If you are going to make your own battery packs, there are a few simple "musts" to be observed. First of all, you'll need plenty of heat, far more than for the simpler PC board connections. A 60-watt iron with at least a 1/8-inch tip is the minimum; a little more definitely helps. The cell ends must be clean, down to bare, raw metal. Best for this task is a steel brush on a Dremel Moto-Tool, but a piece of 250-grit sandpaper will do as well. And again, solder paste is a must, together with rosin core solder. No acid core!

As far as the inter-cell connecting straps themselves are concerned, they are easily obtained in the RC car section of the hobby shop, and are produced by a number of manufacturers. They all are made of relatively heavy, easily soldered metal, cut to length, and have a hole in each end for the solder.

On packs which are to be used in low-current installations, one can use braid for strapping the cells together, such as Desoldering Braid available from Radio Shack, No. 64-2090. Not only is it electrically adequate, it solders quite readily.

Also from the RC car marketplace, the neat cell holder pictured makes assembling the battery a lot easier and better in that it holds the cells securely during the soldering process. As seen, the holder can be used to assemble cells all in a row, or staggered as sometimes required.

Now for the actual soldering job! With everything in place, coat both the cell where it is to be soldered and the strap with a thin layer of solder paste.

Place the strap in position, and apply the soldering iron to both the cell and the strap simultaneously. A little solder melted on the tip of the iron will help the heat transfer, but *both* parts must be heated to the point that the solder will melt when it is touched to them. Be liberal with the solder, but try to do the job as fast as possible to avoid overheating the cell. Hold the strap in place with the end of a model knife until the solder joint sets. It should be bright and shiny. Should it get a crazed or dull appearance, it indicates that you allowed it to move. This is what is termed a "cold" solder joint and must be redone.

To finish the job professionally, you'll want to encase your finished battery pack in heat-shrink tubing. Actually, there is a more practical reason than just looks; the shrink tubing adds the necessary protective insulation. Heat-shrink in all sizes—and most colors—is available from Cermark Electronics and Model Supplies, 107 Edward Ave., Fullerton, CA 92633; (714) 680-5888. Actually, Cermark is a good source of battery packs in many configurations, individual cells in from 50 to 7000 mA capacity, as well as many other useful items.

POWERFUL SERVOS

Two new servos from JR were recently announced, both intended for specialized applications, and both seem to be well designed for them in all respects. I consider JR servos as good as any. They are all mechanically robust, with cleanly molded, strong, tight-fitting cases and smooth-working gears. They also always include all the latest physical and electrical advances.

The first new one I want to introduce you to is known as the JR NES-4735. It is a medium-sized servo, 1.3x.75x1.5 inches (less the mounting ears and output arms); the same size as the older 2031, 2035 and 2135 servos. However, the resemblance ends there, as the new 4735 is both stronger and



A new servo from JR, the NES-4735 is similar in size to other servos in the JR line, but is ahead in both speed and power. This servo should be just the answer for many requirements not met fully by "standard" servos.



The new JR NES-605 servo is a big one. Intended for quarter-scale and larger airplanes and cars. Its modern design includes all features required for this exacting application.

faster, at 90 oz./in. of torque and .15 second for 60 degrees of travel. Other desirable features include a weight of only 1.73 ounces, coreless motor, indirect feedback pot drive, all surface mount components, and ball bearings at both the top and bottom of the output gear.

The other new servo is, as far as I can determine, JR's first such offering to those who prefer their models on the large side. The JR NES-605, intended for large airplanes and 1/4-scale RC cars, has a torque output of 140 oz./in. and a speed of .28 second for 60 degrees. It measures 2.3x1.26x2.5 inches, without the mounting ears and output arms.

The 605 appears to incorporate all the features required for its intended application. It uses a husky 22mm motor, followed by thick gears running on heavy metal shafts. The output gear is ball bearing supported both top and bottom; gears No. 2 and No. 3, being subjected to heavy loads, are bushed with brass. The shaft for the output arm is heavy, with multiple cleanly made splines.

Internally, the 605 sports a sealed, indirectly driven feedback pot, and an amplifier with four FETs (Field Effect Transistors) in a bridge circuit to safely and efficiently handle the heavy motor currents involved. The case is exceptionally well made, has twice the number of case screws usually used, is heavy enough to handle all the stresses involved, and is sealed with O-rings, including one on the output shaft and—get this—wee ones on each of the case screws! This is an impressive servo, and if I ever get back into large airplanes, this is the one that will fly them.

As of this writing, a price has not been established for the 4735. The 605, however, carries a retail price of \$109.95. As always, I recommend that you shop around before putting down your long green. In any event, it will probably be more expensive than other servos in its size class—but size is not the only criteria. As I have stated here before, there is no such thing as good, cheap electronic equipment. And how much is all that time and effort in your big airplane worth? **MB**

PLUG SPARKS

BY JOHN POND

More On The Playboy:

Comparing the performance of the pylon and cabin versions

Several issues ago, we discussed the virtues of flight performance of the cabin Playboy versus a standard pylon Playboy. This writer ventured the opinion, based on his experience with many Playboys, that the cabin version would penetrate wind better. It remained for that hotshot computer man, Dick Huang, of Ft. Worth, Texas, to embark upon an extensive computer program to prove or disprove the allegation.

Dick reports: "In winds of 10 mph or less, the pylon version is a most superior glider. However, when the wind gets up to 15 mph, and the requirement in RC events is to land on the area adjoining the takeoff area, the cabin version proves to be a better choice." Dick finds the reasons for this are not simple, but has run into the same problems as this author; i.e., in winds much over 10 mph, the pylon Playboy would often be blown off the field.

Referring to the profile draw-



Photo No. 1. Joe Meckoll's Pearl Harbor Day winner, a P-30 Comet Zipper, photographed on December 7, 1941. Details in text.

ing of the pylon and cabin Playboys shown in the August 1992 issue on page 40, the difference in wing heights is 1.5 inches, measured from the trailing edge to the fuselage centerline. Dick has worked up extensive tables which are not shown in this writeup due to the vast amount of data input. Basically, the glide



Photo No. 2. Good-looking California Champion by Bruce Abell of Australia. It was a Bill Atwood design kitted in the old days by the Curtiss-Wright Technical Institute.

performance was computed allowing for both wing and tail lift as a function of the longitudinal CG position. The tail load (up or down) was used as a trim for zero pitching moment at each angle of attack (AOA).

Summarizing the data and comparing the sink velocity at a constant 4 degree AOA (this is approximately the maximum L/D), Dick found that for the same CG location, the Playboy pylon has about a 5% lower sink velocity, due to the higher parasite drag of the cabin version.

Also, the lift-drag polar comparison for the pylon and cabin versions was computed with the following results: the pylon glides at 25.7 ft./sec. and sinks at 2.87 ft./sec., while the cabin version glides at 26.9 ft./sec. and sinks at 3.32 ft./sec.

It should be noted that the difference of 1.2 ft./sec. (.8 mph) in glide speed is not great enough to say with confidence that the cabin Playboy is a better wind penetrator. Nevertheless, it does penetrate better than the pylon version, at the expense of reduced endurance.

Dick concludes by saying he feels the increased static margin of the cabin Playboy contributes greatly to its wind penetration capability. However, to prove this analytically is beyond the capability of Dick's computer programs.

Next month, we will wrap up

our discussion of Playboy performance with a report on the best type of engine to use under the new 1992 rules.

50 YEARS AGO, I WAS...

One of the most popular questions these days is, "What were you doing on December 7, Pearl Harbor Day?" Well, Joe Meckoll sent in a most interesting letter on that subject.

The 11th Semi-Annual FF Contest, sponsored by the Gas Model Association of Southern California was held on that day at Western and Rosecrans, starting as usual at 8 a.m. Joe sends in Photo No. 1 of his Phantom P-30 powered Comet Zipper that won Class B Gas that day.

Everyone was thoroughly enjoying the meet until someone came out to the field and announced that the Pearl Harbor had been attacked that morning. That pretty effectively broke up the meet — prizes were awarded and everyone went home. What a way to end a contest!

AUSTRALIA

It is absolutely amazing, the amount of models being constructed by O.T. modelers for the proliferation of various Old Timer meets.

To that end, we received quite a few photos from Bruce Abell, of 17 Ferguson St., Cessnock, N.S.W. 2325, Australia. We are

featuring Photo No. 2 showing a little-known model, the Bill Atwood 1935 California Champion as kitted by the Curtiss-Wright Technical Institute, located in Burbank, California.

SAM USA could take a few pointers from the Australians, as their annual "Aeromodellers Veterans Gathering" is truly devoted to the fun aspects of O.T. flying. No competition — just lots of fun flying. Three or four humorous awards are given at the closing banquet, consisting of plaques for the Best Old Timer, the "Mouth" award (biggest bragger), the "Who, Me?" award, and others that add to the fun.

As a sidenote, Bruce writes that he is quite upset over the way SAM has gotten into the horsepower race. Everyone seems to have forgotten that this is the very reason we started the Old Timer movement in the first place.

SOUTH AFRICA

It's been quite a spell since we've heard from the SAM membership in Transvaal, South Africa, so it is with considerable pleasure that we carry the news as reported by Bob Abbot.

Bob reports the Seventh Annual Jack Abbot Memorial O.T.

day, held on July 26, enjoyed glorious weather. There was a record turnout of 46 models, encouraged mostly by the calms (between blows) and excellent thermals. As many as nine airplanes at a time could be seen circling overhead.

Abbot makes a point of mentioning that their O.T. meets are oriented toward relaxed flying. Competition events are not run. To help make for a relaxing flying day, the club puts on a bacon and egg breakfast and a BRAAI Fire (Barbecue to us Yanks) lunch. Everyone cooked their own meat and enjoyed a variety of salads.

When not eating or flying, good bull sessions generated more fun. What a way to go!

MODEL OF THE MONTH

This columnist feels appreciative that he fell heir to the three-view sketches made by Dick Schumacher of all of his models. In most cases the designs were quite successful.

Most of "Schooie's" designs followed the same basic pattern with some deviations in outlines. Such is the case of the "Josephine," as it turns out to be a Class C deep-bellied version of the "Candid," a very successful 1938 model. This de-



Photo No. 3. Bruce Gornig, of SAM 75, holds Walt Geary's 400 square inch version of the Megow Chief, a potent competitor in Class A RC events. Power is an ElfIn diesel.

sign was produced by Dick for his friend Charlie Pottol, who was closely connected with the engine productions of Jim Brown.

Whereas the Candid was powered by a Little Dynamite engine of .37 cubic inch displacement, the larger Josephine was designed around the latest Jim Brown product, the Thermite .60. Of late, at least three Josephines have been built—two in Australia, and one by Joe Percy of the Ft. Worth/Dallas group. This writer has received very encouraging reports of the design's flying ability.

READERS WRITE

Just received a letter from Bob Aberle, enclosing a picture (Photo No. 3) of Walt Geary's RC Megow "Chief" being held by Bruce Gornig of SAM 75. The model has been reduced to 400 square inches for Class A and uses an ElfIn diesel. Photo was taken at the August 1-2 SAM 75 Annual held at Gastom, Long Island.

Photo No. 4 shows the guy who got the Brown Jr. RC event going. John Delagrange, spark plug of SAM 100, is seen holding a twin-rudder version of



Photo No. 4. Founder of the Brown Jr. event, John Delagrange, poses with a twin-rudder version of a Mickey DeAngeles' "Kloud Queen."

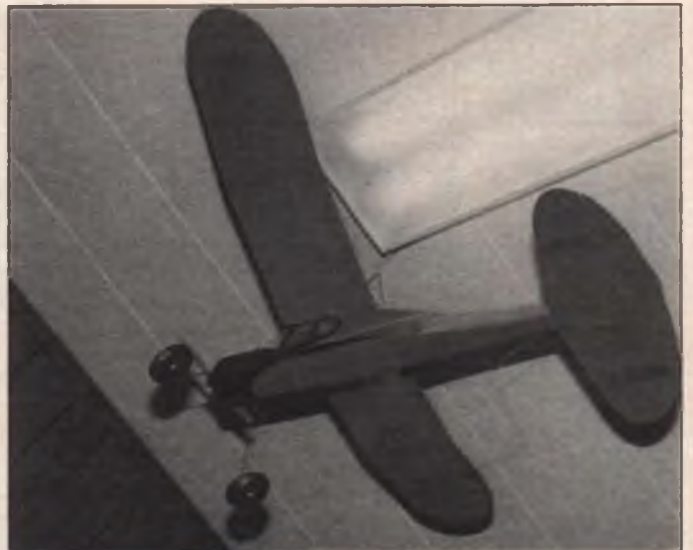


Photo No. 5. A Frank Ehling "Request" built and flown by Tom Ryan. A real good performer with an ElfIn diesel. Tom says it'll beat any comparably powered Lanzo Bomber around.

PLUG SPARKS

Micky DeAngelis' "Kloud Queen."

After a six-month trial at two eastern meets, the Brown Jr. event was put on the 1992 SAM Champs competition schedule. The event drew the remarkable number of 39 entries, with 28 registering official flights in that blustering wind!

Tom Ryan, of RR1, Box 66, Armenia, NY 12501, sends in Photo No. 5 showing a Frank Ehling "Request" that he claims will outperform any comparable Elfin-powered Lanzo Bomber. Tom goes on to say that Frank Ehling saw the model fly and was impressed with its performance.

TEXAS TORNADO

From long-time Old Timer advocate, Bob Lane, 110 Blossom, Lake Jackson, TX 77566, comes Photo No. 6 showing his well-built Struck "New Ruler." Inasmuch as his Sadler

"JOSEPHINE"

Span — 75 in.
Planform wing area — 710 sq. in.
Overall length — 45-3/4 in.

Original power was a Thermite 60

- Wing — V-dihedral, RAF 32 airfoil, single built-up box spar in center of ribs.
- Tail Surfaces — Full-depth spars, lifting airfoil on horizontal stabilizer.
- Fuselage — Basic framework of 1/4 square, bulkheads and stringers top and bottom, oval cross-section, fully cowled engine.

- Designed by Dick Schumacher
- Built and flown by Charlie Pottol, June 1939

MODEL OF THE MONTH

"Pacemaker" was getting into its 17th year, Bob finally built his Ruler from a 10-year-old Hobby Horn kit. Model performs well, although under high power, some Dutch

rolling occurs. A full glass cowl from T&D Fiberglass was used. The cowled O.S. .61 runs hot, but there has been no trouble with the engine overheating and dying.

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Photo No. 6. Beautiful green-and-gold Stuck "New Ruler" by Bob Lane of Lake Jackson, Texas. Powered by an O.S. .61 four stroke.



Photo No. 7. Las Vegas resident Larry Jenno starts a free flight Bomber at El Dorado Dry Lake, the possible site of the next West Coast SAM Champs.

SAM CHAMPS PREVIEW?

At the SAM business meeting held at the 1992 SAM Champs, the delegate in charge of procuring a suitable West Coast SAM Champs site had nothing to report. In the event that things don't work out, Larry Jenno of the VAMPS club has volunteered to stage the meet at El Dorado Dry Lake, near Henderson, Nevada.

Photo No. 7 shows Mike Poorman's Anderson powered Lanzo Bomber being fired up by Larry Jenno. The photo is particularly interesting in that it shows the dry lake's wide open area surrounded by sagebrush as far as the eye can see. After the cornfields of Vincennes, the dry lake would

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PLUG SPARKS

be a welcome relief when it comes to retrieving models.

HALF-A TEXACO SCALE

Here is an event that has captured the imagination of every old-time modeler who likes to build an occasional scale subject. Such is the case of his Bill Schmidt of Wichita, Kansas, who sends in a shot of a beautiful Grumman TBF-1 Avenger, seen in Photo No. 8.

The event allows most any type of model to be flown competitively, and at the same time add those little details that "doll up" a model. Schmidt's model has windows, exhaust stacks, air vents in the cowl and even a retractable landing gear. Should make for a super glide!

FREE PLUG DEPARTMENT

Received an announcement of a new plan offering from Al Lidberg. What makes it especially interesting is that this is one of the first plans for the popular 1/2A Texaco Scale event, which is drawing close to the amount of entries enjoyed by the 1/2A Texaco event.

Lidberg has brought out the Porterfield Collegiate, which was used extensively by the Civilian Pilot Training Program (CTPP) prior to the big buildup for WWII. Seen in Photo No. 9 is a shot of Al's daughter, Annie, age 12, with her dad's very neat looking prototype Collegiate. The model spans 43.4 inches, has a wing area of 300 square inches, and is designed for rudder/elevator controls. The complete plans package consists of the plan itself, written instructions, a proof-of-scale three-view, and a stick-on NC number and Porterfield-Turner emblem decal for the fin, all for a total of \$8.40, which includes postage. Order from A.A. Lidberg Model Plan Service, 614 E.



Photo No. 9. Al Lidberg's daughter, Annie, holds his prototype Porterfield Collegiate, built from the 1/2A Texaco Scale plan set he's offering—details in text.

Fordham, Tempe, AZ 85283.

OBIT NOTICE

While glancing through the SAM 39 newsletter, so ably edited by Robert "Bucky" Walter, this reporter ran across the notice that one of their valued members, Lynn Cole, died at 52 years of age on June 2, 1992.

Bucky noted that at the funeral, the lineup extended beyond the door, down the street, and around the corner. No greater tribute could be made by Lynn's fellow SAM 39 members.

Lynn was a great exponent of Old Timer flying. He took his flying buddy, Jim Deats, literally under his wing, as Jim had health problems. He watched over Jim, took him to out-of-state contests, and in general was a very caring person. Bucky summarizes his obituary: "One nice guy." **MB**



Photo No. 8. Beautiful Grumman TBF-1 produced by SAM 56's Bill Schmidt for the 1/2A Texaco Scale event.



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No other Mustang kit builds so easily and looks so good.

You need only average building skills to create an exact scale outline with Top Flite's computer-designed, interlocking Gold Edition construction. From the molded ABS half-cowl and radiator air scoop to the scale tail wheel location, this Mustang is a masterpiece of accuracy—already a Scale Masters qualifier.

Notice, for example, the smooth, realistic, fully-sheeted wing. And the bubble canopy, wing guns and exhaust ports—all vacuum-formed for easy

assembly. Detailed instructions also thoroughly explain the installation of optional retracts and flaps.

Of course, your Mustang wouldn't be complete without lots of war paint. Here, two huge decal sheets duplicate the markings of "Big Beautiful Doll," flown by Colonel John D. Landers of the 78th Fighter Group. It's the ultimate P-51D...authentic down to the last blood chit.

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SMOKE 'EM!

Setting up a smoke system in your Big Bird isn't all that difficult. Described here are three different systems that work exceptionally well.

Many times our Big Bird fly-ins are also mini-airshows, and some of the planes use smoke to better define what they are doing. I have often heard the comment that smoke also shows your mistakes. Generally that is not true if you are just sport flying or flying a demonstration. You seldom hear anyone standing around saying that this or that was a 9.5 maneuver. The spectators who come to watch our events seem to enjoy the planes more when they show a little more showmanship by using smoke during their flight routines.

There are three Big Bird enthusiasts in my area who have developed particularly effective smoke systems that put out good visible amounts of smoke. I interviewed each one to find out how they put together a good, reliable system that puts out plenty of the white stuff.

The first pilot I talked with was Bennie Phillips, who is president of IMAA Chapter 163, the Lesser Seattle Giant Aircraft Squadron. Bennie had presented his smoke system as part of a LSGAS club meeting program, but I had not taken any notes. It didn't take much encouragement to have Bennie show me his system and explain how it works.

Bennie has been using the Bennett system from B&B Specialties for over two years. The heart of the system is a vacuum



Above: Walt Wyrick's smoke system puts out a good deal of the white stuff. An S.T. 3000 powers his Der Jaeger biplane, and a Perry pump moves the smoke oil. **Below:** Lloyd Marohl's Grizzly Bear looks great in the air because he set up his muffler to blow smoke over and under his wing. Power is a Zenoh G-62.





Vally Aviation now has plans for this Stinson L-5E Sentinel. Model has a 102-inch wingspan, weighs 14-18 pounds and uses engines such as a Zenoah G-38 or Quadra 35. Details in text.

pump that works off the engine pulses. Crankcase pressure provides the pulses that make the pump work. The pump looks similar to a snowmobile fuel pump. The pump naturally works all the time, but has a bypass so that if you are not using your smoke, the pump will just bypass the smoke fluid.

The next item in the system is a valve that controls the smoke fluid flow. This is a firewall mounted unit that hooks directly to a servo. It is important to make sure that you do not introduce any alcohol into this system, as it is for petroleum products only.

When the flow valve is opened, the smoke fluid flows through a one-way check valve into a Bennett muffler, where it flows through a coiled pipe that preheats the fluid. The flow is further regulated by a wheel collar that the hot smoke oil flows through; an Allen screw in the collar is used to adjust the amount of smoke oil that flows into the hollow muffler, where it is heated and vaporized by the hot exhaust and then flows out the muffler in a billowing, white stream.

Bennie has tried diesel and kerosene mix and even Corvis concrete form release oil, but is presently using B&B smoke oil and something called "Superdrive" from M.D.W. Aviation Associates Inc., 9707 South 76th Ave., Bridgeview, IL 60455; telephone (708) 599-8700; FAX: (708) 599-1040. The oil is pumped from a 32-ounce plastic fuel tank in his Super Lazy Ace Biplane. The 32 ounces of smoke oil is good for five to ten minutes.

Bennett Smoke Systems are available from B&B Specialties, 14234 Cleveland Rd., Granger, IN 46530; telephone (219) 277-0499.

Bennie also uses a Don Harris smoke system. The Harris system uses an electric pump with its own 1200 mAH battery pack. The smoke oil leaves the pump and flows through a check valve, then through a preheating coil in the muffler, on into the



Jim Miller's color scheme really helped this 12-foot Telemaster look good. A Saito 270 twin is used for power. Automotive acrylic paint was used for the paint job. Hobby Lobby sells the kit for this giant.



It's almost impossible to wipe the smile from Dave Baxter's face when he's been flying his Lanier Stinger. It is Sachs powered and weighs 18 pounds.

exhaust area where it turns into white smoke. Both of the above systems are reliable and make a good, visible trail of smoke.

My next interview was with Lloyd Marohl. Lloyd is a member of the northwest AMA show team and designs many of his own aircraft.



Fritz Bruning comes down from the Olympic Rain Forest occasionally. He showed up at the recent Puget Sound ROCs fly-in with this very nice Travelaire 2000.

Lloyd's current Big Bird is a sport plane he calls the Grizzly Bear. It is powered by a Zenoah G-62 engine. His smoke system uses a 32-ounce tank, and a Sonictronics Micro-X 6-volt fuel pump that draws the smoke oil out of the tank. A switch operated

continued on page 62



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US COAST GUARD

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KINGSST

Float Fly Fun

**Ace R/C's
annual
get-together
is heavy
on fun,
light on
stress.**

They flocked to the water's edge—150 pilots, their families and friends in tow—to fly, float, praise and, yes, verily, to baptize at the 5th Annual Ace R/C Float-Fly.

