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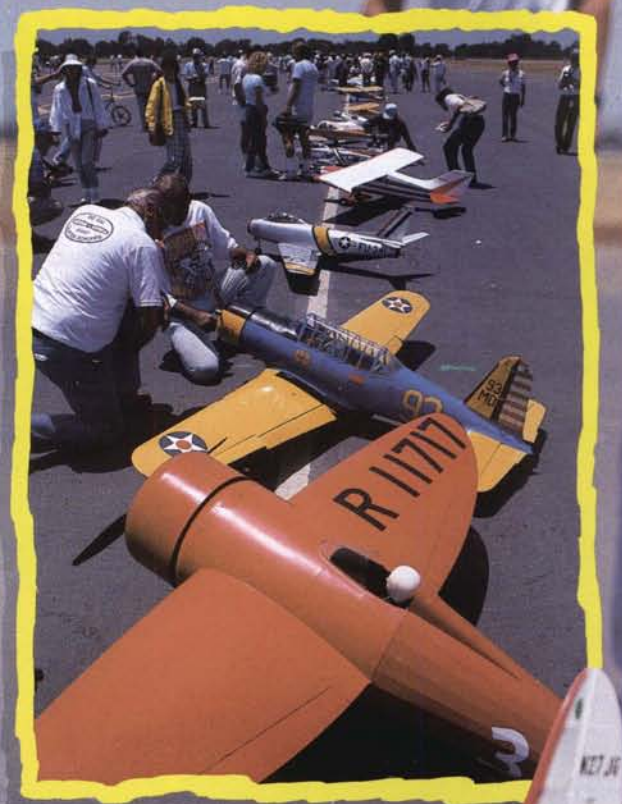
1991 FAI F3C HELICOPTER TEAM TRIALS

OCTOBER 1991

MODEL BUILDER

WORLD'S MOST COMPLETE MODEL AIRCRAFT PUBLICATION

REVIEW:
**R/C FLIGHT
SIMULATOR**



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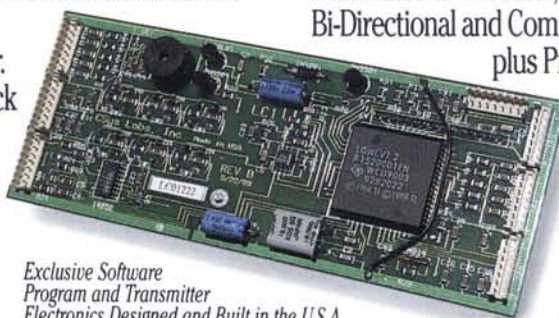
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CONTENTS

OCTOBER 1991 • VOLUME 20 • NUMBER 235
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DEPARTMENTS

WORKBENCH, <i>Bill Northrop</i>	4
DEAR JAKE	5
OVER THE COUNTER	8
ELECTRIC POWER, <i>Mitch Poling</i>	12
RC PRECISION AEROBATICS, <i>Rick Allison</i>	16
BIG BIRDS, <i>Bruce Edwards</i>	20
MODEL DESIGN & TECHNICAL STUFF, <i>Francis Reynolds</i>	24
PLUG SPARKS, <i>John Pond</i>	28
ELECTRONICS CORNER, <i>Eloy Marez</i>	34
JET TRAILS, <i>Scott Stauffer</i>	40
ALL ABOUT ARFS, <i>Art Steinberg</i>	44
HANNAN'S HANGAR, <i>Bill Hannan</i>	48
ENGINES OF THE WORLD, <i>Stu Richmond</i>	52
CONTROL LINE, <i>John Thompson</i>	62
RC SOARING, <i>Bill Forrey</i>	68
RC PYLON, <i>Wayne Yeager</i>	74
FREE FLIGHT, <i>Bob Stalick</i>	80
STRICTLY SCALE, <i>Al Tuttle</i>	88

HELICOPTER WORLD

1991 FAI F3C HELICOPTER TEAM TRIALS, <i>James Wang</i>	56
--	----

PRODUCTS IN USE

REVIEW: RC FLIGHT SIMULATOR, <i>David Garwood</i>	84
---	----

CONSTRUCTION

BUILD: ALCO SPORTPLANE, <i>R.G. Schmitt</i>	66
---	----

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ON THE COVER: Seen at the Scale Squadron's Scale Master Qualifier meet, Mile Square Park, Fountain Valley, California, this beautiful Ryan STA built from a Sig kit by Ken Perkins, former Garden Grove RC Club member, now living in Arizona. Top inset photo shows Joe Tschirgi's Cessna CR-2 racer and Bert Baker's Vultee BT-13 "Vibrator," both competing at the Scale Squadron Meet. Photos by Bill Rice. Lower inset photo by Mike Ogle features D.E. Wilson's beautiful Astro Challenge Jr, powered by a geared Astro FAI-05 with Sonic-Tronics 12x8 folding prop. Flown at Seventeenth Annual Astro Flight Championships (see report in "Workbench" column).



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BILL NORTHROP'S WORKBENCH

MS CHANGES

By now, you are probably aware that some changes have occurred with the International Modeler Shows (IMS). First of all, there was the cancellation of the May 1991 Atlanta show, and then the September issue of *Model Builder* carried an announcement that the October 1991 Milwaukee show has been postponed. In order to avoid confusion and control speculation, it's time to set the record straight.

After three years of producing a model sport and hobby show in Atlanta (1988, 1989, and 1990), it has become obvious that this was not the best location in the southeast to hold this type of show. A location in northern Florida seems much more feasible, particularly when it was noted that the majority of out-of-town attendees in Atlanta came up from Florida. However, May is not the best time of year to have a show in Florida. Although there is evidence that many modelers have retired and moved to Florida, and are continuing, or returning to, their favorite hobby as a year-round activity, the best seasons of the year for a Florida show are fall and winter; the "snowbirds" have flown south to get away from the cold weather, and northern model manufacturers want to join them! The logic, therefore, is to choose October for a Florida show, and have the Milwaukee show in May. More on this later.

The Fifteenth Annual IMS Pasadena Radio Control Model Sport and Hobby Show will take place at the usual time slot; January 10, 11, and 12, 1992. Please note that the show will again occupy *both* of the connected Conference and Exhibition Buildings at the Pasadena Center on Green and Marengo Streets in downtown Pasadena.

Those of you who came away from the 1991 show with bruised hips and elbows will recall that "Middle East Jitters" had brought about a reduction in exhibitors, and as the Conference Building was not available, the whole show took place in the Exhibition Building and Annex. Well... perhaps exhibitors were justifiably jittery about the effect of hobby interest resulting from the Kuwait pull-out deadline of January 15, 1991, but it didn't seem to affect the public! They came to the show hot to trot, loaded with unspent Christmas money and credit cards with unused limits! The jam-



The Fifteenth Annual IMS Pasadena RC Model Sport and Hobby Show is coming back to the Pasadena Center, January 10, 11 and 12, 1992. Other IMS shows are being rescheduled and relocated. See text.

packed aisles made it very difficult to get around and see everything.

For 1992, it's back to the two buildings, plus the Annex and the outdoor car track and helicopter demonstration area. The entrance will again be the ground level west doors of the Conference building, as in previous years. The show will open to the public at 2 p.m. on Friday, until 7 p.m., on Saturday from 10 a.m. to 6 p.m., and on Sunday, from 10 p.m. to 5 p.m.

01/01/01 or 01/01/00?

You think bringing up the downwind turn opens a can of worms? Try *this* one! When does the 21st century begin, January 1, 2000 or January 1, 2001? Our comment in the July "Over the Counter" about Coverite's "21st Century" products being around before the year 2000, instigated the following letter from Greg Weissenberger, an otherwise normal free flight modeler from Garden Grove, California:

Dear Bill,

Re your comment in "Over the Counter" (July 1991 MB): What do you suppose is going to happen on January 1, 2000? The start of the 21st century? Nahh. That occurs Jan. 1, 2001. Think about it: What's the (theoretical) first date in history? Why, it was January 1, (01/01/10). Not Year Zero. And the last year of the first decade was year 10. And so forth.

People do this all the time, notably pop social commentators, whose catchy names

like *Roaring Twenties* and *Fin de Siecle* have no basis in calendar math. I can deal with *Newsweek* naming a string of ten years "The Frobis Decade," as long as they don't equate it to "The Nineties" and start it off in 1990. Arthur C. Clarke saw the 21st century as the commercial space-travel era, and correctly began it in 2001. But nobody else seems to want to.

Back to my first question, what WILL happen on 01/01/00? As a computer programmer, I know that a whole lotta software is going to stop working right unless it gets rewritten before then. We've been getting away with two-digit years too long, and now they're gonna byte us! Data files will need to be redesigned to contain a full four-digit year ("2000" instead of "00"). Why? Well, one big feature of software is calendar logic, such as knowing that Date A is sooner or later than Date B. But a date with year "00" is going to compare lower than any other date in the file, even though it's not likely to stand for 1900!

Where I work, we bought a megabuck order-processing package. Its programmers took a different approach, by hanging a "century digit" in front of the two-digit years of every date in the system. Twentieth-century dates all contain a "0," 21st-century dates a "1," and all date comparisons were written to include this digit. But apparently the programmers were purists like me, because the software waits until 01/01/2001 to

set the "century digit" to a "1." So now (with a feeling of betrayal) I'm rewriting a couple hundred computer programs to pretend that the 21st century starts on January 1, 2000.

Best regards,

Greg Weissenberger

The computer is our tail . . . and it's wagging us!

TIME FOR ANOTHER TEA PARTY?

It's bad enough that the sales tax in Orange County, where we conduct our business, has gone up from 6-1/2 percent to 7-3/4 percent (It's now 8-1/2 percent in Los Angeles county), but now we have been told that our magazine subscription sales to California residents must be taxed!

But what comes as a real threat to the future of small mail order businesses, of which there are many in the model airplane, boat, and car hobbies, was brought to our attention by Roy Clough in a recent letter to this writer. Roy says, "The main thing this letter is about, and this is probably of great interest to all 'Garage' and 'Self-liquidating Hobby' kitters is the new trend for states to pass 'usage taxes.' The object of these taxes is to require mail order companies to collect such taxes on orders from their state. In order for mail order companies to ship anything they must [obtain] a license to collect taxes for that state and provide the appropriate bookkeeping, etc. Florida has just passed such a tax.

"I suspect my reaction is the same as many other super-small kitters. I would not be able to accept orders from any state which has a usage tax on mail orders."

Roy points out that he expects to see many small mail order ads that in the future will have a line that states, "Sorry, we cannot accept orders from any state having a mail order usage tax."

To state legislators all over this country we can only say, "If you must, tax our gasoline and tax our booze, but for heaven's sake, leave our hobby alone!"

Bob Boucher of Astro Flight reports that the seventeenth Annual Astro Electric Championships was held on May 25 and 26 at Fairview Park, in Costa Mesa, California. "There was a very nice turnout and we had beautiful California weather. Many thanks to Bob Sliff, Frank Chastler, and John Lupberger for a well run contest. Five categories of competition were held, following the AMA Rule Book. These were: Seven-Cell Sailplane, Unlimited Sailplane, Seven-Cell Old Timer, Unlimited Old Timer, and Seven Cell-Pylon Racing. The Orange County fliers took top honors in sailplanes and old timers while the visitors from San Diego took top honors in the Pylon event.

"Over the past decade the number of ferrite motors seen at this contest have decreased from about 2/3 of the motors in 1981 to a single Leisure ferrite motor last year. This year we had two ferrite motors entered, both by Team Twister and supported by Mr. Twister himself, Mike Walker. These Yokomo style ferrite motors are very

continued on page 6



ADVICE FOR THE PROPWORN— BY JAKE

Dear Jake:

You know that old saw about the best way to cook some kind of fish is to bake it on a hickory board for three hours, then throw the fish away and eat the board? Well, that's the way I feel about my iron-on shrink covering. I'd probably be better off throwing it away and using the paper bag I brought it home in.

I'm going back to silkspan and dope!

Frustrated in Fresno

Dear Frustrated:

Interesting. Have you tried wrapping the fish in the iron-on covering before you bake it? Also, give lemon and butter a try instead of silkspan and dope.

Jake

• • •

Dear Jake:

I can't get my Summit III to track straight through a loop. I've tried every trimming technique ever devised, and I've even tried to mix it out using my computer radio. All to no avail. I'm really in a quandary.

Seth in Orillia, Ontario

Dear Seth:

My father used to work in a quandary. He cut granite on the second shift.

Jake

• • •

Dear Jake:

Has RC modeling gained any ground on the hobby popularity list? The flying field seems a little more crowded lately, so I was wondering if modeling was experiencing a boom.

Hobbyist in Hyacinth, Washington

Dear Hobbyist:

Actually, we have moved up a few slots on the chart. For 1991, modeling has passed shrubbery sculpture, horseshoe catching, and flour pressing (not to be confused with flower pressing, which is much higher on the list). We now fall just behind Origami, Grand Banks eeling, and hot coal walking. Dan Quayle baiting, which used to be well below us, has made a huge gain and is now near the top of the list.

I don't know about the modeling hobby in general, but my modeling experienced a boom last week. I over-pressured my fuel tank and the resulting "boom" sprayed balsa fragments all over the pit area.

Jake

• • •

Dear Jake:

Good news from the scientific front! Radio control model aviation technology has been used to obtain photographic evidence of living dinosaurs in the jungles of central Africa.

My comrades and I equipped a model

plane with an auto-focus, auto-wind, 35mm camera and added extra fuel cells for range and duration. We used a model because we were concerned that a real aircraft or helicopter would frighten the creatures into hiding. Operating from Nairobi, we flew the craft deep into the jungle and took the remarkable photographs which I have enclosed.

As you can see, several of the creatures are seen floating in a jungle pool. The remarkably clear, bright aqua blue water and rectangular shape of the pool are very rare indeed. Our scientists are hard at work postulating explanations for these unusual natural phenomena. Note also the smooth, almost plasticine appearance of the creature's skin, and the bright primary colors. The common belief that dinosaur skin was scaly, reptilian and drab has been exploded by our findings. Study the assortment of dinosaur body shapes. Is it not remarkable to discover that spherical, flat, and even toroid dinosaurs existed and still do?

We are currently mounting an expedition to travel to this site and study the beasts first hand. Unfortunately, we do not know precisely where this location is because we are quite sure that our model aircraft was blown somewhat off course by high winds after launching from Nairobi. Lacking onboard navigation equipment, the aircraft's telemetry system was not capable of telling us exactly where it was. But by triangulation techniques, we have placed it somewhere on a straight line between Kampala and Bujumbura. Fear not, we shall find it and you shall soon hear of our discoveries in all the media.

Paleontologist on Assignment

Dear Paleontologist:

Are you sure your airplane didn't wander over the suburbs somewhere? How do you account for the Budweiser label painted on the bottom of the pool? But now that I look closer, maybe you're right. It must be jungle, I can see a Jaguar in the driveway.

Jake

• • •

Dear Jake:

There used to be hundreds of different kinds of cars back in the twenties and thirties, but nowadays there are relatively very few available. Why is that?

Auto Enthusiast in Bogota, New Jersey

Dear Auto Enthusiast:

Those cars from the 1920s and 1930s would be 50 or 60 years old now. They're probably all rusted out, and you couldn't get parts for them, anyhow. So it doesn't sur-

continued on page 6

WORKBENCH *Continued from page 5*

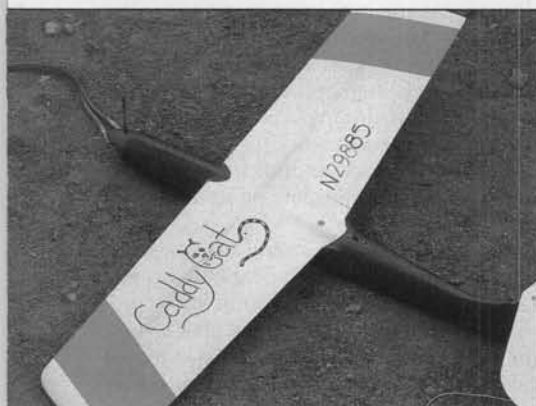
popular in car racing where they do very well for themselves, but at this airplane contest they did not do very well, placing in the middle of the pack in Seven-Cell Sailplane and dead last in the Pylon racing event. In airplanes, it is quite evident that cobalts are king. (Cobalt motors are ruled out of car racing, but permitted in aircraft events. Ed.)

"Seven-Cell Sailplane: Scott McKensie piloted his Astro 05 powered Goldberg Electra to first place with 4181 points, to edge out George Joy with 4023 points, and Jim Skinner with 4013 points. Almost all planes used Sanyo 900SCR cells, the Astro FAI-05 geared motor, and the Sonic-Tronics 12-inch folding prop.

"Seven-Cell Old Timer: Jim Skinner piloted his Astro 05 powered Leisure Playboy to first Place with 4026 points, to edge out Roy Westland with 4015 points, and Ross Thomas with 3891 points. Almost all models used the Sanyo 900SCR cells and the Astro FAI-05 geared motor. The three most



Bob Sliff with his winning model, the Gnome XL; 12-foot span glider powered by 28 Sanyo 900 SCR cells and an Astro Cobalt 60 FAI motor.



popular models were the Leisure Playboy, the Lanzo, and the Astro Viking.

"Unlimited Sailplane: Bob Sliff flew his Astro 60 Powered Gnome XL to first place with 4180 points. He was followed by Steve Neu with his Astro 60 powered F3E model with 4000 points. Scott McKensie took third place with 3472 points.

"Unlimited Old Timer: Ross Thomas earned 4050 points to win first place. Sec-

Steve Neu's first place winner, the Caddy Cat. This is a very fast model and closely resembles the Detweiler design. Wing area is about 180 sq. inches, so the surface loading is close to the 24-ounce limit.

ond place went to Loren Norenberger and third place to Gary Westland.

"Seven Pylon Racing: The San Diego club cleaned up in Seven-Cell pylon with Steve Neu taking first with 259 seconds. Brian Chan took second with 285 seconds, and Steve Manganelli took third with 292. The four top fliers all flew the same design airplane, the Caddy Cat. This model resembles the Detweiler model seen at St Louis. It has glass wings and a Kevlar fuselage and weighs in at about 32 ounces. The model is quite small with about 180 square inches of wing area. It is very fast. All Caddy Cats use the new APC props. Various sizes were tried from 7x6 to 7x8, but the 7x7 seemed to be the fastest. Steve Neu posted the fastest time of 1 minute, 29 seconds. As his total score was 292 points, his average time was 1 minute 37 seconds. There was one spectacular mid-air when Jerry Bridgeman's "Fast Eddie" exploded into a hundred pieces! Jim Skinner had a very beautiful balsa wood model, but with over 250 square inches of wing, it was at least one lap slower than Neu's machine.

"We are planning to have at least one, and maybe two more pylon races this year in Southern California."

MB



Jim Skinner with his neat little all balsa pylon racers. They are powered by seven Sanyo 1200 mA cells and the popular Astro FAI-05 Cobalt motor.

DEAR JAKE *Continued from page 5*

prise me that there are very few of them still around today.

I can't figure guys like you out. You nostalgia buffs are always pining over some technologically archaic piece of junk and muttering things like, "Those were the days."

Well, I prefer the modern 21st century automobile. Give me a Yugo, any day! (Oddly, a surprisingly large number of people actually have given me their Yugos. Usually under cover of darkness and with no forwarding address.)

Jake **MB**

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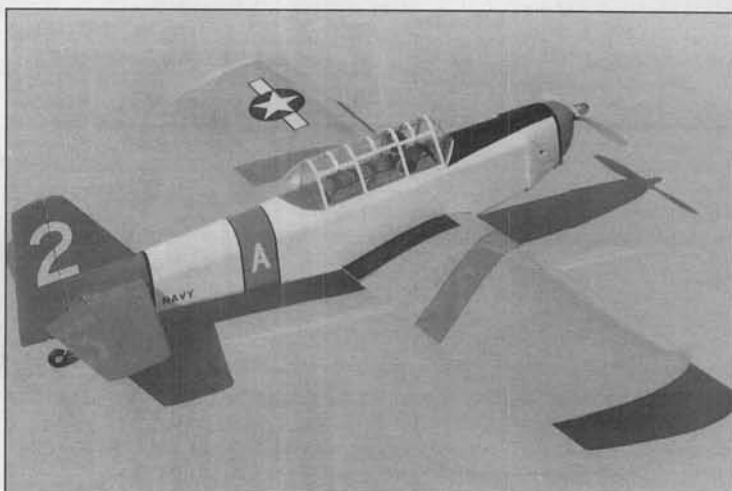
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MB

OVER THE COUNTER



Nor-Cal Aero's Vultee BT-13/SNV.



The Mark IV from Nor-Cal Aero.



Nor-Cal Aero's "Air Kicker" intermediate trainer.



Graupner SB-13 Flying Wing, from Hobby Lobby.

Rodel Modelle's "Romeo," from Hobby Lobby.



Nor-Cal Aero, 20984 Dorothy Lane, Redding, CA 96003, phone (916) 275-4195, is a relatively new hobby company offering a line of kits for scale and scale-like RC model aircraft. All

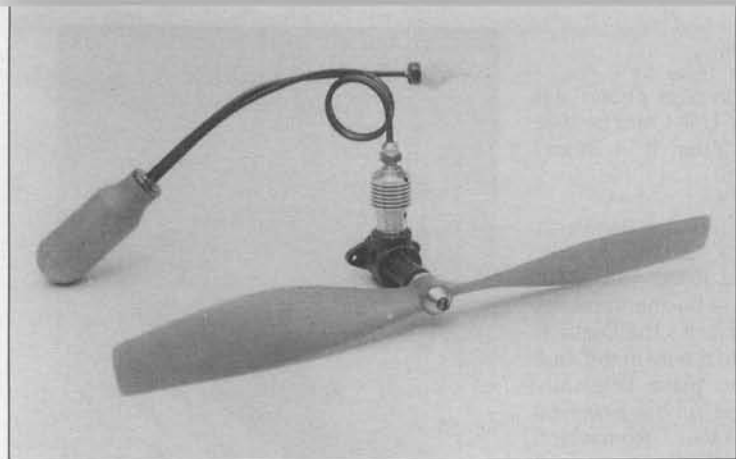
All material published in *OVER THE COUNTER* is quoted or paraphrased from press releases, furnished by the manufacturers and/or their advertising agencies, unless otherwise specified. The review and/or description of any product by *MODEL BUILDER* does not constitute an endorsement of that product,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

models are in the five to six-foot span size range, and feature hand cutting and sanding of all major parts. Ribs, for instance, are router-cut. Also included is extra bracing in the landing gear designs, and plenty of shear webbing, spars, cap stripping and/or sheeting in the wings to handle all flight and landing loads. Kits also include molded cowls and canopies, formed landing gear, detailed rolled plans, and a pictured instruction book.

The kits and designs are all well flight tested and approved by the local Redding Area Miniature Aircraft Club. Members also convinced the company that they should make the kits optionally available framed up

(no covering), or completely finished, using the customer's engine and radio. In fact, they'll even supply those when needed! Call for quotes.

Here's more info on the Vultee BT-13/SNV "Valiant" (or "Vibrator"), which is our favorite from the selection currently available. The span is 73 inches, at one-seventh scale. It's all balsa and ply construction, with molded cowl (with dummy P&W engine), tail stinger, and canopy. The latter has the bows molded in. Landing gear wire is 3/16, and the hardwood mounting blocks are over nine inches long. With 773 sq. in. wing area, the model can be flown with a two-stroke .60 or with four-stroke .80's to



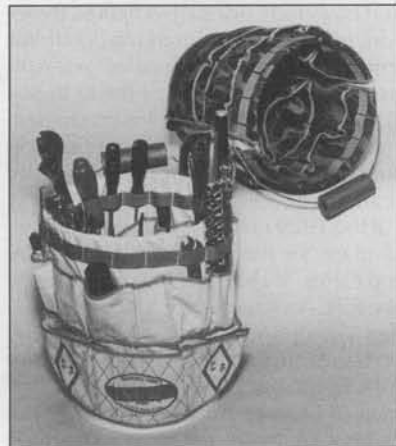
Modela CO₂ available from Hobby Lobby.



Trans Tent" from Model Aviation Products.



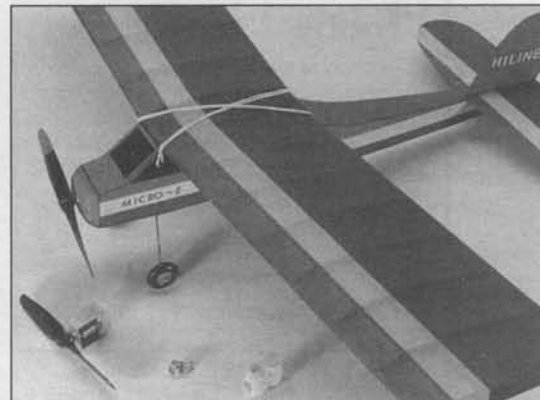
Peck-Polymers' Sandy Peck holds the Dietrich "Convertible."



"Bucket Bag" tool carrier from Model Aviation Products.



Worldwide AeroPlans, by Andrew Anson.



The Hi Line "Micro-4" power system and "Micro-E" sport free flight.

1.20's. Weight will come out in the eight to ten-pound range. Sport or scale ailerons are shown on the plans, and flaps may also be added.

For more information on Cal-Aero, refer to their ad in our September issue, or the November issue coming soon, or contact Don at the above address or phone. When you do, be sure to tell him we sent you!

• • •

Hobby Lobby International, 5614 Franklin Pike Circle, Brentwood, TN 37027, phone (615) 373-1444, has just released its new catalog, No. 18.

Among the many new items appearing in Catalog 18 (We'll include others in subse-

quent issues) is "Romeo." This Romeo won't do too well on balconies, but it should be popular at the flying field. It's a 63-inch span sport stunt RC model for .40 to .61 two-stroke engines, or your choice in four-stroke. It has a hidden channel for the exhaust or tuned pipe. Wing area is 570 sq. in., and the price is a very reasonable \$139.00.

Illustrating the extent of variety in the Hobby Lobby Catalog 18, you'll find the Modela CO₂ engine for free flight models in the two to three-and-a-half-ounce weight range, and spans of 24 to 36 inches. It is an inch-and-a-half high, and weighs all of one ounce, including tank and prop! Price is \$36.30.

For still more variety, there is the new Graupner SB-13 Flying Wing, available from Hobby Lobby. This electric powered sailplane has a span of 84 inches, and is based on the full-scale Akaflieg Braunschweig (sure!) company design. In addition to electric flight, it can also be used for slope soaring or hi-start launching. Kit price is \$299.00.

To obtain this new Catalog 18 from Hobby Lobby, full of all sorts of airplane kits, boat kits, electric power supplies, accessories (mostly from European manufacturers and not otherwise available in the US), and interesting tidbits of information on a variety of model subjects, just call or write to Hobby



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hobby specialties



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The Hobby Horn discount prices for the MMC FULL KITS are listed. Full Kits include cut parts, plan, strip and sheet wood, wire and window material. Kits marked with an *** have the wire landing gear pre-bent.

1936 Flying Quaker 84*	\$67.99
1938 Powerhouse 50**	\$35.96
1937 Long Cabin 78*	\$49.52
1939 A. T. Sportster 50**	\$35.96
1937 Quaker Flash 67*	\$47.84
1940 Buzzard Bombsheal 50* span kit*	\$35.96
1937 Air Chief 81*	\$37.78
1940 New Ruler 74*	\$74.72
1939 Thermic 100 Glider (100" Span Old Timer Sailplane—modifications shown for R/C)	\$86.23

P & W MODEL SERVICE

Old Timer kits for FF or R/C. The following is the discount price on full kits. The full kits include all cut parts, plan, stick and sheet wood, wire and windshield material.

1935 Miss America 84*	\$75.58
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1937 Dallaire 108*	\$79.92
1938 Clipper Mk I 72*	\$55.96
1938 Kloud King 63*	\$44.48
1938 Powerhouse 84*	\$56.24
1938 Record Breaker 96*	\$73.04
1938 Trenton Terror 72*	\$42.80
1939 Korda Wake 44*	\$20.12
1939 Mercury 72*	\$61.28
1939 Zipper 54*	\$56.24
1940 Ranger 46*	\$33.55
1940 Sailplane 78*	\$89.00
1940 So Long 50*	\$31.88
1941 Brigadier 56*	\$42.79
1941 Super Quaker 78*	\$76.40
1941 Playboy Jr. 54*	\$32.72
1941 Playboy Sr. 78*	\$53.72
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Lobby at the above address or phone and ask for it. It's FREE in the USA! And be sure to tell them you read about it in *Model Builder*. That's important!

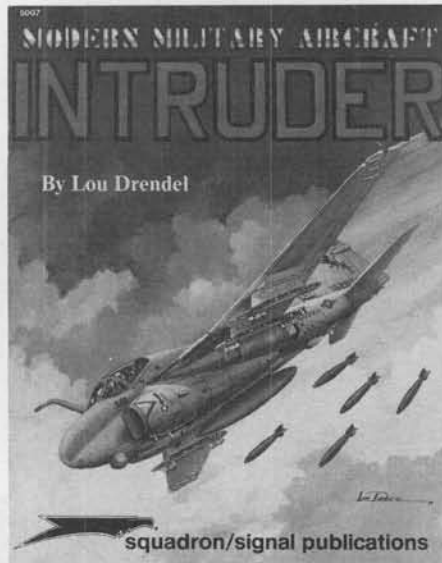
In spite of the loss of its founder, Bob Peck, Peck-Polymers, P.O. Box 710399, Santee, CA 92072-0399, phone (619) 448-1818, Fax -1833, is continuing its business and has just announced a new kit. It's the Dietrich "Convertible" (spelled that way in the Zaic Yearbook in which the plans originally appeared). This old time rubber powered model, for R.O.G. or R.O.W.... from which it earned its name no matter how you spell it... has a 34-inch wingspan, and the kit includes quality die-cut balsa, molded windshield, hardware, tissue, rubber motor, clear concise plans and instructions, and a 15-inch pre-cut (not pre-carved) prop blank. The retail price is a very reasonable \$28.95, available at your hobby shop or direct from Peck-Polymers. If you've come into the hobby in recent years, have some stick-frame building experience, and have harbored a desire to find out what this hobby is really about, **BUILD THIS MODEL!**

Hi Line Ltd., 11014 Marcliff Rd., Rockville, MD 20852, phone (301) 530-0327, now has its new "Micro-4" electric motor system for small sport and scale free flight aircraft. A plan for the "Micro-E," shown in the photo, is included with the system.

The Micro-4 is a four-watt motor suitable for free flight models weighing 1.5 to two ounces, with wing areas of 50 to 70 sq. in. The system, including prop, 50 mAH battery, and charging jack/switch weighs about 20 grams, or around 3/4 ounce. Complete system price is \$17.95, plus \$2.00 for postage. Maryland and Arizona residents must add 5% sales tax. Catalog available for \$1.00.

Model Aviation Products, P.O. Box 26017, San Bernardino, CA 92406, phone (714) 883-3586, offers a line of accessory products for the model hobbyist, such as balancing devices for model aircraft, tool bags that fit over five-gallon buckets or plastic crates, transmitter covers, aircraft and rack racks that fit over flight or tool boxes, protective wrappers for propellers, and velcro-locking wraps for batteries and receivers in aircraft. For more information on these and other new items coming, contact the company at the above address or phone.

WorldWide AeroPlans and *1919-1939 AirWars* are two quarterly magazines published by Andrew C. Anson, 8931 Kittyhawk Ave., Los Angeles, CA 90045. *AirWars* is all about military aircraft of the Golden Era of aviation between WW I and WW II, 1919 to 1939. It contains articles and photos on particular aircraft of any nation, accompanied by scale drawings, model construction drawings, and color marking details. The Winter 1990 issue, for instance, has an article and photos covering the 1924 McCook Field Fly-Out, where manufactur-



Squadron/Signal Publications' "Intruder."

ers competed for Army contracts for observation aircraft. Then there is an article, and photos, and model and detail drawings for the Russian Polikarpov Chaika (Gull), by Dick Gates. Then photos of readers' scale models, and then full-size plans, broken down into separate pages, in pre-war model magazine style, for the early '30's SPAD fighter, as originally published in *Air Trails*. The magazine finishes off with book reviews and some advertisements.

Issue No. 3 of *AeroPlans* includes reduced plans of Murray Wood's one-fifth scale, super detailed Boeing F4B-4 for radio control, John Blair's 5/8-inch scale plans for a rubber powered Curtiss P1-A fighter, three-view drawings and scale marking details for the Polish PWS-10 "Pavipollo" parasol-winged fighter, scale views of the Bellanca 28-70 and 28-90, beautifully drawn, shaded, and cut-away plans for the Curtiss A-8 "Shrike," by Chuck Hafner, three-views of John Parker's JP-350 Unlimited Reno Racer (seen at the 1989 races, but did not qualify), model plans for the Mowhawk "Pinto" by Richard Gates, scale views of the U.S. Army Curtiss R3C-1 Racer and 1925 Dyle & Bacalan Lifting Body Bomber DB-10 (!) by Hubert Cance, and scale views of the Hawker "Spanish Fury."

Enough? Contact Andrew Anson about subscribing to these soft cover quarterly books.

And speaking of aviation books containing detailed photos, drawings, text, plus full-color paint and marking information, the series of books that flow continuously from Squadron/Signal Publications, Inc., 1115 Crowley Drive, Carrollton, Texas 75011-5010, are just simply outstanding. The list of aircraft that have been featured to date, only one to a soft cover book, is too long to include herein, but it spans WW I, WW II, Korea, Viet Nam, Desert Storm, and everything in between. Write to SSP for its complete list of books, which also covers other military equipment such as tanks and gun carriers, and be sure to mention *Model Builder*. We'd appreciate that!

MB

CONTROL-LINE HEADQUARTERS



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ENGINE: .20 - .40
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WING SPAN: 48"



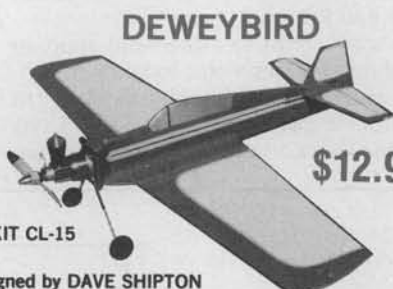
KIT CL-20

AKROMASTER

Designed by MIKE GRETZ

\$21.95

ENGINE: .15 - .19
WING SPAN: 34"



DEWEYBIRD

\$12.95

KIT CL-15

Designed by DAVE SHIPTON

ENGINE: .049 WING SPAN: 22-1/2"



KIT CL-19

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ENGINE: .29 - .40
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WING SPAN: 60"

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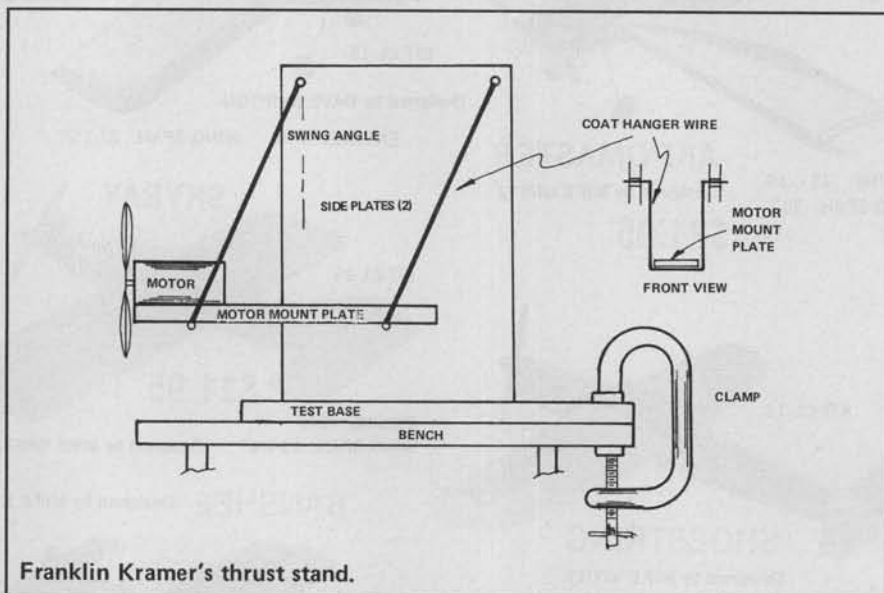
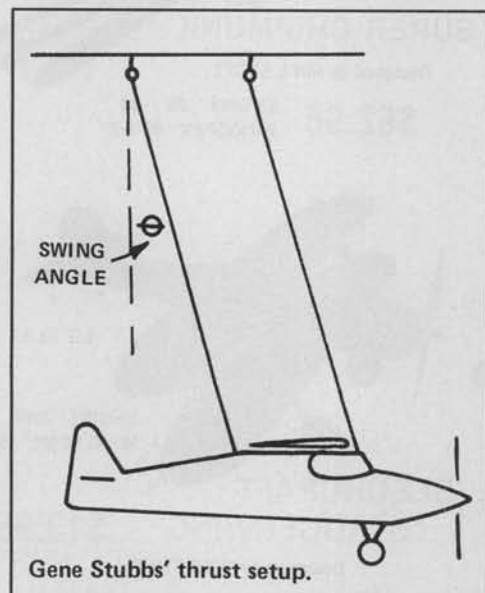
KNOW THAT THRUST!

Ted Davey's May RCM column included two charts listing the static thrust for several props, plus the rpm and current draw. The April issue of RCReport had motor tests by Brian Lee that included static thrust for several props, and there was an article by J. L. Doksansky on building a thrust stand in the same issue. Bill Young's computer programs that I mentioned in last month's column also include thrust calculations. This started me thinking about static

flying, sent me a paper (not yet published) on his results. He found that for electric RC duration, a W/T ratio from 3:1 to 3.5:1 gives the best results. Gene and Al did their work completely independently; it is nice to see that FF and RC results agree!

Can static thrust measurements apply to other things besides motor and prop matching? It would be nice to be able to relate it to the airplane performance as well. Does someone know how to do this? Most equa-

in an article in RCM, November 1984. It is: $T = D^{1.75} P^{1.2} (KRPM)^{1.2} / 145$. T is thrust in ounces, D is diameter in inches, P is pitch in inches, and KRPM is rpm/1000. As an example using this formula, Ted Davey's data for a 10x8 prop at 5300 rpm is 23 ounces of thrust. Put the numbers into Larry's formula and you get: $(10)^{1.75} \times (8)^{1.2} \times (5.3)^{1.2} / 145 = 28.2 \times 12.1 \times 7.4 / 145 = 17.4$ ounces of thrust. In this case, the Renger formula underestimated the thrust. Steve Rogers sent me data



thrust and what it can tell you about matching props to motors and flying performance.

Thrust measurements are usually used to match a propeller to a motor. The assumption is that the propeller that gives the highest static thrust will also have the best performance in the air. This means better climb, duration, and efficiency. Furthermore, Ted Davey's charts show that there is a point of maximum thrust. Loading the motor beyond that point produces less thrust and draws more current. So, measuring thrust and current together can help find the most efficient setup.

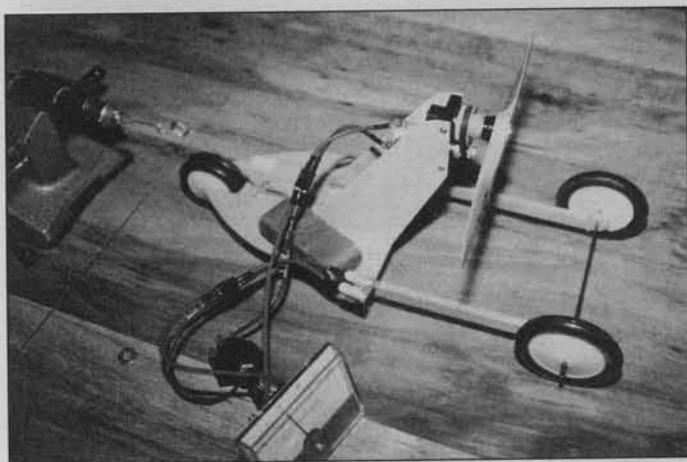
Gene Stubbs, in the Boeing Hawks Free Flight newsletter, says that in his experience a weight-to-static thrust ratio between 3:1 to 3.5:1 is needed for an acceptable climb, i.e., a three-pound airplane would need about one pound of thrust. Al Weber, who has made a science out of electric duration

tions or theories dealing with thrust and aircraft drag do not use static thrust. Most equations deal in flight thrusts, that is, thrust equals drag. I would like very much to see equations that show how thrust falls off as speed goes up, starting from zero (static). I'm sure that someone somewhere has done the work on this. If any of you have info on this, I would be very interested. Another equation I would like to find is one to calculate the drag of an airplane, given either its rate of climb or rate of sink. These are probably well known formulas, but I have not found any references. Last of all, is there a way to calculate power (watts or horsepower) from static thrust? I know of a couple of indirect ways, but it sure would be useful to use the thrust value directly.

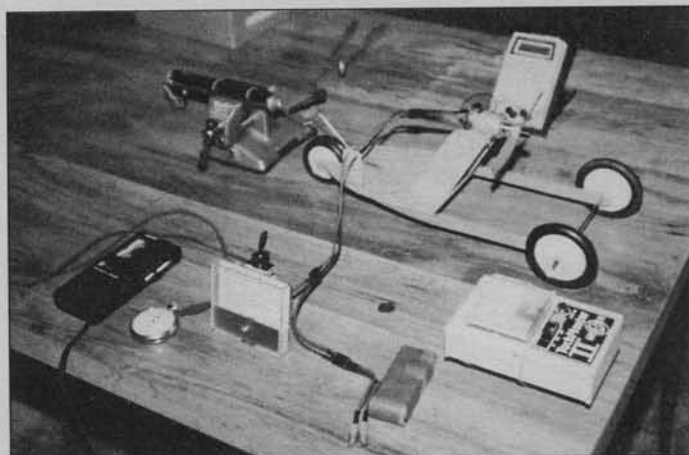
It is possible to calculate static thrust from rpm and propeller pitch and diameter. Larry Renger published a formula for static thrust

on his thrust measurements; an 8x4 at 8070 rpm gives 10.2 ounces of thrust. The Renger formula calculates 17 ounces; in this case, an overestimate.

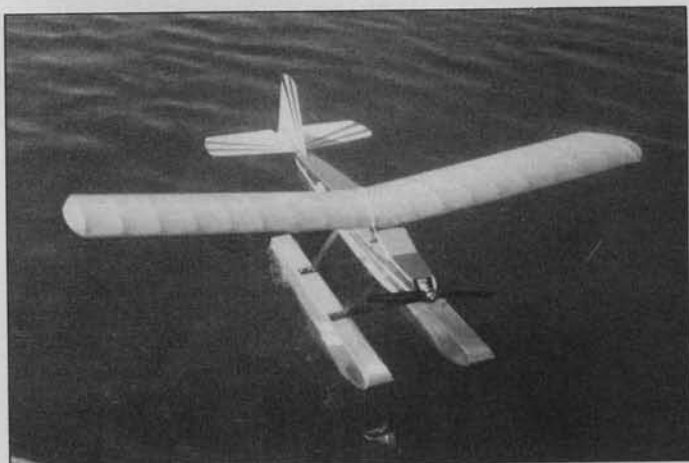
I decided to try to come up with a formula. I started with George Abbott's formula for power, which uses diameter to the fourth power, rpm to the third power, and pitch to the first power. Power is thrust times velocity. So, to get thrust from a power formula, you cut diameter down to the third power, and rpm down to the second power. The formula would then look like this: $T = k \times P \times D^3 \times RPM^2$. The k is a constant that accounts for the propeller blade shape, air density, and scaling for the measuring units used. I used the data sent to me by Steve Rogers, and the data in Ted Davey's and Brian Lee's columns to get an experimental value for k. I found that k had quite a wide range, from 8×10^{-11} to 14×10^{-11} . The average



Roland Schmitt's thrust stand.



Schmitt's thrust stand; note DVM, tachometer, ammeter.



George Ball's Seagull, with 035 geared Astro, is a great flier.



Ball's Heath Parasol is up on step.

over the data was 10×10^{11} . If the formula is used with KRPM (rpm/1000), inches, and ounces, it is $T = P \times D^3 \times KRPM^2 / 10,000$. The calculated thrust for Ted Davey's 10x8 prop is $8 \times 10^3 \times (5.3)^2 / 10,000 = 22.5$ ounces (23 ounces observed), and for Steve Rogers' 8x4 prop $4 \times 8^3 \times (8.07)^2 / 10,000 = 13.3$ ounces (10.2 observed). My guesstimate is that the formula will give thrust results that are within plus or minus 25% of the true value most of the time. Does anyone have a formula that is better? For that matter, did I just reinvent the wheel? I would like to know if this formula has been published previously. Let me know if you know!

Enough theory! The fun part is measuring the thrust. The setups range from very simple to complex. Al Weber hangs his plane, minus wing, from a line at the balance point to a single hook in the ceiling. Gene Stubbs does the same, but he uses four hooks in the ceiling, and loops the lines under the wings. This makes four suspension points. Franklin Kramer uses a motor stand that swings on hanger wires. All these setups measure the swing angle (the angle between the line or hanger with power off and the line or hanger with power on). The formula for the weight-to-thrust ratio is $W/T = 1/\tan(\text{angle})$. Handy angles to remember are: 20 degrees equals a W/T of 3.5; 27 degrees = W/T of 2; 34 degrees = W/T of 1.5; and 45 degrees = W/T of 1. To get thrust,

multiply the weight of the airplane (or the part of the motor stand that swings) by the tangent of the swing angle. For example, if the motor plus swing stand weighed 16 ounces, and the swing angle was 25 degrees, the thrust would be $16 \times \tan(25) = 7.5$ ounces.