This edition of the Ace Offshore Drilling Extravaganza officially began Saturday, June 6, with the sun rising over the muddy waters of Higginsville (Missouri) City Lake. However, many arrived Friday to take advantage of the nearly perfect weather and uncrowded sky.

BY DAVID MANLEY • PHOTOS BY ROY INMAN



Above left: A magnificent Antic, one of Lou Proctor's most famous and frequently built designs, taxis out for another flight. Center and right: Aircraft types ranged from the traditional Cubs to the modern amphibians. Below: Just a few of the 150 pilots awaiting a turn on their transmitter sticks. All agreed that the Ace R/C employees and several members from area clubs produced a well-run, well-organized flight line.





Left: While most pilots came fully prepared to tend to their aviation boo-boos, several found the well-stocked repair station quite convenient for making safe repairs. The workbench seemed to be the third most popular location—right after the snack wagon and privvies. Right: Tom Runge, Ace R/C president and Float-Fly CD, with the electric powered Pondsider, Ace R/C's newest kit—details in text.



Many pilots took advantage of the offshore baptizing service and Ace water shuttle. The faithful repeated this scene many times throughout the weekend gathering. While the helper stabilizes the plane, the boat's captain keeps an eye out for sharks. Fortunately, none were spotted.



Modelers staked out positions all along the east side of Higginsville City Lake. This shelter was hardly needed in the cool breezes and mostly cloudy skies. A wooded area behind this setting offered privacy for the many campers.

About 5,000 residents—including Barney, Andy, Opie, Aunt Bea and Ace R/C, Inc.—call Higginsville home. Folks here invented those American family values the politicians found so valuable to their campaigns this year. Staples of this way of life should reach the coasts in about two years.

Modelers from 15 states, including those from as far away as California, Florida and Maryland, brought nearly 200 aircraft to the shore of this lake. Many families camped in the cool, wooded area on the lake's north shore.

Steve Kaluf, Ace sales manager, reported that hundreds of safe flights took place Friday, the unofficial arrival-unpack-unwind-set-up-kick-back-tune-up-and-send-out-the-safari-for-toilet-paper day.

"The weather Friday was absolutely perfect and the lake was as smooth as glass," said Kaluf, this year's event manager. "Apparently, everybody got together to coordinate frequencies because it all went off safely. I didn't hear of any mishaps, either in the air,

on the ground or in the water."

Float-fly officials, many of those flying and numerous spectators estimated the attendance for the two-day (official) event at about 1,000. While many came from the immediate area, a large group came from Kansas City, 47 miles west.

To produce this air-and-water adventure takes many hours of preparation and a truckload of even-tempered humans. Kaluf said at least 10 Ace employees and 30 area club members directed traffic, piloted the verrrrry busy retrieval boats, manned the transmitter impound, consoled those errant of thumb, and served the money-laden hungry, thirsty and confused at the various concessions.

Kaluf and Tom Runge (the always-in-demand contest director) said they hope to reduce to zero the number of Ace employees needed to help run the event in coming years. In addition to a full work week at the plant, many Ace employees also spend weekends working at company functions or attending trade shows. They deserve a break.

Ace sponsorship, however, will continue.

Working with the Ace crew were several members of the Mid-Missouri Modelers—the Higginsville-based host club of the float-fly—and volunteers from the IMAA 49th Jumbo Squadron and the Central Missouri State University RC Club of Warrensburg, Missouri.

A typical Midwestern spring weather pattern produced a passing frontal zone early Saturday, bringing a heavy downpour, gusty winds and low-level scud. By mid-morning, however, the rain stopped, the winds subsided and the serious flying began.

Despite a thick, threatening overcast, Kaluf said 263 official flights were recorded for the day. Choppy water contributed to several flame-outs and a good supply of spinner cleanings.

Despite closing down the flight line at 1 p.m. Sunday, Kaluf said they still recorded 197 official flights for the day. Total for the two-day meet was 460, he said.

The float-fly's outstanding safety record stems from aircraft safety inspections and excellent flight line management, several modelers speculated.

George M. Myers, a profound and prolific contributor to the worlds of miniature and model aircraft, took time out from his fact gathering to fly a new Ace kit offering. The Pondsider, an electric amphibian designed by Texan Scott Hartman, was scheduled to debut at the fall trade shows, according to Runge. This agile craft, featured in a March 1992 *Model Builder* construction article, performed extremely well on a standard 05 ferrite motor.

Writer/scientist Myers christened the prototype—a 48-inch span (give or take) high-winger of little weight and lots of personality—with a substantial dunking. A short time later the craft was in the air with George on the sticks. This again proves that a good aircraft coupled with a well-designed, American-made, drip-dry radio provides an unbeatable combination.

On Saturday night about 300 climbed the mount to partake of a fully catered meal. Higginsville City Lake is about two ounces of Missile Mist east of the city's airport. As Ace leases the facility and serves to manage the property, they use the hangar to serve the meals. At previous float-fly gatherings, the Ace crew also staged vaudevillian-like productions.

The airport, located on a plateau overlooking the lake, offers an extensive view of the model flying area. The runway, which Ace uses to test fly new and modified aircraft, was the site of a pre-dinner flight demonstration. Obviously, Ace does not fly model aircraft during any full-scale airport operations or near full-scale aircraft.

The seven acts included the Ace Show Team RC Skydivers—four-pound steerable jumpers equipped with parafoils. Cal Orr, Tom Runge and Jim Van Loo flew Bingos of various sizes in formation aerobatics.

Master scale modeler Bud Atkinson put

continued on page 52

THE FIRST MESSER- SCHMITT: WILLY'S M.17 LEICHT- FLUGZEUG

BY DAVE LINSTRUM

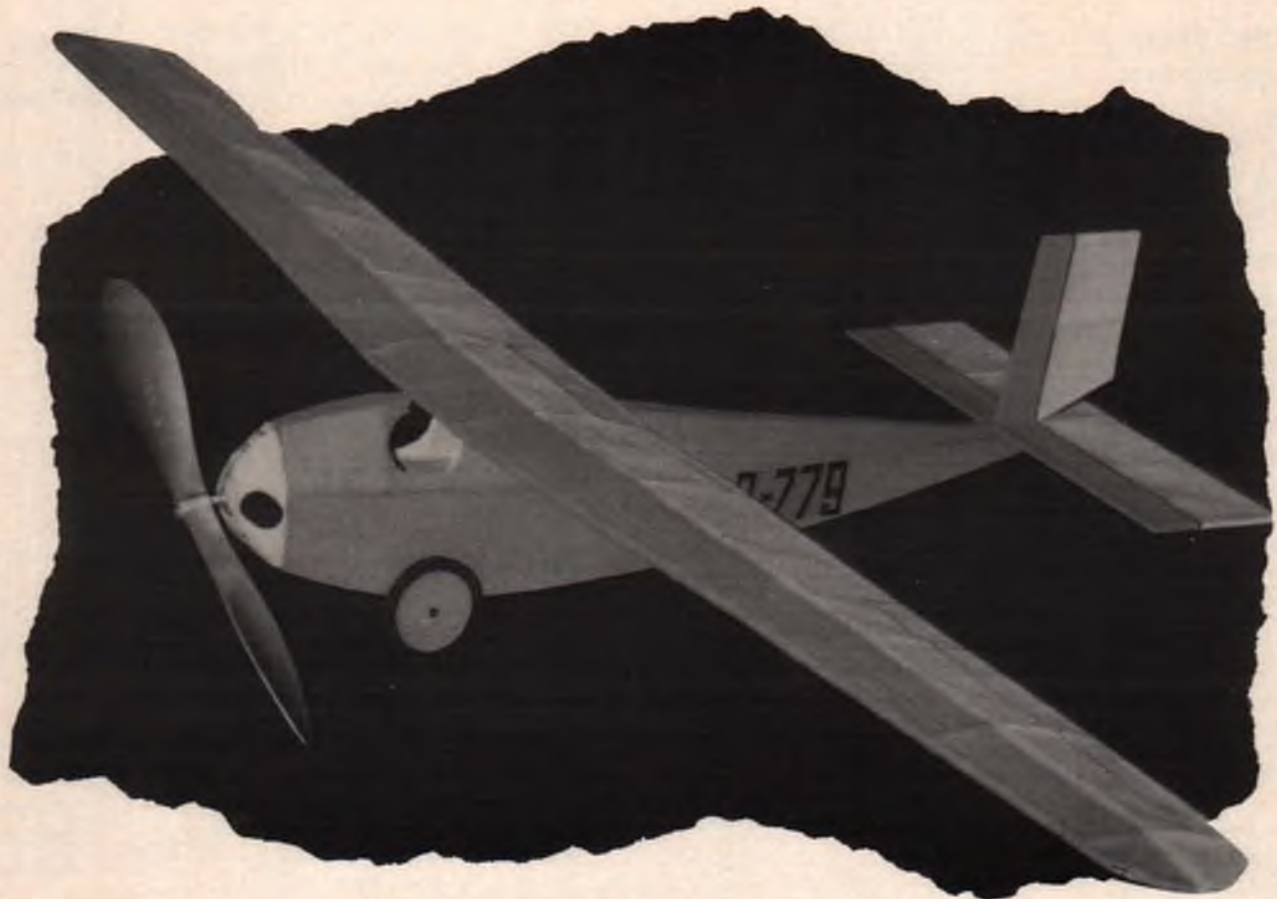
Willy Messerschmitt was a senior in the Munich Technical University when he designed this simple, elegant two-place aircraft. In the ultralight tradition of the mid-20s, it was wood and fabric with a shiny aluminum cowl (the stick-and-tissue model, with silver cowl, is thus an honest replication). Willy crossed the English Channel to obtain the powerplant—a 32-horsepower Bristol Cherub.

There are those who suspect he found more on that trip than an internal combustion engine for his airplane. The fuselage (especially the wheels, cockpit and concave turtle deck) is almost a clone of the British 1924 Beardmore Wee Bee. However, the fin and scalloped trailing edge on that Lympne Trials winner are distinct from the M.17 lines.

Industrial espionage aside (no

one can prove these claims), the M.17 flew like a homesick angel—albeit an anorexic one on that tiny twin-banger! However, this modest propulsion did not deter Willy's pal, Theo Cronweiss, from winning an international prize for a flight from Munich to Rome across the Alps. Those were certainly the halcyon days of intrepid heros—especially when the pilot had a big cowling in front of him and had to peer out sideways to see what mountain pass he was going to try to climb over!

Today a refurbished original M.17 airframe hangs in the Deutsches Museum in Munich. For scale documentation, we provide a photo and three-view. Colors are dark honey amber on the entire fuselage (except for the aluminum cowl) and forward part of all flying sur-



NOTE LE IS ON EDGE!

TRIM RIBS FROM REAR TO FIT - THEN NOTCH FOR TOP SPAR

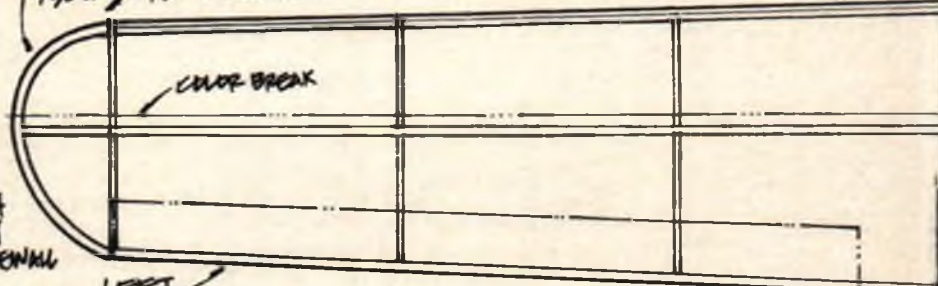
COVER MODEL WITH JAPANESE TISSUE / PAINT WITH FACTRA ACRYLIC (AIRBRUSH) TO NOT DOPE! PRE-SHINK TISSUE.

WING RIB 1/32 SH

USE 4 3/4" DIA PECK SILVER PLASTIC PROP W/ 1/32 WINGSHAFT.

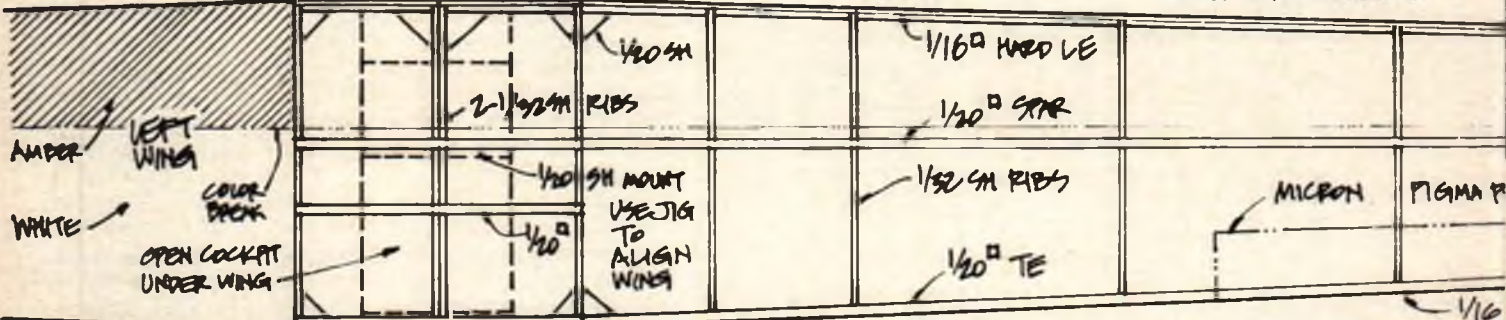
IF YOU USE PECK NYLON BEARING, BURY IT SO NOSE DOES NOT CAUSE MODEL TO EXCEED 9" WITH PROP IN PLACE

WET FORM 2 LAMIN 1/32 SH 1/2" DIBEDRAL



Wings

ADJUST MODEL FOR LOOSE RIGHT TURN WITH THRUST SHIMS.



DIBEDRAL BREAK 1/2" VEE DIBEDRAL

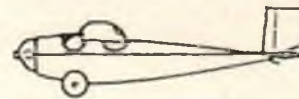
1/32 SH SPINE

Top

3-VIEW, PHOTO & COLOR DATA THANKS TO BENNO SABEL & SIEGFRIED GLOCKER, GERMANY



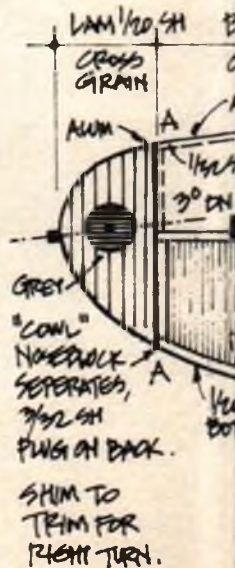
ORIGINAL A/C RESTORED DEUTSCHES MUSEUM, MUNICH



M.17

Type: high-wing monoplane
 Maker: Messerschmitt Flugzeugbau GmbH
 Span: 11.6 m (38 ft 0 1/4 in)
 Length: 5.85 m (19 ft 2 1/4 in)
 Height: 1.8 m (5 ft 11 in)
 Wing area: not available
 Weight: maximum 370 kg (816 lb); empty 100 kg (397 lb)

Powerplant: one 32-hp Bristol Cherub III air-cooled flat-twin
 Performance: maximum speed 132 km/h (83 mph); range not available
 Payload: seat for 1 passenger
 Crew: 1
 Production: not available



Colors

- AMBER YELLOW: (SIM TO DARK HONEY) ENTIRE BODY, WHEEL HUBS, FORWARD 1/3 TOP OF FLYING SURFACES - SEE COLOR BREAK LINE.
- WHITE (BLEACHED LINEN): REAR 2/3 OF SURFACES
- BLACK: I.D. #, TIRES
- ALUMINUM: COWL (NOSEBUCK)
- DARK GREY: CYLINDERS

FLAT CTR.



Stab

1/16 ALUM TUBE

MOTOR: 14" + LOOP 0.10-0.12" FAI TAN

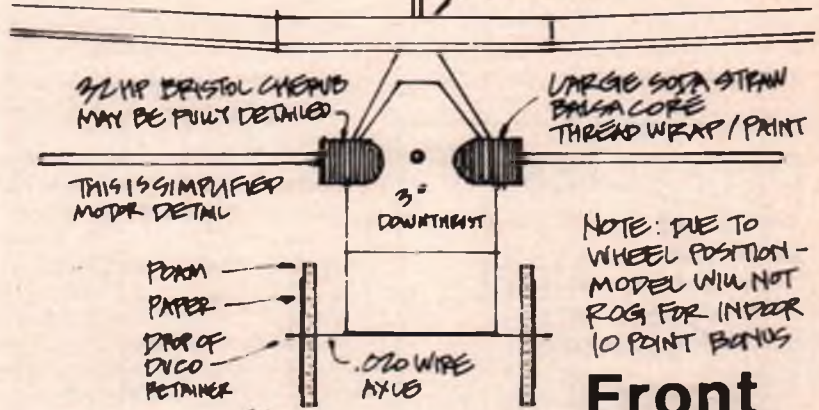
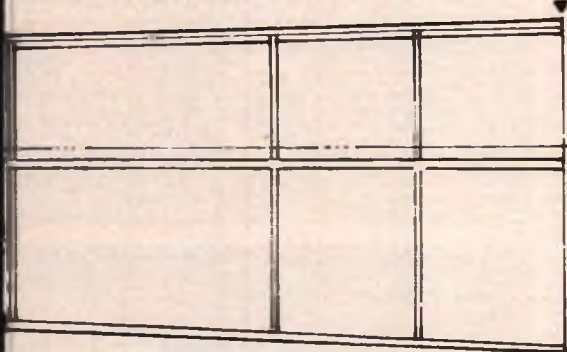


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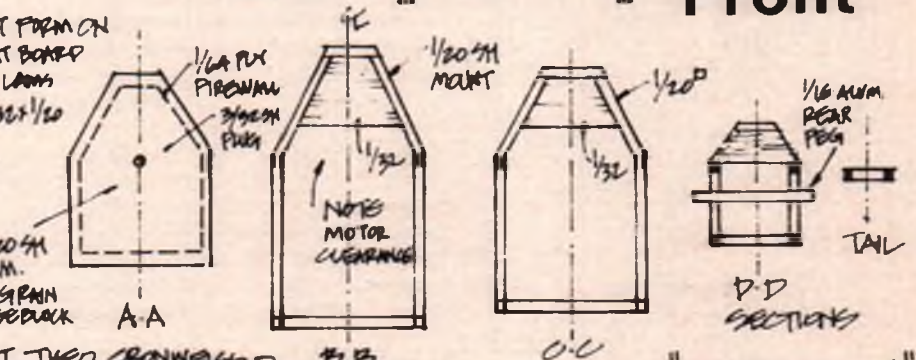
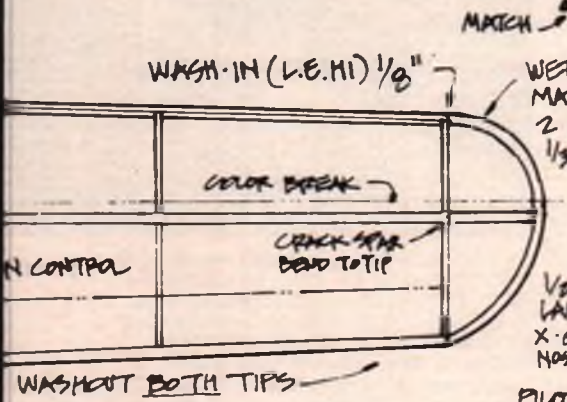
DO NOT USE
PUDDER FOR TURN.
USE RIGHT THROUST.

ALIGNMENT CRITICAL!
NOTE: USE JIG TO
ACCURATE MOUNT WING!



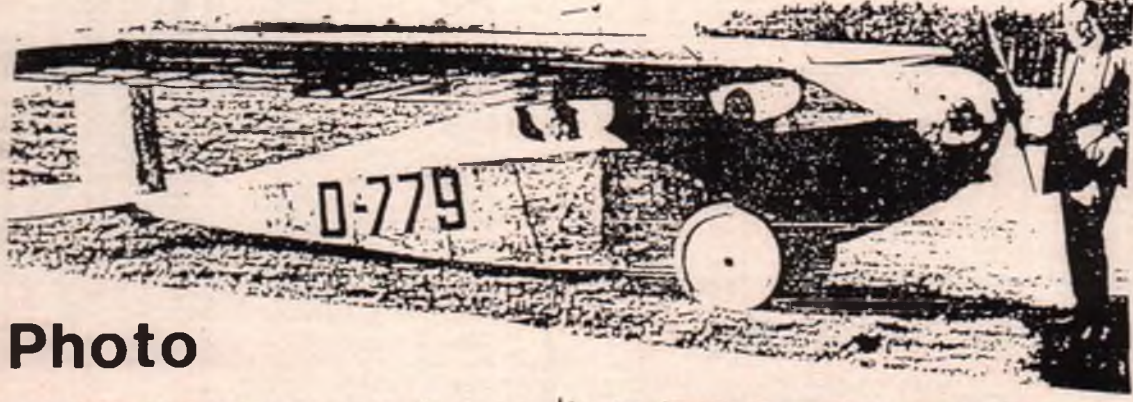
NOTE: DUE TO
WHEEL POSITION -
MODEL WILL NOT
ROG FOR INDOOR
10 POINT BATTUS

Front



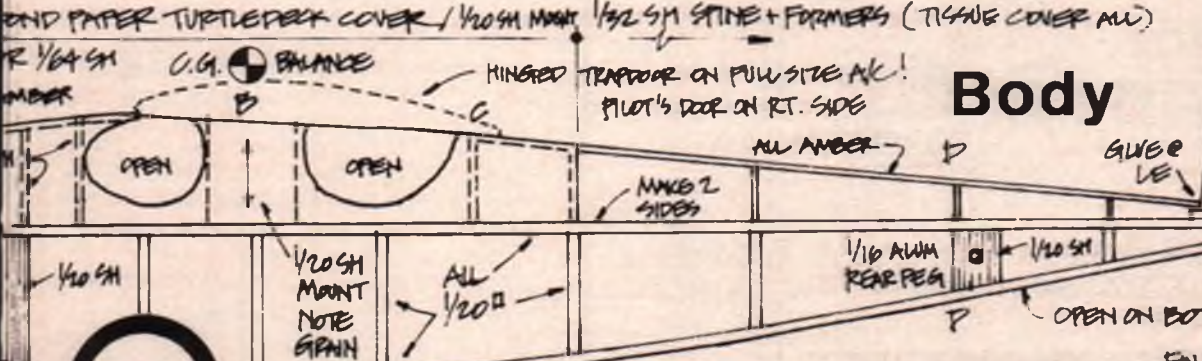
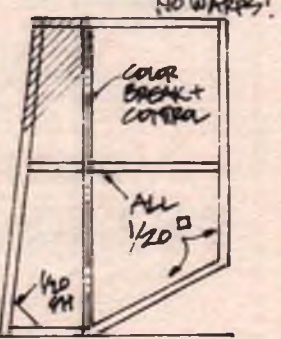
"MY FIRST PLANE!"

DESIGNER
WILLY
MESSERSCHMITT
WITH HIS NEW
AIRCRAFT
CIRCA 1925

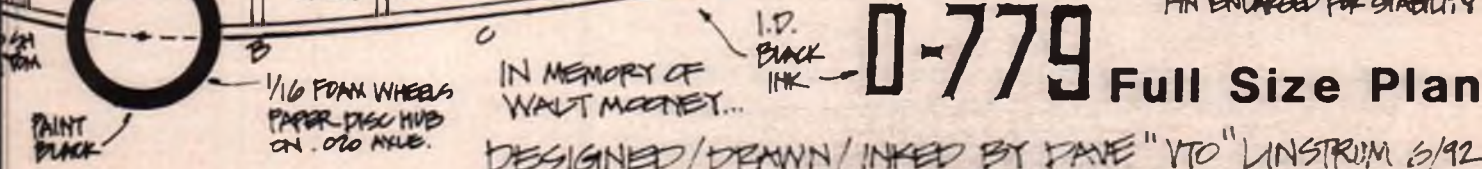


Photo

Fin



Body



0-779 Full Size Plan

IN MEMORY OF
WALT MOONEY...

DESIGNED / DRAWN / INKED BY DAVE "VTO" LINSTRUM 6/92

9" Peanut • 1925 Messerschmitt M.17

faces, with bleached white linen on the rest. Numerals, cowl combing and tires are black.

This should suffice to present to a scale judge. A mix of Pactra acrylic colors makes an acceptable hue—somewhat like mustard in an opaque finish. The full-size aircraft had an amber shellac on the fabric.

Use a silver felt-tip marker on the noseblock to simulate the aluminum cowl.

So you want to build this historic flier? First make two 11x17-inch copies of the plans at your local copy shop—one to build on (tape it to a soft surface like ceiling tile or foamcore and cover with wax paper) and the other to use for patterns. Read the callouts on the plans and assemble the requisite tools, balsa, tissue and paints.

We find this to be the minimal workshop inventory: X-acto knife with #11 blade or a broken double-edge razor blade, dressmaker's pins (we like the bead-head type), self-healing cutting board (use a scrap of artist's mat board if you are economy minded), glue applicator, artist's sable brush and needle-nose pliers. If you airbrush, do it on pre-shrunk white Japanese tissue on a frame, then cover the model—note the color break line on the plans for the flying surfaces. Be sure to build in an uncluttered work area with good light. We prefer listening to jazz while building—some say it enhances craftsmanship!

The skeleton photo shows all the major framework assembled and the plans are fully annotated, so we will not tell you how to "Glue Part A to Part B" here. You should not attempt the M.17 until you have some experience with stick-and-tissue construction—a Peck-Polymers Peanut like the Pietenpol Air Camper or Nesmith Cougar should teach you the tricks. These kits are available at hobby shops or by mail order—see Peck's ad in MB.

One word about covering—do not use color dope anywhere on this model! Acrylic paints and a silver felt-tip marker for coloration and thinned white glue for adhering tissue to the frame are perfect. They are both odorless and clean up with water. An India ink technical pen such as a #8 Micron Pigma is great for numerals (trace them on



Top & Above: The author's replica with and without its clothes on. The long, high aspect ratio wing gave the full-size aircraft outstanding performance on only 32 horsepower—the model is likewise an excellent flier. It's designed to take full advantage of the 9-inch fuselage rule, hence the greater-than-normal (for a Peanut) wingspan of 17-3/8 inches.





Only a few M.17s were ever built. This restored original is on display in the Deutsches Museum in Munich. Photo taken from *Flug Revue*, May 1984.

the tissue on a light table or sunlit window). The #5 size gives a finer line for control surface outlines and tiny lettering. The Micron ink is non-smear.

High-wing monoplanes like the M.17 seem to do better when trimmed to fly to the right under power—with Peanut Scale, the glide is a minor part of the flight. If you fly indoors, the power portion of the flight should last until touchdown. Be sure the C.G. is as shown on the plans; you may have to add some strip solder below the nose. We prefer solder, smashed flat with pliers, to bulky, messy clay. Using down and right thrust, and possibly a bit of right rudder, trim for a loose, right spiral climb.

We hope you enjoy this historical replication. Imagine flying over the Alps with it back in 1925. That should be a vicarious thrill! **MB**

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Wringing Out The YS .61FSH

Our Chopper Chatter columnist gave this powerful engine a workout in three different helicopters. Here are his impressions.

BY JAMES WANG

For the last few months, I have been tinkering with the YS .61FSH helicopter engine. The YS is powerful, with a tremendous amount of torque, and is well suited to the modern FAI style of two-speed operation—hover at very low rpm, forward flight at high rpm.

I've used the YS .61FSH in an X-Cell, Scout II and TSK Ace. Because it's a long-stroke design, the YS loves to hover at 1200 to 1300 rotor rpm. At full bore, the YS produces awesome power. The idle is fabulous; I let it tick over at idle for five minutes, and it did not falter or quit. One thing I did notice is that the motor takes time to transition from hover to full bore. It's almost like a turbocharger with a time lag. Depending on how well the carburetor has been set up, it may take one to three seconds before full power kicks in, but when it does, the motor really pulls!

There also is a time lag transitioning from idle to hover power. For example, when you are flying at 400 feet and throttle the motor all the way back for a descent, then add power at the end of the descent to bring the model into a hover; the engine doesn't come up to speed immediately. It takes a second or two to settle back into that smooth hover rpm. Once it settles back to the usual hover speed, however, the motor runs fabulously.

I found this characteristic in all three of the helicopters.

Because of this time lag characteristic, the YS .61FSH may not be as well suited for a hotdogging ship as some of the other helicopter engines currently available.

It may not respond as quickly to rpm changes as the O.S. .60 SFN, but the YS has a more constant torque. The YS makes an



The YS .61FSH inside our author's X-Cell 60. The engine cylinder faces toward the rear of the helicopter. Note the 1/2-inch diameter knob on the bottom of the crankcase opposite the carburetor; it is the idle adjustment knob. Text gives hints on how to set up a YS carburetor. The Hatori 666 muffler is very quiet and causes minimal power loss—an excellent combination. This motor loves 38% nitro fuel and hot plugs, like the Enya 3 or Fox.

ideal, smooth motor for contest flying, or for lugging a heavy scale ship. I left my YS in the Scout because it's such a great combination. With a Hatori 666 muffler, it's very quiet, too.

YS recommends using 30% nitro fuel and hot glow plugs (Enya 3, Fox RC Long). I tried Byron 15% and the motor still ran very consistently, but with much lower power output. The Schluter Scout, for example, became 15 mph slower.

The YS .61FSH has an interesting carburetor design. It uses a rotating baffle plate like an automobile carburetor. There are three things that need adjusting: the hover (main) needle valve, sub needle valve screw, and idle knob. In the YS instruction manual, the big main needle valve is called the hover needle valve. Even though it is labeled as such, it looks and works like the conventional needle valve on any model engine. This needle meters the amount of fuel flowing into the carburetor; it affects the idle, mid-range and top end.

What YS calls the sub needle valve is a slotted screw that requires a flat screwdriver to adjust. This valve affects the top end mixture. To set the sub needle valve, you need to fly at full throttle. If there is no smoke, the top end is too lean; the sub needle valve needs to be opened slightly. Opening it 1/4 turn gives a nice, rich, powerful top end and also improves the throttle transitioning. In general, I find that opening the sub needle valve screw between 1/4 and 3/8 turn gives the best results.

With the 30% nitro fuel, the sub needle valve is 1-3/8 turns open on all three of my helicopters. Depending on the weather and fuel, you may need to close the main needle by 1/4 turn. When the temperature drops, the engine runs more powerfully because it can run cooler and the air is denser. This means there is more oxygen in the same volume of air. Thus, as the temperature drops, you need to open up the needle valve a couple of

fuel like the Byron 15%, the sub needle valve must be closed by about 1/4 turn, and the idle richened by 1/2 turn of the knob.

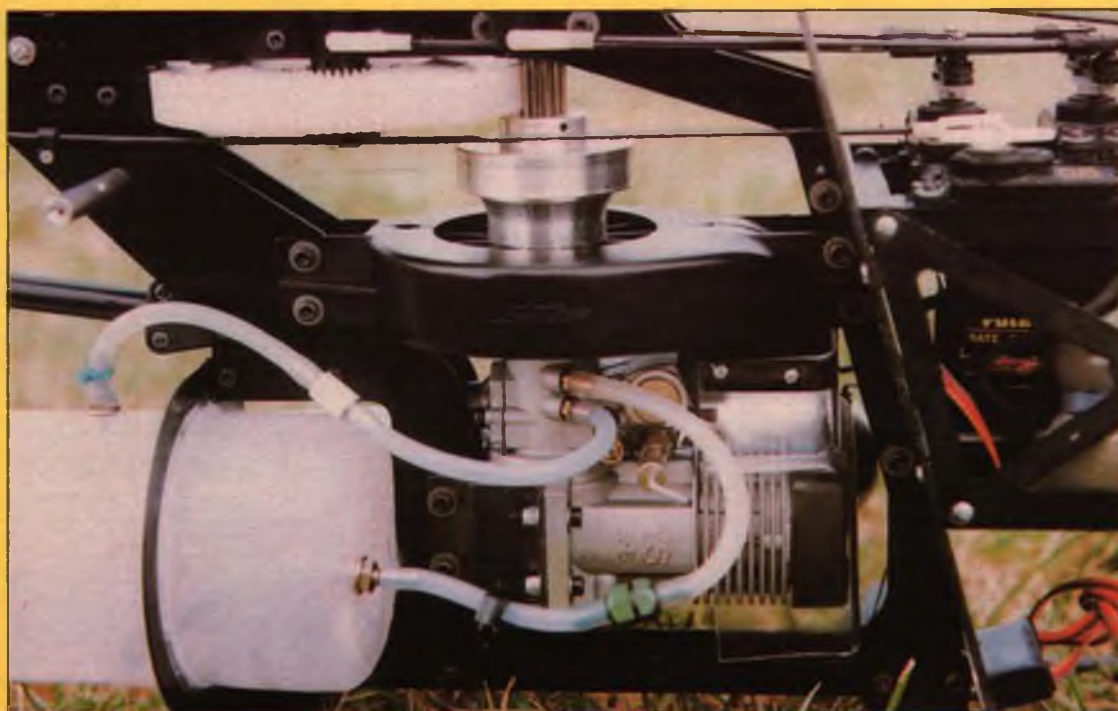
The YS is unique from other motors in that it uses crankcase pressure instead of muffler pressure to pressurize the fuel tank. There is a nipple on the engine crankcase for connecting the pressure line. A one-way valve is provided and is installed in the line between the nipple on the crankcase and the fuel tank vent. The one-way valve allows the pressure to flow only from the engine to the fuel tank. When the engine is running, you can see the plastic fuel tank expand like a balloon. The engine puts several psi of pressure into the tank. Before you fill the fuel tank, it's important that you disconnect the one-way valve to relieve the tank pressure. Otherwise, you'll only be able to partially fill the tank, and then when you disconnect the fuel line, the pressurized tank will squirt the fuel at least ten feet!

When mounted in the Concept 60, the idle adjustment knob on the YS is difficult to reach. Kyosho sells a special engine mount for installing the YS in the Concept. In this case, it's best to set up the idle knob by bench running the motor with a propeller. The idle knob can be easily reached when the motor is installed in an X-Cell or Scout.

The threads on the YS crankshaft are different from those on the O.S. and Enya. Consequently, if you plan to install the YS in an X-Cell 60, you will need to order a special YS tapered nut from Miniature Aircraft.

The YS .61FSH is slightly more expensive than some of the other .60 helicopter engines, but you definitely get your money's worth. The top-end power and low-end torque are among the most powerful of all .60 motors. After the carburetor was properly set, which took awhile because the instruction sheet is fairly brief, the motor ran very consistently. There has not been a flame-out in over 60 flights. The engine does not have a protruding heatsink head, but there have been no overheating problems, either.

Miniature Aircraft recently introduced optional gears for the X-Cell 60 to change the stock 9:1 gear ratio to 9.4, 9.5 or 9.6:1,



The same YS .61FSH installed in a Schluter Scout for more testing. You can see the hover (main) needle valve and the sub needle valve. The carburetor is very unique; it uses a rotating baffle instead of the common rotating barrel. Two lines make up the fuel system plumbing: the lower one with the large filter is the fuel intake line; the top one, which has a one-way valve, provides engine crankcase pressure to pressurize the fuel tank. It is an amazing system; when the motor is running, the fuel tank is pumped up like a balloon!

clicks to prevent a lean run. Similarly, on a hot day, the same engine needs to have the needle closed a couple of clicks to prevent running too rich, with a resulting lack of power.

The YS idle adjustment knob is not particularly sensitive. The factory setting was found to be a good starting point. You may have to open or close the knob by up to one full turn from the factory setting. When switching from a 30% fuel to a lower nitro

to raise engine rpm in hover. With the YS you may not need to change the gear ratio because it likes to operate in the low rpm, high torque condition. It's ideal for the FAI two-speed flying style, or for hovering a scale model at low rpm to produce a scale sound.

If you are not into hotdogging with its constant throttling but instead prefer smoothness and powerful forward flight, or need to lift a heavy scale ship, the YS .61FSH may be just right for you. **MB**

Chopper Chatter

Fuels & Fuel System Troubleshooting

BY JAMES WANG



Century Imports recently introduced this Bell 47G scale conversion kit for the Miniature Aircraft X-Cell 60. The scale-looking aluminum truss tailboom is welded by the factory and is finished with white powder-coat paint. Also included is a welded metal landing gear, anodized black. The main cabin and dummy fuel tanks are fiberglass. For information on this or any of the other Century Imports items pictured on these pages, give them a call at (408) 942-9521.



James flies an X-Cell 60 with the new Robinson R-22 scale conversion kit from Century Imports. Because it is not a full-fuselage scale ship, it is fairly easy to add to a stock X-Cell 60. Due to its clean lines, the model is relatively fast and does nice autorotations.

I have an X-Cell 60 that I really like for hotdogging. The model is not super-fast in level flight, but it has an excellent climb rate, and is agile and dependable.

A couple of weeks ago, I took the X-Cell out for a spin—the first time it had been flown since I moved from Maryland to Connecticut several months ago. The O.S. .60 ran rough in hover and would lose power and quit after one or two minutes of running. I tried all combinations of needle settings, to no avail. A friend suggested the plug might be too cold, so I tried an Enya 3—still no luck. It occurred to me that the fuel might be bad, so I tried some

fresh S&W 30% nitro fuel, which did help—a little.

At full bore, the O.S. was pulling the X-Cell like a rocketship; however, it was still running very rough in hover. I tried adding a .004-inch thick shim under the cylinder head to reduce the compression ratio because this engine had been modified to have a higher exhaust timing. The gasket didn't help. A friend suggested that instead of adding a gasket to reduce the compression ratio, an alternative is to use a colder plug. We tried an Enya 5, but the problem got slightly worse. We tried almost every brand and type of plug—Fox, Enya, O.S., K&B, Super Tigre, etc. It seemed like the

hotter plugs helped slightly. The engine had all the symptoms of bad carburation.

A number of fliers recommended replacing the 6H carburetor on my O.S. .60 with a Super Tigre carb. I discounted this idea, as I've always liked the 6H and have never had a bit of trouble with it. The carburetor on the 6H is supported by a ball bearing, so it has no in-and-out slop, idles well, and has a large throat for good top-end power. I took the carb apart, cleaned it completely, and even changed the fuel lines, but the engine still ran rough and lost power after about a minute of running.

Then I took the Kalt fuel filter apart and found all sorts of gummy stuff hiding behind the filter screen! After the filter was cleaned, the motor ran fine. The moral is: check your fuel filter frequently. A filter should always be used between the engine and the fuel tank. You will be surprised at how much microscopic junk a good filter can trap!

I especially like the Kalt fuel filter. It is made of two aluminum sections screwed together with a very fine screen between them. It can be opened and cleaned frequently. The Du-Bro Mouse Trap fuel filter is also nice. This one cannot be opened, but it is transparent so you can see how much junk is trapped inside.

Over the past few years I have tried many different fuels—Power Master, Red Max, Mach 7, Byron, Coolpower, Tower Hobbies, S&W, K&B, and Magna, to name a few. I've concluded that the more expensive fuels do run smoother and that going to a higher nitro content does indeed increase the horsepower.

Certain engines are more sensitive to nitro content than others. Engines like O.S., YS and Enya love nitro. They produce considerably more power while using the 30% nitro fuel instead of 10%, which is about as low as you can go and still get good performance. In contrast, European engines like the Rossi, Super Tigre, Picco, OPS and Webra are designed to run on a straight methanol/oil mix (0% nitro). This is more a reflection on the cost and availability of nitromethane in those countries than anything else. Outside the U.S., nitromethane is difficult to come by and therefore commands an outrageous price. In Japan, a 4-liter can (about one gallon) of 30% nitro fuel costs \$70. On a recent trip to Japan, I visited a hobby shop that was selling Byron 10% nitro fuel for \$30 a gallon! We are very fortunate to have reasonable fuel prices here in the U.S.

Rossi engines do great on 5-10% nitro fuel. I tried some 30% fuel in mine, but instead of more power, the engine ran erratically. My Webra and Super Tigre run fine on 0-30% nitro fuel. Their performance is fairly proportional to the nitro content.

I prefer to run fuel with a synthetic lubricant instead of castor oil because expelled castor oil varnishes the outside of the engine and tuned pipe. If the motor is run on the rich side, synthetic lubricants work fine. Leaning out an engine makes it run hotter, and it's important to realize that synthetic lubricants break down long before castor oil. Never fully lean out an engine when using a synthetic lubricant.

I usually carry two different fuels to the field: 10% nitro for fun flying and 30% nitro for heavier models or those with a fuselage, or when I need more speed. The 30% fuel is great for helicopters with a scale fuselage because a fuselage provides less cooling and makes the engine run hotter. The extra weight requires more power, too. The higher nitro fuel gives that extra power without having to lean out the fuel mixture.

I have tried the Magna 30%, Powermaster 25%, and S&W 30%—they are all very good, but like all high-nitro fuels, they are costly. For sport flying, Byron 10% and 15% are both good. K&B 500H has about 15% nitro, and produces excellent power in comparison to other 15% fuel. It costs more, too. Recently, I have been using Byron fuel regularly with good success; my only gripe is that it is castor-based and varnishes my shiny mufflers. Castor oil



Another interesting product from Century is this all-metal hub for Schluter helicopters with the System 88 rotor head. It fits the Schluter Scout, Magic, and Junior 50.



This is our columnist's favorite new item for the month, an all-metal swashplate for the Hirobo Shuttle from Century Imports. There is no discernable slop between the rotating and nonrotating pieces; an excellent piece of work.



Century's new mufflers for the O.S. .60 RF and Enya .60 rear-exhaust motors. This muffer is ideal for using these engines in X-Cell, Kalt, or Hirobo helicopters. They are also great for scale helicopters because the muffer is compact and hidden below the model.

can also gum up the ball bearings if the motor is not treated with an after-run oil after the last flight of the day.

My friend David Ramsey recommends not storing fuel for more than a year, even if the plastic container is unopened. Nitro can breathe through plastic and will lose its potency over time. Metal cans, though more expensive, keep the fuel potent much longer. K&B is about the only manufacturer that still uses metal cans. Fuel should be stored in a cool, dry place, tightly sealed at a more or less constant temperature. Garages and attics are not good storage locations because of their considerable temperature fluctuation between day and night.

• • •

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FLOAT FLY continued from page 42

his giant scale T-34 through its paces. Pattern divas John Britt and Tom Cook singed the runway with their jet demonstrations.

While 31-year-old Stanley King of Webster Grove, Missouri, is short on name recognition in the modeling world, he is long on desire to fly. A boating accident on July 2, 1983, left Stan with little use of his arms and hands and no leg movement. He's confined to a wheelchair and drives a specially equipped van.

Stan accomplishes the seemingly impossible task of flying his Sig clipped-wing, quarter-scale Cub (on floats, naturally) with a specially built Ace Micropro transmitter. Ace plant manager Paul Holsten, Tom Runge and Steve Kaluf worked in various capacities with Stan to come up with modifications that permit Stan to fly. The transmitter sits in a tray on Stan's lap. He makes the necessary control inputs mostly with arm and wrist movements.

"This is my fifth year in RC," King said. "I fly better than some, as good as others. I do alright."

Stan made several flights during the weekend and suffered only a minor landing mishap on one flight. He also flew a demonstration flight for the crowd Saturday night.

A major part of the Stan King story involves modelers from the St. Louis area, of which Webster Grove is a suburb. Stan is a member of the St. Louis RC Flying Association and often flies with the Signal Chasers and the Horseshoe Lake Float Flyers.

To watch Stan fly is to be reminded that it takes the help of many to get him into the air. Others have to build and cover his aircraft, install the equipment and tend to all the endless nit-picky details.

Several of those who extend that selfless dedication to Stan also came with him to this year's event. Offering encouragement as well as help were a brother, Brett King, Mark Speckert and John Crawford, all from the Webster Grove area.

Stan wants to communicate with other disabled RC pilots in an effort to ameliorate their flying condition and exchange ideas. His address and phone number: Stan King, 853 Greeley Avenue (Rear), Webster Grove, MO 63119; (314) 962-4704.

Clearly, the Ace Float-Fly ranks among the top fun gatherings in the country. The reasons for its success seem to center around the quality of sponsorship, safety and structure.

Dennis and Trish Brooks, of Kansas City, Kansas, were among those who pitched tents in the camping area with the notion of getting as far away as possible from the daily rush for the on-ramp to the fast lane. Dennis, who is teaching Trish to fly, traditionally brings his RC Nobler. He enjoys the float-fly as an alternative to competitive events.

Twenty-six-year-old Mike Doyle, a member of the Shawnee Mission (Kansas) RC Club, brought his Royal .45-powered, tuned-piped Fun One. "I really think this is so

successful because of its central location (in the country) and it's a very good site," Doyle said.

Gene Marshall, also a SMRC Club member, has never missed the event. Marshall, who was among the many campers, this year flew a Balsa USA Laker and an Ace 4-40 on floats.

"What makes this great is the same element that makes the IMAA so successful—the lack of organized competition," said Marshall, who competes only at local fun-fly events. "The Ace Float-Fly is one of only three major floatplane fly-ins in the midwest (Missouri, Illinois and Arkansas) and is one of the best organized and sponsored. There's no stress." **MB**

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HANNAN'S HANGAR

BY BILL HANNAN

"I don't mind living in a man's world as long as I can be a woman in it."



Author's wife, Joan, circa 1954, prepares to fly a 1/2A powered control line "Flying Saucer." Although no longer a filer, she now operates Hannan's Runway aviation book business.