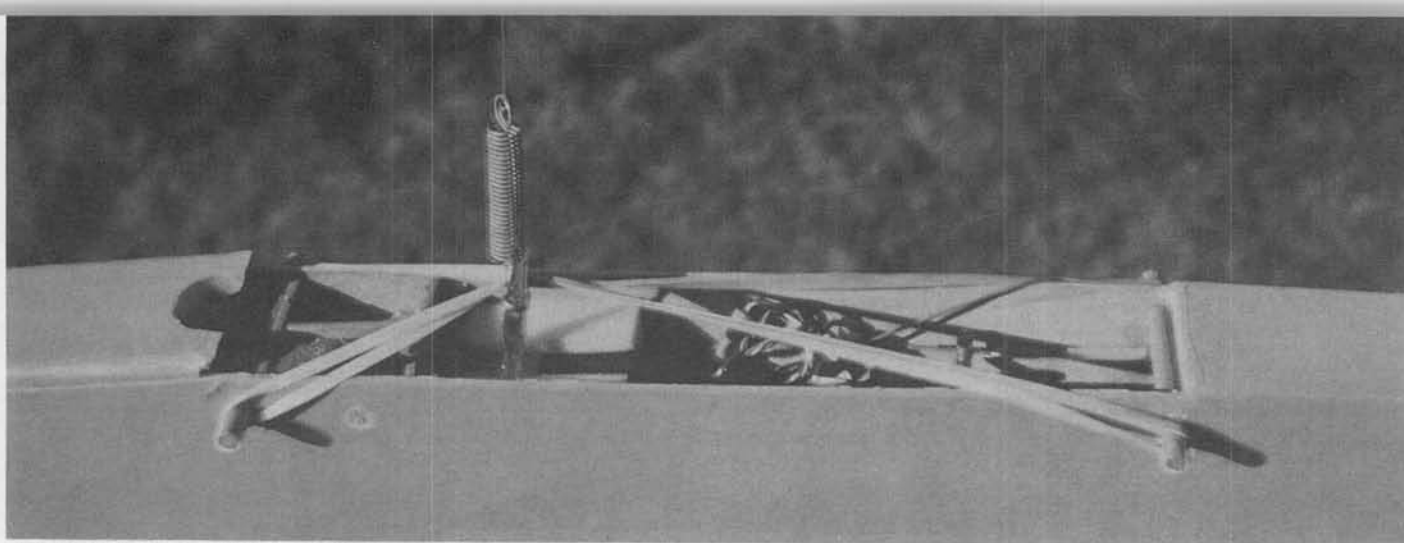
A very simple thrust setup could be made with a motor stand that holds the motor straight up. This would be clamped onto a scale. The difference between the readings on the scale with the motor on and off would be the thrust.

Thrust measurement with a fish scale is quite popular. The Zebco model 228 is often used. J.L. Doksansky uses the Normark Weigh-In scale, which has an LCD readout in pounds and ounces. This scale is available at fishing stores. Often the fish scale is attached to the tail of the plane, and the thrust is measured directly. Doksansky uses a sliding tray motor mount. The tray is on go kart wheel bearings that roll in guide tracks made with aluminum angle stock. Roland Schmitt made a clever and simple trike stand with Williams Brothers wheels, as shown in the photos. It looks like a pusher, but it is not. The motor is tractor, the fish scale is attached at the back where two wheels are doubled. So, now you know how to measure thrust! Have fun with it!

Mike Murphy wrote in with some neat

uses for plastic bottles and aluminum cans. He carefully cuts the top and bottom off an aluminum can, then cuts it top to bottom to get an aluminum sheet. He then cuts the sheet into strips wide enough for the desired use. One-quarter-inch is fine for cooling transistors; one-inch is wide enough for motors. Fold the strip into an accordion with a tab at one end and glue the heat sink to whatever needs to be cooled. Mike makes the motor heat sinks long enough to extend out into the prop wash. He says his flight times increased 30% and the speed control never overheats no matter how hard it is driven. Mike uses the little "feet" on the bottom of clear plastic two-liter bottles for air scoops. The feet can be cut off and trimmed into small scoops, then installed over an opening in the fuselage to force cooling air in. Mike says these are good ideas for the environment, too; you are recycling material! Thanks, Mike, for the ideas!

George Ball wrote from Ontario, Canada, describing his adventures with electric float flying. He built the Seagull from tracings I sent him, and says it has been an excellent trainer, both on floats and wheels. Last year it was flown on a Kyosho 480G with an Astro gear box and seven 1200 mAH cells. This year it is flying on an Astro 035 cobalt with six 900 mAH cells. It has had hundreds of



Al Weber's thrust measurement setup. Super simple!

water takeoffs and landings. George uses the Futaba MCR-4A receiver/speed control and S133 micro servos. This has worked well for him, and has survived dunkings. It works as good as new once it dries out. The plane weighs 40 ounces with the six 900 mAH cells.

George went on to build a 1/6-scale Heath Parasol on scale Edo floats. It weighs 48 ounces with an Astro cobalt 05 geared with seven 1200 mAH cells, using the same radio as in the Seagull. It is covered in Solarfilm, and the floats are covered with Micafilm. It does ROW well, and flies well, but does not

track as well as the Seagull. George will probably add a ventral fin to improve the tracking. Seaplanes (full size as well as models) frequently need more fin area to compensate for the float area ahead of the C.G. Thank you, George, for the photos and info!

• • •

One last item! Some time ago, I recommended a book on permanent magnet DC motors. It was entitled, "Permanent-Magnet and Brushless DC Motors," by T. Kenjo and S. Nagamori, published by Clarendon Press (1985). It was available in both paperback and hardbound. In a classic case of "roundtuit" I didn't get around to ordering a copy until last year, only to discover it is out of print! If you have a copy of this book to sell, or know where to get one, let me know! I would be quite happy to pay you the original price you paid, plus the expenses of shipping it.

For now, thrust ahead with electrics! Write to me at 7100 CSW, Box 734 PSC 2, APO NY 09220-5300; or to Normannenweg 20, 6200 Wiesbaden-Biebrich, Germany. **MB**

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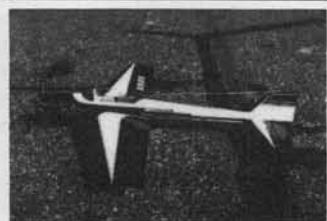
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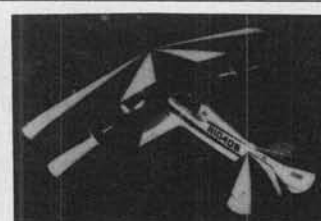
DESIRE

Wing Span: 66" Weight: 8.5-9.0 Lbs.
Wing Area: 920" Engine: 1.20



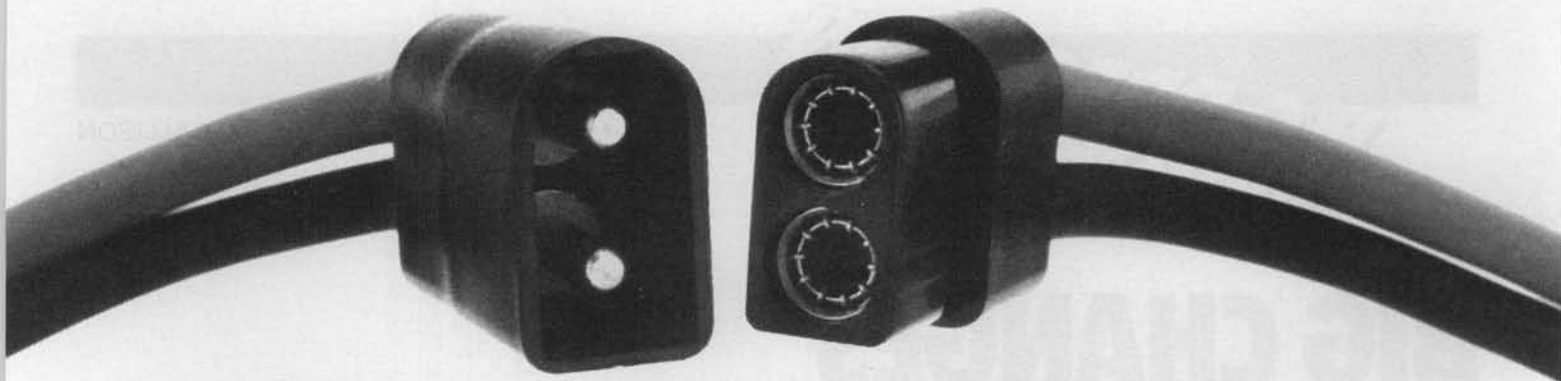
TYPHOON

Wing Span: 73" Weight: 8.5-9.5 Lbs.
Wing Area: 1000/900" Engine: 1.20

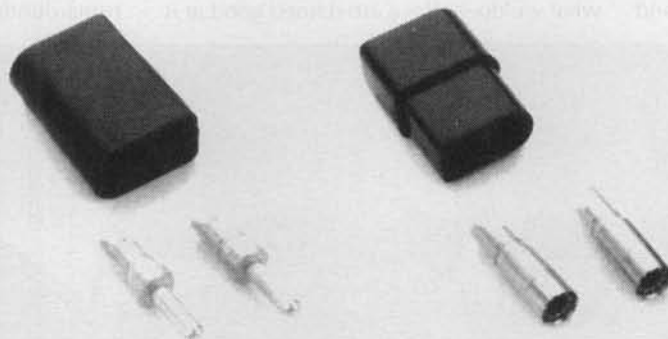


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BIG CHANGES IN PATTERNLAND!

Change is a valued part of life, according to most of the ancient philosophers I have read. Without the invigorating impetus of change, we humans tend to stagnate. We become safe, static, rooted creatures, our once glorious and

(constantly changing, of course), and drawn in with our mother's milk (or whatever new and improved infant formula she used).

All of this is neither good nor bad; it just IS. Human beings are adaptive animals. This is what we do, and we are darned good at it.

The only class which will not have a new schedule to fly is Novice, but the Novices will be able to use tuned pipes for the first time.

Sportsman class will add three scored turnarounds which must be performed in



Gene Rodgers' "Mystic," Wayne Apostorico's "Sapphire ML III," and Bryan Henderson's "SL-1," are YS-120 powered and have Futaba PCM 9-channel radios.

unlimited potential trapped in the sticky embrace of a comfortable and seemingly benign inertia. Yuk!

Fortunately, human nature works in such a way that this process is nearly always self-limiting.

We are Homo Tinkerus more than Homo Sapiens. In the Corporation of Life on Earth, we are the Engineering Department, and in the entire recorded history of civilization, no engineer has ever admitted that something (anything) worked so well that it couldn't be improved on. Change is programmed into us, encoded in our languages

We are the species that invented chess, crossword puzzles, and politics. We are clever, eager, challenge seeking, problem solving creatures. I like to think that some of the cleverest and most eager problem solvers of the whole bunch fly pattern and read this column. I like to think that, and I hope that it's true, because the hour of great change is close upon us here in Patternland.

At your first contest in '92, nearly everything will be different.

A 98 db noise limit will apply to all classes, with a score penalty for non-compliance.

the box, or aerobatic frame.

Advanced class will change to an all-turnaround schedule.

Expert Turnaround class will be eliminated. The people flying that class currently will be allowed to declare for either the new Advanced or the new Masters at their first contest in '92.

Masters class will shift to an all-turnaround schedule, using the present F3A maneuver list.

FAI F3A will shift to a multiple schedule format, using one schedule for the prelims and another for the finals. Three schedules

(A,B,& C) will be used, with A and B in use for '92 and '93, and B and C used in '94 and '95. All of the new FAI schedules will offer a significant increase in level of difficulty.

All classes, including Novice, will be scored using K factors, as currently applies to Expert, Masters, and FAI. Many unused maneuver descriptions will disappear from the rulebook. The descriptions and suggested downgrades of many other maneuvers will be changed to coincide with the FAI descriptions for the same or similar maneuvers.

The AMA Pattern Judge's Guide which will appear in the '92 book has been extensively reorganized and rewritten, with a good deal of change in the essential content. A Definitions section will be added.

The Suggested Field Procedure and field setup section of the book will change to accommodate turnaround and multiple flight line contests.

The practice of calling individual maneuvers will be eliminated except for the landing and takeoff maneuvers. Instead, Aerobatic Box entries and exits will be called. A specific rule governing reflights in the case of radio interference will be added. The number of flights used to determine the winner will change. Minor wording changes to clarify intent will be all over the place. The center of the takeoff maneuver will be defined. The description of the landing area will change from a circle to a zone.

Finally, I hear on good authority that the illustrations, layout, typeface, and paper of the book itself will change, and possibly the price as well. They are still planning on printing the thing in English, so you can relax about that. Mon Dieux!

What does all of this mean to each of us? Well, it obviously means different specific stuff to different folks, depending on class flown, etc., but the one thing it means to nearly everybody is a lot of homework to do. It surely means that more people will be doing far more practicing and building than they have done in previous years. In at least three classes (Expert, Masters, and FAI), a lot of folks will have to face the important basic decision of which class to fly.

Beyond the above, I might venture a few predictions as to how things will shake down, and as an active participant in the process of all this change (as the Chairman of the NSRCA Rules Committee that wrote most of the major proposals for RC Aerobatics), I certainly can tell you what the intent of each of the changes was, and what the hoped-for outcome will be. We probably should deal with the intent angle first.

The idea behind the noise limit is pretty self-explanatory. The time had come, the technology was in place, and both the pattern community and the AMA were in favor of the change. The limit is high enough so that most aircraft setups now in use will easily pass, and the rule contains a provision which allows a local CD to disregard it (with advance notice) if he or she chooses. Cheap and fairly accurate sound meters are available from several sources. A 5 or 10% score

Novice

1. Takeoff k=1
2. Straight Flight Out k=1
3. Procedure Turn k=2
4. Straight Flight Back k=1
5. Stall Turn k=2
6. Immelmann Turn k=1
7. Three Inside Loops k=3
8. One Horizontal Roll k=1
9. Landing k=1

Sportsman

1. Takeoff k=1
2. Double Stall Turn k=3
3. Half Reverse Cuban 8* k=1
4. Cuban 8 k=2
5. Immelmann Turn k=1
6. Split S* k=1
7. Three Inside Loops k=3
8. Straight Inverted Flight k=1
9. Stall Turn* k=1
10. One Reverse Outside Loop k=3
11. Three Horizontal Rolls k=3
12. Landing k=1

* denotes new scored turnaround done "in the box"

Advanced

1. Takeoff k=1
2. Double Immelmann k=2
3. Half Reverse Cuban 8 k=1
4. Slow Roll k=3
5. Stall Turn k=1
6. Top Hat with Half Rolls k=3
7. Humpty Bump with options k=1
8. Four-Point Roll k=4
9. Stall Turn with Half Rolls k=2
10. Cobra Roll w/ 1/2 Rolls k=2
11. Immelmann Turn k=1
12. Three Outside Loops from the top k=3
13. Split S k=1
14. Square Loop k=2
15. Landing k=1

penalty (10% for over 101 db) is provided for instead of disqualification. This will definitely keep pattern in the forefront of the sound reduction movement, but shouldn't pose much of a hardship for anyone. Novices will be allowed the use of pipes (or devices in the "gray area" that increase engine rpm, like some of the new "tuned mufflers") to meet the goal.

The proposal to add three turnarounds to the Sportsman class (check the schedule printed around here somewhere) wasn't an NSRCA proposal, but I believe it was a good idea... as did 57% of the respondents to the NSRCA Survey done early last year. Ron van Putte deserves the credit (or blame, depending on your point of view), and I believe his idea was to provide an early "bridge" into the turnaround concept, rather than have people just tackle it cold turkey when they got to Advanced.

Advanced was redone, using the present

(and proven) Canadian Advanced maneuver schedule. This class is slightly less demanding than the present Expert Turnaround class, and the intent is to teach the art of flying "in the box", while retaining the "old" Advanced goals of teaching point rolling, slow rolling, and vertical maneuvers, and trimming for same.

Expert was deleted because there are simply too many classes, and too few people to fill them. The present Expert schedule is only slightly more difficult than the new Advanced schedule, and was originally conceived as a temporary transition class on the way to a full turnaround concept, which we now have. The people flying Expert presently must choose between Advanced and Masters in '92. From the flying I have seen in the last several years across the country in this class, I think about a third could handle the new Masters, while the rest would benefit greatly by being able to spend some additional time in Advanced.

Masters was changed because the NSRCA Survey indicated that all but a small and vocal minority wanted it that way. At the last Nats, 85 people registered in FAI F3A, and about 13 in Masters. In many parts of the country, Masters is routinely not flown at contests because of low participation levels. There is another viable argument which applies to all AMA style pattern classes, and is becoming increasingly important, and that is the space requirement. Many places just don't have the half mile or so of overly space needed in both directions to hold AMA pattern events.

In any event, the new Masters is, very simply, the old FAI, but with scored takeoff and landing maneuvers. The reasoning was to use a proven and familiar schedule, and perhaps entice some people presently flying F3A without much success (or who maybe just don't have the time, money, or inclination needed to aspire to the heights of international competition) to stay put and fly the new Masters rather than jump into the new and more demanding FAI schedules. The new Masters then, will probably consist of some Expert TA people, some present Masters people, and some present FAI people. That's the plan, at least.

K-factors for all will merely make the scoring a little fairer by rewarding the more difficult maneuvers proportionately. This will have the side effect of de-emphasizing the landing and takeoff maneuvers in the lower classes, while forcing people to concentrate on building skill at the more difficult flying tasks if they want to continue to score well. Besides, I have long maintained that, if they are done properly, landings and takeoffs are NOT aerobatic maneuvers. This concept is contrary to what you might see at Trainer Night at your local field, of course.

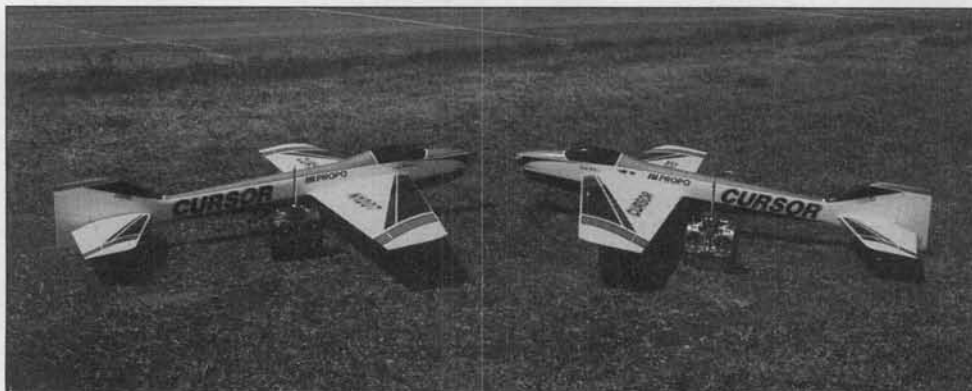
The intent behind most of the other changes, and especially the revised Judge's Guide, was to make all of the above work together as a cohesive whole. The basic structure of our present Judge's Guide is over 20 years old. It has been revised on a piecemeal basis many times; parts of it have



Dave White flew his clipped winged "Conquest 120" at the Merced Pattern Meet in Merced, California. Photo by Dave Olson.



Mack Patterson piloted his plane at the Merced Pattern Meet. Elmore Wasson's plane in background. Wasson built both. Photo by Dave Olson.



Author Rick Allison's latest pair of Cursors.



John Neff of RC City with his "Fractured" Cursor. John is the guy who lays up all the fuselages at RC City.

become outdated and irrelevant over the years, and while it contains a good deal of very valuable information, almost nothing in it applies to judging the turnaround style of pattern. It was apparent very early in the process that what was needed was more or less a complete rebuild.

The new Guide should be a little easier for the beginning judge (and contestant) to deal with as far as finding needed information, as well as being far more up to date. It will be new, however, and it will be surprising if we find no "gray" areas that we need to fine tune in the future. And because the AMA rules-making apparatus is set up to deal only with piecemeal changes submitted by disparate and isolated sources often working at loggerheads with each other, it is very likely that this new guide will also need to be totally rewritten in another 20 years, after it becomes another patchwork of changes. C'est la vie, although we tried to make this one a little easier to tinker with by adding an expandable Definitions section and using more of a modular approach to present the data.

Many of the maneuver descriptions and downgrades were revamped to bring the AMA and FAI books into line with each other, with a view to simplifying life for both contest officials and judges, who have had to remember two sets of often conflicting rules for some time now. The descriptions of some maneuvers were changed to make them capable of being performed "in the box."

The calling of individual maneuvers was eliminated for several reasons, not the least of which is that it was an archaic practice dating from the days when several circles

were required at each end of the field to allow the pilot to build up his altitude, airspeed, and courage before diving to show center for his next maneuver. Secondly, there really isn't time to call maneuvers in turnaround flying. It places an additional unnecessary workload on an already very busy pilot. Calling of the box entries and exits was deemed sufficient notice of intent to commit judgeable aerobatics, and calling of the landing and takeoffs maneuvers was retained for safety (traffic control) reasons.

The old landing circle dated back to the time when points were given in pattern for "spot" landings. When was the last time you went to a contest with an actual landing circle laid out on the runway? How many runways are 30 meters wide? The circle is no more; it has been replaced by a 30 meter zone which may be displaced to anywhere on the runway by the CD for safety reasons.

That takes care of the reasoning, but what will be the net effect of all this? We peer into the crystal ball and see:

About six months to a year's worth of some fairly sloppy flying in most classes while folks sort out the new maneuvers. The good pilots should still win, providing they practice, but most of them won't look as pretty doing it for a little while. And neither will the people they beat. I don't really see more crashes, but some of the "saves" should make watching pattern a little more entertaining for awhile.

A (hopefully) moderate amount of confusion concerning those rules which have been superseded or are brand new will exist, especially on the part of that solid 10% (Isn't that a low figure? wcn) of competitors, CDs and judges who never bother to read the

new rulebook when it comes out. A few spirited discussions will end in red faces for some of these people who should have done their homework more thoroughly. This situation will also last about six months to a year.

A very small amount of change to no change at all is seen in the typical airplane setup for most people. A possible exception to this may exist in FAI, where the proposed new patterns look like they will demand even more vertical performance than in times past.

Contests may run a little faster because of fewer classes and less wasted time on long unscored turnarounds, but this likely will be offset by the need for additional scribes for the new turnaround classes, sound checks, and the slightly increased load at the scorer's table due to K factors in all classes. Probably a wash, all in all.

Multiple flightline contests will run with as many as three turnaround lines side-by-side. The use of poles on the 150 meter line will become rare, and most boxes will be marked by 60-degree lines on the runway from each pilot station.

Most local contests will choose to run only one maneuver schedule in FAI, and not hold a finals. Some may opt for three rounds of the prelim schedule, and three rounds of the finals schedule, with the best three rounds determining the winner.

Since the changes are so extensive and sweeping, I actually see a better informed group of pilots, officials and judges starting the year "on the same page." This is because it will be just about mandatory to purchase and read the new rulebook simply to partici-

continued on page 92

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LET'S GO TO THE RACES

October 3 through 6, 1991, is going to go down in the books as a time Big Bird lovers will talk about for years. I am referring to the First Annual RC Unlimited Air Races and Air Show Competition, to be held at Madera Airport near Madera, California, about twenty miles north of Fresno.