Our lead-in quotation this month, by Marilyn Monroe, is from *Peter's Quotations*, by Dr. Lawrence J. Peter. We hope it may be appropriate for this month's topic: "Ms. Model Builders." How about some recognition for the women in this hobby? Certainly they deserve more than they have received. We will attempt to remedy that, aided greatly by the participants themselves.

A LITTLE HERSTORY (AS DISTINGUISHED FROM HISTORY)

There have long been dedicated female modelers, yet the percentage compared to males has been miniscule. Why? Perhaps some answers may be found in early childhood. Author Stephanie Brush, in her book *Men: An Owner's Manual*, explains that boys do not outgrow their passion for toys in the way that girls do. In her view, boys always want to operate their toys. By contrast, girls playing with dolls want to grow up to be a Barbie, and to become the toys with which they have played!

Gina Boyanowski, co-editor of the Detroit Cloudbusters newsletter, has a rather different girlhood outlook, however, which she shares in her article, "Girls Allowed."

"As a youngster, I was known around the neighborhood as somewhat of a tomboy. I identified with my brothers; I liked playing baseball with them. I grew up thinking their toys were pretty neat, and wondered why they could walk around the neighborhood with their shirts off and I couldn't. After all, it was hot!

"Being the first girl in the family, I was the one who would have to learn the difference between being a girl and being a boy. I remember being very disappointed when I received a tea set for my birthday. And our home movies show me refusing my grandmother, who was trying to get me to wear a frilly hat. Ech!

"Finally, I think my family

gave in to my preferences. One of my most treasured Christmas gifts was a pair of cap guns. My doll collection? A Ken doll. I never did understand the reason for the difference between a boy's bike and a girl's bike. You'd think it would be a lot more painful for a boy if he fell against the crossbar than for a girl. But then, I guess a girl's bike is built so that she can ride it while wearing a dress. Sure.

"So it was, growing up with two older brothers. Of course, in a lot of ways I was a typical little girl. I took tap-dancing lessons. I played the flute, although now I wish I had opted for the trombone, just to be different. I liked who and what I was, and soon began to realize that I was, in fact, to be a member of the female persuasion. Of course, I still wanted to do what I wanted to do and didn't want to be told what I should want to do, just because I was a girl.

"What does all of this have to do with model aviation? Well, many years later my best friend was describing her brother, whom she wanted me to meet. 'He has model airplanes hanging in his room.' That intrigued me. I don't know why; my brothers had never built model airplanes. Of course, it would be years before I would actually get to see the models hanging in his room; however, I did meet him. And I learned about aviation.

"I became his primary wire launch assistant when he went hang gliding. He built model airplanes and even designed a free flight gas model and named it after me. It flew well. Many of our dates began in the flying field and ended up in his workshop. I found myself shopping the hobby stores. I found myself reading the model magazines. I found myself building model airplanes. I was in love.

"Once married, I learned how many hours of construction went into Paul's models. Paul quickly learned my distaste for the division between the sexes, something I had hidden from him. If a date was being planned for a



Glenna Tarango replacing the rubber motor in her Howard Ike racer during an Arizona contest. Photo via Dave Smith.

night out with the boys or a fishing trip, I demanded to be given one good reason why I wasn't invited. 'I like the boys, I love fishing.' The only answer, of course, was they just didn't want women around; thank God none of them was brave enough to say it. I got my way. Something I know how to do very well, just because I'm a girl.

"Now that I have grown up and settled in, occasionally a family gathering will stir up those disturbing feelings; especially when the women dutifully put on the meal as well as clean up. And when the men go one way and the women go the other, I am torn. For the rest of the evening, you'll find me flitting from one room to the other, trying to get the best of both worlds—unhappy with my predicament.

"Then there are my modeling friends, a good many of whom are men and treat me like one of the guys—something I've always wanted to be, figuratively speaking. Somehow, with a shared interest in aviation, the division between the sexes seems to disappear. These men are as encouraging to me as the next guy,

Glenna Tarango's free flight scale model of Frank Hawks' Travel Air Mystery Ship with Texaco Number 13 markings. Photo via Dave Smith.



and the more the merrier. Welcome to the Cloudbusters, not for boys only."

ANOTHER POINT OF VIEW

Janet Lueken of Escondido, California, who once co-owned a hobby shop with her late husband, Jack, offered these thoughts:

"Having a husband and a son, both model airplane fanatics, I pretty much lived and breathed glue and tissue paper, too. I tried building one or two models, but couldn't get the total enthusiasm that I saw at the contests we attended.

"Then one day I found out why. Jack handed me a model magazine and said, 'Read this!' The article pointed out, in a humorous way, that women are too practical for the hobby. They knit, sew, or work on something that lasts. It is simply against their grain to spend all that time and effort on something that may crash on the first flight, leaving only bits and pieces of the effort."

In spite of this, Janet remains an enthusiastic supporter for the hobby, as do her two daughters.



Jane Schlosberg with her free flight scale Piper Vagabond. Photo by Bob Schlosberg.

AND IN ARIZONA

The Flying Aces Cactus Squadron boasts two very active (and competitive!) female model builders, according to club president Dave Smith.

Glenna Tarango first joined the group some five years ago, having had minimal (and unsuccessful) building experience during her girlhood. However, she has become an expert, specializing in highly detailed, fine flying scale models. Her subjects have ranged from Golden Age racers to complex twin-engine types such as her North American B-25. An artist by trade, Glenna is as knowledgeable about stained-glass as she is about stick-and-tissue free flight models. She also functions as club secretary-treasurer, and even contributes "how-to" construction technique items to the squadron newsletter.

Glenna's fellow club member, Jane Schlosberg, became involved in model building after attending many contests with her famed husband, Bob. In her words:

"Many years ago, Bob began encouraging me to join him in the hobby, but I always seemed to be too busy, working and caring for our family, to get involved in something else. However, after we retired to Arizona and I didn't have those other responsibilities, I decided to take him up on his offer of help in learning, and moved into his workshop with him. I'm sure he wishes that it was bigger now!

"When I began, I knew very little about the differences in airplanes, and virtually nothing about aerodynamics—as opposed to most males, who seem to grow up knowing about such things—so I had a long way to go, and still do. I couldn't have had a better teacher—he's been a taskmaster, and that only benefitted me. In the beginning, it seemed to take forever to even fit in a stick of balsa, but I feel I've come a long way in almost six years.

"I also had to learn how to wind a motor in a model, and how to launch, still one of my

problems. Bob says I throw (launch) like a girl (surprise!). I've needed much help in learning how to trim a model, and still do, but it's getting easier. I've lost three models out-of-sight, and each time it has been exciting to see such a glorious flight, and at the same time a sadness to be losing a 'friend,' which they do become after all the hours of building and detailing.

"After I had been building for awhile, I had the desire to pit my efforts against others, to see where I stood in ability. I have had some modest success in contests. The best part is seeing a realistic flight, with the sun shining through the tissue. Interestingly, until I wanted to enter contests, Bob had no desire to do that. He just flew for his own

when I decided to join Bob in the hobby. It has brought both of us many happy hours together, even when we fly out here in the desert when it's over 100 degrees!"

AND FROM BOB SCHLOSBERG

"My thoughts and some facts on Jane's modeling career. In almost six years, she has built about 30 models, of all kinds. That's about five per year average, so she's not been an occasional modeler by any means. By my count, she has eight 1st place awards, and about three times that amount in 2nds and 3rds. I personally really enjoy (maybe love) to see her beat the men, and it bothers me not at all if she beats me. I'm proud of her



Christine Redhead, of England, displays her P1stachio-size scaled-down Delta Dart, which has an indoor duration of 40 seconds. Photo by Pete Redhead.

enjoyment. But I guess I brought out the competitor in him. He has many trophies, but he always enjoys and celebrates my achievements almost more than his own.

"A very wonderful bonus to this hobby has been meeting such a great group of people, and from such diverse backgrounds. I feel I've made some very good friends, people who have helped me grow as a person, and whose friendships I value dearly.

"I think I made a good choice

for many reasons besides modeling, but because this is not supposed to be an area of expertise for women, I think it's a little special.

"I've had some comments made at the flying fields by other guys about how lucky I am to have a wife who is interested in the same thing I've been interested in all my life. It's obvious that many others would like to have the same luck."

Tune in next month for more about women who enjoy aviation! **MB**

FREE FLIGHT

BY BOB STALICK

More on the proposed .010 event

Interest in an event for these tiny screamers continues to grow. When are you gonna build one?

In the October issue of *Model Builder*, I described, somewhat lyrically, my "magic moment" flight with the .010-powered P-Wee-B as it flew out of sight in a booming thermal. Apparently, the description hit a sympathetic chord, as several of you wrote to share your own memorable experiences with me.

Now it's time to get up to date on the .010 free flight question posed in October. First off, I received more letters and phone calls on this subject than I've ever received about anything I have written. So, your interest seems to be there. Thanks to all of you who took the time to air your views on this potentially popular event.

With one exception, all of the comments were aimed at reducing the complexity of the event. I therefore recommend that the proposed rules be kept as simple as possible—at least in the beginning.

Also, a number of people were interested in locating full-size plans for the P-Wee-B, pictured in that issue. I know of no source for full-size plans, but if you would like a scaled three-view with full-size ribs and the complete magazine article, drop a business-sized SASE to Bob Stalick, 5066 NW Picadilly Circle, Albany, OR 97321. I



John Crossetto always comes to the N.W. Free Flight Champs with a passel of 1/2A models. This is the classic RamRod 250 by Ron St. Jean, which John flew to 3rd place in Nostalgia. Power is a Cox reed valve .049.

have already sent out about a dozen such packets, and can always do a few more.

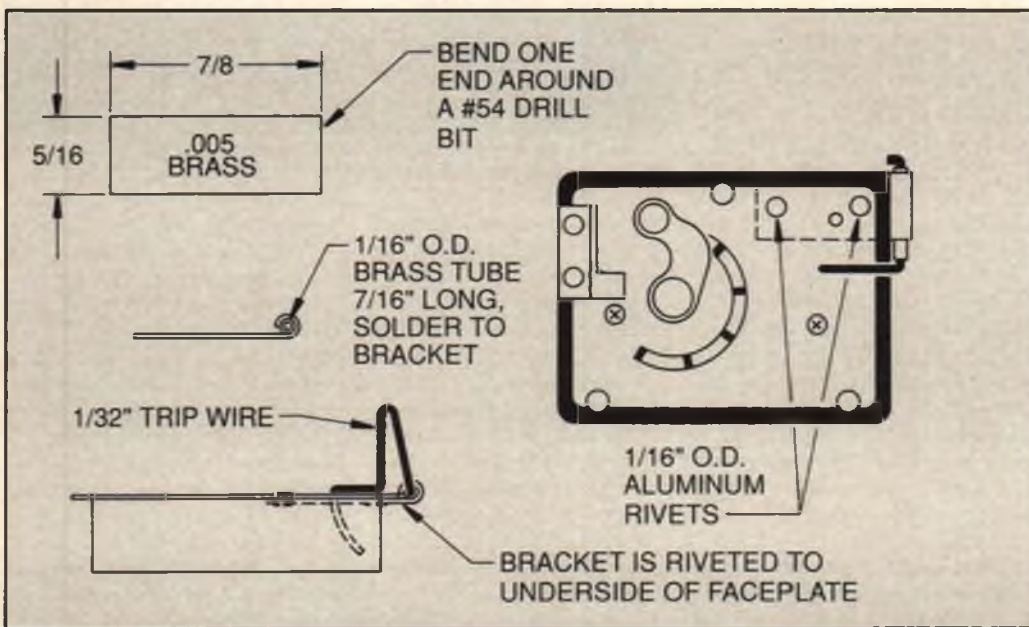
By the way, if you want full-size plans for a bonafide .010 ship, John Pond has them for a design called the Hot Canary. John wants \$4.50 for the plans—order #47G4. Be sure to include 90 cents for postage and California sales tax if applicable. The

Hot Canary is a large .010 model with a span of 33 inches, but it should be a good performer.

So, on to the proposed rules that I would like to try out for the 1993 contest season. I hope you will give these a try at a fun meet or at a regular contest, then drop me a line with your thoughts about improvements so we can formulate some changes for the 1994 season.

1. Model: No design restrictions. Any size, any weight can be used.
2. Engine: Must use a Cox Tee Dee .010 engine.
3. Timer: No mechanical timer may be used to control the engine run.
4. Flight rules: 10-second engine run, six attempts to get in three official flights of 20 seconds or more. All flights are to be hand launched. Two-minute max. Three maxes qualifies for a flyoff.
5. Flyoffs: Continuous 10-second engine runs and two-minute maxes until an overrun occurs

Sketch showing how to modify the KSB 30-second pinch-off timer from the stock pivot arm release to the more positive trip arm release as used on the old Talone timers. This simple mod was devised by Chuck Stanley. Details in text.



or a max is not attained. One attempt for each flyoff flight.

There you have the proposed 1993 rules. Give them a try. Now, if you don't like either the P-Wee-B or the Hot Canary, read on for some ideas on what to fly.

JANUARY THREE-VIEW

L'IL PEARL by Bill Chennault, as interpreted by Bob Stalick

As potential .010 fliers look around for designs to use in the event, consider scaling down successful larger designs. I have a penchant for the Spacer and RamRod, but for the purposes of this article, I scaled down a Bill Chennault Mini-Pearl to .010 size. I call it the L'il Pearl. Since I have not yet built this model, it is still a concept design—one that you might wish to use as a guide when you scale down your favorite model.

As the L'il Pearl is a pylon model, the usual construction features apply. The wing is built with slight wash-in at the right polyhedral break, and wash-out is built into each tip. The construction of the wing and stab is totally conventional. The fuselage is built flat on the board, *a la* the Starduster. Cover the complete model with Japanese tissue, fuelproof it and check the warps and center of gravity.

Prior to your first powered flight, check to see that the engine has a slight bit of right thrust—1 degree or so. Try a short run. The model should climb in a right spiral, making about one to one-and-a-half turns in a ten-second engine run. Use a bit of right rudder tab until it does. Although the drawing doesn't show a dethermalizer fuse, always use one. These ships thermal easily, so any means of bringing them back should be used.

The L'il Pearl is a bit on the small side for .010 with its 99 square inch wing, so you might wish to scale your models to a wing area slightly larger—say 110 square inches or so. Remember that most of the Pee Wee 30 and .020 Replica models have wing areas between 140 and 150 square inches, so

design these smaller models accordingly. If you are interested in receiving a full-size set of plans for the L'il Pearl, I have sketched it out and will sell a copy for \$3.00 postpaid in the U.S. (address above).

JANUARY MYSTERY MODEL

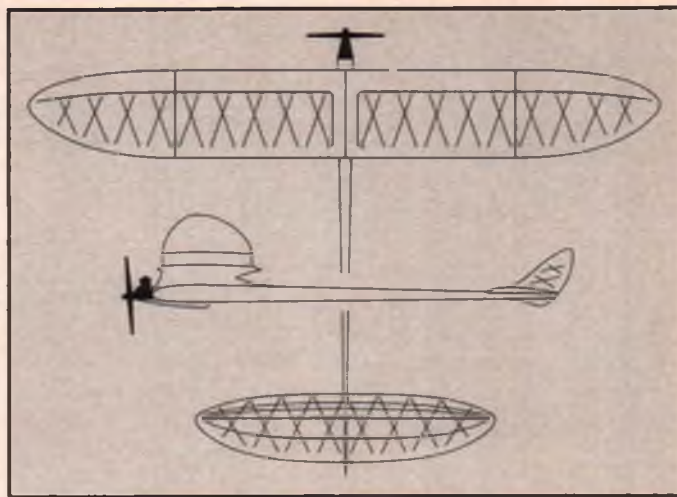
Absolutely one the prettiest 1/2A models that has ever been designed! This ship was featured in an old issue of a now-defunct model magazine and had classic lines for its time. The model was powered by the then-new Holland Hornet. It was co-designed by two experienced Southern California free fliers who had teamed up to produce this and several other very attractive models.

If you know the name of this model, all you have to do is to send it to *Model Builder*. The winner is drawn from among the correct entries to win a one-year free subscription to the magazine.

OCTOBER MYSTERY MODEL WINNER

Grab two sheets of 1/16x3 balsa and a couple of 1/16 squares and you've got the makings of Ed Lidgard's "Li'l Cloud Sniffer," which appeared in the February 1947 issue of *Air Trails*. It's a 20-3/4 inch span rubber cabin ship with sheet balsa wing (curled into an airfoil by doping the bottom) and

Bruce Matthews, of British Columbia, always has at least one new and well-trimmed model to show off. This is his *Dynamoe D.T.* rubber model, done in black with red scallops. He placed 3rd in the "Wock" event at the N.W. FF Champs.



MYSTERY MODEL

tail surfaces, and sheet balsa fuselage sides with a single large cutout and 1/16 square uprights, joined by 1/16 square cross-pieces and covered with tissue. Ed, who now resides in Perry, Georgia, admitted in the original article that the fuselage construction was patterned after a similar technique developed for Comet Models by Carl Goldberg.

The response from our readers was excellent, with 21 correct entries. The winner of the random drawing and the complimentary one-year *Model Builder* subscription is Jim Whelan, of Coraopolis, Pennsylvania. Jim has good reason to be familiar with the model. He writes that his local group of gumbanders holds a fun-fly each month for a particular event—10¢ Scale, Embryo, that sort of thing—usually flown in rounds, FAC style, the last one down being the winner. By pure coincidence, the Li'l Cloud Sniffer was the featured model at their August get-together. Therefore, Jim, in your case the free sub is going to cost you

Dustin Grell flew this hand-launch glider to 1st place in Junior HLG at the N.W. FF Champs.



something extra—a postcard letting us know how the meet turned out!

NFFS BOOK: POWER MODELS, THE STATE OF THE ART

As noted in the November issue, the new NFFS book on power models is now available. Keith Hoover edited this gem, which is based on the *Zaic Yearbooks* in format, although in 8-1/2x11 size. Keith notes that this 130-page effort has 60 three-views, about 60 articles and 45 color and black-and-white photos.

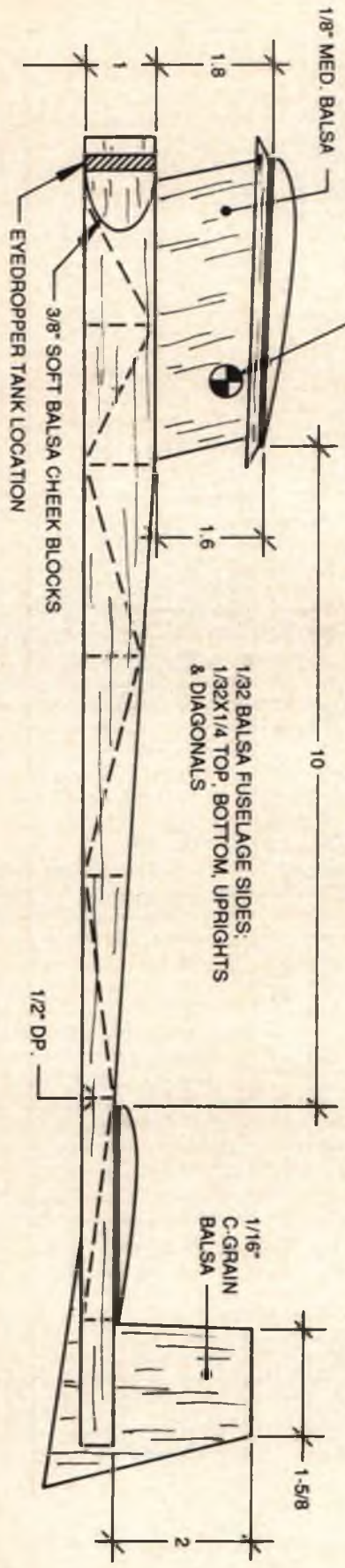
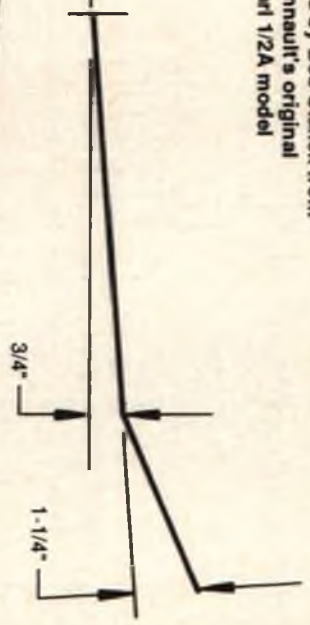
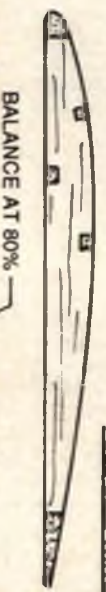
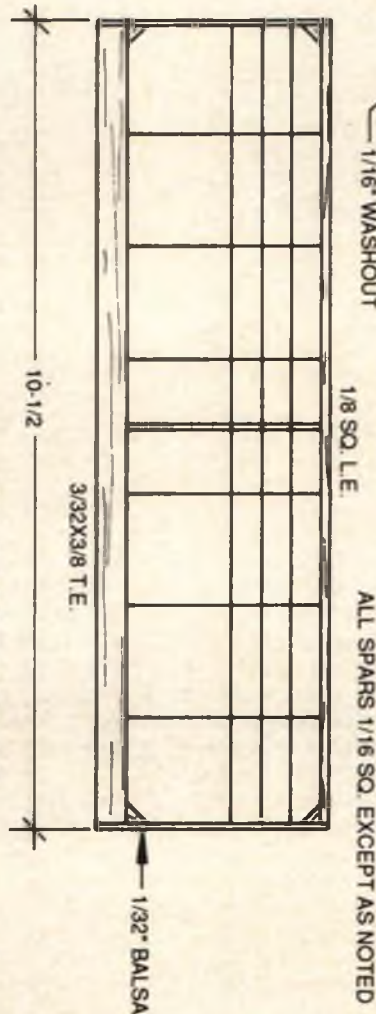
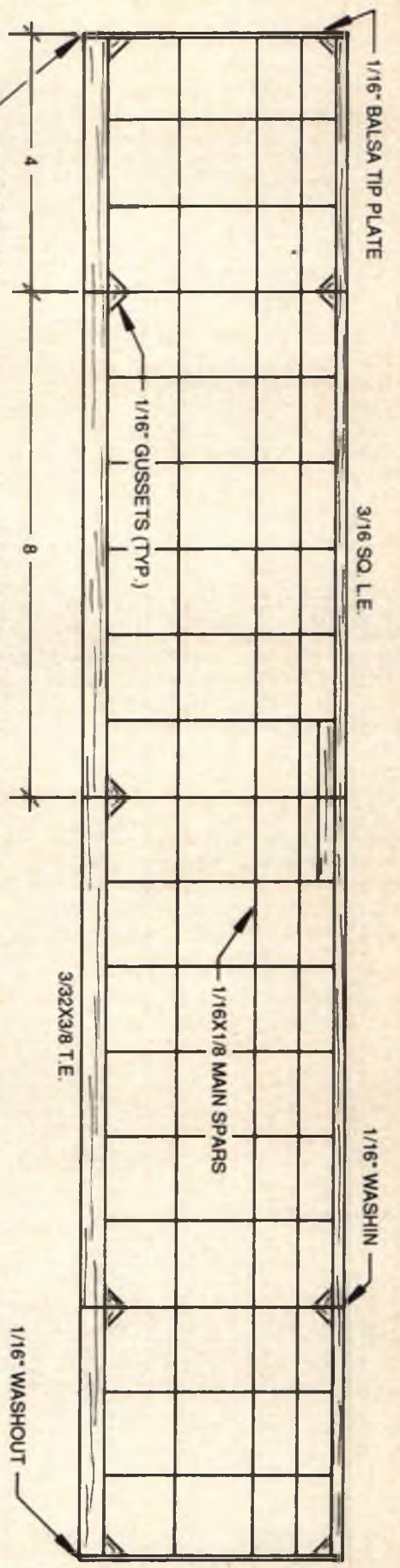
The book features alternative power models as well as traditional designs. CO₂ and electric ships are included, as well as a selection of F1J models and all manner of other ships. If you are interested in a copy of this limited edition book, you can order it from NFFS Publications, c/o Fred Terzian, 4058 Moorpark Ave., San Jose, CA 95129. Cost to NFFS members is \$19.50 plus \$2.50 postage. Non-members can get a copy for \$21.50 plus \$2.50 postage.

NFFS ANNOUNCEMENTS

From Tony Italiano comes the announcement of the Ten Models of the Year:

International Class: F1A (Nordic)—Bunters by Mikhail Kochkarev and Sergei Makarov; F1B (Wakefield)—Tiltwing HC 17, by Hank Cole; F1C (Power)—#15 by Randy Archer.

AMA Outdoor Power: Large—Niblet 584 by Norm Poti. Small—Hurry Up by Bill Lynch.



L'il Pearl
.010 Concept Model
 Designed by Bob Stalick from
 Bill Chennault's original
 Mini-Pearl 1/2A model

COVER WITH JAPANESE TISSUE
 RIGHT/RIGHT POWER PATTERN

FREE FLIGHT

AMA Outdoor Rubber: Large—Small Giant Speckled Bird by George Perryman. Small—Teacher's Pet by John O'Donnell.

AMA Indoor: Rubber—Novice Pennyplane by Cezar Banks. Catapult Glider—Article by Chuck Markos. Special—Lacey M-10 by Peck-Polymers and Butch Hadland.

Nominated to Free Flight Hall of Fame: Al Casano (deceased)—An East Coast mover and shaker of the 1930s and 1940s in the education of the young regarding the virtues of building and flying model airplanes. Lew Mahieu—Designer of many winning designs, the most famous of which are variations of his Zeek. Clarence Mather—A prolific published designer and flier of many types of model airplanes. An expert at scale and F1D designs.

KSB ENGINE TIMER MODIFICATIONS

From the *CIA Informer* comes the following tidbit of interest to all power model fliers.

"Chuck Stanley presents this how-to tip on modifying the KSB 30-second timer to provide the positive Tatone type release, rather than the arm type. Cut a piece of .005-inch brass with tin snips or scissors. Roll the end around a #54 (.055-

inch) drill bit. Slide into the hole a 7/16-inch length of 1/16-inch O.D. brass tubing; this should protrude about 1/32-inch from the top edge of the brass stock. Solder the tube in place. Drill out the rivet from the rear of the timer on-off switch using a 1/16-inch drill bit. The on-off switch can now be removed. Place the new bracket in the upper right-hand corner of the timer faceplate and drill two 1/16-inch holes 3/16-inch from the top edge of the upper right-hand corner of the face plate. Install two 1/8-inch long pieces of 1/16-inch O.D. aluminum tubing into these holes and mash them lightly with a pair of pliers. Take a 1/8-inch diameter punch and lightly peen on an anvil these new rivets so that they hold firmly. Bend and install the 1/32-inch trip wire and that's it!"

NATIONALIST UPDATE

I just received a nice letter from Nat Antonioli, who tells me that the Nationalist 560 plans are now available from John Pond Plans Service. Nat notes that the plans are exceptionally well drawn and show all of the ribs from the undercambered root to the flat-bottom tip. It's plan number 56F5 and costs \$6.00 plus \$1.20 postage (and



Mike Slessor produced this F1J model, which has some characteristics of the 1/2A Vee published as a three-view in a recent issue of *Model Builder*. Mike found he had to increase the dihedral to 11 degrees in order to get consistent flight patterns. Impressive performer with a Tee Dee .049. Photo by Bob Stalick.

tax if you live in California). See John's ad elsewhere in this issue for the address.

A SOURCE FOR FREE FLIGHT SUPPLIES

I just received a catalog from Airmen's Supply Company, a mail-order free flight supply house in Nebraska. According to the 18-page catalog, they carry Jetex supplies, CO₂ motors, hundreds of plans and dozens of kits. They also have the construction supplies that most good hobby shops carry. If you are interested in keeping your catalog collection up to speed, send

a buck to Airmen's Supply Co., P.O. Box 1593, Norfolk, NE 68702-1593.

THE END DEPT.

As you are reading this, it will be mid-winter. For us in the Northwest, that means the weather is pretty wet and nasty. However, it also means the Annual Strat-O-Bats Misery Meet is only a month away. And, we are in the middle of the indoor season. Free flight is just the greatest hobby.

Now, go out to the shop and pick up some balsa and a knife. It's time to ponder, and it's time to build. **MB**

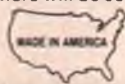
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SNAP ROLLS ON TAKEOFF & OTHER UNINTENTIONAL STUNTS

In which our columnist addresses a number of subjects inspired by recent reader correspondence.

Frequently this column consists of only one item or theme, but this month I want to discuss some of your letters and bring up a few of the smaller items which have collected in my word processor. We'll start with the subject of snap rolls on takeoff.

I received a letter from M.H. Picard of Goodview, Virginia, in which he expressed some concerns over crashes caused by snapping on takeoff. With high-wing models particularly, he inquired, "With all the weight in the fuselage, why do they want to flip over on their backs? If the aircraft is stalling on takeoff, why doesn't it just drop its nose and go straight ahead?" These questions may have occurred to others who have experienced a takeoff crash or two, so let me share some of the answers I gave Mr. Picard.

A snap roll results from a stalled wingtip. As soon as one tip starts to stall it starts to drop. This raises the other tip, effectively reducing its angle of attack, so only one tip will stall at a time. Tapered wings, sweptback wings, heavily loaded wings, underpowered planes, and planes that are forced into the air before they have sufficient flying speed, are the ones most apt to snap roll on takeoff.

The reason why sweepback contributes to snap rolls is interesting. If one tip of a sweptback wing stalls, the remaining lift on the wing is forward of the part that was lost due to the stall. This moves the center of lift forward with respect to the CG, so the plane tends to pitch up, which thereby increases the angle of attack and deepens the stall.

It is said that rectangular wings always stall at the center first. True, but note the word "first." After a rectangular wing stalls at the center, aerodynamic and configuration asymmetries cause the stall to progress out on one wing panel faster than on the other, and the plane then has a roll moment. Any wing flying near stall therefore tends to be unstable in roll.

Ailerons are frequently not effective for recovering from a snap roll that is starting, even if we have time to apply them. They are apt to make matters worse instead, because

the lowered aileron on the stalling wing panel is apt to make it stall more completely and faster.

However, snap rolling on takeoff is not something we must live with. To prevent it, the following rules apply:

1. Keep the wing loading light.
2. Keep the balance point far enough forward.
3. Use ample power.
4. Avoid wings with severe planform taper.
5. Avoid thin airfoils and sharp leading edges.
6. Avoid sweepback.
7. Build wash-out into both wing panels.
8. Let the model build up plenty of flying speed before lifting it off.
9. Ease the elevator stick back gently on takeoff, and no farther back than is needed.

These rules need a little discussion, as some of them are contrary to other objectives we may have. Violating *all* the rules will guarantee snap rolls on takeoff, but if we choose to violate some of the rules for good reasons, then we need to pay more attention to the rest of them. For instance, if you have a heavily loaded plane, use more power. If the plane is scale and has a sharply tapered wing, pay attention to all the other rules. Wash-out is wash-in when inverted or in outside maneuvers, so I don't use it.

I would expect low-wing models to be more subject to takeoff snap rolls, because the wing is more in ground effect initially, and the plane may be lifted off before free-air flying speed is reached. On the other hand, high- or shoulder-wing models are more subject to being upset by crosswind gusts, and this might be confused with snap rolling on takeoff.

As in all other matters of aircraft design, we compromise on our models' potential to snap roll on takeoff. It is certainly more of a problem for beginners in the RC hobby than it is for experienced modelers.

SNAP ROLL AEROBATICS

A snap roll is an interesting aerobatic maneuver, and most of us who like to tumble

around up there want a plane that will snap well on demand and also spin, which is just vertically-downward snap rolling. Fortunately it is not difficult to get snap rolls and spins when we want them and yet avoid them when we don't want them.

The unintentional snap roll or spin occurs when the airplane is in trouble as a result of violating one or more of the "rules" listed above. The intentional snap roll or spin is performed by giving the plane full up (or down) elevator and full left or right rudder. Depending on the design, many airplanes also spin or snap better with full aileron also, and sometimes need full throttle, as the prop blast over the tail will increase the pitch and yaw control forces.

A snap roll is supposed to be a maneuver with one wing fully stalled. One might expect that opposite aileron (opposed to the direction of the roll) would make it snap even better, reasoning that the down aileron on the stalled side should deepen the stall. Also, the drag of that down aileron on the inside of the maneuver should contribute to the yaw. But on many or most models, it doesn't work that way. Opposite aileron kills the snap. I suspect the reason is that the up aileron on the outside kills so much lift on that wing that there is no longer enough lift differential between the two wing panels to roll into a snap.

Airplanes with the CG well forward or with small tails may be unable to snap roll or spin. If it won't when you want it to, try increasing the elevator throw, the rudder throw, and moving the CG back (in steps.) If it still won't snap or spin with the CG back to where the level-flight longitudinal stability is getting hairy, a little tail enhancement is in order.

If the elevator is too small the airplane won't snap or spin, but the size of the rudder is equally important. I am currently flying a model of my own design which used to snap and spin fine. Then I crashed it, and in rebuilding it I changed some of the areas a bit. After that it flew fine but wouldn't snap or

continued on page 86

DU-BRO Announces The Birth Of A Feather Weight Champion.



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BIG BIRDS continued from page 39

by a servo turns the pump on and off. A five-cell 1200 mAh NiCd pack powers the pump. The smoke oil flows through a one-way check valve purchased from an automotive supply store.

The muffler on Lloyd's Zenoah G-62 is a stock can muffler that has had the vents welded shut and two baffles welded inside. The one closest to the exhaust is quite thick and holds a lot of heat. Four 3/8-inch holes are drilled in the thick baffle; a second

through a line in the muffler, exits then makes a U-turn back in front of the exhaust and continues out the muffler, where it is plugged. The line has eight #80 holes drilled vertically in front of the exhaust and angled slightly away from the exhaust.

Walt's system gives 15 to 20 minutes of smoke. He has his system mounted in a very nice flying Balsa USA "Der Jaeger."

All of these systems work very well, expelling a good stream of white smoke. They all have a one-way check valve and use some type of pump or pressure to move the oil from the holding tank to the exhaust system.



The interior of Bo Moore's 1/3-scale Aeronca Champ is nearly perfect and uses material from a full-scale aircraft supplier. The 42-pound model is powered by a Zenoah G-62.

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thinner baffle is welded in the outer half of the muffler and four 3/8-inch holes are drilled in this baffle.

Four holes are drilled in line, top and bottom, for the exhaust exit. The smoke oil is directed to strike the inner plate, where it is heated and turns into dense, white smoke. Lloyd's system is very reliable and has been in use for over two years. His smoke oil mixture is 50% diesel and 50% kerosene and seems to work well. The system gives from five to ten minutes of smoke.

Walt Wyrick provided the information on his system, which is the third and final system we will investigate. Walt is a fine builder who belongs to the Mount Rainier Radio Control Society. He has won many awards at the Northwest Model Exposition with his Big Birds.

Walt's system also has a 32-ounce tank, but uses a Perry P-40 pump which is operated by a pressure tap on his Super Tigre 3000 engine. Walt's J'Tec muffler has all the excess flash removed on the inside, and he flutes the exit pipes before adding stainless extension pipes to them.

A J'Tec cutoff device squeezes the fuel line carrying the smoke oil to stop and start the smoke. After the oil flows past the cutoff, it is heated by flowing through a copper or brass tube bent around the cooling fins on the engine. The oil continues on

Each of these fliers uses a slightly different method of heating the smoke oil. Bennie uses a coiled tube in the muffler; Lloyd uses the baffles as a heat sink, then sprays the smoke oil on them; and Walt uses a coil of tubing around the engine fins and a single line in the muffler to heat the smoke oil.

Each of these fellows feels that pre-heating the smoke oil is a critical part of their success in creating lots of smoke. One of the things I noticed was that model smoke systems, even the best ones, do not put out the same proportions of smoke that full-size aircraft do. We all thought it was due to the lower exhaust gas temperatures that our engines experience, when compared to full-scale aircraft.

I questioned LSGAS member Noel Kieffer, who is an FAA accident investigator, about the temperatures in a full-size aircraft engine such as a four-cylinder Continental. He said that 1650 degrees was the maximum permissible exhaust gas temperature for that type of engine. The exhaust temperature in a model gas engine is around 450 to 550 degrees, so we are dealing with a lot less heat to make our smoke systems work.

The systems mentioned here are systems I know are working. There are others that may work just as well. If you have a favorite way to make smoke or a favorite smoke oil

you would like to share with us, please drop me a line care of *Model Builder* and I will share the information in this column.

On August 9, I drove about forty miles south to visit the Puget Sound ROCS Annual Big Bird and Four-Stroke Fly-In near Rainier, Washington. In years past, the ROCS had been operating a pretty hard-core fly-in, with inspections of each plane and lots of safety reminders. This year a different format was tried so that more Big Bird pilots would be encouraged to attend.

The safety inspection was dropped but you were encouraged to check out your bird before flying. Transmitters were impounded but the normal club system of frequency control was used. A free potluck lunch was provided by the club members and their wives. The weather was warm with a nice breeze blowing right down the runway.

The event was the most hassle-free Big Bird fly-in that I have attended in years. Gene Ehlers, the Contest Director, should be commended for his low-key, friendly approach to running such an event. Perhaps the ROCS are starting a trend here, away from the Big Bird fly-ins as they are now being run.

Current fly-ins find us filling out what seems to be an endless number of AMA and other safety forms that ask many questions that have little to do with safety. The same number of crashes seem to occur regardless of how many times you promise to fly safely and not sue the AMA or any of its officers.

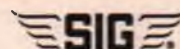
I have said in the past that if you are consciously trying to fly safely, you will, and will lose fewer planes than the fellow who has little regard for his fellow fliers or his own planes.

Perhaps the day is coming when we will see fewer sanctioned events and more gatherings where pilots will spend their time flying and less time covering official posters.

This month the mailbox was full of interesting letters and photos. Lynn Lockrow noticed that I had put out the call for Hyperbipe plans for Paul Stanley. Lynn says he has a set of blown-up Hyperbipe plans that should do well for a Super Tigre 3000 engine. The plane would be in the 15- to 17-pound range. If anyone else is interested, contact me and I will put you in contact with Lynn.

Roy Vaillancourt sent us a picture of his latest plane, a Stinson L-5E Sentinel. Roy's plans are some of the best I have seen. My friend Ken Rowe is building the wings for his L-5E. I have seen several planes built from Roy's Vailly Aviation plans and the pilots have all been pleased with the drawings and the way the completed models flew. For details on the L-5E or any of Roy's other designs, write to Vailly Aviation, 18 Oakdale Ave., Farmingville, NY 11738, or call (516) 732-4715 after 6:30 p.m. Eastern time. **MB**

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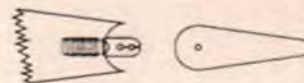
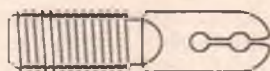
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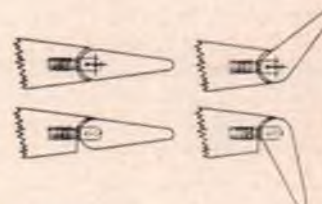
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BY ART STEINBERG

Hi-G's Turbo-Tube

A glueless, futuristic, high-tech ARF kit for those who like 'em hot!

I have gazed into the future of ARF airplanes, and the future is here! I have just assembled and flown an RC model so advanced and so downright unusual that it boggles the mind. The name of this model is the Turbo-Tube, and it is manufactured by a company called Hi-G out of Phoenix, Arizona.

Joe Mosca, chief engineer at Hi-G, maintains that you can actually stand on a Turbo-Tube wing without breaking it. Never one to let such a claim go unchallenged, I suspended a wing half with a paint can under each tip, then had my son Gary, all 160 pounds of him, step on the wing. True to Joe's word, aside from a couple of circular imprints on the surface, there was no integral damage to the main spars.

And what spars! Two of them run the full length of the wing, each made of a half-inch of solid hardwood. These are joined in the center by a couple of heavy-gauge alumi-

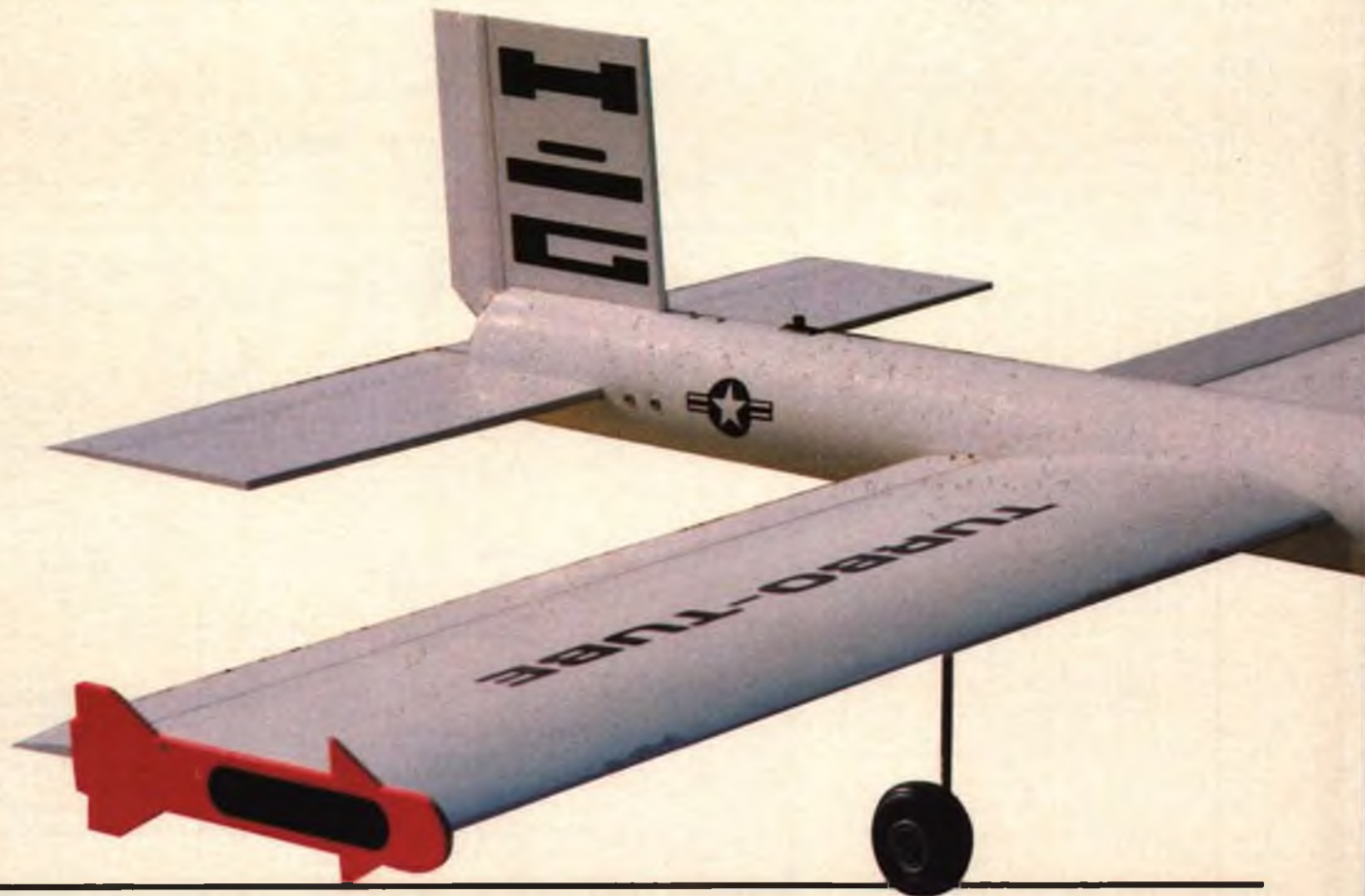
num tubes, making a practically unbreakable wing assembly.

And why such a long nose moment? Because the receiver, airborne battery and three of the model's five servos are mounted in the tail. The rudder servo also handles the nosewheel steering by means of a long plastic tube pushrod extending forward the full length of the fuselage. The same holds true for the throttle servo. Mounting the elevator and rudder servos so close to the control surfaces results in strong, positive throws. Furthermore, like many larger models, each aileron has its own servo, mounted on each side of the fuselage and extending into the wing root. Again, this makes for a highly positive aileron control system.

Nowadays the market is flooded with new ARF RC models one after another, some well designed, others just thrown together on a table in somebody's garage. Most model designers don't come with

aeronautical degrees, though it must be said that there are many self-taught model airplane designers who seem to know precisely what they are doing. But Joseph Mosca, the man behind Hi-G models and the man who dreamed up the Turbo-Tube, has a background bristling with engineering credentials.

With an engineering degree from Columbia University, he has worked for the Curtiss Wright Corporation, helping to develop that company's Wankel rotary engine. As part of the General Electric Corporation team, he worked on the design and development of their small gas turbine engines. He has contributed his talents to the engines which power the F-16 Hornet, F-117, T-38/F-5, and Blackhawk, Apache and CH53E helicopters. He amplified his education by attending MIT's Aeronautics and Astronautics Engineering Masters program. Joe has been involved in more high-





Slowed down for a low fly-by, the Turbo-Tube shows its stable flying qualities.

tech programs than we can describe here, but the point is that the chief engineer of Hi-G is no backroom experimenter. He's a bonafide aeronautical scientist, private pilot and RC flier.

As you examine and finally begin the assembly of the Turbo-Tube, many unique differences from traditional ARFs become obvious. Amazingly, this airplane requires no glues of any kind. All parts fit precisely, being plugged in, locked together and held securely by screws.

Assembling the Turbo-Tube requires no particular building skills, but it does demand a reasonable ability to pay attention to instructions. The highly descriptive directions are contained in ten pages of text, plus an additional three pages of photographs and diagrams. To eliminate any possibility of error, each step has a box which is intended to be checked off upon completion.