The aircraft in the Air Race will be required to have a minimum wing span of one hundred inches, with a maximum allowable weight of fifty-five pounds. Any piston engines may be used. Competing aircraft must represent the scale outline of an actual full-sized Reno Air Racer.

In addition to the Air Races, there will be an Airshow Spectacular that will feature Giant Scale and large ducted fan aircraft, duets (two planes) and teams (three or more planes) will compete for top prizes by doing the most spectacular maneuvers of which they are capable. According to the flyer I received, over \$25,000 has already been committed for prize money and the event seems to be well organized and should give RC flying and Big Birds some exciting press.

I had been wondering how I might contact one of the hopeful entrants and find out how their plane was being prepared, along with other details, so that we could all get some idea of the effort required to be competitive. It was indeed a pleasure to receive a call from Art Gross, who is preparing a Bert Baker P-38 (soon to be available from Yellow Aircraft Company) for the Big Race. Apparently most planes are being prepared by teams, and so it is with Art, who will supply the plane, engines, and radio. The engines are Super Tiger 2500s with two back up engines. Wally McAllister will be assisting with tuned pipes and A.P.C. will supply the propellers, the retract landing gears are Rhomair.

George Manning will be the pilot during the Big Race. George is a past Tournament of Champions competitor and has midget racing experience, so he should fly a good

race for his team.

Art has chosen Lefty Gardner's P-38 as his full scale example to put into model form. Lefty's full size P-38 has a very pleasing red, white and blue paint scheme, and is nicknamed "White Lightning."

One of the most interesting features on Art's P-38 is his emergency parachute. This will be a last resort device that will pop out should the plane go out of control. The aircraft will use a JR radio with one transmitter and two receivers to handle all the ser-

team the best of luck, and our thanks go to Art for sharing some of his trials and tribulations in bringing together the necessary components to be competitive.

Several years ago Art had a real problem with some spilled cyano-acrylate glue and also at about the same time he needed to apply some CA glue to a remote area of a plane he was working on. Necessity being the mother of invention, Art must be the father of innovation and adaptability, because Art devised an excellent little bulb-

type cyanoacrylate dispenser that will not clog and makes remote application of CA glue much easier.

These little beauties are very handy because if you want to make the hole in the applicator smaller, simply insert a wire in the feed tube and then stretch the tube until it is the desired diameter. I watched with fascination while Art stretched two of the feed tubes to different diameters. Dave Brown Products will be marketing the cyanoacrylate dispensers under the name C/Applicator.

Sanding blocks have always been a pain for me to arrange in a form that made sanding easy. The

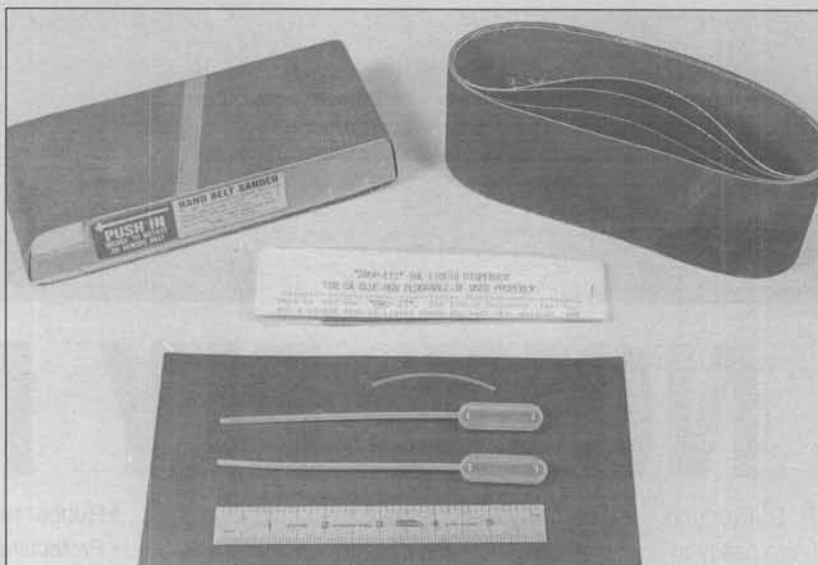
Hand Belt Sander is an excellent unit that allows quick change capability to different grits. The Hand Belt Sander is also available from Dave Brown Products.

Art also left me one of his five-foot sanding blocks; it is a four-sided affair and has four different grits on it. It is really great for use on Big Birds and should make sanding even the biggest Bird an easy task, leaving a good even surface for that special finish you want to put on your plane.

Haven't seen one of these since the one produced by Delta Mfg. over 20 years ago. It was a 40-inch long extruded aluminum tube, 3/4x1-1/2, covered on two sides with two different sanding grits. Greatest tool on earth. Still have it! wcn.

• • •

The Lesser Seattle Giant Aero Squadron received an invitation from the Bel-Air R/C



Art Gross developed these two useful items; a CA dispenser that won't clog, and a handy hand held belt sander. They will be marketed by Dave Brown Products.

vos. The servos will be set up on each control surface in a pull/pull configuration.

Art and his team will have their work cut out for them to bring all of these components together and gel them into a reliable, lean, mean racing machine. With careful attention to detail, all should go well.

We talked about all the facets of the plane and about all I could recommend to Art was that he purchase one of Miller RC Products' reduction drive electric starters. Race Day is no day to be cranking on a stubborn engine by hand. Art thought that was a good idea.

It certainly has to be a challenge to prepare a Big Bird for competition racing, but the rewards will far exceed the euphoria of the winning teams because competition always has spin offs that are beneficial to the entire RC hobby. All the Big Bird fliers in the Northwest wish Art and his Big Bird flying



Don Belisle really enjoys his Ace 4-120 Biplane. It weighs 20 lbs., and uses a Zenoah G-38 engine. The radio is a Futaba A.M.



Not all Big Bird lovers are pot-bellied old men. Justin Long enjoys flying his stand-way-off scale Fokker D-7; 11 lbs. Super Tiger 2000 power, 72-inch span.



Canadian Randy Davis poses with his Byron "Husky." The Big Bird weighs 26 lbs., and is powered by an O.S. 240 twin using a C.H. ignition system. Radio is a Super 7 Futaba.



A Balsa U.S.A. Fly Baby Biplane glistens in the sun because Richard Anderson did a great job on the finish. A Zenoah G-38 powers this 25 lb. plane, while an Airtronics Spectra P.C.M. does the guidance.



Gordon Anderson did a beautiful job building this Bellanca Decathlon. It is guided by a Futaba 1024 P.C.M. The O.S. Gemini 1.2 twin powers this 17-lb. plane.



Dick Snaer poses with his Fairchild P.T.-19. It weighs 28 lbs., and has a 109-inch wing span. A Quadra 35 pulls the Big Bird through the air, while it is controlled by a Futaba 7 UAP.



This Sig "Spacewalker" was built and is flown by Ralph Graham. It is powered by a Kawasaki 3.3 c.i. engine with a C.H. ignition system, and uses a Futaba 1024 P.C.M. for guidance.



Art Gross demonstrates his long sanding block on a quarter-scale Cub wing.



When attached to his P-38, Art Gross believes that this chute will prevent any nasty accidents should his Big Bird lose control.

Flyers of Bellingham, Washington, to display and fly their Giant Planes on June 9, 1991. So, decked out in our snazzy new club jumpsuits we converged on the Bel-Airs' flying site. The day turned out to be one of those days we all dream of during the long wet north west winters. Blue sky and sunshine was the order of the day with a light breeze right down the runway.

Thirty-six Big Bird pilots came out of the woods and enjoyed a wonderful day of flying. Local news coverage provided us with about 300 spectators. L.S.G.A.S. supplied 19 of the Big Birds and put on a good show, with Bennie Phillips towing the Stars and Stripes into the air with his Piper Cub, to much applause.

The flying was more on the order of a Barnstormer's Airshow than the usual fly-in, but we did a lot of enjoyable flying, with only a few faux pas. Many thanks to Bel-Air's president Dick Snaer, good buddy Dick Anderson, and all the Bel-Air members for an exciting day of flying at their field. No doubt some of the Bel-Air fliers will now have the urge to give Big Birds a try, and we can only wish them well in their endeavors.

• • •

Dick Hansen, C.E.O., head cameraman and chief shipping clerk at Hansen Scale Video, 10807 S.E. Stacy Court, Portland, OR 97266, telephone (503) 653-2578, was kind enough to send me his tape of the Top Gun Scale Contest for 1991, videotaped at West Palm Beach, Florida. There were some absolutely great planes at this year's event, with several from England, Germany and France. The quality of the flying was just

what you would expect from the Top Gun get-together.

I called Dick to thank him for his video and we chatted about his tape at some length. Dick said that he is in no way a professional video photographer and that his wish is to provide his view of the scale contests he attends with a lot of different shots of the attending planes and pilots. The shots of the takeoffs and landings are quite good. Dick's comments and those of his good friend Dick Heining (Proctor Enterprises owner) are very humorous. If you would enjoy two hours of great scale flying then this tape is for you. Dick says that there is a money-back guarantee with his videos, so if you are unhappy with it, you may return it for a full refund. I personally would not part with the old Norwegian's tape for any price.

• • •

The Big Bird Electric experiment is starting to get into gear. So far the experience has been very rewarding, probably because I have had more opportunity to visit with Bob Benjamin. Bob is one of those people who has a vast store house of knowledge and willingly shares it with those around him. He is making my try at Big Bird electrics a pleasure.

Mounting an electric motor is a much different proposition than mounting an internal combustion single cylinder engine. A high quality motor such as the Astro Flight "60" is going to run very smoothly with little vibration, therefore it will only be necessary to build the motor mount strong enough to withstand thrust output and aerodynamic

loads. Extra structure to dampen vibration will be unnecessary and only add excessive weight. It will be necessary to provide air vents for the cooling holes in the motor, and an outlet to vent off the heat. So the cool air inlet will no doubt add to the overall weight reduction of the airframe.

Balancing the prop on a single-cylinder engine has always been of questionable value. With an electric motor it is an absolute necessity, because the motor runs so smoothly it makes little sense to induce vibration into a superb smooth-running system with an unbalanced propeller.

It is our good fortune that Bob Boucher, of Astro Flight, is visiting the Seattle area over the July 4th weekend. Bob Benjamin and I hope to extend some Northwest hospitality to Bob. We also hope he brings some of that nice California sunshine with him, because as I write this column, on June 20, it is raining like the dickens and it's 52 degrees outside!

Connectors are a very important area of concern in electric flight. If the motor flight pack wiring and connectors have insufficient current carrying capability, the length of flight is greatly affected. I have been told that Sermos connectors are the Rolls Royce of connectors, so John Sermos was called and he says they give the best performance available, which translates into more amps for the motor to use to fly the plane. (*When you mention this to Bob Boucher, you'll hear about the new connectors he is introducing, for sure! wcn.*)

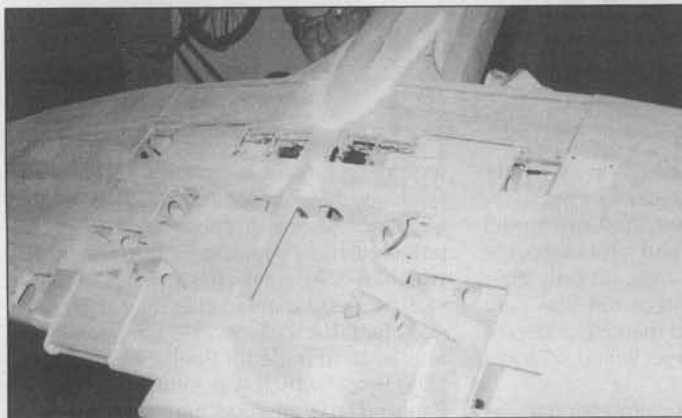
A big bag of Sermos connectors arrived at the old hangar and they are indeed impres-



Lefty Gardner's P-38 "White Lightning," which Art Gross is using as his example for the Unlimited Race at Madera, CA, October 3 through 6, 1991.



John Bolle shows how his Super Tiger G-4500's will be mounted together for the belt drive on his Sea Fury "Dreadnought."



Sea Fury "Dreadnought" is well on its way to becoming a contender at the Unlimited Air Race at Madera Municipal Airport, Madera, CA. John Bolle is an outstanding builder.



John Bolle may be smiling because he knows that the full sized Sea Fury "Dreadnought" has won the Unlimited class three times at the Reno Air Races. John's Sea Fury is ready for glassing.

sive. The Sermos connector bodies are Lexan and the contacts are silver coated. They may be ganged together in many configurations. The quality is top of the line.

Since becoming interested in an electric powered Big Bird, I have started reading the Electric Flight columns more closely and I have this picture of men in white lab coats standing before banks of instrumentation trying to get the very last amp through a very small motor swinging a very large prop.

Now, I am not criticizing these gentlemen, because they are obviously enjoying themselves, and their kind of thorough investigating and experimenting makes it easier for someone such as myself who wants to use off-the-shelf equipment and get in the air. I can only offer my admiration and thanks for their efforts, and say that I will not be doing that kind of work with electric flight. My efforts will be toward reporting about what equipment we may have available to us as Big Bird enthusiasts that may be purchased off-the-shelf and used without a lot of experimentation.

Electric flight is going to be very popular in areas that demand quieter type flying and now is an excellent time to give it a try because newer and better equipment is appearing.

• • •

Last month I showed you some of the experimental runs on the K.D.I. muffler and I want to add this month that those experiments were possible because John Tatone was very helpful when I was unable to find one of his mufflers for my Zenoah G-38 at any of the local Hobby shops. As reported,

my ignition module failure stopped the muffler test. One of the questions that remains unresolved is whether the K.D.I. will withstand the exhaust heat of the big gas engine. The K.D.I. was doing fine until the module quit.

A quick call to Bill Carpenter at C.H. Electronics gave me trouble-shooting ideas, and I soon found that the problem was an internal failure of the spark lead. I sent in the unit, and in short order received an updated exchange unit. I must say that I was impressed, because the unit I received was quite a bit improved; it had C.H.'s latest coil and a shielded lead.

Over the years, the C.H. system has been evolving from a pretty fine product into an outstanding, top-of-the-line unit, and that is because Bill Carpenter has continued his research and development. Bill has had quite a few health problems, but has kept improving his product when he probably should have been getting a little more rest. Those of us who enjoy the benefits of C.H. Electronic ignition systems on our engines owe Bill a lot of thanks for his efforts, which have made our Big Bird engines run so well and so smoothly. When you see Bill at a Fly-in, go over and shake his hand and say "Thanks."

Col. Nick Nixon, U.S.A.F. retired, was passing through Tacoma, on his way to Alaska from Lake Charles, Louisiana, and gave me a call. Nick wanted to know where the good hobby shops were in our area, and I was able to inform him. It is always great to hear from Air Force types because, as with Nick, we had many of the same acquaintances

and operated out of many of the same bases, and of course, we both enjoy our Big Birds to the fullest.

Nick has promised to tell all the Big Bird flyers in the L.A.R.K.S. club to send us some pictures and let us know how Big Bird flying is going down south. Big Bird humor is hard to beat. Nick was telling me about his quarter-scale Ugly Stick. This beauty has an .020 Cox engine, an 18-inch wing span, and is an exact scale model of an Ugly Stick. I can only speculate as to if it is Q.S.A.A. legal!

I was just about to mail off my column to *Model Builder* when a call to Walt Hale's R/C Supply revealed that Walt and his partner, John Bolle, intend to enter a Sea Fury named "Dreadnought" in the unlimited air race. The aircraft has a 101-inch wingspan and will be powered by two Super Tigre G 4500s using a belt drive system. Radio is a JR X347 P.C.M.

John is the builder and Walt the pilot. Walt may not have the credentials of some of the other pilots, but he is one of the finest RC pilots many of us have seen anywhere, so it is felt that the "Dreadnought" will be a very competitive team. Northwest Big Bird enthusiasts around the Tacoma area will no doubt be cheering for Walt and John.

Big Bird "Book of the Month" is *Tales of an Ancient Modeler* by Norm Rosenstock. This is great reading for any RC enthusiast, available from V.I.P. Publishers, Inc., P.O. Box 16103, Colorado Springs, CO 80935.

Good flying and sunny skies until next month. Bruce Edwards, 8304 53rd Sreet. Ct. West, Tacoma, WA 98467; (206) 564-4416.

MB

A PROFESSIONAL DEMONSTRATION

Commercial plugs only appear in this column when something new impresses me from a technical standpoint. The following is not a plug because the product didn't meet that and other qualifications. I'm writing this because the episode was both humorous and sad.

We entered a float fun fly at Lake Goodwin, Washington, in April (and placed fourth. Well . . . fourth is better than fifth.) After the

after that, the model crashed on the water and floated in four separate pieces.

The demonstrator then fired up model number two, and again had a lot of trouble getting it started. It too, took off only after much bouncing. The motor run was very erratic, but I think he did manage a loop of sorts. Some unkind observer yelled, "Cancel my order."

We tend to think of "professional" as superior, and "amateur" as amateurish.

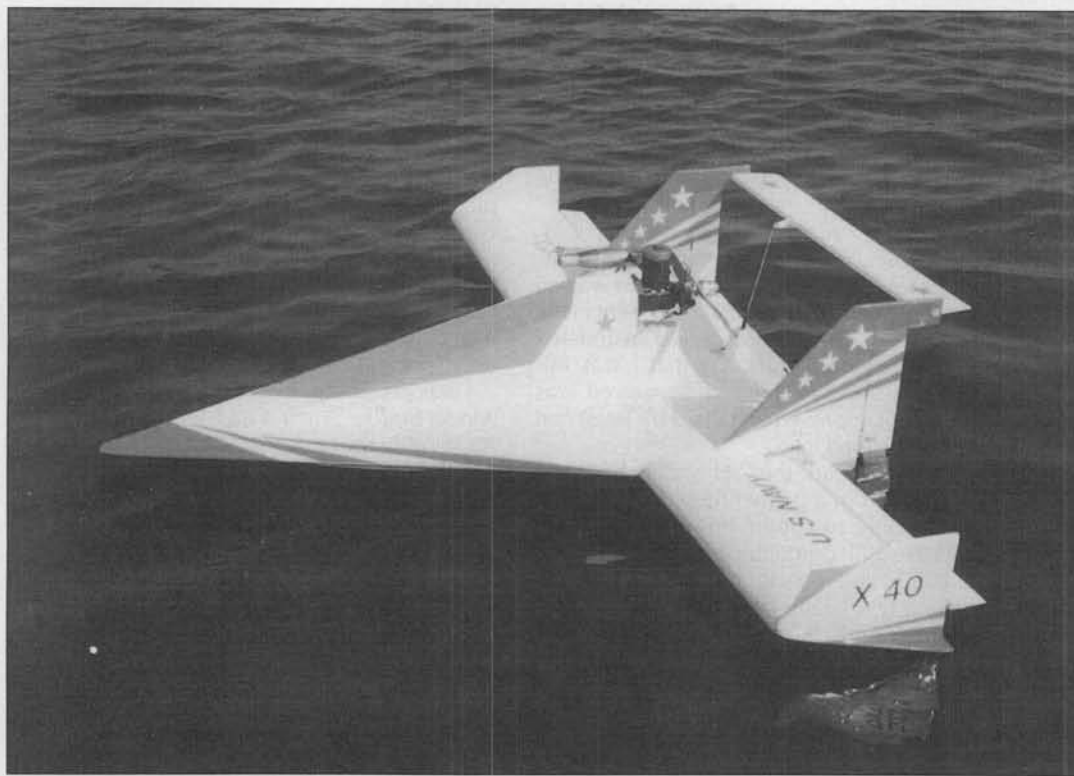
requires a bit of care in both takeoffs and landings, but once airborne, it is neither quiet nor furtive in appearance. It is .40-powered, has 47-inch span, 600 sq. in., and weighs 6-3/4 pounds. It is fast, has excellent vertical performance, flies like a jet, and does fantastic Lomcovaks. Lomcovaks are also stock in trade for Paul's "Sea Era" and "The Beast" which was jointly designed by Paul and Ed Westwood, and is kitted by John Sullivan.

The Sea Stealth has one stunt that is completely unique, however. It can descend vertically (actually at about an 85-degree angle) from any altitude, with the engine idling, nose level, elevator neutral; and make a hands-off-the-transmitter pancake landing on the water without killing the engine. It looks a bit like a parachute landing; but parachutes don't take off from the water after landing! Paul admits this capability wasn't consciously designed into the plane, but was serendipity. He stumbled onto its vertical-landing mode, and has amazed people with it ever since.

This most-unusual aerodynamic mode is a bit difficult to explain. The following is Paul Weston's own theory: "The leading edge of the delta is almost twice as long as that of the straight wing panels, which causes the center of pressure to move forward [after the stall]. By coincidence it moves to coincide with the CG, and thus produces the stable, hands-off, controls-centered, freefall.

"I think the lift coefficient at this extreme angle of attack could be around four or five, due to the vortices generated over the rounded leading edges of the wings and the delta forward extension."

Your columnist just ran a little lift calculation to check Paul on his estimate. In watching Sea Stealth land vertically, he and I estimate a descent velocity of about 15 feet per second. If that is accurate, the stalled lift



Paul Weston's "Sea Stealth" can make vertical landings at idle. See text.

contest, a manufacturer of floatplane kits, who shall remain anonymous, gave us a couple of demonstration flights. He had trouble starting the engine on the first plane. Once running, it bounced badly on takeoff. I suspect the float bottom angle was too low (see "MD&TS" for September). Immediately after take off, one plastic float strut broke and the float hung straight down. Seconds

Forget it. Right after the professional demonstration above, my modeling buddy, Paul Weston, demonstrated his original-design "Sea Stealth" (see photo). Now that was a demonstration!

This delta with wings is one remarkable seaplane. It uses the wing center section for flotation, like Paul's earlier model, the "Sea Era". Because of its huge bottom area, it

coefficient figures out to be 6.3! These are ridiculously-high-sounding CLs, but we are talking about a mode where we have no experience.

I'm not sure whether to call the force which is retarding the vertical descent "lift" or "drag" in this case. Lift and drag are the vertical and horizontal components, respectively, of the total force on the wing, but in this case the horizontal component is zero. Also, the lift and the drag formulas are the same, so it doesn't matter. Call it a drag coefficient of 6.3 if you want. But that is just as ridiculous as a lift coefficient that high. The classical 90-degree flat-plate drag coefficient is only .64, a tenth as much, so I've either made a mistake or there is something I don't understand here. The Sea Stealth would have to descend flat at 33 mph to have a drag coefficient of .64. It settles very much slower than that. I just calculated the drag coefficient for a typical parachute, and it also looks much too high. Readers, "Help."

Paul Weston has plans available for Sea Stealth, at \$15.00 plus \$3.50 shipping and handling. This includes a complete instruction manual. His address is 4214 W. Lake Sammamish Parkway NE, #306, Redmond, WA 98052.

THE ELECTROMAGNETIC SPECTRUM

Physics anyone? Science is something

formers, speakers, etc., where the electricity is flowing in wire coils and the magnetism is in iron cores.

Neither electricity nor magnetism has to have the wire or iron, however. Both can flow through space as waves, and do, no matter what the frequency of the "alternating current". But in all cases this radiation will consist of both an electric field and a magnetic field at right angles to it, hence the name "electromagnetic radiation."

I'm sure you have already been looking at the chart, but look some more. About the lowest point of interest is our alternating current power, where the frequency is only 60 cycles per second (50 in Europe). Saying "cycles per second" is a no-no nowadays, however. One cycle per second is called one "Hertz," in honor of Heinrich Hertz who generated the first man-made radio waves.

The lower the frequency the larger the "transmitter" must be to radiate much electromagnetic energy. At 60 Hertz the amount of radiation is very small, but enough that man is beginning to worry about the effects of sleeping under an electric blanket or living under a high-voltage power line.

By the way, for those unfamiliar with the system for denoting large numbers, "ten to the sixth" (written as a ten with an exponent

in that part of the spectrum to permit the FCC to be more generous.

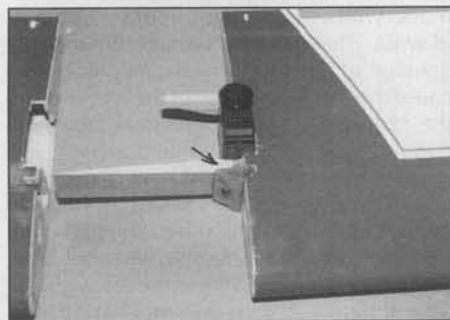
You will note that as the frequency gets higher, radio waves turn into infra red, then into visible light waves. Light waves we must have to build and fly our model airplanes. Vision is part of the feedback loop when we fly R/C. We talk about the colors of the rainbow as "the spectrum". Actually the visible spectrum is a very small part of the total spectrum.

As the frequency continues to increase, light waves turn into ultra violet and on into X-rays, and the X-rays turn into nuclear radiation then into cosmic rays.

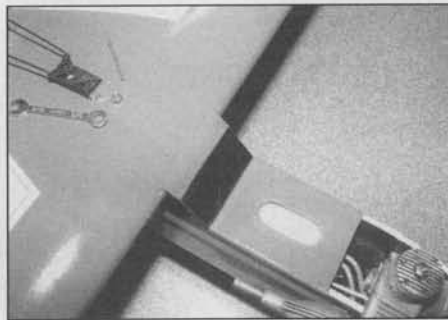
It is always the same combination of electricity and magnetism. We give different parts of the spectrum different names, as the various frequencies affect our human senses in different ways and we have different uses for them. A radio transmitter doesn't look much like a light bulb, which isn't much like an X-ray machine, but they are all putting out different frequencies of that same electromagnetic radiation. The galaxies in space radiate pretty much the entire spectrum. Now isn't that fascinating?

DUDLEY COOK IMPROVES SLIP-OFF WING MOUNT

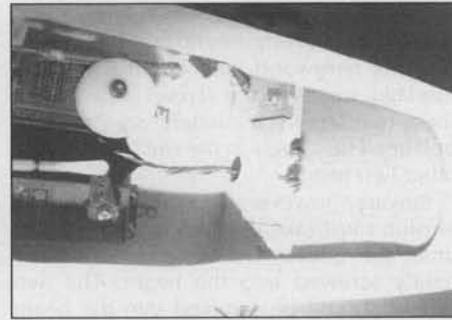
This column is operating as it should. You readers are contributing good technical stuff



Hardwood fitting was drilled and tapped for wing mounting bolt, and built into wing center with glue and screws.



Inverted wing mounting bolt is adjusted and locked with two wrenches; see text. Also note fuel tank window and alleron arm set for differential.

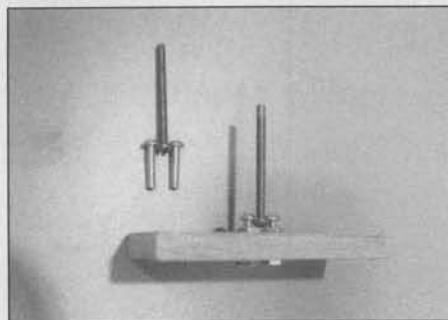


Two screw heads provide simple-to-make slip-off wing mount slot. Also note author's exponential attachment on elevator servo.

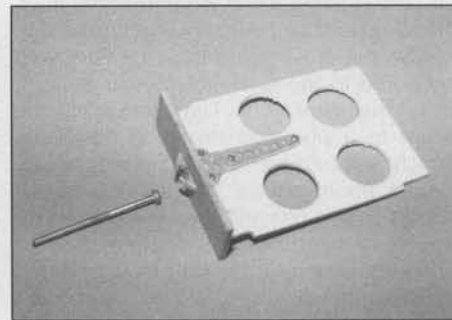
some people love and other people hate. Since you are reading a technical stuff column, you are probably one of the lovers. If you are a young lover you may not have been exposed to electromagnetic radiation theory yet. (We are all exposed to electromagnetic radiation itself). Interesting stuff, and it impacts our model airplane hobby in many ways.

Very briefly, if we bring a magnetic compass near a wire carrying a current, the compass will deflect. There is a magnetic field at right angles to the electric field. Likewise, a permanent magnet has an electric field surrounding it at right angles to its magnetic field. Electricity and magnetism can't exist without each other. (How romantic).

When we start alternating an electric current or varying a magnetic field, the magnetism and the electricity start talking to each other (it was a pretty boring marriage up to this point). This interaction is the principle behind all electric motors, trans-



Simply built slip-off wing mount uses two more screw heads.



Slip-off wing mount made from 1/8-inch hard aluminum alloy. Dudley Cook puts bolt head in the slot.

of 6) means one with six zeros after it, or one million, etc. From a frequency of half-a-million to one-and-a-half million, Hertz is the AM radio broadcast band. In the 72 megahertz band (yes, Charlie, mega means million) we have all fifty of our RC airplane channels neatly tucked in. They are tucked closer than we would like, but there are too many other activities which demand space

and design improvements, and we are all getting smarter. For instance, several of you have taken my original design of the slip-off wing mount and improved it. In the June issue I reported on Dan Fulmer's version of the slip-off wing mount, for use on two-piece wings.

Dudley Cook, of Middlesex, New Jersey, sent the latest excellent improvement. As I

originally proposed the model-saving slip-off wing mount in the June 1990 issue of MD&TS, the single wing-mounting bolt had the head on top of the wing (or on the bottom of the wing, in the case of low wingers). The nut on this bolt fit into a slot in a fuselage structural bulkhead, and had to have a special tab attached to it to keep it from rotating during installation of the wing.

Dudley got creative and turned the bolt upside down. Now the head of the bolt goes into the slot, and the nut is on the outside of the wing where it can be tightened with a wrench or pliers. Dudley threads part of the bolt guide tube through the wing, or puts a captive nut on top of the wing. Excellent! I like it. A photo shows Dudley's configuration.

Now we don't have to put a tab on the nut, we don't have to make a deep slot to accommodate excess bolt length, and we can use a lock nut on the outside of the wing to assure that the bolt doesn't loosen under vibration. Before, we had to somehow secure the head of the bolt on the outside of the wing, usually by putting a drop of glue on it.

Making the slot out of two more screw heads, as shown in a photo, is a further thought of my own. With shop equipment it is no problem to make a metal slotted fitting, as I have previously discussed, but it has worried me that many modelers don't have the tools to make one easily. The twin-screw-head slot requires no building, only a piece of hardwood for a beam across the fuselage, to screw the screws into. Locate these two screws accurately, so the wing-bolt head fits snugly in the slot between the other two heads.

Beware, however. Those two screws in tension must take the weight of the plane times the g-load. Use long wood screws tightly screwed into the beam. The two screws should be screwed into the beam almost all the way, leaving just enough gap for the wing bolt head. Long unsupported screw shanks below the heads would invite the screws to bend and separate under load, the wing bolt head might pop out of the slot.

Also the cross beam must be very well anchored to the fuselage sides or bottom. Don't trust glue alone. I glue and screw the beam to a plywood structural bulkhead, which is in turn well tied into the fuselage.

One photo shows this bolt-heads slot design on one of my planes. It has given no trouble in flight, and is easier to make than previous versions of the slip-off wing mount.

Remember that in the slip-off wing mount we only tighten the single bolt finger tight, because we want it to slip out of its slot easily in the event of any type of crash. Actually, "Finger tight" isn't going to be quite tight enough if all our fingers have to grab is the small end of the bolt. One can envision a number of ways to turn the protruding end of the bolt to snug the bolt head against the open end of the slot. I prefer filing a flat on each side of the bolt end, then grabbing the flats with pliers or a special socket wrench. Look at the photograph.

I use a piece of rectangular brass tubing

(available in your hobby shop), which just fits over the flats on the bolt end, as a socket wrench to tighten the bolt and hold it while I tighten the lock nut with a small box wrench.

Not "tight", just "snug." Use your judgment. The aft shear pin will keep the bolt head in the slot, but we don't want the wing bolt so loose that the wing chafes with the fuselage under engine vibration.

Within an hour of reading Dudley's letter I had inverted the slip-off mounting bolt on one of my models. I have since flown this model a number of times. Perfect! Today I test-flew a new model where the slip-off wing mount was built Dudley-style to start

with. Perfect! Thanks, Dudley Cook, for your valuable improvement.

Small diameter screws for wing mounting bolts, that are long enough to go through the thickest part of the wing and into the fuselage slot, are a bit hard to locate. If you can't find a source, use threaded steel rod, and put a nut permanently on one end for a "head" to engage the slot. Screw the rod through until it extends slightly from the nut, then solder and/or peen (rivet) the end onto the face of the nut to lock it.

In the June '90 issue, we discussed using a small nylon screw for the shear pin at the trailing edge, but, in practice, I find I like a small-diameter wooden dowel shear pin much better. On both an eight-pound .60-powered floatplane and on a five pound .40-powered landplane I use 1/8-inch diameter birch dowel. It has always sheared when it was supposed to and never failed when it shouldn't have.

I tap the pin into place in snug holes. If the holes get worn so the pin is loose and apt to fall out, I will tack it lightly in place with CA, or use a slightly larger dowel. If the shear pin breaks in a crash, tap the broken ends out of the holes with a punch. Be sure to use a through-hole in the fuselage beam so you can drive the broken pin on through.

If you read the June '90 issue you will recall that we purposely crashed an RC model with a slip-off wing mount in all kinds of ways. The wing always slid off, and the damage to the model was negligible, because the kinetic energies of the wing and of the rest of the plane were separated and there was no destructive interaction.

I spoke at a meeting of the Marymoor RC club recently and talked about the slip-off wing mount, among other things. One member seemed a bit concerned about the danger of losing the wing in the air, with the slip-off mount. For the record: I have flown many flights with slip-off wing mounts on airplanes of different sizes, both seaplanes and land planes. I've never had a wing come loose in the air. One must be careful and use good judgement in using the slip-off mount, but that is required with any wing mount.

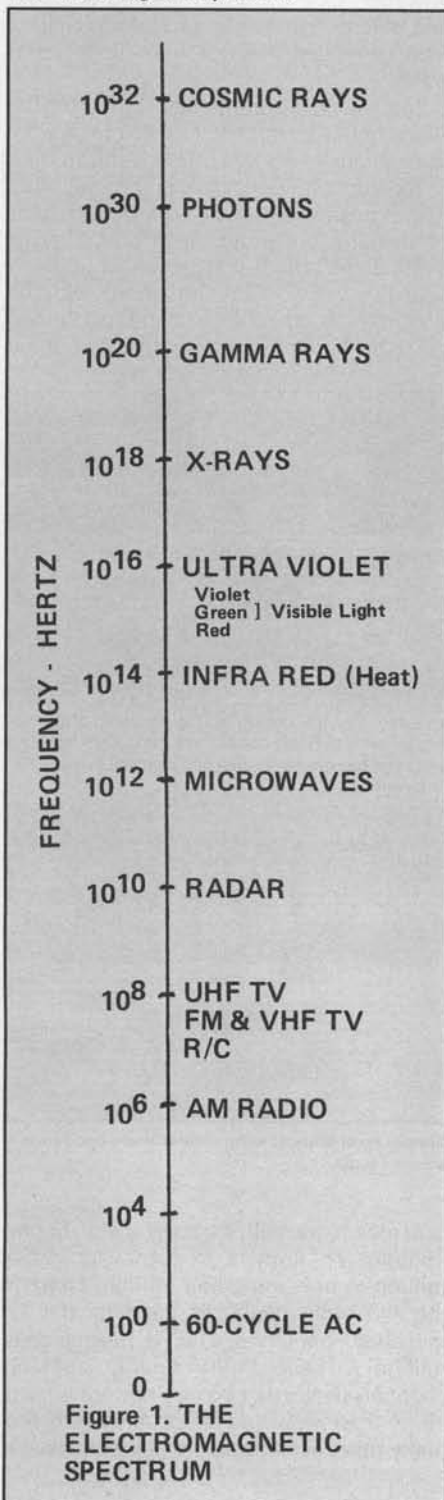
I've had a few crashes and very rough landings with these planes. In every case the wing separated from the plane cleanly upon impact. In ninety percent of the cases the damage was zero. In one violent crash the firewall was torn out and the float struts were a shambles, but there was no other damage to the fuselage, or to the tail, the wing structure, or wing mounting. I've probably saved at least a hundred hours of repair time by using the slip-off wing mount in the last year and a half.

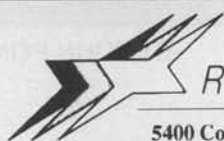
A SUPER SLIP-OFF WING MOUNT?

P.S. I was about to mail in this column when I got another letter from Dudley Cook, discussing details of the shear pin. He got me to thinking about it some more. I believe I said, in an earlier column, that the shear pin was the part of the slip-off wing mount that I liked the least. I had spent a lot of time trying to optimize the shear pin design, but

continued on page 92

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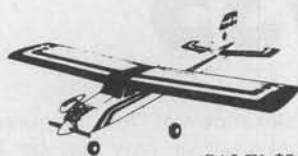
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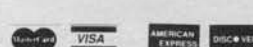
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LOOKING BACK TO 1935

This month we have a real treat in store for you, thanks to Franklin Dewey, Burbank, CA, who attended the NAA Nationals held at Lambert Field, St. Louis, MO armed with his trusty Brownie camera. It is 1935 and gas models have finally come into their own as one of the most popular events. What else could we start off with but Photo No. 1 of Joe Kovel's famous KG-2 (KG taken from the builder-designer team: Joe Kovel and Charlie Grant, then editor of *Model Airplane News*). You can't see the scale reading but suffice to say Joe received the maximum fuel allotment as seven pounds was the limiting factor.

The model flew quite well, placing fourth with a flight of 31 minutes, 5 seconds. To say the weather was great was a terrific under-

statement with temperatures of 90 degrees, and light, southerly winds. The first four gas contestants registered flights over 30 minutes. Those were the days for great free flight gas times!

Looking over the list of gas model contestants, this writer received a pleasant surprise in spotting Dewey's name in sixth place with a flight of 9 minutes, 17 seconds. He has provided Photo No. 2 of his "Jeep," an early Dallaire design we have failed to track down.

How about Photo No. 3? You didn't know that the Junior Motors Co. set up a "repair" and help station in those early days? Johnny Brodbeck, of K&B, was famous for doing this after WW II. Noted are a considerable number of spectators, kibitzers, and helpers

for the model known as "Mrs. Frequently." This model may or may not be Fred Buckenberg's design while a member of the Bamberger Model Club of New Jersey. This club enjoyed a tremendous turnout of gas models at this and subsequent Nationals featuring the highly coveted Texaco Perpetual Trophy.

We have been running photos of Winfred "Winnie" Davis, of Kansas City, MO, for a considerable number of issues and years. This columnist was greatly pleased to find Photo No. 4 among Dewey's group of negatives. Like many other contestants, Winnie had his share of engine troubles, but did take fifth place in the Comet Gas Powered Open R.O.G. event.

Incidentally, how many of you out there



Photo No. 1. Joe Kovel's KG-2 is being weighed in at 1936 Nationals, Lambert Field, St. Louis, Missouri.



Photo No. 2. Franklin Dewey placed sixth in the 1935 Nationals at St. Louis.



Photo No. 3. Nothing new under the sun! An engine repair station by Brown Jr. Motors at the '35 Nats. Probably the first of its kind!

know that Comet Model Supply put up a trophy for the Gas Model Event held in conjunction with the Texaco Event in the 1934 Nationals at Akron, Ohio? This was won by Carl V. Carlson, of Chicago, with a flight of 6 minutes, 48 seconds, thereby setting the record for the Open Gas Event. As a side note, this Gas Model Event was continued in subsequent Nationals featuring the Texaco Event.

Speaking of the foregoing Comet Trophy, Photo No. 5 shows a Loutrel Sportster as designed by Louie P. Loutrel (of Loutrel engine fame) taking off. Ludwig Bielko and Ben Shereshaw each brought models of the Sportster, with Bielko placing fourth and Shereshaw ending up in seventh place.

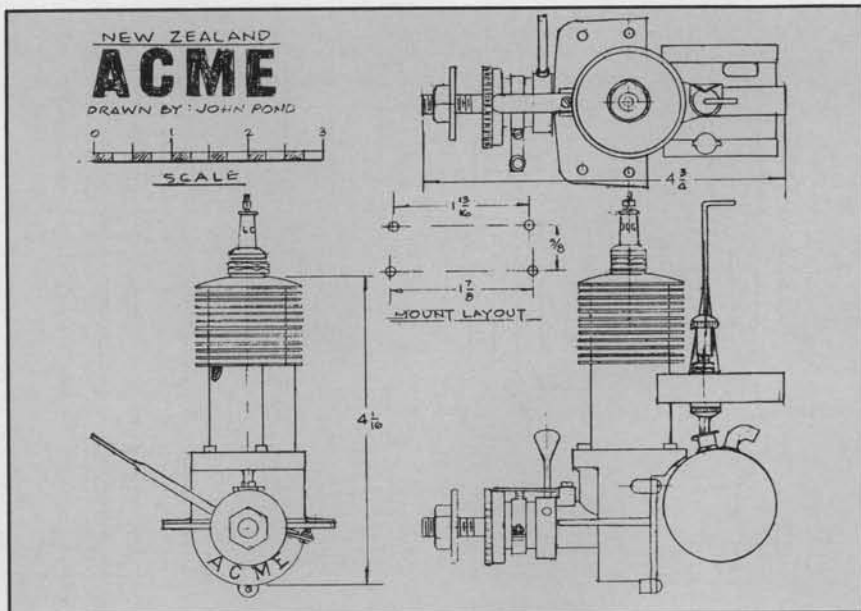
A little known note is that Ben Shereshaw designed this model for the Loutrel firm. One of these days, we will attempt a recreation, as the boys from the Bob Long group used this wing in their cabin design

known as the "Old Box" and published as the "Long Cabin" model in *Air Trails*. Based on Shereshaw's "Pioneer" design, it wouldn't

excellent candidate for the special events that keep popping up on the SAM contest calendar. We are, of course, referring to Ohlsson 60, GHQ only, Vivell 35, and Class B Electric Events. Just the model instead of a Lanzo Bomber! Getting down to business, does anyone have a copy of this plan? If not, do you have any old parts that could be copied? In short, we're desperate, we can use anything!

FREE PLUG DEPARTMENT

For those interested in "Year-Type" books, Mervin Buckmaster, of Barinoe Productions, R.M.B. 1798 Samaria Road, Benalla, Victoria 3673, Australia, has turned out his second edition of "Australian Aeromodeling Digest 1991." Volume I has already been on the mar-



ENGINE OF THE MONTH

take much to make a creditable replica.

Photo No. 6 shows a rare one; with the wing off is a Heath Company "Miss Empire State." This squarish, simple model, powered by a Brown Jr. engine, appears to be an

ket since 1990.

These are mostly Australian-oriented designs, engines, etc., but this writer feels we can learn from everyone. Some of the articles are rather interesting, particularly the



Photo No. 4. Winnie Davis with a Corben Super Ace, gas powered flying scale. Placed sixth in the Comet Gas Powered Event.

Photo No. 5. Ludwig Bielko's "Loutrel Sportster" taking off for a fourth place.



Photo No. 6. Seen with the wing off, a little known Heath Co. "Miss Empire State."



attempt on the World's Record for RC Seaplanes. Imagine using the large center float as the gas tank and using a Perry Pump to bring the fuel up. Rather ingenious! Books are \$10.00 each. Suggest you get yours now as I suspect production is severely limited.

ENGINE OF THE MONTH

We are again indebted to Gordon Coddling, of Kingman, Arizona, for this most unusual New Zealand subject, the "Acme." This engine arrived in the U.S. via a trade with Cliff Olsen in the post-WW II years.

The "Chrome Plated Brown 60," as Coddling is fond of calling the Acme, was the product of A.J. "Bert" Dacombe, living in Christchurch, New Zealand. In 1938 Bert produced a successful running engine to the extent he immediately went into production. From reports, production of the Acme continued until 1954, when Bert completely dropped all manufacturing.

The engine shown is the 1/4 hp version. This is the old S.A.E. way of designating engine size rather than cubic-inch displace-

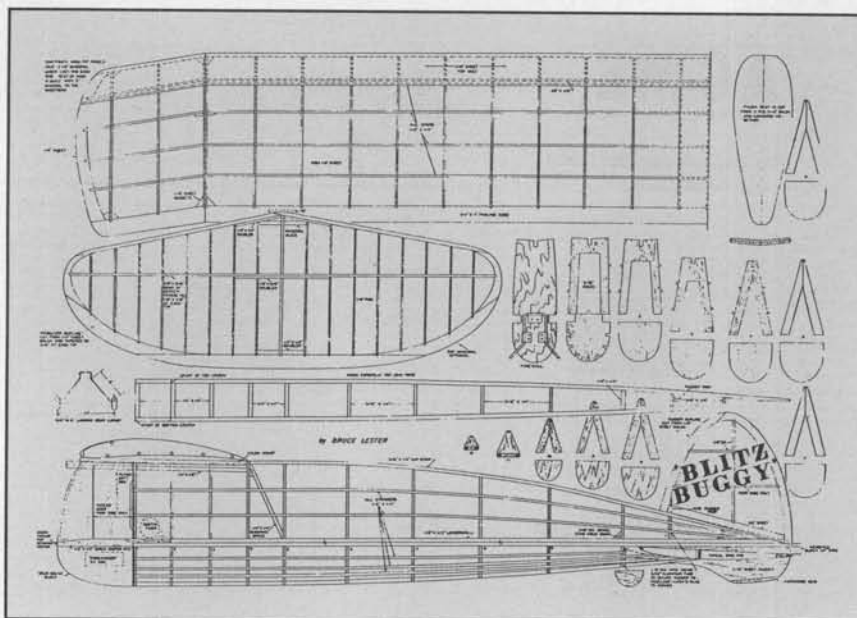
Brown Jr. All engines followed this basic design. For those interested in the technical details, the crankcase was "hogged" out of

sand cast aluminum blanks (giving considerable problems with porosity), which required much machining. Cylinder was turned from steel bar stock as was the crankshaft. The piston was 3% nickel cast iron lapped to the cylinder, which was bolted to the turned flange of the crankcase.

Interestingly enough, Dacombe had to make his own spark coils and actually made his own coil winder. He would provide coils with each engine sold, but not independently. Coils were too hard to come by during the war years!