The instructions include an estimated completion time for each step. All of these steps add up to 5 hours 40 minutes for assembly, plus an additional hour for thoroughly reading through the instructions before beginning. I found this time to be a very generous estimate, as I managed to shave about an hour off the manufacturer's projection.

The engine pod was easy to assemble. The powerplant I chose was a particularly strong-running Webra Speed 40. It slipped perfectly into the pre-installed Hayes motor mount. The fuel tank, also of Hayes manufacture, is factory installed in the fuselage, with fuel lines already attached and properly labeled for feed and overflow. Are you beginning to get the idea that Hi-G does most of the work for you?

One servo for each aileron is installed in each side of the fuselage, joined with a "Y"

continued on page 84



A Webra Speed .40 serves as the motive power in the author's test model. Nose gear is factory installed, and the spinner is furnished in the kit.



The tail section of the Turbo-Tube, ready to be plugged into the fuselage. It holds the receiver, battery and three servos.

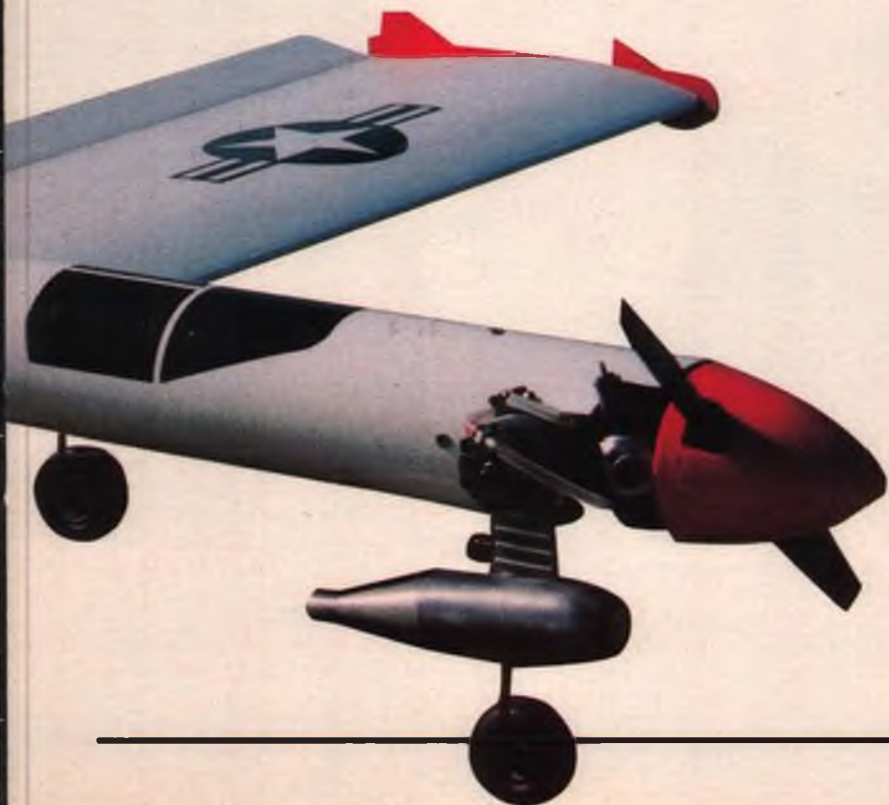


The underside of the tubular fuselage, showing the left wing partially inserted on its aluminum supports. Note the two aileron servos which protrude into the wing roots.



View of the tail shows the tight, clean mating of all parts. On/off switch is in front of the rudder, and the battery charging connector conveniently hangs out the tail opening.

The Turbo-Tube ready for another exciting flight. All black markings are excellent quality self-adhesive decals. The "missiles" on the wingtips are actually skids, made of tough plastic.



Portrait of a Champion: Paul Walker

An up close and personal look at the 1992 World CL Precision Aerobatics Champion and five-time National Champion.

CONTROL LINE BY JOHN THOMPSON



Paul Walker with his "Total Impact," the 1992 World Champion combination.

The scene is a small CL precision aerobatics contest in Kent, Washington, in the summer of 1992. A dozen fliers from around the region are putting their planes through the standard pattern at the Boeing Aerospace Center, doing their best to impress a couple of local judges.

The judge on the left, clad in T-shirt, jeans and a white cap with the word "Washington" over a drawing of the state's famous

Mt. Rainier, looks like any other guy who might hang around a control line flying circle; perhaps just a little more official-looking with his clipboard.

But the fliers pay particular attention to the scoresheet signed by the judge on the left. When the superstar of the sport analyzes your stunt pattern, you can't get a more qualified critique.

At the 1992 Jim Parsons Memorial

Stuntathon, Paul Walker was only a few days off the plane from Czechoslovakia, where he won the individual World Championship for CL precision aerobatics and led the United States to the team title. Bob Hunt was fifth and Bill Werwage sixth in control line model aviation's semi-annual counterpart to the Olympic Games.

And Walker was also still fresh from winning his third straight United States



Total Impact—described in the text. Can you tell that it can be taken down into 16 parts?



National Championship—his fifth overall. At the 1992 Nats, Walker won every round of every day, and had the highest three scores on the final day.

Unassuming and friendly on the sidelines, this “average guy” flier stands out when the competition begins. From his unique, brightly colored airplane that flies as though it were on an invisible set of aerial rails, to his pattern approaching perfection, Paul Walker has

emerged as the consummate stunt champion of the 1980s and 1990s.

It was a stroke of good timing that, in the spring of 1992, *Model Builder* arranged to prepare an “up close and personal” view of Paul Walker for the Q&A column. It’s intended to be the first of a periodic series of top-gun modeler profiles. Designed to give readers a chance to learn what makes a champion flier, Walker has always been

quick to cooperate with any request for information for publication—this time he took it to the ultimate, by winning the Grand Slam of precision aerobatics.

Our interview was conducted primarily via the mail, with Paul’s answers to our questions punctuated with some glimpses of life at the world-class level of competition.

“I’m flying at 30,000 feet on United, heading for the Nats,” Paul’s letter began.



Paul Walker (left) points out the fine points of a maneuver to judges Al Brands (center) and Bob Parker during a warmup flight at the 1992 Jim Parsons Memorial Stuntathon.

Sixteen pages later, the narrative was interrupted by this notation: "I am in Chicago on my way home (from the World Championships). Here are the results. Stunt: 1. Paul Walker, USA, ..."

Between those two revealing moments, Walker shared the background, philosophy and practices that led him to the world title.

Paul Walker was born in Upland, California, and grew up in nearby Alta Loma. The family often hiked in the mountains, and young Paul was an avid bicyclist. As with many top CL fliers, the sky beckoned early.

"In the summer and fall, I flew kites frequently," Walker recalls. "I can remember making my own, but when I was rich I would buy a 10-cent kite."

His interest in model airplanes led him to the study of aerospace engineering and, with degree in hand, to Northrop Aircraft in Hawthorne, California. He became a runner and competed in the 1977 Santa Monica marathon ("Once is enough ... I have not done that again!"). He took flying lessons and got his pilot's license.

In 1979, Walker moved to Seattle and became a stress analyst for Boeing, examining the strength of primary aircraft structures.

Living in northwest Washington allows Walker and his family to spend a lot of time camping; the rest of his free time is almost entirely devoted to model airplanes. One of his projects for late 1992 was teaching his youngest daughter to fly control line airplanes.

The interest in CL flying began with a single flight that hooked Walker as a youngster, and commences a tale that will have a familiar ring to a great many adult CL enthusiasts.

"I flew and owned virtually every one of the Cox plastic planes," Walker recalls. "Then that fateful time arrived. One summer, I delivered newspapers for a friend of mine who was on vacation. He had built a Ringmaster Jr. Flash and was afraid to fly it. Instead of paying me cash for doing his paper route while on vacation, we agreed on the airplane. This was my first wood airplane.

"Then it was off to the local high school to fly it. After a half-hour of trying to start it, it finally was running. Off it went into a wingover and into the ground. Less than half a lap. It hurt, but I picked up the pieces and repaired it. This was to teach me something about McCoy .19 Redheads. Since there was dirt in the engine, I had to disassemble it to clean it. What I didn't

know was that the cylinder could go in 180 degrees backwards. Well, I did, and it didn't run right for a long time until I discovered this.

"I moved on to Junior Satans and learned to fly level and do inside loops. As time passed, I graduated to McCoy .35s. They seemed giant at the time. I built the Carl Goldberg series of Buster, Shoestring and Cosmic Wind several times.

"I lost several planes trying to fly inverted. I would try to enter by way of a wingover, but never could seem to pull enough down to do it. Finally, one day I was flying my Shoestring, doing inside loops, and the engine quit about one-third of the way into the loop. I panicked and froze. This left me inverted with no power. Nothing else to do but land inverted. Coolly and calmly I did, and didn't hurt it.

"Next flight I flew inverted on purpose and that was all there was to it. Two Skylarks and two Noblers later I entered my first contest. I couldn't even do a complete pattern when I went, but when I came home I had done the whole pattern in the contest.

"I moved on to other contests and flew combat (Fox .36X on Winders), carrier (profile) and B team race. Back then, my favorite event was Destruction Derby! Best I ever did was second. We got 20 planes in the circle at the same time, all on 60-foot lines. Started them all at the same time and once all 20 were running, launched all 20 at the same time. What chaos! It was great. Once the last plane was down, you had three minutes to repair and restart. Anyone in the air at this point in time could continue. This continued until there was only one plane capable of flight. My all-plywood plane was beat by an all-fiberglass plane."

During college, Walker put modeling on the back burner. After graduating, he returned to the hobby as a precision aerobatics specialist. His first original airplane design was built before college, and he flew in all of the local Southern California contests. His favorite contest site was near Mission Bay in San Diego.

"After college, my first airplane built was the Omega-Z. It was then that I wanted to fly at the Nats. My first Nats was 1977—finished 14th. Not a bad start! As long as I can remember, I wanted to fly at the Nats. Once I did well at the Nats I decided to try for the World Championship."

Paul Walker exemplifies one of the traits that often gives a specialist in a particular sector of model aviation an edge over his fellow specialists—he is knowledgeable about *all* sectors of the hobby. He's often to be seen as a spectator at the non-stunt circles, where he tries to pick up any technology that could assist in his precision aerobatics program.

There are bits of technology from a variety of sources in Walker's world championship plane, "Total Impact," which breaks down into 16 pieces for transportation. It's



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powered by an O.S. .40VF, with a Smith-Werwage carbon fiber tuned pipe and a Bolly 12x6 carbon fiber prop reworked to an 11x4. The 62-inch span plane has 700 square inches of wing area, and weighs in at 60 ounces. It's of I-beam construction with a carbon fiber spar.

Walker traces his success in precision aerobatics to his insistence on trimming his airplanes to perfectly fit his flying style. He continues to search for perfection long after most fliers would say "close enough."

"The plane is trimmed so that it gives the appearance that it is not working hard at all to do the pattern. There is no yaw or roll in the corners and it maintains constant line tension in all places.

"Also, thousands of practice flights spent checking out various trim settings allows me to find the best one. This also helps retrim the plane when going to various locations. At this year's Nats, I had to change the tip weight, move the leadouts, change the rudder offset, and change the prop pitch."

After the Nats, while preparing for the World Championships, Walker again retrimmed the plane, adding tip weight, moving the leadouts aft and adding rudder offset.

"Being able to trim an airplane is great," Walker continues. "But you have to be in the proper mental attitude to fly. I firmly believe in being well-practiced prior to a big competition. Once well-practiced prior to a competition and after retrimming the plane once there, I believe in a minimum of practice—just enough to stay sharp. Too much will tire you out and you will thus lose concentration. Rest as much as possible. This has worked for me."

In the workshop, Walker finds he has time to build one competition plane a year, and also will build an additional sport or experimental plane, such as the flying wing design "Off the Beaten Path" pictured in this column in July 1992.

He has used take-apart construction on his last three Nats-winning planes, which makes transportation easier and, Walker says, has not affected the flying.

Asked to name his favorite designs, he says, not unpredictably, "Of course, I like my designs the best. Some of (Ted) Fancher's planes fly quite well. I dislike the Patternmaster design series. It has never shown the capability to fly in the wind." Walker has demonstrated over the years the ability to fly in all conditions—including his victory at the 1987 Nationals in Lincoln, Nebraska, when the wind was howling at 45 mph.

His flying habits depend on the time of year. "From January to the Nats and/or World Champs, most of the flying is serious. Trimming sessions mostly, then working on the pattern. For the month prior to the Nats or World Championships, I spend five days a week flying. If everything is right, it is just a matter of five flights a session. Obviously, three of these days are

spent flying after work. This can sometimes be very hard, as I can be quite tired then.

"After the Nats/World Championships, the time that I do spend flying is mostly fun flying or testing new things (like the flying wing). No serious schedule here, just have fun."

Most of Walker's practice flying is spent in search of the perfect trim. "Trim is everything. The best plane in the world, out of trim, will lose! I am always trying to find the perfect trim so that the plane will fly effortlessly in all conditions. I haven't found it yet, but am still looking. Learning how to trim allows me to readjust to changing weather and sites quickly, if at all. The

more a plane is out of trim, the more these various factors influence it.

"For a stunt flier to prepare is to know the trim of the plane and how to adjust it properly."

Walker regularly attends the U.S. Nationals, the U.S. World Championships Team Trials, the World Championships (as defending champion, he will automatically be invited to the 1994 championships), the Northwest Regional Control Line Championships in Eugene, Oregon, and other local contests of interest.

"The difference between a good day and a bad day is simply that on a bad day you

continued on page 83

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133	5/16	80
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137	7/16	1.20
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232	0.16 x 1	50
233	0.16 x 3/4	45
234	0.16 x 2	95
235	0.25 x 1/4	30
236	0.25 x 1/2	50
237	0.25 x 1	90
238	0.25 x 3/4	65
239	0.25 x 2	1.70
240	0.12 x 1/4	35
241	0.12 x 1/2	55
242	0.12 x 1	95
243	0.12 x 3/4	75
244	0.12 x 2	1.60
245	0.84 x 1/4	70
246	0.84 x 1/2	1.15
247	0.84 x 3/4	1.40
248	0.84 x 1	1.80
249	0.84 x 2	3.40

SQUARE BRASS TUBE (12')		
STOCK NO	SIZE	PRICE EACH
149	1/16 Square	85
150	3/32 Square	80
151	1/8 Square	90
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153	3/16 Square	1.10
154	7/32 Square	1.20
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253	032 Brass	3.50
254	008 Tin	90
255	016 Alum	1.00
256	032 Alum	1.40
257	064 Alum	2.40
258	Assl Brass	2.75
259	025 Copper	3.50

BRASS ANGLE (12')		
STOCK NO	SIZE	PRICE EACH
171	1/8 x 1/8	55
172	5/32 x 5/32	65
173	3/16 x 3/16	55
174	7/32 x 7/32	60
175	1/4 x 1/4	65

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184	7/32	70
185	1/4	75

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160	1/32	12
161	3/64	15
162	1/16	20
163	3/32	25
164	1/8	40
165	5/32	60
166	3/16	80
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BY ELOY MAREZ

The Cox Hobbies "Failsafe" RC system (EC, Dec. '91) has proven to be very popular with those who prefer their airplanes on the small side. Being inexpensive, it appeals to the beginner and experimenter. The airborne system is light in weight (less than two ounces) and is available in two versions, one with BEC circuitry for electric powered models and another for conventional power or gliders.

The pushbutton-operated transmitter, with its "Failsafe" feature that prevents locking the controls in either direction, is an excellent idea, especially for beginning fliers. However, for the more experienced, fully proportional stick control is a better way to fly. Upon first having the system operating on my workbench, I had the thought that it might be possible to convert it to full proportional control, and made a mental note to look into it "as soon as I have the time"!

Well, the time came, and I'm happy to report that it turned out to be even easier than I had hoped. It involves some me-

chanical changes and a few solder joints only—nothing electronically complicated, no tuning, and no adjustments! Following the instructions presented here, you can do it all yourself, and unless you are a speed reader, it will actually take longer to read the instructions than to do the required work. When finished, your Failsafe transmitter will be completely proportional via a stick, just like the big ones!

The gimbal assembly to be used is the D&R Products Single Channel Stick, which is readily available from Ace R/C. It is a high-quality, smooth-working assembly that you can depend on. In its basic form, it does not include a trim lever, although the original Cox rotating trim knob can be reinstalled to provide that function. Frankly, I wouldn't bother; for this type of flying, the needed trim can just as easily be made at the control linkage. If used, the trim unit works at just over 10 degrees.

The very first step in converting the Cox Failsafe transmitter starts with the servo! For use as intended, the servo movement is

adequate, however, in the updated version, most of us will find that the amount of servo travel is a bit shy. It only requires changing one resistor to increase it.

First, turn things on and confirm that everything works normally, paying special attention to the position of the servo arm at neutral. Turn off the transmitter, remove the batteries from the airborne unit, and take the case apart by releasing the little catches that hold it together. This is best done by sticking a fingernail or knife blade under them and lifting just enough to clear the lock. Refer to the sketch, and locate the resistor indicated. It is a wee (1/8 watt) 18,000 ohm unit, color coded Brown, Gray, Orange.

Now turn the board over, locate the lands to which the resistor is soldered, and remove it. The job is best done with a small iron and desoldering braid (Radio Shack 64-2090). In use, the braid and the iron are applied simultaneously to the solder connection. As the solder melts, it is absorbed by the braid, leaving clean, shiny components. Install a 10,000 ohm resistor (Brown,



Black, Orange). Good solder joints, no bridges, huh?

Replace the airborne batteries and turn things back on. Whoops; the servo centering has shifted! It's OK, it was supposed to. To correct it, remove the servo base by removing the case screws (two on top, two on bottom). You'll find a motor and a small pot—a round unit with three wires attached and two small screws along its perimeter. With the receiver switch off, loosen the screws a turn or so, and with a pair of tweezers, rotate the pot in the direction that the output arm must turn to return to neutral. Rotate the pot only as much as the required arm movement. Turn the switch on and check for the new neutral. Adjust again if necessary. When things look right, tighten the pot screws, reassemble the servo and just for the heck of it, check it all one last time.

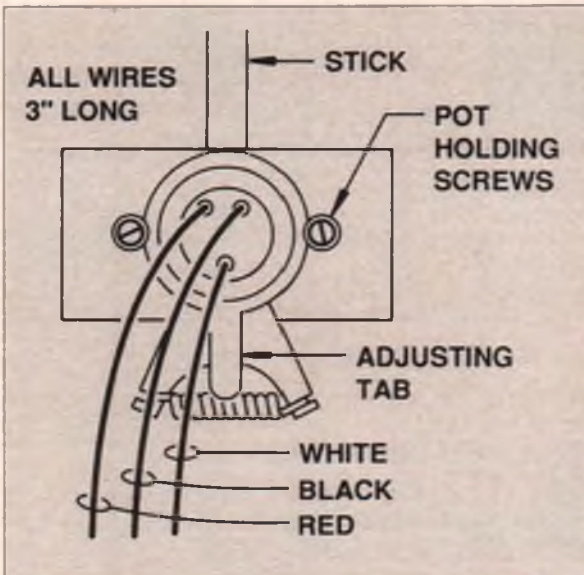
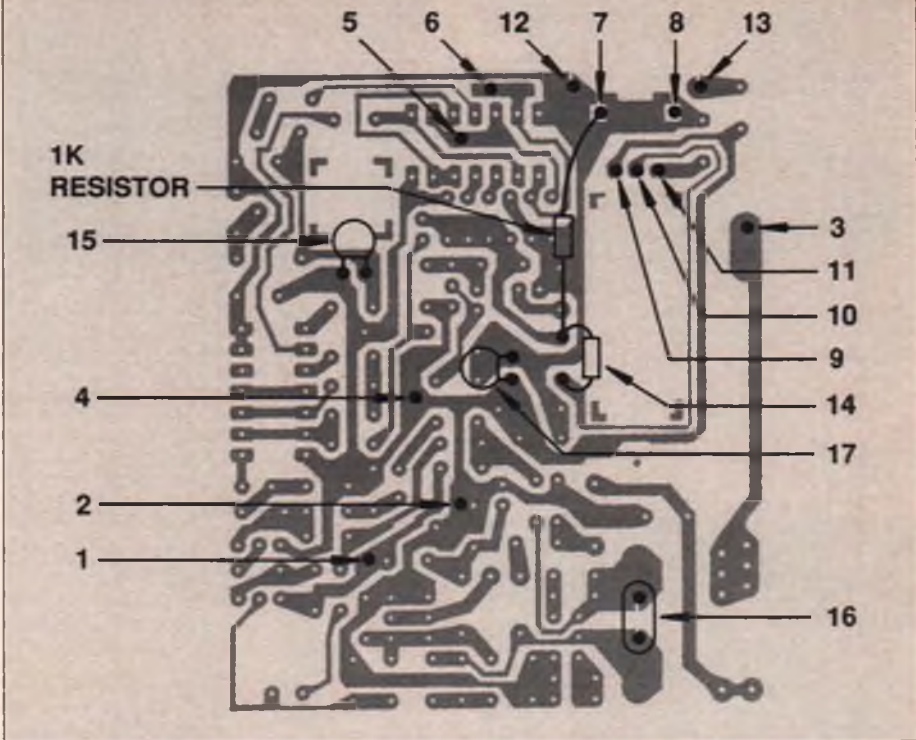
STEP-BY-STEP TRANSMITTER CONVERSION

Refer to the sketch of the transmitter PC board. All of the following steps that include a number in brackets [] refer to that number on the sketch.

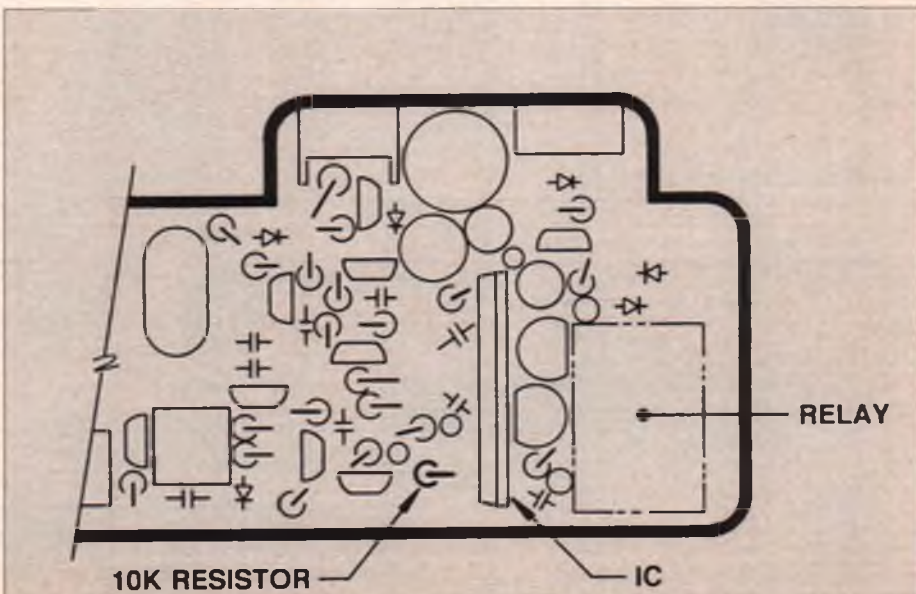
- Remove the batteries.
- Remove and save the four screws that hold the case halves together (two at the base of the antenna and two at the bottom of the battery compartment).
- Remove the rear case section.