All Acme engines were sideport, three-port induction and "Westbury"

piston timing (taken from the English engines of that time). Coddling states the power output was as good as an Ohlsson 60 using the same prop and fuel. Inasmuch as the en-



MODEL OF THE MONTH

ment. Dacombe produced 1/3, 1/4, 1/5, the Super 1/6, 1/6, and 1/7 horsepower. The Acme engine we are featuring had the same bore (7/8-inch) and stroke (1-inch) as the



Photo No. 8. A good group of rubber powered modelers; Rogusky, Cushenberry, and Burt.

(Left) Photo No. 7. Dick Everett not only wrote a column, but was a terrific competitor in Southern California meets.



Photo No. 9. A beautiful 1/2A Art Chester "Jeep" by Eut Tileston. Fine craftsmanship.

gine was a long-stroke type, plenty of torque was developed. Starting was easy and fuel consumption low.

Of note is the "Lodge" sparking plug (English) that functioned as well as any of the other spark plugs of that era. Also interesting are the tapered mounting flanges which gives the engine a downthrust of one to two degrees for cabin-type adjustment.

MODEL OF THE MONTH

This month we present a Canadian design as built and flown by Bruce Lester called the "Blitz Buggy." The model bears a striking resemblance to Sal Taibi's "Pacer" or Jerry Stoloff's "Yehudi."

In design the model has the same features as the Pacer; inverted lifting stabilizer set at a positive angle, triangular rear fuselage with an extremely short nose. This short nose feature was adopted by numerous modelers, especially by Paul Gilliam in his series of "Civvy Boy" designs. The thinking here was to group the center of lift, center of gravity, and the center of lateral area as closely as possible to obtain maximum stability resulting from the short moments between forces.

Lester reports this model was quite successful in the Canadian Nationals, the AMA Nats, and several other important meets. The major difference in this model as compared to Skyscraper designs was the swept-back wing tips. Some modicum of stability

was obtained with this arrangement. For those Canadians wanting to build a local design, the "Blitz Buggy" is the answer!

FIFTY YEARS AGO

Just received in the mail a copy of the Berkeley Model Supplies dealer bulletin dated January 25, 1940. Most interesting are the side announcements, such as staff additions, Henry Struck and Sal Taibi, to their experimental and development group. At that time, Sal was in the woodworking department (now we know where he learned his wood and the good cutting tricks) while Henry Struck was put on the drafting table to produce some of those good flying scale designs with which he was so expert in winning trophies.

Interesting enough, the "Berkeley Boys" copped the first contest under the new NAA rules: Struck, first; Taibi, second; and Joe Raspante, third. Can't do any better than that!

Bill Effinger also announced that Berkeley would exhibit at the Macy Hobby Show during the month of February, using a large space in the Macy Toyland floor space. In addition, for the first time, Berkeley would display at the American Toy Fair, Hotel McAlpin, Sixth Ave. and 34th St., New York. This was scheduled for April 1st through April 20th, 1940.

Of particular historical interest was the announcement that Berkeley was now stock-

ing the two new Ohlsson engines: Custom 60 and "19." The sample 60 mounted in a Buccaneer Special C was good enough to place second in the Metropolitan Council Contest on January 7th against 83 other contestants! All of the above without a single test flight!

Bulletins like this are always little gems of information. Under "new motors," Berkeley noted the new Forster "B" engine was to be introduced at the same time as the "Brownie B," the latter selling at the attractive price of \$7.50 complete.

Also noted was the announcement by American Supercraft Corp. that important improvements had been made on the latest "Sky Chief." These included Champion Spark Plugs as standard equipment, a piston ring for better compression seal (and starting), and the fuel tank now attached to the needle valve.

Man! Those were the days when the model industry was in a ferment of activity and business competition. The modeler really had it made then!

NOSTALGIA CORNER

We have been running photos taken by Dick Everett for his *Air Trails* "Out West" column during the 1946-56 era. With the shots that have been presented, it is only logical that we feature Photo No. 7 showing Dick Everett himself.

Besides being a columnist, Dick was also



Photo No. 10. Finally! Sal Taibi came up with his 1940 Nats winner with Super Cyclone Power. The "new" one has an Orwick 64 up front. Also see page 80.



Photo No. 11. J.H. Coppage's "Buzzard" built by Bud Perry of Alabama. A surprise for good looks!



Photo No. 12. A squadron of "Miss Fortune X" models by John Delagrance. Mickey DeAngelis design.

an ardent competitor, witnessed by the number of trophies he is holding from the Los Alamitos Nationals. Everett also designed numerous free flight gas and rubber powered models. Many an issue of *Model Airplane News* and *Air Trails* featured such models as "Elwy," "Snobber," "Pine Needle," and others too numerous to mention.

Everett's models were no one-time winner types. Wherever results were published, especially at the Nats, or the big Western Open, Dick's name could be found among the winners with such models as "Elwy."

Everett first came to notice as a member of the Hampton Roads "Brainbusters," a club that boasted many of the modelers employed at Langley NASA Research Center. When he moved to the West Coast, Dick fitted right in with all the hot competitors.

SOUTHERN CALIFORNIA ECHOES

We can always depend on "Jasper" Mikkelsen (known as "Mik") for good photos of rubber powered free flight competition models. Such is the case as seen in Photo No. 8 showing three hot competitors at Taft: John Rogusky, '39 Korda Wakefield (Megow kit), Bill Cushenberry, Ernie Linn Wakefield, and Bill Burt, Lanzo Duplex cabin.

Ever since the advent of good FAI rubber, as sold by Ed Dolby of FAI Model Supplies, there has been a resurgence of interest in rubber powered models. This was augmented last year by the appearance of "yellow" rubber, considered by many to be the best available. Confidence in that the rubber motor won't tear up your model is probably the best incentive to return to this type of flying.

PLYMOUTH INTERNATIONAL REVISITED

Quite a few issues back, we ran a photo of the lucky winners of the 1952 Plymouth

International local eliminations on the West Coast. Seen in the photo taken in the baggage car were fifteen people for whom we asked identification.

We received numerous letters, but the most hilarious was the one from Gene Wallock. Gene, in his younger days, was irrepressible, generally joining in all the shenanigans and high jinks cooked up.

Gene has this to say: "It boggles the mind to reflect on the crazy things that happened at the Fort Shelby Hotel in Detroit that summer. One of my biggest impressions was Doug Spreng (of later RC Stunt fame) flying his control line model on the hotel roof. As if this wasn't enough, he reached over the side and flew the model parallel with the sidewalls. That brought out a lot of heads!

"This thrilling flight came to a halt finally when the police arrived. Actually there was very little complaint from the hotel roomers, but people looking up at this aerial display brought traffic to a screeching halt; all this twenty stories below the flying!

"Of course, ventilation requirements call for a huge ventilation airshaft for the inner rooms. Sheldon Greenhut had a Dyna-Jet. It was only logical it should be fired up at 10 p.m. This aroused the ire of the house detective (we didn't call them security personnel then) and he ran out on the deck of the airshaft calling for quiet.

"This was a fatal mistake with over 500 modelers (under the age of 21), who quickly locked the only exit door on him. The hapless detective was then showered with aluminum-bound telephone books from twelve stories up. I can remember a whole bed coming down! Finally, someone felt sorry (or regained sanity) and let him out. Needless to say, we were not bothered by him

again.

"Jim Walker was there and we had an A-J Interceptor contest at the corner gas station till way past 1:00 a.m. It was typically hot and humid and a few of them went up and out. Jim had plenty more to give away. The hotel management made a bad judgment call when they admitted regular guests at the same time we were staying there. One evening I noticed a card game going on directly across the air shaft from our room and the task was established . . . deposit a volume of water into that room through the open window. The waste paper basket was selected as the storage container. We turned off our lights and waited about half an hour to lull them into a false sense of security. A running start to gain momentum and the free state water glob was airborne. I'll never forget the looks on their faces when the table was cleared by a miniature Johnstown flood. One guy even looked out the window at the sky thinking it was a cloudburst.

"A good time was had by all and a lot of lasting friendships established. Memories never go away. Hal Cover and I are both active members of the SCAMPS. Dick Peterson is an active member of the THERMAL THUMBERS. The last I heard of Clint Merrill he was selling Buicks in Kansas. Maybe some of the folks will recognize themselves in the picture and write in, just to catch up on the last 38 years." (Doug Spreng, who managed to hide his face in the photo . . . it's in the Oct. '90 issue . . . is an electronics specialist for the state of Nevada, and lives in Lake Havasu City. wcn)

Would you believe it? I have just hunted all through my voluminous pile of photos and not one shot of Wallock left! This character is smart. Someone is liable to match his photo with those in the post office. I understand there is still a warrant out for that group at Fort Shelby! Haw!

1/2A TEXACO FLYING SCALE

Here is an event that is literally exploding with entries. The idea of using 1/2A Texaco rules and using flying scale models is simply great when using the Cox Black Widow 049 for power.

As has been previously noted, these particular Cox engines are great for economy but cantankerous for good engine runs. When power is not at its peak (which invariably happens) the flying scale models look simply great flying at what seems like scale speed.

This has brought out numerous different types, one of which is run in Photo No. 9. This is an Art Chester Jeep as faithfully created by Eut Tileston. With such fine work in evidence, it is a real pleasure to see these types fly. Get yours ready for the SAM Champs at Jean, Nevada!

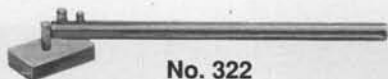
SPARK COIL FLAP

Larry Davidson certainly stirred up some interest on spark coils when he stated in a letter to SAM president Jim Adams, that the plus and minus connection to the coil made a great deal of difference in the performance of the system.

continued on page 104

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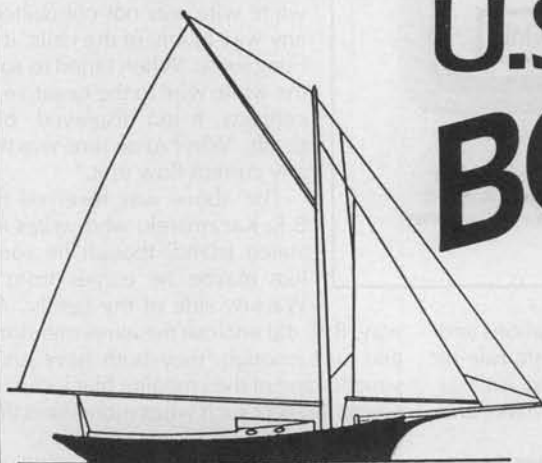
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HEROES, BLACK MAGIC, CYCLING & LEGAL VS. TRUTH

Trouble in paradise? It is common knowledge in the RC world that those hero fliers we see in the ads, trying to convince you that if you buy the radio they happen to be holding at the moment you have taken the first step towards the next Tournament of Champions, are sponsored in some manner. Sponsorship might range from simply a new radio every now and then, to monthly salaries and/or expenses to major contests. Not a bad job if you can get it, huh?

The just-appeared (July magazines, as of this writing) Hobby Dynamics (JR Systems) ads brought something of a major surprise in that respect . . . it is headed by a picture of well-known Chip Hyde, winner of the 1990 TOC and 1990 Tangerine, and amongst all the other notables, appears the name of my old Air Force buddy, Dean Koger, 9th at the last TOC. The surprise is that until recently, both of these Top Guns had been flying under the Futaba banner, and were in fact, doing so at the TOC.

One can't help but wonder what brought about the change. We'll probably never know, but we can't forget for a minute that whatever else was involved, fliers of this caliber can have their pick of everything available, don't have to settle for anything but the best, and cannot afford to take the slightest chance with their radio equipment.

Good luck to both of you in your new colors!

Another name to remember, though for slightly different reasons, is Gene Taylor, of the San Gabriel Valley (CA) Radio Control League. It seems that Gene has invented a new and unique way to lose airplanes, that of getting the frequency control pin locked on the transmitter's snap roll button. The good news is that the "big PT-19" has been recycled and is now back in the air . . . let's hope with the frequency pin now in a different location.

Vive l'difference, though I guess in this case it would be more correct to say "There

is a difference." I am referring once again to inexpensive radios, which I have talked about here before and about which I don't get really excited. Though I have heard, and included here, opinions to the contrary, I



Get rid of those ugly unprofessional felt tip pen-marked clothespins on your Frequency Control System. Ace R/C makes the job easy and neat for you with its vinyl, weather-proof ID stickers, seen here full size.

still maintain that they have limitations and less quality. Hey gang, it is a basic rule of economics, inexpensive stuff just isn't as good as that which costs more to make and has to sell for more.

Anyway, there is another opinion, from a source which we can depend on to know a bit about RC equipment. The 1991 Ace R/C catalog, in its description of its ET1210 Electronic Throttle, a unit designed specifically for boaters, states that it "May not work with inexpensive radio systems." Yes, Virginia, there is a difference . . .

THAT OLE BLACK WIRE CORROSION simply won't go away . . . just as sure as everything, it comes creeping back every so often. And seems to get mysteriuser and mysteriuser (!). Take a look at what this month's mail brought:

"I hope I am not stirring something up in the so-called 'Black Death' business (haven't heard much about it lately), but I have a situation I would like your thoughts on.

"In the process of retiring my old wide-band Futaba radio, I pulled the battery pack out of the transmitter to re-cycle and see if it is any good to keep as a spare. When the pack would not charge or discharge I pulled it out of the case and found the negative lead broken loose. Stripping insulation back showed black wire. Further investigation showed this condition all the way to the spring contact in the plug. The spring contact itself was showing signs of corrosion.

"Since I had gone this far, I thought I could save the day by switching the white wire and contact to the negative spot. Now, the white wire was not connected in any way to any of the cells, it just hung loose. When I tried to solder the white wire to the negative cell contacts, it too displayed 'black death.' Why? At no time was there any current flow in it."

The above was received from B.R. Kaczmarek, who writes from Staten Island, though he sounds like maybe he comes from the Warsaw side of my family. Any-

way, B.R. did enclose the wires mentioned, and sure enough, they both have an advanced case of the creeping black crud that seems to affect such wires more often than I consider safe.

For the benefit of new readers, eight years ago, in November '83, I reported a phenomena that I had observed enough times to finally catch my attention. It happens that quite often, especially in older radios, or, as near as I can establish, in radios that have been idle for long periods of time, a black colored corrosion, or oxidation, attacks the lead connected to the negative terminal of NiCd batteries. As most such wires are covered with black insulation, we have come to refer to it as "Black Wire Corrosion," though in fact I have observed it countless times in old Orbit equipment in which the negative wire was blue-covered, and a few cases have been reported in JR equipment in which it is brown. I mention these colors

continued on page 86

HOBBICO HAS YOU COVERED.



Bullet Glue: Thin or thick formula CAs work equally well on balsa and plastics. Debonder release agent and Activator accelerant also available.



Expanded Scale Voltmeter: Monitors 9.6V transmitter and 4.8V receiver packs.



Locking Glow Plug Clip: Fits standard or 4-stroke plugs.



Deluxe Power Panel: Powers all electronic field equipment from a 12V battery. Replacement banana plugs also available.



Precision #11 Blades: High-quality steel blades. 100 ct.



Bullet Epoxy: Excellent for bonding metal, ceramic, wood, glass, or plastic. Available in 6 and 30 minute formulas.
Bullet Threadlock: Apply to screws, nuts, and bolts to prevent them from vibrating loose.



Ultra Tote: Everything you want in a field box, from sturdy wood construction to lots of versatile storage area.



Top Fueler Electric Fuel Pump: Delivers one ounce every 6 seconds at 12V. Also operates from 6V.



Hot Shot & Super Hot Shot: Combine a locking glow plug clip with a re-chargeable NiCd for convenient starting power.



Custom Radio Cases: Single and Double cases protect your sophisticated transmitters with foam-lined mahogany interiors and stylish aluminum outer skins.



Hand Crank Fuel Pump: Moves 1/4 oz. of glow fuel with every revolution.



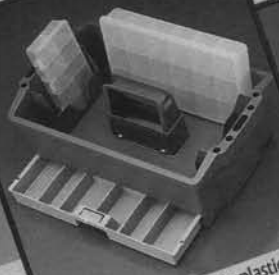
Digital Mini-Tach: Evaluate different props and fuels and peak your engine for maximum RPMs.



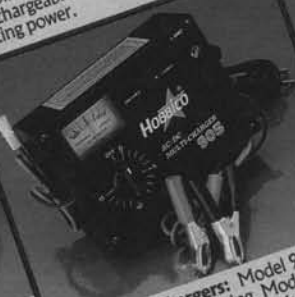
TorqMaster 90 & 180: Engineered for high output and fast, easy starts. Both feature replaceable carbon brushes. TorqMaster 180 is designed with 4-piece wet magnet.



Mafrec 12V 6Ah Battery, lead-acid Starter Battery, and AC charger provide rechargeable power for your electronic field gear.



Tool Brute: Durable plastic tote organizes your tools, parts, and accessories.
Parts Boxes: Four sizes of clear plastic organizers with molded-in dividers. Smaller sizes fit neatly into Tool Brute.



Hobbico Chargers: Model 900 is ideal for basic charging. Model 905 is AC/DC Multi-Charger with selectable charge/discharge switch and precision AMP charge meter.



Deluxe Heat Gun: Shrinks large areas quickly and easily. Features a heavy-duty motor, 3-position switch, and adjustable air intake baffle.
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AIRTRONICS

VANGUARD 6 CH FM w/4 servos

SALE
\$169⁹⁶

AIR0073FM

- 6 CH
- 4 SERVOS
- ALL NICADS
- SERVO TRAYS
- 1991 FM

AIR0070FM 4CH VANGUARD FM W/3 STD SERVOS 139.96
AIR0073FM 6CH VANGUARD FM W/4 STD SERVOS 169.96



VISION 8 CH

SALE
\$519⁹⁶

- 1991 FM PCM
- 4 SERVOS
- NICADS/CHARGER
- SERVO TRAYS
- DUAL RATES
- MIXING

The Vision VS8P is suitable for pattern, scale and sport aircraft and the VS8SP is specially designed for sailplane flight application. Both systems feature a gold Label Super Narrow Band Dual Conversion Receiver to assure you full operation in 1991 and beyond.

AIR0100PCM VISION 8P PCM W/4 SERVOS 519.96
AIR0105PCM VISION 8SP PCM W/4 SERVOS 519.96
AIR0150FM INFINITY 600 FM SYSTEM 329.96
AIR0150PCM INFINITY 600 PCM SYSTEM 369.96



AIRTRONICS

VANGUARD VG7P

SALE
\$229⁹⁶

AIR0077FM

- 1991 FM
- 4 SERVOS
- ALL NICADS
- SERVO TRAYS

The VG7P 7 channel FM system offers: aileron rudder coupling, dual rate elevator and aileron controls, throttle end point adjustment, adjustable low throttle trim, elevator flap mixing, total travel adjustment on aileron, elevator, and rudder.



JR RADIOS

MAX 4AM 1991 SYSTEM 4 CH

SALE
\$119⁹⁶

JRSJ4MC2

4th Servo
Order Part
JRSJS07
\$16.96

JRS4FC2 MAX 4CH FM SYSTEM W/3-507 149.96
JRS4FC2 MAX 6CH FM SYSTEM W/4-507 189.96
JRS5FH2 MAX 5CH FM HELI W/5-507 299.96
JRSJ10C PCM 10 PATTERN SYSTEM 699.96
JRSJ10H PCM 10 HELICOPTER SYSTEM 759.96



JR RADIOS

X-347 7 CH

SALE
\$439⁹⁶

JRSXPC

Sub-trim, Dual rates, Exponential, Servo reversing, End point adj. (ATV), Programmable mixing, Fail safe, Programmable function trainer (PFT), Stop watch, Model select, Model name input, Type selection (helicopter, air-plane, glider), Modulation selectable (PCM/PPM), Copy function.



JRSXPC X-347 PCM PATTERN SYSTEM 439.96
JRSXPH X-347 PCM HELICOPTER SYSTEM 459.96
JRSXPG X-347 PCM SAILPLANE SYSTEM 439.96
JRSXP770 X-347 FM AIRCRAFT SYSTEM 349.96
JRSXP790 X-347 FM HELICOPTER SYSTEM 374.96

JR PCM 10

SALE
\$699⁹⁶

JRSJ10C

10 Channels, touch screen input, servo reversing, dual rate, EXP and VTR on aileron, elevator and rudder, end point adjustment on all channels, group mixing (5), servo test, name input, integrated timer, stop watch, plug in Tx battery pack, snap roll, 4 JR 4031 servos, 700 mah battery.



COX

TEE DEE .049

\$27⁹⁶
COX170

A high performance 1/2A engine for those smaller R/C projects needing extra power.



COX1001	R/C PEE WEE .020	17.96
COX150	BLACK WIDOW .049 ENGINE	19.96
COX160	TEE DEE .020 ENGINE	27.96
COX170	TEE DEE .049 ENGINE	27.96
COX200	TEE DEE .051 ENGINE	27.96
COX210	TEE DEE .09 ENGINE	31.96
COX2901	MEDALLION .09 R/C W/MUFFLER	33.96
COX350	BABE BEE .049 ENGINE	15.96
COX3701	QUEEN BEE .074 R/C W/MUFFLER	36.96
COX4101	QRC .049 ENGINE W/MUFFLER	19.96
COX4505	DRAGONFLY .049 ENGINE	21.96
COX4506	TEXACO .049 BLACK WIDOW	19.96

WEBRA

WEB280	28 SPEED ABC W/MUFFLER	94.96
WEB281	28 SPEED ABC - HELICOPTER	124.96
WEB282	28 SPEED ABC - SHUTTLE	99.96
WEB320	32 SPEED HELI ENFORCER- CONCEPT	134.96
WEB400	40 SILVERLINE W/MUFFLER	69.96
WEB401	40 SPEED W/SILENCER TN-CARB	119.96
WEB402	40 SPEED ABC TN-CARB	134.96
WEB403	QUICKKEE 500 40 SPEED W/MUFFLER	219.96
WEB404	40 SPEED ABC HELI	149.96
WEB500	50 SPEED RING W/TN CARB	174.96
WEB501	50 SPEED ABC W/TN CARB	179.96
WEB503	50 SPEED ABC HELI	154.96
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WEB611	61 SPEED W/TN CARB	169.96
WEB612	61 SPEED ABC TN-CARB	184.96
WEB613	61 SPEED W/MUFFLER & TN CARB	199.96
WEB616	61 SPEED LONGSTROKE TN-CARB	239.96
WEB617	61 SPEED ABC LONGSTROKE TN-CARB	189.96
WEB619	61 SPEED ABC HELI	199.96
WEB800	80 SPEED ABC W/TN CARB	209.96
WEB910	91 SPEED W/TN CARB & MUFFLER	239.96
WEB911	91 SPEED ABC W/DYNAMIX CARB	209.96

ENYA

SS 40 R/C w/muffler

\$69⁹⁶
EMP403

The Super Sport Series of engines from Enya are designed to be reliable, easy to start and powerful at an economical price. Ball bearing versions are noted by "BB" after the size notation.