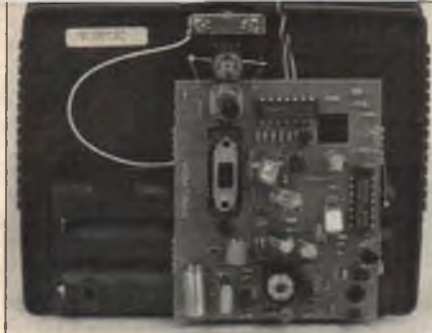
The component board is located on the right side of the transmitter rear case cover. Because the gimbal also needs to be on that side, the board has to be shifted to the left side. To do so requires that it be installed flipped over, with all of the electronic components now facing the rear cover. As the parts are removed in the following steps, it is a good idea to clean off the PC board with solder wick as described previously. Proceed as follows:

- Remove and save the clear plastic lens inserted in the LED receptacle.
- Cut the wires at the pushbutton switches.
- Remove the PC board mounting screw, located directly under the on-off switch.
- Lift up the PC board and turn it over. While not exactly fragile, the board needs to be handled with some care. Take care not to disturb or damage the coils.
- Unsolder and remove the red [1], black [2], and white [3] wires from the PC board. Save the wires for reassembly.
- Remove and discard the black [4], orange [5], and yellow [6] wires that were originally connected to the pushbuttons.
- Unsolder and save the trim pot [7] through [11].
- Unsolder both ends of the wires [12] and [13] going from the PC board to the LED. Save the latter.
- Remove the 220K (Red, Red, Yellow) ohm resistor [14]. Install a wire jumper in the same holes.
- Remove the 10 mF capacitor [15]. Install a wire jumper in the same holes.
- Unsolder the crystal [16], remove the



Above: Sketch of the transmitter PC board, showing points referred to in text. Though it may look complicated, each point only indicates the removal or replacement of a wire or component. Left: Wiring and orientation of the resistor element in the stick assembly. The element is locked in place with a plastic ring that mates with indentations along its perimeter. Below: Increasing the servo travel requires replacing the stock 18K resistor with the 10K resistor shown—fully described in text. Only BEC-equipped (electric power) units will have the relay shown; regular units will have that space blank.





The rear case of the transmitter, showing the printed circuit board in its original location. It is held in place with a single Phillips head screw, located just below the on-off switch.



New location of the circuit board, now flipped over. Note that the original steel Phillips head mounting screw has been replaced by a nylon screw. The LED socket interferes slightly with the top edge of the board and requires a little trimming, as explained in the text.



Here are the half-round cutouts that must be made in the pushbutton mounting plate to mount the D&R stick assembly. The outer half-holes mate with similar cutouts in the transmitter case to complete the mounting holes for the base of the stick assembly.

spacer found on the pins, and resolder the crystal back in its original position, flush on the board.



The plastic bezel molded into the front transmitter case at the bottom must be removed to provide clearance for the PC board. Ribs on the mounting post must also go.

- Remove the 47 Mfd capacitor [17] and replace with a similar value but physically smaller tantalum unit. Note the sign towards the top of the board on the component side; install the new capacitor accordingly.

You are now through taking the circuit apart—see, I told you it wasn't all that bad. If you need a cup of coffee or a pit stop before we start the reassembly, do it now!

The D&R gimbal installation requires a bit of surgery but is not really complicated. First, remove the right-hand pushbutton switch plate from the case; note that it is held in place with small tabs on the right and left edges. The plate will be rotated 90°, with the tabs now top and bottom. Take that into consideration when making the cuts as shown in the photograph. If you remove the tabs, the plate will no longer lock in place.

Cover the front of the plate with masking tape to protect the surface and to allow the pencil marks to guide your trimming. The square cut-out originally in the plate is exactly the width of the D&R assembly, and both must be aligned perfectly to prevent a crack from showing. The 1/4-inch half circles required are easily made with a round file. Temporarily snap the plate into its opening in the case to locate and form the other halves of the outer holes for the stick assembly.

Install the pot per the drawing. The pot is made with a square depression along its perimeter, and the plastic holder has match-

ing tabs to secure one to the other. Be sure they are oriented and mated properly. Pre-wire the pot as shown in the diagram, and install it in the plate and in the transmitter's front cover.

Refer to the photo—note that the PC board is re-installed on the left side of the rear cover, flipped over from its original position. In this manner, the bottom of the board is exposed. The whole thing looks better if all of the wires go into holes in the board into the lands from the component side. If a small drill (#60) is available, drill holes as indicated for the red [1], black [2] and white [3] wires. Otherwise the wires can be routed to the top of the board and soldered on top of the lands in their original position.

- Notice that the switch is held in place in its cavity with plastic melted around it. Trim off all of the excess plastic around the outside of the switch and its holder.

- Drill and tap the original PC board mounting screw hole for a 4-40 screw. Use a #43 drill if available; a 3/32 will also work. If a tap is not available, a sheet metal screw will work as a tap in the soft plastic.

- Remove the remaining (left) switch panel. Round the square cutout to 3/4-inch diameter and snap in the 3/4-inch hole plug.

- Remove the rectangular plastic bezel, lower center, inside the front cover. A Dremel Moto-Tool and rotary cutter does the job rapidly and neatly.

- There are two standoffs inside the lower corners of the front case. These standoffs are ribbed on two sides; trim off the ribs on the right-hand standoff with your modeling knife.

- Still on the front cover, notice the LED holder just above the opening for the trim pot. Using your knife again, trim off 1/16-inch of it on the side facing the trim pot. Note that there is a raised rim at its base; trim it away as well.

- Remove the red wire on the upper switch contacts. Install a new 3-inch long red wire, facing towards the opposite direction.

- Cut and sand away the teeth-like projections on the left side of the board and in the opening for the switch.

- Hold the trim pot with the knob up and the three connectors facing you. Bend the

continued on page 82

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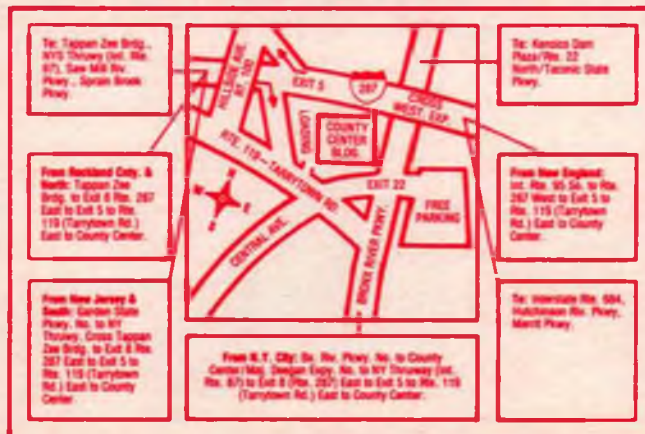
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DELTA VEE

Some wild flying is in store for those who build this Astro 035-powered electric delta! Full-size airfoil, keel and fin patterns on the following pages.

BY WILLIAM WHITTEN

This little electric delta has been more than twenty years in the making. Way back in the Dark Ages (1971), one of the model magazines published a 1/2A delta by Jim Simpson, called the Thunderbird. I wanted to build one, but the CG was left off the plans and I never did track it down, so the project was put on the back burner. Eventually, I quit flying and went on to other interests until just last year, when I found myself hooked on RC planes again.

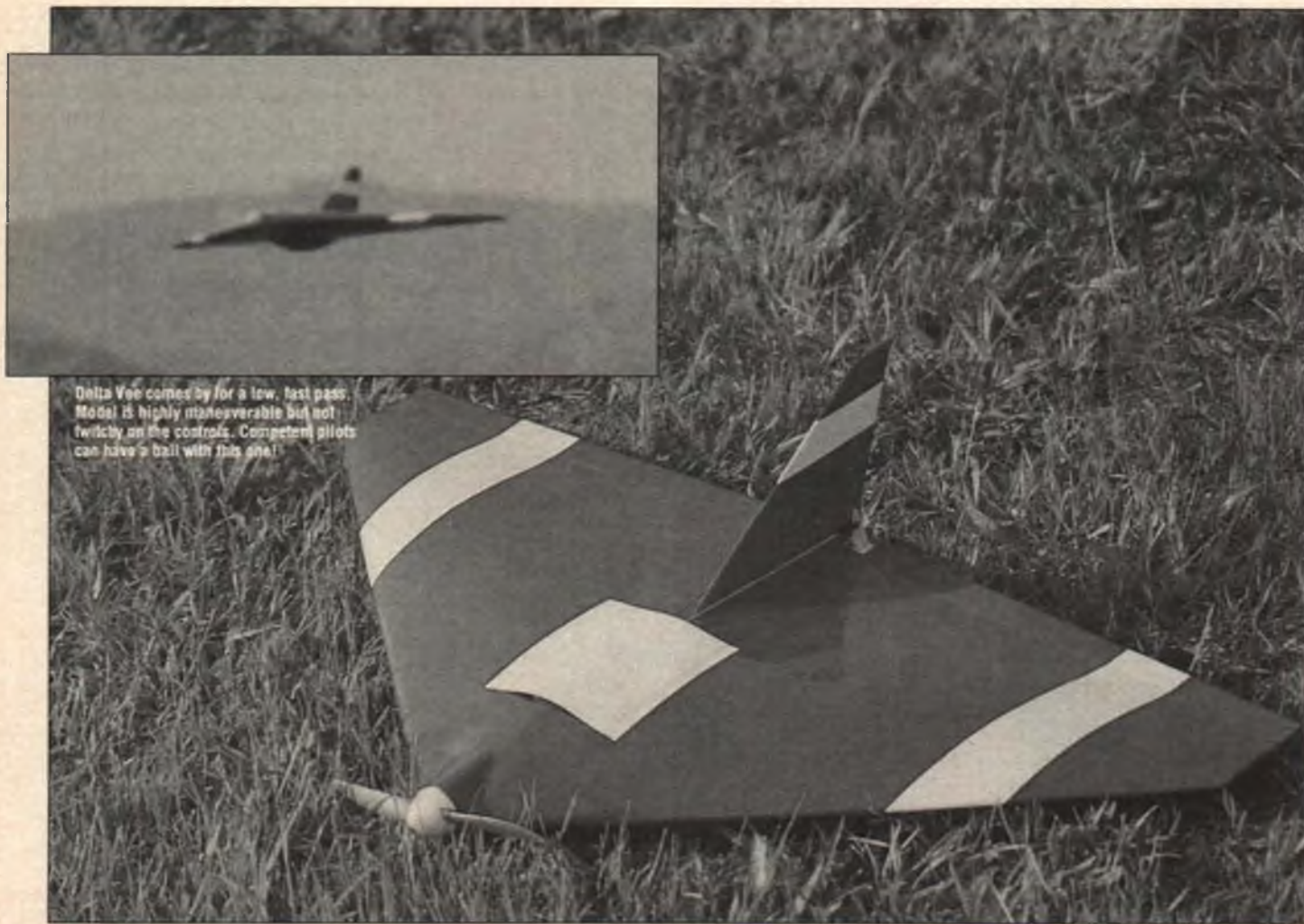
When one of the local fliers brought out a delta, it reminded me of the one from long ago, so I dug out the old magazine and started figuring how to build an electric version for the '90s. I "lifted" the airfoil and the foam construction and redesigned the

rest to suit an Astro Cobalt 035. The wingspan is 30 inches and the all-up weight is 27-28 ounces. Delta Vee is easy to build and flies nicely as an electric. You know you want one, so let's get started!

RADIO AND MOTOR

As with most electrics, you should try to keep the weight down as much as possible, so a light radio is a definite plus. I used a micro receiver and a couple of older model mini servos. Delta Vee needs to be landed under power, so an electronic speed control is almost a must. I used an old Jomar SC-5. I don't trust BECs on a plane so I used a 100 mAH receiver battery, which is good for quite a few flights.

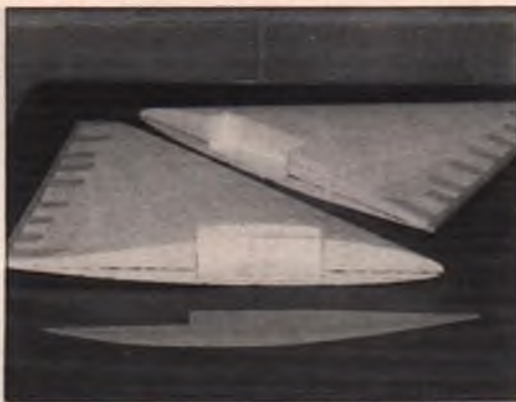
You will also need some sort



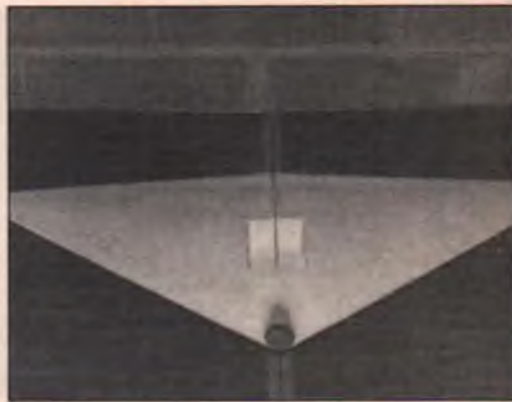
Delta Vee comes by for a low, fast pass. Model is highly maneuverable but not twitchy on the controls. Competent pilots can have a ball with this one!



The setup for cutting the Delta Vee wing cores via the "pivot point" method. It's a one-man operation and requires only one airfoil template. This technique was explained in detail in a past "Model Design and Technical Stuff" column by Francis Reynolds—see text for reference.



The finished cores with the equipment cutouts made and the balsa trailing edge strips glued on, ready to be glued to the plywood spine in the foreground.



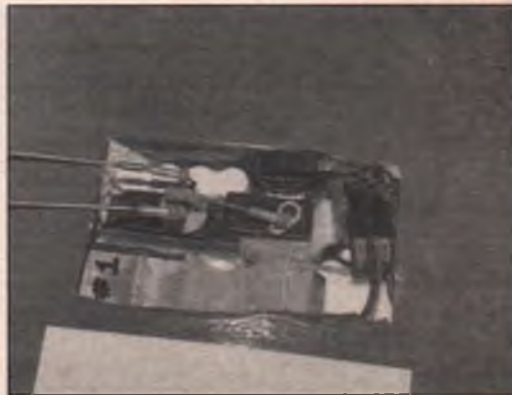
Top front view of the joined wing cores, with the cardboard motor tube installed and faired into the leading edge with vinyl spackle.



Bottom view. The protruding plywood spine serves as both a skid and launch handle. They don't show up here, but the spine has three narrow slots flush with the bottom of the cores, through which fiberglass strapping tape is passed and stuck to the cores to serve as a wing spar.



Close-up of the equipment area with the spine and motor tube visible.



When it comes to setting up the elevon controls, nothing beats the convenience and versatility of electronic mixing. Lacking that, the next best way to go is with the Du-Bro V-Tail mechanical mixer as seen here.



There are a couple of modifications needed on the Astro 035 to move the prop adapter farther aft and also to make it possible to mount the Ace 1/2A spinner—all detailed in text. (This motor is an 020, but the mods are the same for the 035.)

of mixer for the elevons. A transmitter mixer is best, but a Du-Bro V-Tail Mixer will also do nicely. It takes a bit of grinding and tinkering to get it short enough to fit under the hatch, though.

The only motor I can recommend for this model is the Astro

Cobalt 035 with a five-cell 900/1000 mAh SCR battery pack. This gives as much power as most ferrite 05s, but weighs much less and flies the Delta Vee very well if the weight is kept under 28 ounces. You can try a cobalt 05 and seven 1400 mAh cells, but I doubt it will fly much better and the increased weight will make launches and landings more difficult. Stick with the 035 system; if you feel the need for more power, you can always advance the motor timing or go to six cells with the resulting shorter flight times.

CONSTRUCTION

Delta Vee is simple—foam cores covered with plastic film. The only wood is a bit of balsa for the elevons and fin and some plywood for the spine.

Start by making the foam cores. Xerox the airfoil pattern, glue it to a scrap of Formica and cut it out to make the template for cutting the cores. Only the wing root airfoil is shown, as

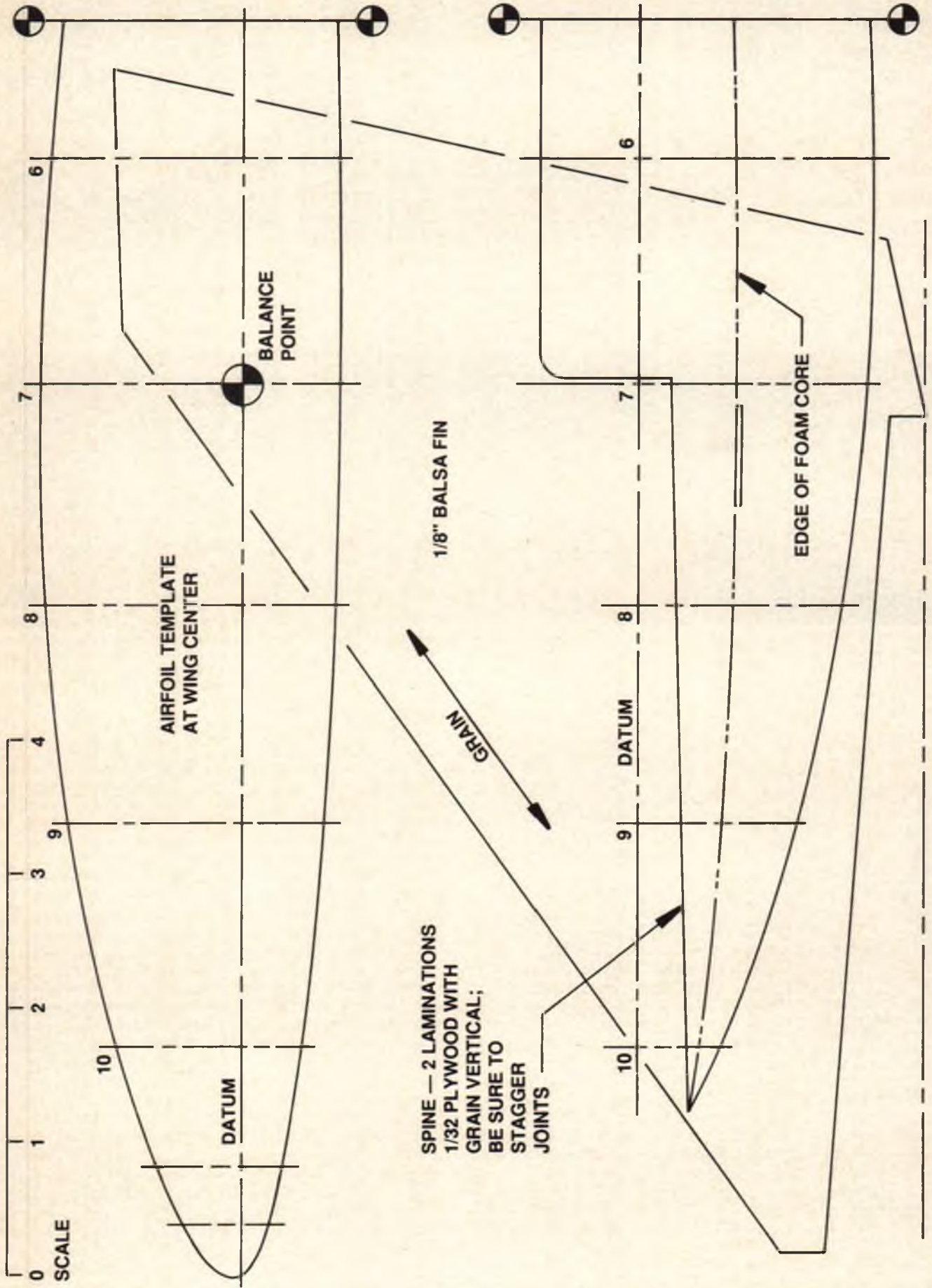
the cores are cut using the "pivot point" method. For those not familiar with this, the usual hot wire bow is not used. One end of the cutter wire is anchored to the workbench and the other is attached to a handle. The wire pivots around the anchor bolt and is stretched tight while cutting. By moving the pivot point, any reasonable tapered core can be cut with just one person and one template. (Francis Reynolds explained the pivot point method in detail in his "Model Design and Technical Stuff" column in the February '89 Model Builder.)

Once you have the cores, sand them smooth and trim the trailing edges so they are a constant 1/4-inch thick. The hot wire will melt the tips some so quite a bit will have to be trimmed. If the final tip dimensions are off a little, it's OK. Glue the 1/4-inch square balsa trailing edges on with white glue or aliphatic resin and sand them flush with the foam.

Spend a little time planning your radio installation and mark the cutout areas on the cores. I cut out most of the foam with a razor knife and hollowed the undercuts for the receiver with a soldering pencil. Rough cut both cores for the cardboard motor tube. Use a section of model rocket body tube or the roller that gift wrap comes on, and remember the cutouts for the motor brushes. A bit of sandpaper around a slightly smaller tube will make it easier to get a good fit in the foam.