EMP090	09 TV W/MUFFLER	42.96
EMP150	15 R/C W/MUFFLER	49.96
EMP190	19 R/C W/MUFFLER	54.96
EMP251	SS 25 TV W/MUFFLER	64.96
EMP252	SS 25-BBT W/MUFFLER	89.96
EMP300	SS 30 R/C W/MUFFLER	69.96
EMP301	SS 30BB R/C W/MUFFLER	89.96
EMP351	SS 35H HELO R/C W/O MUFFLER	119.96
EMP403	SS 40 R/C W/MUFFLER	69.96
EMP404	SS 40BB R/C W/MUFFLER	94.96
EMP405	SS 45 R/C W/MUFFLER	106.96
EMP500	SS 50-H R/C HELICOPTER	139.96
EMP110	11CX R/C W/MUFFLER	72.96
EMP402	40CX R/C W/MUFFLER	119.96
EMP451	45CX R/C W/MUFFLER	129.96
EMP452	45CX W/PUMP W/O MUFFLER	189.96
EMP801	80X R/C W/O MUFFLER	179.96
EMP600	60 R/C G-8 CARB W/MUFFLER	129.96
EMP602	60X S.E. RING W/MUFFLER	159.96
EMP604	60XL R.E. CHROME W/O MUFFLER	184.96
EMP606	60FX R/C CHROME W/MUFFLER	189.96
EMP608	60FX S.E. PUMP-CHROME W/O MUFF	219.96
EMP609	60 R.E. PUMP-CHROME W/O MUFF	209.96
EMP610	60 S.E. PUMP-HELO W/O MUFFLER	224.96
EMP530	53 4-CYCLE W/MUFFLER	199.96
EMP800	80 4-C W/O MUFFLER	249.96
EMP905	90 4-C W/MUFFLER	298.96
EMP906	1.20 4-C W/MUFFLER	319.96
EMP907	R120 4-C W/MUFFLER	359.96
EMP908	R120 4-CYCLE W/PUMP-MUFFLER	389.96

FOX

40 R/C BB w/muffler

\$71⁹⁶
FOX24096

An American made ball bearing engine that offers excellent power, long life and easy starting. Comes complete with muffler.



FOX22000	19 BB SCHN R/C W/MUFF	59.96
FOX22500	25 BUSHING R/C W/MUFF	53.96
FOX24095	40 BUSHING R/C W/MUFF	59.96
FOX24096	40 B.B. R/C W/MUFF	71.96
FOX24097	Q-500 40 R/C SPECIAL	119.96
FOX24098	40 BB DELUXE W/SPIN & MUFF	79.96
FOX24197	QUICKKEE .40 SPORT W/MUFF	84.96
FOX24600	45 BB SCHN R/C W/MUFF	89.96
FOX25000	50 BB SCHN R/C W/MUFF	98.96
FOX26600	EAGLE IV.61 R/C RING W/MUFF	113.96
FOX27400	EAGLE 74 R/C W/MUFF	124.96

K&B MFG \$69⁹⁶ 65 R/C SPORTSTER

K&B5800

New member of K&B's highly successful Sportster Series. Features include excellent idle, moderate power and easy starting. American made and complete with a super quiet muffler.



K&B5600	20 R/C SPORT W/MUFF	41.96
K&B5680	28 R/C SPORT W/MUFF	49.96
K&B5800	65 R/C SPORTSTER W/MUFF	69.96
K&B5900	45 R/C SPORT W/MUFF	64.96
K&B4011	40 R/C W/MUFF	69.96
K&B6550	61 R/C W/MUFF	84.96
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FUTABA 1991

7UAFS SUPER SEVEN

SALE
\$319⁹⁶
FUT074



FUT052	5UAP PCM W/R129DP - 4 SERVOS	279.96
FUT074	7UAFS SUPER SEVEN FM SYSTEM	319.96
FUT075	7UAFS SUPER SEVEN PCM SYSTEM	379.96

Dual conversion 1991 receiver, all nicads and charge, servo reversing, trainer system, control panel with ATV-4 standard servos, programmable mixing on 7ch systems. PCM models have a 10 bit microprocessor for high resolution.

9 CH PCM 1024 SYSTEM

SALE
\$669⁹⁶
FUT090



Dual Conversion 1991 receiver. 3 dual rates, 3 Snap roll functions, LCD Screen, programmable mixing function, precision gimbals, timer and tachometer, programmable memory for up to six different models, (4)S5101 competition servos.

FUTABA 1991

4NBL ATTACK SYSTEMS

SALE
\$109⁹⁶
FUT043



1991 Micro receiver. All NICADS and charger. Aircraft version with 3 standard servos. Glider version with 2 micro servos and 250MAH battery. Electric version with electronic speed control and two (2) micro servos. Servo reversing.

FUT043	4NBL AM SYSTEM W/3-148	109.96
FUT045	4NBL AM SYSTEM W/2-133	154.96
FUT046	4NBL ELECTRIC SYSTEM W/2-133	174.96

CONQUEST SYSTEMS 1991

6 CH FM

SALE
\$189⁹⁶
FUT061



The new 1991 series of Conquest systems from Futaba all feature dual conversion receivers, standard S148 servos, trainer system, servo reversing and full nicads.

FUT041	4NBF FM DC SYSTEM W/3-148	139.96
FUT042	4NBP PCM DC SYSTEM W/3-148	209.96
FUT061	6NKF FM DC SYSTEM W/4-148	189.96
FUT062	6NKP PCM DC SYSTEM W/4-148	239.96

SERVO SALE

AIRTRONICS

AIR4102	STANDARD SMT H.D. SERVO	17.96
AIR4141	MICRO SERVO W/METAL GEARS	44.96
AIR4732	HI TORQUE CORELESS B.B. SERVO	49.96
AIR4737	HI SPEED CORELESS B.B. SERVO	49.96
AIR4741	H.D. CONTEST B.B. STD. SERVO	34.96
AIR4831	MINI B.B. SERVO	29.96

FUTABA

FUTS30	H.D. B.B. SERVO G	29.96
FUTS33	B.B. MICRO SERVO G	29.96
FUTS48	LOW PROFILE STD SERVO G	16.96
FUTS133	B.B. MICRO SERVO J	29.96
FUTS134	1/4 SCALE H.D. SERVO J	39.96
FUTS136G	COMPACT 108° RETRACT SERVO	49.96
FUTS148	LOW PROFILE STD SERVO J	16.96
FUTS5101	SMT B.B. STD SERVO	31.96
FUTS9101	SMT HT HS B.B. CORELESS SERVO	44.96
FUTS9201	SMT HT B.B. AIRCRAFT SERVO	44.96
FUTS9301	SMT HT CORELESS SERVO	44.96
FUTS9601	SMT MINI B.B. CORELESS SERVO	44.96

ROYAL

ROY0101	TITAN SERVO JR	13.96
ROY0102	MINI TITAN II JR	17.96
ROY0103	MICRO TITAN JR	23.96
ROY0104	MAXI TITAN JR	23.96
ROY0061	TITAN SERVO FUTABA G	13.96
ROY0062	TITAN SERVO FUTABA J	13.96
ROY0063	TITAN SERVO AIRTRONICS	13.96
ROY0064	TITAN SERVO WORLD MOLEX	13.96
ROY0065	TITAN SERVO WORLD/ARISTO "S"	13.96
ROY0066	MINI TITAN II FUTABA G	17.96
ROY0067	MINI TITAN II FUTABA J	17.96
ROY0068	MINI TITAN II AIRTRONICS	17.96
ROY0069	MINI TITAN II EXPERT MOLEX	17.96
ROY0070	MINI TITAN II EXPERT/ARI "S"	17.96
ROY0091	MICRO TITAN FUTABA G	23.96
ROY0092	MICRO TITAN FUTABA J	23.96
ROY0093	MICRO TITAN AIRTRONICS	23.96
ROY0094	MICRO TITAN EXPERT MOLEX	23.96
ROY0095	MICRO TITAN WORLD/ARISTO "S"	23.96
ROY0096	MAXI TITAN FUTABA G	23.96
ROY0097	MAXI TITAN FUTABA J	23.96
ROY0098	MAXI TITAN AIRTRONICS	23.96
ROY0099	MAXI TITAN WORLD/ARISTO "S"	23.96

MAGNUM

40 FSR

Inflation Fighters. The Magnum Series of engines are all Schnuerle for great top end and low reliable idle. The Pro Series features twin ball bearings. All engines include a muffler.

\$74⁹⁶
MAG401



MAG110	MAGNUM GP 10FSR R/C W/MUFF	42.96
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MAG400	MAGNUM GP 40FSR R/C W/MUFF	54.96
MAG211	MAGNUM PRO 21FSR CAR	87.96
MAG251	MAGNUM PRO 25FSR-BB W/MUFF	69.96
MAG401	MAGNUM PRO 40FSR-BB W/MUFF	74.96
MAG451	MAGNUM PRO 45FSR-BB W/MUFF	79.96

ROYAL **\$74⁹⁶** .45 ROY0450

The perfect engine for the advanced trainer or sport airplane. Schnuerle ported, twin ball bearing and muffler. Easy to adjust carb for maximum top end and low reliable idle.



ROY0250	ROYAL 25 R/C ABC W/MUFFLER	54.96
ROY0281	28 R/C ABC W/MUFFLER	59.96
ROY0400	40 R/C ABC W/MUFFLER	69.96
ROY0450	45 R/C ABC W/MUFFLER	74.96

RJL

61 R/C

Schnuerle scavenged side exhaust, front rotary valve, double ball bearing, 18 oz. Comes complete with muffler.

\$98⁹⁶
RJL610



SAITO

FA-65G GOLDEN KNIGHT

Smooth running, excellent idle and plenty of power to replace "40" size two stroke engines. An excellent choice for scale airplanes up to 8 lbs. or aerobatic midsize aircrafts.

\$214⁹⁶
SAT650G



SAT450S	FA-45S ABC 4-CYCLE	159.96
SAT500	FA-50 4-CYCLE ENGINE	169.96
SAT650	FA-65 4-CYC. R/C W/MUFF	189.96
SAT800	FA-80 4-CYCLE R/C W/MUFF	219.96
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SAT901	FA-120S GOLD SPECIAL 4-CYCLE	309.96
SAT500G	FA-50G GOLD 4-CYCLE	189.96
SAT650G	FA-65G GOLD 4-CYCLE	214.96
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SAT902	FA-120SD DUAL PLUG & PUMP	339.96
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SAT993	FA-130T TWIN ENGINE 4-CYCLE	449.96
SAT994	FA-270TDP TWIN PLUG & PUMP	798.96
SAT995	FA-270T TWIN 4-CYCLE	669.96
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ISC INTERNATIONAL

ASP 40

The perfect engine where high power and a reliable idle are required. To insure long life the cylinder has been chrome plated and the crankshaft is supported with two ball bearings.

\$73⁹⁶
ISC540



ISC540	ASP 40RC W/MUFF	73.96
ISC541	ASP 46 FSR ABC W/MUFF	79.96
ISC542	ASP 46H FSR ABC WO/MUFF	79.96
ISC543	ASP 61 FSR RING W/MUFF	89.96
ISC544	ASP 61 FSR ABC W/MUFF	94.96
ISC545	ASP 91 FSR ABC W/MUFF	124.96
ISC546	ASP 1.08 BX FSR W/MUFF	179.96
ISC500	ZENOAH G-38	189.96
ISC501	ZENOAH G-62	264.96
ISC505	ZENOAH G-23	184.96

YS ENGINES

.61 FS **\$249⁹⁶**
YSE610

Unique pressure system, ABC piston-sleeve, ball bearings, excellent workmanship all add up to a high performance long lasting contest/sport engine.



YSE450	.45 SIDE EXHAUST ABC W/O MUFF	129.96
YSE451	.45 REAR EXHAUST ABC W/O MUFF	129.96
YSE120F	1.20-4C W/PUMP & SUPERCHARGER	369.96
YSE610	.61 LONG STROKE SIDE EXHAUST	249.96
YSE611	.61 LONG STROKE REAR EXHAUST	249.96

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JET TRAILS

BY SCOTT STAUFFER

EAGLES, AGGRESSORS & VIPERS, OH MY!

The annual Mid-Atlantic Fan Fly was in May at NALF Fentress, in Chesapeake, Virginia, and contest director Hal Brenneman could not have picked a nicer weekend; sunny, 96 degrees each day, with a nice light breeze down the runway. Being mostly an indoors person, I was not fully ready for this type of weather and managed to come home with a rather nasty sunburn. But if I had it all to do over again I would still go, though I would not wear shorts, and would use plenty of suntan lotion! The nice weather brought out an enthusiastic crowd of spectators.

There were over 30 entries and more than 65 planes, from as far away as Florida. The runway at Fentress is 10,000 ft. of smooth pavement. If you couldn't take off from here, you definitely had something wrong.

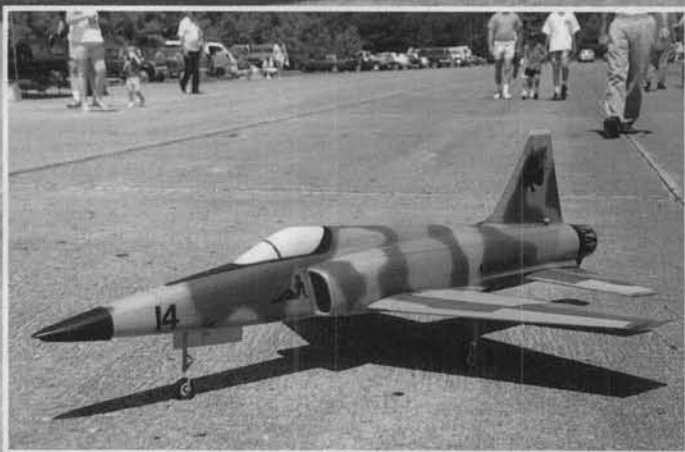
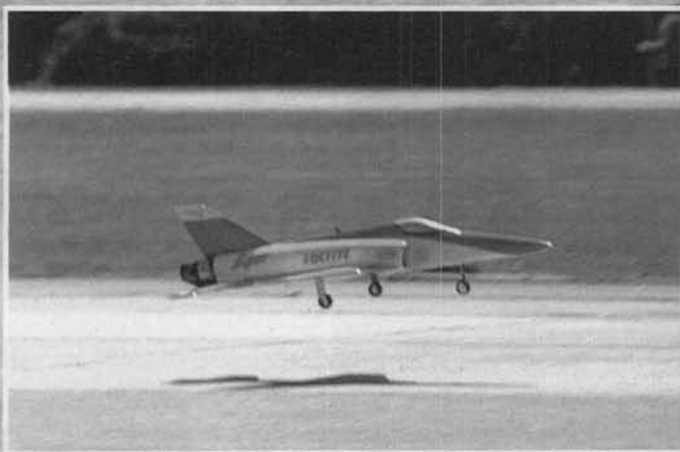
My friend Larry Tudor and I arrived about mid-afternoon on Friday. We headed out to

The drag chute is deployed as Charlie Trivitt lands his Cook F-4 Phantom. Two years in the making! Features twin KBV-72 Viojet fans (see text for more).



John Grayble, of Brooklyn, New York, came up with this paint scheme for his Aggressor . . . just got out the airbrush and had fun. The yellow panels were added later to improve visibility.

Takeoff of Dava Malchione's yellow and red viper.





Dave Malchione won "Best Scale" with this Violet F-16. The Aggressor paint scheme was done with Testor's model paint. Dave said it only took a few of the little jars to do the job.



Jim Braun of Marysville, Tennessee, flew his wicked-looking, black F-4 Phantom with a Playboy Bunny tail. Uses O.S. 91 Dynamax fan with Spring Air retracts and weighs 13 pounds. Paint was Ultra Base, with Top Flight decals. Flew great.



Dale Anstine's first jet is this Violet Aggressor. As Dale's a lawyer, he christened his plane the "Legal Eagle." It was clocked at 155 mph with a KBV-72.

Betsy and Vern Smith of York, Pennsylvania, won "Best Finish" with this pumpkin Aggressor. Betsy helped with the paint scheme and the masking, plus she's a pretty good pit crew. They make a great team.





Starting with a basic Regal Eagle kit, Vinny Calano modified it into this MIG. It has fixed gear, is totally Monokoted and uses a Dynamax O.S. 91 fan for power. Constructed of balsa, it carries 32 oz. of fuel and weighs 11 lbs.



The remains of Vinny's MIG after he made the cardinal mistake of pulling up during an inverted pass. If you look closely you can see individual blades of the Dynamax fan on the runway.



Charlie Trivitt's Aggressor taking off. White and yellow USAF paint scheme really stands out. Features scale struts and gear doors.



Patti Violet's F-86 Sport Sabre just before touch down (note the flaps). Patti won "Pilot's Choice" with this plane.

the field to get a quick check flight on my "Baracuda." Everything seemed fine, so we packed up and opted for a cold motel room and some hot pizza. I think next time we'll get a bigger room. We brought six aircraft, and it was a little tough getting them all in the room, to charge batteries.

We arrived at the field on Saturday about 9 a.m.; over half of the entries were already there. By 10 a.m., the pits were swollen with planes. After a pilot's meeting, it was time to take to the skies. Vinny Calano was the first up with his "Regal Eagle." This is the plane that won "Pilots Choice" last year. Unfortunately, on his second flight this day, radio failure caused its demise.

Soon the skies were filled with Eagles, Aggressors, and Vipers. Oh my! There were seldom less than three planes in the air at any one time. The flying schedule was relaxed and easy. If you wanted to fly, you just got the frequency pin, proceeded to the appropriate pilot box for that frequency, and flew. If the frequency was in use, you signed up and your name was called when the pin was returned. You rarely waited very long. Everything ran smooth and easy. I averaged five to six flights a day, and could have flown more.

There were a couple of manufacturers present; Bob Violett and Century Jets. Violett brought along his new F-16, powered by his new Nelson 91 engine. I first saw this engine at the Toledo Expo and was anxious to see it perform. I was not disappointed. It provided the F-16 with smooth, even power, and flew the plane with authority. Of course, Bob helped. His daughter, Patti, flew her Sport Sabre so well she was voted the "Pilot's Choice" award. She also let Bob fly her Sabre a few times.

I noticed that Bob's planes were some of the quietest planes there. They also flew a lot like pattern planes. Maybe that's why they're so popular with pattern fliers. I've also noticed that some planes fly like they have their air brakes on; most notably the A-4 Skyhawk. They seem to roar by. But Bob's planes knife through the air like an arrow.

There were a few planes for display only, while others had their maiden flight such as Jim Braun's Yellow F-4, done up in a gorgeous black/Playboy Bunny paint scheme. After some engine break-in runs, he taxied the jet onto the runway. Advancing the throttle, he accelerated and gracefully lifted off. After climbing out to a safe altitude, he sucked up the landing gear, and nervously made some trim changes. He was obviously sweating and it wasn't just from the heat. After a while, he stopped turning blue and became more comfortable with it, and brought it down lower so we could see it better. After a few low fly-by's, he brought the F-4 in for a nice landing.

On Sunday, an almost-maiden flight was made. Charlie Trivit brought out a prestigious Cook F-4 Phantom, and proceeded to make some nice high speed taxis. On a couple of these runs he deployed the drag chute for that touch of realism. It took him nearly two years to complete the plane.

Four-and-a-half months were spent just on the cockpit. It was very scale looking. Charlie chose to use two Viojet KBV-72 fan units instead of the traditional twin Dynamaxes. Special inlets and thrust units had to be fabricated for the project. He hopes this combination will add top end speed to the 23-pound plane, which is not a bad weight. I've seen heavier ones fly well.

After several high speed taxis, he taxied back to the pits. With all that time and money moving around out there, Charlie did not feel comfortable enough to make the first flight himself. Instead he's going to pass the controls to master stick wiggler Bob Fiorenze for the first flight at the Bay of Quinte jet rally (in June). I don't blame Charlie, I hate first flights myself.

Another first-timer was Bill Anstine, of York, Pennsylvania. Bill is a member of the same club to which I belong, the York RC Club. I was surprised when he showed up with a Violett Aggressor. Up until this point, Bill mostly flew sport and pattern aircraft. His plane sported a Craig Wilson red, white and black paint scheme, with the nifty name of "Legal Eagle." This is a fitting name, as Bill is a lawyer. Bill earned his jet wings by turning in some respectable 155 mph speed runs. Welcome to the jet age, Bill.

There was a nice assortment of scale aircraft, in addition to all the sport planes, and an assortment of Byron F-16's. Dave Malchione, of Kennet Square, Pennsylvania, brought his BVMF-16. The unique thing about his plane is the paint he used. He started with a base coat of K&B gray, then used Testor's model paint for the darker camouflage colors. Dave says that Testor's is an enamel-based paint and is fuelproof. However, he sprayed a coat of clear over it just to be sure. Finished weight was 12-1/2 lbs., and it flew great.

Century Jet Models had its B-57 twin there, but the crew was not satisfied with the way the engines were running so they didn't attempt a flight. I spoke with them on the phone a few days later. They said that they have since flown the plane.

I'm going to put this paragraph under the heading of, "Boy are you lucky." Because that's basically what my friend said to me. It was on my third flight of my Baracuda. I was going downwind, setting up for a speed run, when there was a bang, the engine quit, and something came off the plane. So I glided the plane in and landed with no problems. When we got back to the pits we noticed the bottom hatch was missing. Upon further investigation, we found that the fan had exploded. That caused the hatch to come off. Now comes the amazing part. When the fan blew, it severed the wires to one of the aileron servos. The remaining functioning servo had been knocked loose and was jiggling around in its wing box. I was flying with only 1/4-aileron! If that wasn't enough, the fan sucked the radio antenna wire in and chewed it down to only six inches in length. And, the explosion broke the main wing support in the fuselage. Any one of these failures could have caused the plane to

become a smoking hole in the ground!

What gets me is that I didn't notice anything special when I landed. It responded just fine. The gear came down and I made a routine landing. I thank JR for making a super radio and Bob Parkinson for making a strong and stable airframe. The damage can be easily be repaired. I talked to Bob Parkinson about what happened, and we came to the conclusion that I didn't have enough blade clearance. In order to extract the maximum amount of performance from my fan, I made my blade gap less than 1/16-inch. Bob explained that the new 90-size engines turn his fan in excess of 22,000 rpm. At those speeds the fan starts to expand. If your clearance is too close, the blades will strike the shroud, causing major blade failure. Bob recommends a gap of 1/8-inch to compensate for expansion. Bob has heard of this happening to other fans as well.

As near as I can tell, there were only six crashes; four totalled and two repairable. Two of the four totalled belonged to Vinny Calano. He first lost his long-flying Regal Eagle to radio failure. Then he put his scratch-built MiG in, due to a mix up of the thumbs. An Eagle, a Viper, and an Aggressor also bit the dirt trying to stretch landing approaches after flame-outs. The last to go subterranean was Frank Rega's JHH F-16. It stalled on takeoff and augered in. Six mishaps is not considered bad for an event of this size.

On Sunday afternoon, the awards were presented. As I said earlier, Patti Violett won "Pilots Choice," flying her F-86 Sport Sabre. Dave Malchione won "Best Scale" with his BVM F-16, and Vernon Smith's Aggressor was voted "Best Finish." The paint scheme was orange with green stripes, a red rising sun on the fuselage, with Japanese symbols on the tail... created by his wife Betsy. After the awards, the field was reopened for flying.