Set the cores aside and make the center spine from birch plywood with the grain vertical. The plywood doesn't come wide enough to make the spine in one piece, so laminate two layers of 1/32-inch ply and stagger the joints. (Some 1/8-inch Lite-Ply with the grain going the long way would probably also work.) Note the three horizontal slots just below the foam line; make these with

continued on page 80



SCALE

AIRFOIL TEMPLATE
AT WING CENTER

BALANCE
POINT

SPINE — 2 LAMINATIONS
1/32 PLYWOOD WITH
GRAIN VERTICAL;
BE SURE TO
STAGGER
JOINTS

1/8" Balsa FIN

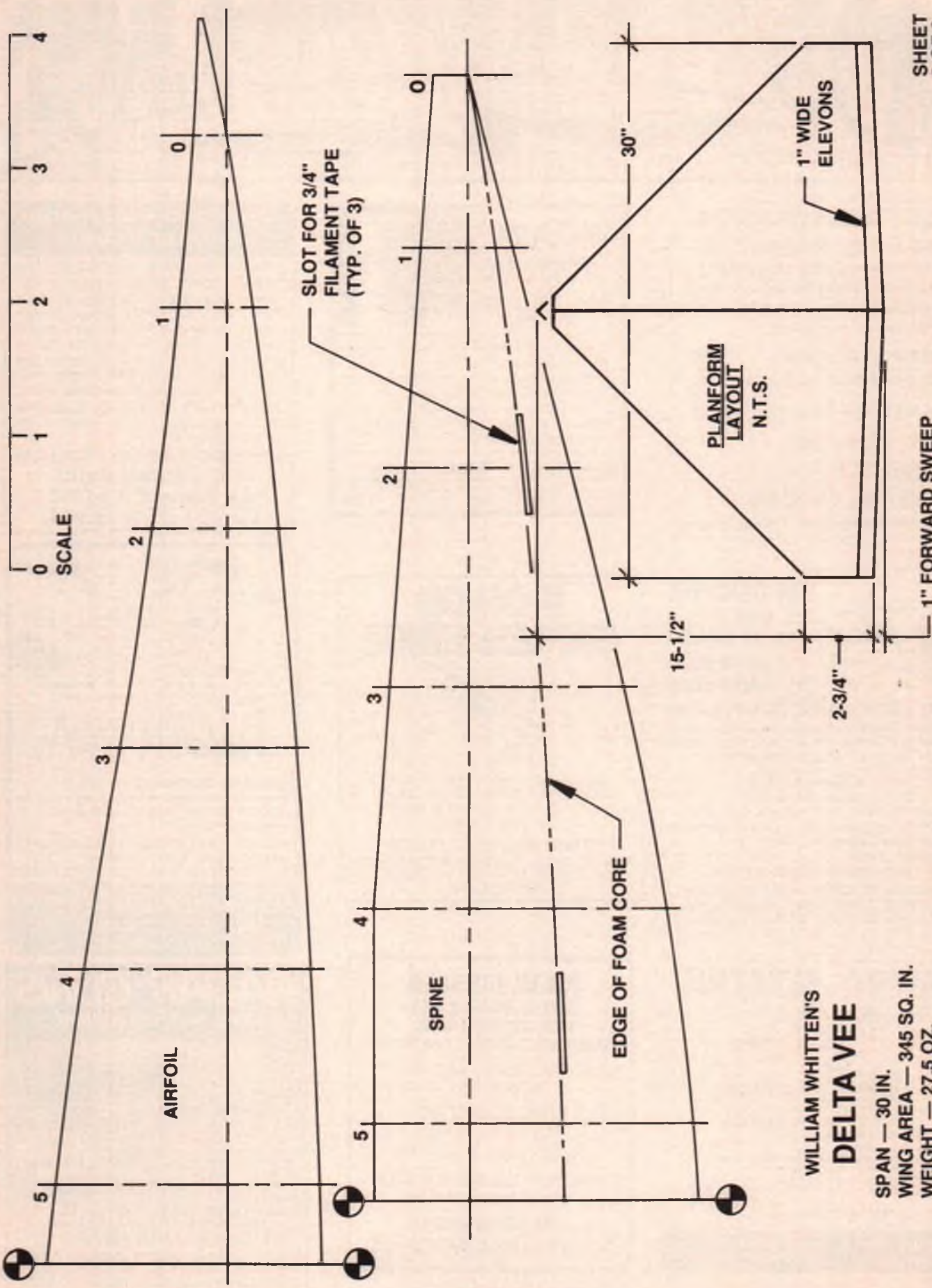
GRAIN

EDGE OF FOAM CORE

0 1 2 3 4 9 8 7 6

10 9 8 7 6

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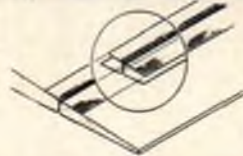
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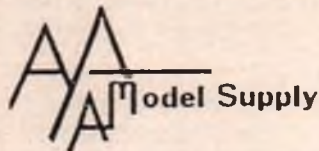
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DELTA VEE *continued from page 75*

a Dremel tool and a cutoff wheel. Glue the spine to one of the cores with five-minute epoxy. Let it dry, then carefully glue the other core on, making sure it is aligned with the first side. Let it dry thoroughly.

Epoxy the motor tube in place. The front should fit flush with the leading edge of the wing and rest on the cutout in the spine for a small amount of downthrust. Fill in any voids with scrap foam, and fair in the motor tube with vinyl spackle. Epoxy a strip of nylon tape along each side of the hatch opening to add a little strength to the thin foam. If your servos almost poke through the bottom of the foam, it wouldn't hurt to put some there too. Turn the wing upside down and lay three full-length strips of 3/4-inch fiberglass filament packing tape along the bottom. These run through the slots in the spine and function as wing spars. Don't leave 'em off, or your wing might fold up!

If you want to hide the radio antenna inside the wing, bury a section of nylon tubing in the side you plan to put the receiver on. I use the Hayes 18-inch plug-in antennas and find they work just fine.

Cut out the fin from 1/8-inch balsa and the elevons from 1-inch trailing edge stock. Cover the entire plane with one of the low-heat plastic films. Bright colors with contrasting stripes are suggested to help improve flight visibility. Hinge the elevons and glue on the fin. If you have to land on a hard surface, it might be wise to add a small skid under each wingtip to avoid damage. I fly off grass and haven't felt the need.

Smear some five-minute epoxy on the spine where the servos will go, let it dry thoroughly, then attach the servos to the spine with servo tape. The receiver and speed control fit in the hollow area, and the receiver battery snuggles down next to the servos. The motor battery goes on the other side of the spine and is held in place with sticky-back Velcro. Make sure there is enough room for air to circulate to help keep the batteries cool. The switch just hangs loose and is tucked out of the way. The hatch cover is a piece of thin plastic held on with vinyl tape. Leave a little arch in each end to permit some airflow over the batteries.

The motor should fit snugly inside the cardboard tube. A couple wraps of tape around the motor may be needed if the tube is a bit too big. If desired, a thin plywood ring can be glued just inside the front of the tube to limit the motor's forward movement. Wire everything up with good quality silicone wire, keeping the leads as short as possible, and make sure you put a fuse in the line, just in case. The only plug-in connection I use is to the battery pack, and I don't use an arming switch as there isn't a good place to mount it. Just be careful and don't plug in the battery pack until just before you fly.

There are a couple of modifications to be made to the motor. First, the prop adapter should be moved back, as close as possible to the motor casing, to reduce the chance of a bent shaft in a hard landing. You may have to grind a little off the end of the motor shaft and regrind the flat spot. A bent shaft can be straightened, but it's a pain—better to keep it from bending in the first place.

The other mod allows fitting an Ace 1/2A spinner. It is a perfect fit and no one else seems to make one this size. Replace the screw that holds the prop on with one that has the head cut off. Get a hexagonal PC board stand-off from Radio Shack and re-tap it to match the threads on the prop screw. Cut it down and use it as a union nut to hold both the prop and the spinner on. Most of the shank inside the spinner cone will have to be removed to allow room for the union nut. A screw through the front of the spinner holds it on. You'll also need to enlarge the spinner slots to fit the prop blades.

The best prop I've found is the APC 7x4. Other 7x4s will fly the model, but the APC seems to unload better and is noticeably quieter in flight. The APCs do tend to break in a hard landing, so you may want to use one of the flexible nylon ones.

FLYING

Set the CG as shown and line up the elevons to follow the reflex curve of the airfoil. Start with plenty of elevator throw and not too much aileron. (This is where a transmitter mixer makes things easier.) Later on you can try moving the CG back a little to lessen the nose-heavy tendency.

For the first flight, have someone else hand-launch the plane. Later you can hold the bottom skid and launch with one hand while holding the transmitter with the other. Delta Vee doesn't need a real "spearchucker" launch—just a good straight and level toss into the wind. (This is where we "lefties" have it easy if we fly Mode 2. "Normal" people have to launch with the wrong hand or make a quick grab for the stick!) Let it build up some speed and climb out for some altitude, then trim for straight and level flight. Delta Vee flies much like any other aerobatic electric model—fairly fast and it goes where you point it. It will slow down quite well, but it takes awhile to bleed off speed. Loops and rolls are easy, but it won't spin and inverted flight is poor due to the reflexed airfoil. Landing should be done under power, so save a little battery for the end of the flight. Bring it in nose-high and cut power as you grease it in. The prop may touch but doesn't seem to break too often.

That about covers it. In case you're wondering, the "Vee" doesn't refer to anything in particular—I just like the name. (Hey, you try to think up one that hasn't been used!) My Delta Vee has taken a long time to get here, but it's been a lot of fun. Good luck with yours. **MB**

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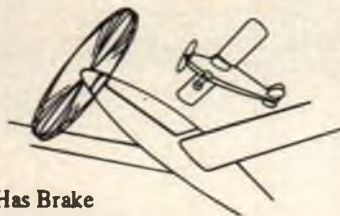
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COX continued from page 72

left and center ones out straight and cut off the narrow ends.

- Reinstall the trim pot back into its original holes, but on the opposite side of the PC board, i.e., the side with the solder lands. The one still-normal connector will go into hole [11]. Solder all three connections.

- Refer to the sketch of the PC board. Install a 1000 (Brown, Black, Red) ohm resistor from [14] to [7]. Remove short lengths of plastic insulation from your hookup wire and insulate the resistor leads with it.

- Install the PC board in its new position using a 4-40 nylon screw, with a 3/8-inch nylon standoff under the board.

- Insert a 3/4-inch length of fuel tubing in the LED cavity; it provides a support and the proper spacing for the LED.

- Remove the original wiring soldered to the LED leads and position the LED in its holder. Notice that the LED base has a flat on one side, adjacent to the lead. This flat faces right!

- Connect 1-inch wires from the original points [12] and [13] on the PC board to each LED lead.

- Connect the black wire from the battery case to point [4] on the PC board.

- Connect the red wire from the forward contacts of the switch to point [1] on the PC board.

- Connect the white wire from the antenna base to point [3] on the PC board.

- Connect the black wire from the stick pot to point [9] on the PC board.

- Connect the white wire from the stick pot to point [10] on the PC board.

- Connect the red wire from the stick pot to the center connector on the trim pot.

CHECK-OUT TIME!

First step is to check all of the new solder connections for bridges and/or improper soldering. Check that the switch is in the off position then install the cells in the battery box. Keeping the two transmitter halves separated, turn the switch on. The LED should light; if it doesn't, turn the switch off, look again for solder bridges or an improperly made connection.

Everything should be OK, except that the servo is off center again. To get everything back in step, with everything turned on:

- Turn the trim pot fully counterclockwise.

- Set the stick adjusting tab to center the servo.

- Now turn the trim pot clockwise. Notice that the servo moves for only a small part of the rotation of the pot. Set the pot in the middle for half of that movement.

- Recenter the servo with the stick adjustment.

- Snap in the left side panel, the one in which you previously installed the 3/4-inch plastic hole plug.

- Reassemble the case with its four screws.
- Congratulate yourself!

PARTS PROCUREMENT

The following required parts are available from Ace R/C:

- D&R Single Channel Stick Assembly, No. 15K33 @ \$10.00.
- Clarostat SK pot for above, No. RV038 @ \$5.50.
- 4.7 mF tantalum capacitor, No. CT-475A @ 90 cents.
- 10K 1/8W resistor RB-103 @ 25 cents.
- 1K 1/8W resistor RB-102 @ 25 cents.
- RC wire, assorted colors, 30-inch lengths, No. 50L20 @ \$2.75.

You will also need the following:

- One 3/4-inch 4-40 nylon screw.
- One 3/8-inch spacer for #4 screw.
- One 3/4-inch black plastic hole plug.
- One 1-inch piece of small diameter fuel tubing.

The non-Ace parts listed are common electronic store items, however, they may be a problem for those of you not in a large city. Therefore, a parts package, to include those plus all of the other small parts and the SK stick pot, minus only the stick assembly, can be obtained from this writer for a



Another possible conversion of the Cox Failsafe: stick assembly shown is in short supply, though more may be available by press time. If interested, check with the writer at the address listed.

\$10 donation, postpaid.

Note also the photograph of the Cox transmitter fitted with another type of gimbal assembly; a replacement part from an older two-channel transmitter. It doesn't work any better, but it looks good and is slightly less work. As of this writing, only a small number have been located, though there is some hope that more might be unearthed by the time you read this. If interested, write for an update.

In any event, your Cox Failsafe system is now more like the expensive fancy radios. Why, it even has servo reversing—anytime you need it, simply reverse the two red and black wires at [9] and [11], and recenter the stick assembly as previously described.

Exponential? End point adjustments? Well, let me see—if we change...

Eloy Marex, 2626 W. Northwood., Santa Ana, CA 92704; (714) 540-4935, evenings. **MB**

CONTROL LINE continued from page 69

can't, for whatever reason, put the airplane where you want it," Walker observes.

Asked about his endless quest for perfection—isn't a plane or a pattern ever good enough?—Walker remarked: "I'll never fly one plane forever. Things always change, including the pilot, whose reflexes change. What is good now may not be good five years from now. I am always looking for the combination of airplane and pilot such that the pilot can put the plane through a rulebook pattern effortlessly in all conditions. The one I am flying now is good, but not perfect. I'll keep trying!"

Walker also was asked about the influences on his development as a stunt flier, and for his advice to novice fliers.

"In my stunt career, I have always looked up to Ted Fancher. He has been an example of a total gentleman and stunt flier. I always try to be more like Ted."

Walker's advice to novices: "Ask questions of expert fliers. Search out their help. Have them help trim your airplanes, and listen to them. And keep it simple in the beginning."

If there was a single remark that exemplifies the Walker outlook, it probably was this: "You have to know that you can do what you set out to do. Every Nats I have won, I knew that I was going to do it. If you don't think you can, it is likely that you can't."

Just for the record, the winners of the Jim Parsons Memorial Stuntathon in August of 1992, mentioned above: Expert Precision Aerobatics, Alan Resinger, 502. Advanced Precision Aerobatics, Darrell Harvin, 447.5. Beginner Precision Aerobatics, John Leidle, 194. Old-Time Stunt, Don McClave, 307.75. Nostalgia Stunt, Don McClave, 499.

A product news flash: Bill Harding of Harding Productions reports that the instructional video, "Introduction to Control Line Building and Flying," described in last month's column, is intended to be the first in a series.

The first video, intended for beginners, covered construction of two basic airplanes, the Sig 1/2A Skyray and the Skyray .35. The second in the series will feature construction of the Sig Twister, a flapped profile stunter. The third in the series will be a "very advanced" course on precision aerobatics, featuring Bill Werwage.

For information, contact Harding Productions, 4782 Unity Line Road, New Waterford, OH 44445.

As always, club news, contest reports, photos, technical tips and other control line news are welcomed. Also of interest are nominations for "top-gun profiles" like the above interview with Paul Walker. Write John Thompson, 1145 Birch Ave., Cottage Grove, OR 97424. **MB**

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TURBO-TUBE *continued from page 65*

harness (or separate aileron leads if you have a computer radio with mixing capabilities and you wish to go that route). As the ailerons are already hinged to the wings, all that is required is to screw the PVC plastic wingtips (these are not functional, but act only as skid protection) to each wing, then slide the wings onto the aluminum tubes you have previously mounted in the fuselage.

As the wings are slipped into position, the

main landing gear is dropped into its slot and is automatically held in place. One retaining screw in each wing holds everything together, though the fit of the wings is so snug that I doubt it could ever come apart. The vertical and horizontal stabilizers, both factory hinged, are screwed together. The rudder, elevator and throttle servos are mounted to this assembly, then the receiver and its battery are attached to it.

I found assembling these modular components vastly different from any ARF I have ever seen. And what a factory finish on this model! The extruded Dow blue

polystyrene wings and the balsa tail are painted with a special industrial oil-based paint, easy to repair with a little spackle and sandpaper. The fuselage, a custom-made and reinforced spiral-wound tube, has fuelproof inner and outer layers. It is covered with a soft, white graphic film, not to be confused with common heat-shrink films.

When all is finally assembled, you have a gleaming white airplane, ready for a bit of adornment. A stickler for detail, Hi-G includes a complete array of attractive stick-on graphics, the kind that are so thin you think they are painted on.

ADVERTISER INDEX

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Our completed airplane had a wingspan of 47 inches, with 440 square inches of area. It weighed 5 pounds 3 ounces, just a tad over factory specs, which resulted in a wing loading of 27.2 ounces per square foot. The CG was right on the money.

The instructions for flying the Turbo-Tube are so precise that if you were to digest them thoroughly, there might not be any time left for actual flying. I approached the initial test flight with a great deal of caution—like most modelers, I have an inherent uncertainty about airplanes with unusual planforms and extremely long nose moments. I enlisted the aid of the best RC pilot I know, Jerry Kitchin, to do the test flight honors. A thrust of full throttle took it smoothly into the air, and moments later Jerry had it nicely trimmed.

It was immediately evident that the Turbo-Tube, because of its clean lines, is a very fast airplane, faster than most sport planes in its size range. Jerry does amazing things with airplanes, such as continuously rolling through a 360-degree circle, doing the same continuous rolls through a loop, plus just about every pattern maneuver known.

While I watched the Turbo-Tube perform in the hands of this gifted pilot, I began to wonder if an ordinary hacker like me could competently handle such a high-performance machine. Jerry took it up high,

throttled back, and handed me the transmitter. My impression at the end of the flight was that any experienced pilot could handle this airplane without much difficulty.

Because everything is set up on the center line, the Turbo-Tube doesn't care if it's flying upright or inverted. Not only does it go where you point it, it actually seems to go exactly where you *think* it should go! I had no problems at all. As stated in the instructions, this is a high wing loading airplane, and landings shouldn't be stretched out too much. This is definitely not a small-field airplane, as it does need plenty of room to land and roll out. Of course, the more headwind you have, the less runway you need.

Hi-G sent me an extra set of wings that are shorter in span, intended for even higher performance—something on the order of Warp 9 or thereabouts. I didn't try these wings; the original wings went on so tightly that I didn't want to go through the effort of removing them and installing another set. Actually, the real reason is probably that the original setup is plenty hot enough for me. However, if you are some kind of thrill-seeking flying fiend, just cut an inch or two off the original wings with a radial arm saw. It's simple to do, and guaranteed to speed up your adrenalin flow at the field!

Between flights, dig out the instructions

and read the Turbo-Tube Hot Tips on page nine. This is loaded with advice on how to soup up the airplane even further, such as where to apply tape to seal gaps, how to fly it with the wings cut down as much as eight inches, how to install a tuned pipe, etc.

Hi-G is an environmentally conscious company. They say that the foam wing is CFC free, that the plane uses less tropical rain forest products than most other planes, and that the paint used is the low-solvent, low-emissions type. They go so far as to offer a \$10 credit toward future purchases if you return the packing carton and materials to them in good shape!

In summary, the Turbo-Tube is as modern and futuristic as its name suggests. It is no trainer, nor is it meant for low-time pilots just beyond the solo stage. But if you like 'em hot and lightning fast, able to handle any flying abuse you can dish out, then this airplane will escort you into another flying dimension!

To get your own Turbo-Tube, contact Hi-G at 2131 E. Crocus Drive, Phoenix, AZ 85022; (602) 788-5209. Retail price is \$155.00.

I always enjoy reader questions and comments, and all letters with an SASE are answered. Mail to Art Steinberg, 2267 Alta Vista Drive, Vista, CA 92084, or telephone me at (619) 726-6636. **MB**

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MODEL DESIGN cont. from page 60

spin. The spiral dive of an airplane that was asked to spin but can't is not a satisfying maneuver.

I tried moving the CG back until it became erratic, and gave it a lot of elevator and rudder throw. Still no snap or spin. The elevator was the same as before, but in rebuilding I had reduced the effective rudder area somewhat. I then increased the rudder area to 150% of the rebuilt rudder area and Bingo! It snaps and spins better now than it ever did. I've also moved the CG forward again, and it still snaps and spins beautifully.

VERTICAL PERFORMANCE

We talked about unlimited vertical climb in the April 1992 issue. At that time, I had just completed an RC model that I could fly out of sight straight up anytime I wanted to, and I was at the height of my enthusiasm for planes with that capability. In that column I said I would like to publish a list of those builder/pilots who wrote and told me they can fly vertically indefinitely. From my relatively sheltered viewpoint, I thought at that time that unlimited vertical was more rare than I now know it to be. I'm sure that many of you who routinely fly unlimited vertical, read that column and didn't bother to write.

William Harvey of Manitowadge, Ontario and Kermit Walker of Lodi, California did write. Both of them build super-light, powerful ships and fly vertically regularly. Thanks, guys.

Kermit's letter was long and informative. He is a top-notch IMAC (International Miniature Aerobatics Club) competition flier. Kermit lists three milestones in the achievement of vertical performance capability and flying skills: Sustained straight vertical climb, sustained vertical rolls (That is a tough one. I always arc over into a dive from continuous rolls which start out vertical), and successive vertical snap rolls (that is the ability to climb

out vertically from a full-stall condition.) Kermit also says the choice of prop is very important in achieving unlimited vertical performance. I agree, both from theory and from experience.

VISIBILITY

Traffic cones and signs, and hunters jackets, are usually bright orange, "because this color has the best visibility." Bright yellow is also considered very visible. But when hot-air balloon operators send up toy helium balloons to check the winds aloft before takeoff, they don't use "highly visible orange," they use black balloons! Some people must not be as smart as some other people. The question is, which people are the smart ones? As is frequently the case with simple-sounding questions, it depends.

In the February 1992 issue of *Model Aviation*, Byron Blakeslee quoted Wayne Angevine of Boulder, Colorado, on the subject of visibility. Wayne referred to a book, *Probing the Atmospheric Boundary Layer*, published by the American Meteorological Society. The book is quite technical, complete with math, but the conclusions are simple.

Which color is best for visibility depends on the background. If we are trying to see a hunter or a road sign against green trees, gray buildings, or brown earth background, the bright orange is best. If we are trying to see a distant balloon or plane against the sky, then black or some other dark color is best.

If you doubt that, fly your light-colored RC model up high, then ask yourself what color it looks. You will find that it looks dark even if it is white or any other light color. If it is dark-colored it will look even darker against the sky, and will therefore be even more visible.

The thing to note is that the sky is a light source. The high plane is visible not because of light reflecting from it, but because it forms a shadow on your eyes in a small spot of the lighted sky. Even a white plane is darker than

the sky. The only way we can make a model lighter than the sky is to put lights on it.

The exception to this is when we fly under a black cloud. There a light-colored plane would have an advantage because we would then see it by reflected light. Also, when the plane is flying below the horizon, which may be much of the time, white or bright colors would be better.

So, the best compromise for overall visibility seems to be a two-tone color scheme, such as white and dark red; but with big areas of solid color. Big solid-color areas are important because our eyes are not able to resolve little areas at a distance. Black and white stripes or a checkerboard of squares becomes solid gray at a distance, and has poor visibility both above and below the horizon.

I like to make the fuselage and fin all one color, and the wing and stab the other color. If I use any trim it is on the top of the wing only, so as not to reduce the big area of solid color as seen from below. I make the wing the dark color, since it is the largest area visible against the sky.

Byron brought up another visibility problem that I have also experienced; visibility during final approach. I recently had a small hot model with a dark blue wing for good sky visibility. Fine, except when I tried to land it. As soon as it dropped below the horizon coming toward me it disappeared... literally! PANIC! All I could do was hold the controls steady and wait a few seconds for it to get close enough so I could see it again.

That only happened twice before I took corrective action. The entire leading edge—everything visible from head on—was changed from dark blue to white, and the problem was gone.

PARTING WORDS

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