This year's event was a marked improvement over last year. The weather was great. There was a good turn out and more than one pilot commented on how fantastic the runway was. I'd like to thank Hal Brenne-man and Rob Fabian for organizing all of this; plus all the club members who helped make this a first class event. I know I'll be back next year.

JETS OVER DELAND

On February 9-10, the Deland Golden Hawks sponsored its second Jets Over Deland Jet Rally, at Sidney Taylor Field, in Deland, Florida (see *Al Tuttle's report in our June '91 issue. wcn*). Barry Cohen was there with his video camera to catch the action, including a 222 mph Viper run by Terry Nitsch, interviews with well-known pilots such as Jerry Caudle, Charlie Chambers and others, and memorable flights of aircraft from a wide assortment of manufacturers. The quality of this tape is on line with Barry's usual standards. Running time is 1 hr. 45 min. and the cost is \$25 plus S&H. For more info contact Barry at R/C Video Review Magazine, (407) 790-3435.

Well, that does it for this month. Until next time, keep your gear up, your burners lit, and watch your six. **MB**

THE CONTROL SYSTEM

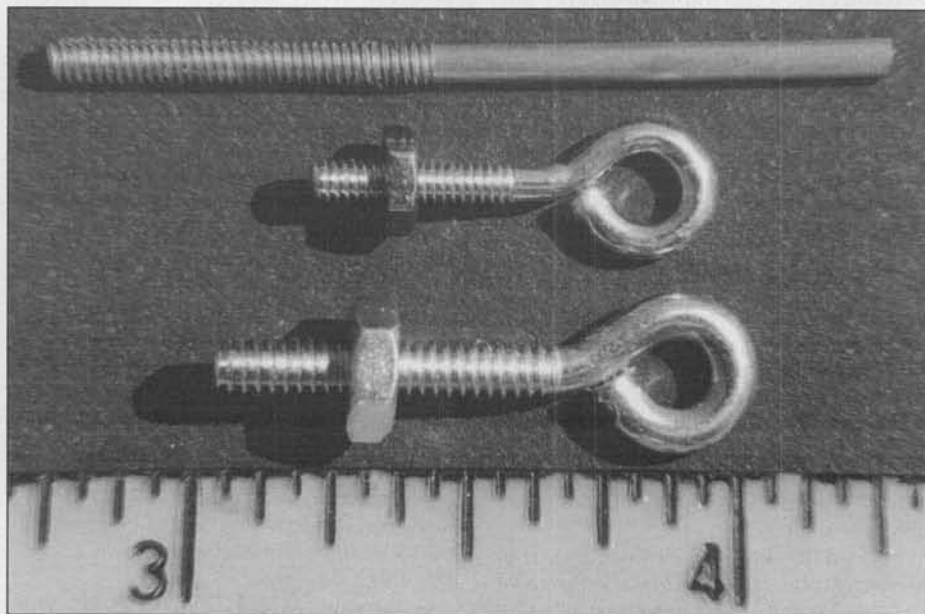
There is a mistaken idea in some model building circles that ARF enthusiasts know just enough to fly what they buy, exactly as it comes out of the box. There's a general feeling among the dyed-in-the-wool old timers that these folks aren't really too interested in the technical points of RC flying, and prefer to leave the heavy thinking to the balsa, glue, and sandpaper crowd.

I don't agree with that premise in the slightest, because I'll stack the ARFs I know against the best in the hobby, when it comes to devising modifications and innovations to RC airplanes. That's when we all share the same interests, that of making our planes fly better. And whether a plane comes from the manufacturer largely ready-built, or in the form of a pile of boxed balsa and a set of plans, there are lots of things which can be done to improve the performance of every model.

One of the most important features on a model airplane is the control system, which consists of various mechanical means of transmitting motion from the servos to the control surfaces. In aileron equipped airplanes, probably the most common method used these days makes use of torsion rods,

an extremely reliable and flutter resistant way to move the ailerons. Most kits are supplied with torsion rod systems, especially in the smaller size models, say powered

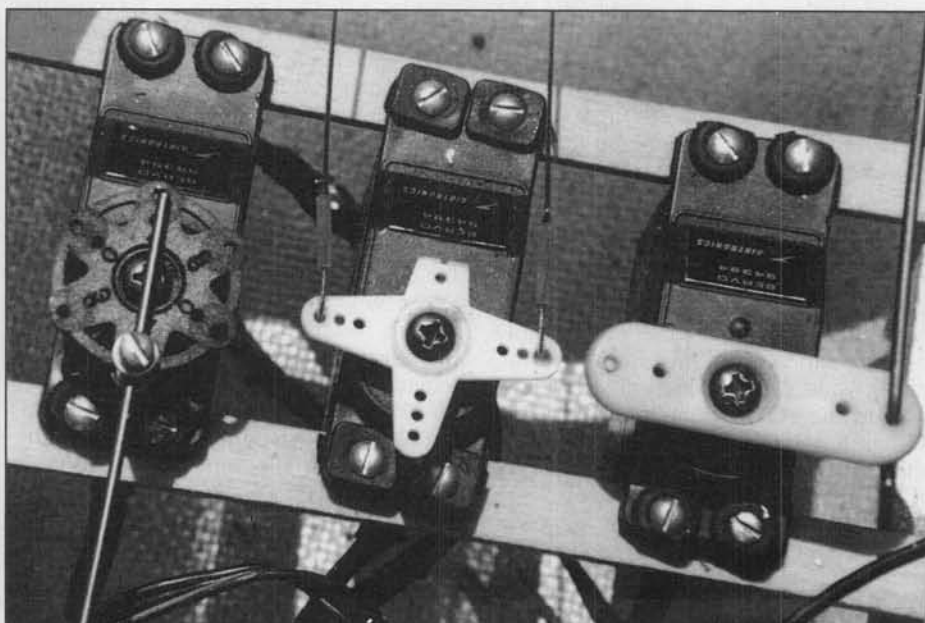
with engines up to and including the .40 sizes. Torsion rods are cheap, simple in operation, and any experienced modeler can whip up a set in just a few minutes, using



At top is Pylon brand 2-56 threaded copper coupler as used for cable rigging; below are 2-56 and 4-40 size threaded eyebolts. Take your choice; they all do the same job.



This is the stuff of which RC model cable control is made. It's nylon-coated 40-pound test stainless steel wire as used for fishing.



Center servo demonstrates simple cable connection to servo arm. Loop of cable is held in place with snug fitting nylon tubing and a drop of cyano.

only some piano wire and a bit of tubing.

Other popular ways to control ailerons include the more complicated pushrod and bellcrank system, the flexible cable system, and the dual servo system. This last method is reserved for larger aircraft in which there is a possibility of aileron failure from the use of a single driving servo. Each aileron is thus provided with its own servo, mounted in the wing just behind the ailerons, with a short pushrod connected directly to the aileron control horn. Quarter-scale and pattern fliers

use this system almost exclusively.

But when it comes to rudder and aileron control, we tend to stick to the same old ways. I imagine the vast majority of sport fliers, whether they fly hand built or ARFs, probably use one of the two most popular tail surface control systems. We are all familiar with both of them, the flexible nylon-in-a-tube pushrods, and the rigid pushrod method. The rigid types are usually constructed of balsa, hard wood, or fiberglass arrow shafts, but both these and the nylon

pushrod types usually get the job done.

I have recently been experimenting with what many modelers think is an improved method of transmitting movement from the servo to the tail surfaces. This technique uses control cables instead of pushrods, and the inherent advantages make it attractive to the more advanced modeler. I prefer the use of cables because their pull-pull action exerts a more positive control over the elevators and rudder. I almost started using it in desperation, as it all began with one of my ARFs



This threaded coupling was made from a 2-56 bolt, a strip of tin sheet, and a nut. Just attach the cable to one end and the clevis to the other.

Here's one way to connect the cable to a control horn, using author's homemade fitting and cable which is held with tubing and cyano.

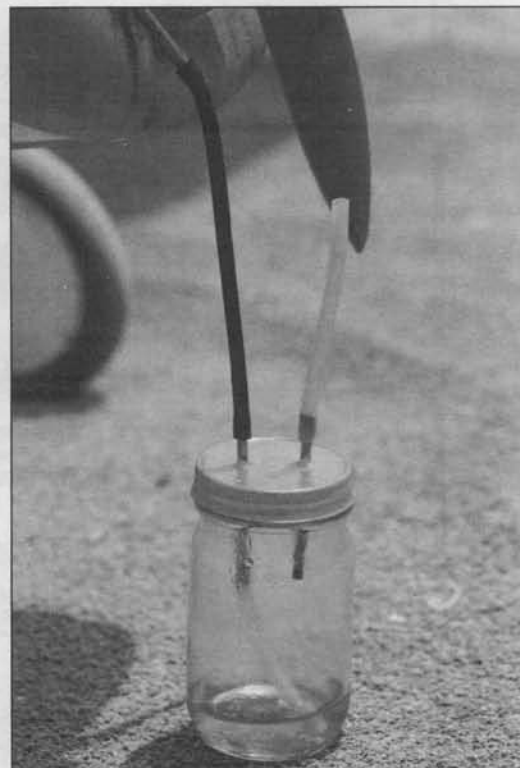


Photo tip: When fueling, it's customary to let the overflow line squirt onto the ground, and often onto your clothes. This simple overflow bottle catches the excess, saving it for later use.



Eagle Products' new 8500 series of AMA aircraft peel-and-stick numbers come in 1-1/4 and 2-inch sizes, and six different color schemes, including neon fluorescents. They really dress up author's ARF; lend a touch of elegance.

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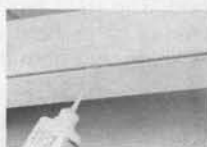
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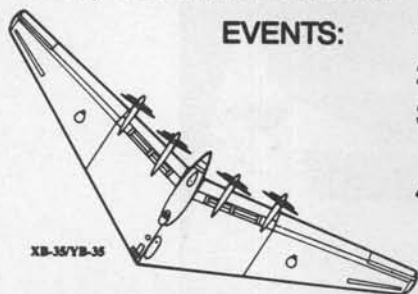
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- Sponsored By: *MODEL BUILDER Magazine*
Bill Northrop, Publisher
- AMA Sanction #10438 — AMA License reqd.
- Site: SAM CHAMPS, Jean, Nevada
- Time: 8:00 a.m. to 4:00 p.m.
- Jr., Sr., & Open combined in all events
- Entry Fee: \$4.00 each event



EVENTS:

1. Rubber Power
2. Glider (164 ft. towline)
3. Scale — any power
(20 sec. official)
4. Gas — 25 sec. eng. run, or
Electric — 35 sec. motor run
• combined event •



In case of controversy, opinion of Contest Director and Judge will be final.

Chief CD
Carl Hatrak
3825 W. 144 St.
Hawthorne, CA 90250

Scale & Flight Judge
Bill Stroman

- **NOTE:** Proxy entries encouraged. Send models to flier of your choice, **NOT** to *Model Builder* or CD's.

which developed a serious case of tail flutter when performing a shallow dive under power. As a matter of fact, the horizontal stabilizer finally cracked on both sides of the fuselage. When I heard the loud crack and saw the stab flopping around at an altitude of a hundred feet, I took the usual action to minimize crash damage, throttling to full idle and carefully noting the impact site for later reference. But even with the tail drooping one or two inches on each side, the airplane miraculously maintained a level attitude. In disbelief at this good fortune, I found that there was still sufficient elevator control available, and so I managed to bring the plane in for a completely uneventful landing.

I completely rebuilt the stabilizer, because in retrospect, it was obvious that the original balsa spars used by the manufacturer were too soft for the purpose. And then I decided that to prevent the recurrence of flutter it would be necessary to install a completely slop-free control system. I did a great deal of research, getting most of my information from modelers who had experience with high-stress control systems, and finally came to the conclusion that pull-pull cable systems are highly superior to standard pushrod controls.

There are a number of reasons that cables are more desirable on our models. For one, they are absolutely free of all loose play when properly installed. With the right amount of tension on the cables, the control surfaces are surprisingly resistant to movement when wiggled by hand. This translates into a very precise degree of control, with no tendency for the surfaces to be deflected in high speed or high-G maneuvers.

The next advantage of cables is that they are the lightest of all control systems, as the thin wires which connect the servo to the control surface weigh barely anything at all. Contrasting this to the weight of standard pushrods, using cables certainly helps avoid tailheavy airplanes. Additionally, the cables are resistant to stretching, and maintain their trim settings for an indefinite length of time.

And contrary to what one might expect, it takes just minutes to install pull-pull cable systems versus standard pushrods. In an actual test, I found that the average control cable could be installed in ten minutes or less. But one of the advantages of cable use which many modelers would consider most beneficial, is that they are the least expensive way to go. And here's another point to think about, that of safety. Now let's imagine that while using a standard pushrod, something lets go. Perhaps it's a clevis, or maybe the threaded end of the rod, or anything you can think of. And let's say that a pushrod controls the elevator, so that when the pushrod goes, it's bye-bye-birdie, because loss of elevator control means a certain crash. Now let's assume that in a pull-pull cable control system one of the two cables goes. If it's the one which moves the elevator up, a skilled pilot can roll over and bring her in upside down, holding crash damage to a crunched turtledeck and rudder. But should

the down cable break, the plane can still be landed in the normal manner, as all that is needed in that case is up elevator. So cables seem a safer alternative to conventional pushrods, because it would require the unlikely event of both cables to break at once to cause an inevitable crash.

The basic cable most commonly used is stranded stainless-steel wire fishing leader, which is available at most stores which sell fishing gear. It should be approximately 40-pound test, of the nylon coated type, and you can stock up on enough to build a dozen airplanes for only two or three bucks. There are various commercially supplied kinds of model hardware to simplify the job, up to and including complete pull-pull cable kits containing all the cable and fittings needed for a typical installation.

The most critical part of a cable installation is encountered wherever it is necessary to connect a cable to a screw eye bolt or other type of fitting. After looping the cable through the hole, many modelers just swage the loop closed with the same metal swage used in rigging up fishing tackle. Others use thin brass tubing, pressing it closed with pliers. But the simplest, lightest, quickest, cheapest, and more importantly, most reliable method is to use a piece of nylon tubing with an inside diameter of about a sixteenth of an inch, and about half an inch long. The cable is securely retained in place by wicking in a drop of thin cyano glue. At first, this seemed a questionable method to me, but those who have used it extensively say they have never seen it fail. I tested it to the full 40-pound weight of the cable, and it held just fine, so that is the method I now use exclusively.

A lot of the manufacturers are getting wise to the fact that cable controls are the coming thing, and they are beginning to put out a number of useful products in answer to the demand of what amounts to a new market. For example, Sullivan products makes one of the handiest fittings I have yet seen under the Pylon Brand name. This consists of a 2-56 threaded coupler which has a hole running lengthwise completely through the shaft. This is sized to fit 1/32 wire or cable, and all that needs to be done is to insert the cable end and secure it with a dab of thin cyano. Presto! You now have a cable with a threaded fitting on the end which is going to far outlast the life of the airplane. Sullivan also makes some dandy threaded eyebolts which accomplish the same thing, and these come in both a standard 2-56 and a 4-40 thread for larger models. Du-Bro makes another coupler in the usual 2-56 size which is called a rigging coupler (stock #45L201), and consists of a threaded rod with a hole in one end.

Modelers who have extra time and like to tinker can easily make all kinds of cable fittings in their workshop with the simplest of tools. With a few threaded rods or some 3/4-inch long 2-56 bolts, and maybe a little tin or aluminum sheet, there are many ways to make threaded cable couplers. The only tools required are needle-nose pliers, tin snips, a drill, and a fine file for finish work,

and if you give it a little thought, you'll probably be able to think up your own favorite ways to get into the cable control movement.

One reminder, two control horns are required for each moving control surface, and this can be accomplished by mounting a pair of horns back to back. I prefer to use Du-Bro's adjustable control horns (stock #45L493), as they offer a much finer degree of adjustment than the standard control horns which have only a few holes to position the clevis.

In this discussion on cable controls and their fittings, no attempt has been made to entirely cover all related products on today's market. No doubt a good many applicable fittings are being produced which are not mentioned here. My only purpose is to acquaint our readers (both ARF fans and builder types) of another way to install control systems. If you decide to try it, let us know how it works for you.

MORE ON THREADED RODS AND CLEVISES

Some months ago we did a report on mishaps with threaded rods which seemed to have shallow threads, thus allowing a metal clevis to work its way off during flight. As this appeared to occur most often with imported products, we blamed it on cheaply made fittings, and advised our readers to beware. One of our readers has an opinion on that subject worth listening to, and he sent me the following FAX:

Dear Art:

I don't mean to be a thorn in your side, but regarding your column on threaded rods and clevises, it's not that threaded rods are cheap, resulting in a sloppy fit on Du-Bro clevises, it's that they are a metric thread. I'm surprised that experienced modelers would not immediately notice the sloppy fit and take corrective action before disaster strikes. Canada converted to metric and joined the rest of the planet over 15 years ago. Your own Fearless Leader did a piece on this metric backwardness that you Yankees are guilty of. Most helicopter fliers are aware of this metric thing, as most choppers are from Japan or Europe. My experience with Japanese threaded rods, at least on helicopters, is that they are of very good quality, made of a harder steel and generally superior to the domestic product.

Sincerely,

*Andy Wortowicz
Timmins, Ontario*

Well, it certainly sounds like Andy knows what he's talking about, so I'll bow to his experience and knowledge on this subject. But at least we do agree on one thing; foreign threaded rods and U.S. made metal clevises just don't mix!

If you have any comments on any of this month's topics, or for that matter any questions, write me at 2267 Alta Vista Dr., Vista, CA 92084, and don't forget an SASE for a personal reply. You can phone me at (619) 726-6636 (but remember, I'm usually out flying until noon every day), or FAX me at (619) 726-6907.

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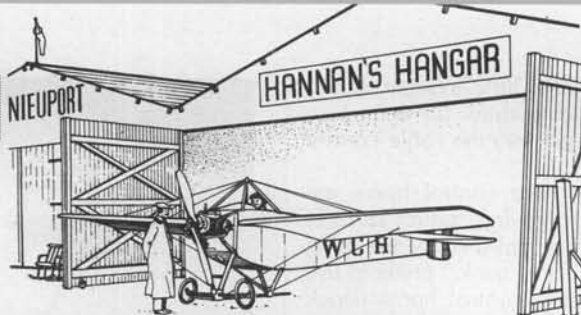
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BY BILL HANNAN

"SIMPLICITY, MOST RARE IN OUR AGE"

Our lead-in quotation, by Roman poet Ovid, dates from 2 B.C., yet seems just as appropriate today. Simplicity, even in our hobby is rare, but happily, not entirely extinct. . . .

The Lincoln Star newspaper devoted a half-page to model airplanes and to Tom Winter, model builder and classics professor at the University of Nebraska. Reporter Marc Krasnowsky noted that even in today's sophisticated high-tech world, low-cost, rubber-powered model airplanes still hold fascinations for many people. Tom Winter explained that the simplicity was a key attraction, saying: "Free Flight is both the beginning of modeling and the summit . . . the simple but still profound soul of model-dom."

While some model competitions suffer from "arbitrary" judging, an endurance contest is exactly measurable with a stopwatch. Another factor, beyond competition, however, is the sheer joy of watching the thing fly. Tom continued: ". . . there is reward no matter what your age is."

In closing, the article says, "Kids as young as seven and adults as old as 70 are forsaking fashionable technohobbies, and summoning the soul of model-dom. 'Simple is profound enough.'"

Bill Galloway sent in a Times Picayune article about his friend and fellow model builder, Jim Poche, of River Ridge, Louisiana. Photos showed Jim in his workshop and a few of his creations, which include model planes, boats, cars and various other miniatures.

Poche, a retired engineer, began building models at age 12, inspired by model magazines, and now devotes up to 12 hours per day to his projects: "You can't be in a rush when you do this kind of work . . . When I begin working, I block everything out of my head. My mind, my hands, and eyes are focused on my work. I can't and I won't let other things get in the way . . . this hobby has been wonderful therapy for me. It keeps my mind off troubles. Yet, I am not completely satisfied with my work. I still have a lot to learn. I realized many years ago that if I didn't have my model planes and wood-working, my life would have been very dull."

FAREWELL JOHNNY

We are saddened to report the passing of Johnny Clemens, at age 77. Johnny, possibly the most fun-oriented of all the AMA past

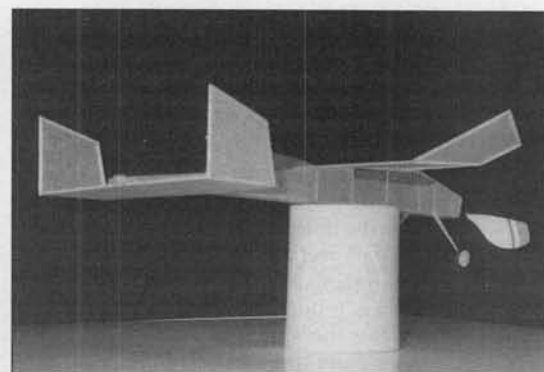
presidents, remained positive in his outlook in spite of many physical set-backs.

Once a member of the original Comet Model Airplane and Supply Company sales team, John opened his own Dallas, Texas hobby shop during 1941, and continued to operate it until shortly before his death.

Thanks to Dick Johnson, one of Johnny's many friends and admirers, we offer this poetic tribute:

GOODBYE J.C.

Oh the ranks grow ever thinner
as our "Legends" go to rest,
But, the journey must be worth it
since they go to meet the best.
Names like Goldberg, Mooney, Plecan,
Walker, Arden, Fox and Wright,
there to welcome Johnny Clemens
to the end of his long flight.
To a place where winds are gentle
and the thermals soft caress
bless a thoughtful soul that helped us
with a hobby's happiness.
As long as there are memories
we will never quite lose sight
of the mortal journey shared with him
and what has seemed so right.
It's up to us to carry on
with hopes that we can merit,
the friendship that he left with us
and that we now inherit.
Bon voyage John . . . and thanks.



Charmingly simple "Pussy-Cat" jointly published in *Model Builder* by Dick Baxter and the late Walt Mooney, as interpreted by Pete Baker, of Milwaukee, Wisconsin.

ART IN MODEL BUILDING

In response to our question "Is model building art?", Sam Welch, of Utah, replies: "Yes, building is pure art! Michelangelo's 'David' is merely a model of the human body. Our art goes one large step further; ours is functional!"

HANDY HINTS DEPARTMENT

Jake Larson, of Treasure Island, Florida,

Happier times during 1987, when the late Johnny Clemens (R) was being presented a Topper vintage gas model by Dick Johnson. Photo by Martin Krieger.





Don Srull charges up Hurst Bowers' "General Electric" Aristocrat. Micro 4 system powers model which was enlarged from Hannan Peanut plans. Photo by Tom Schmitt.

employs natural plant fibers, found in palm tree fronds, as stringers in lightweight models. He also says incense sticks are a good source of small diameter bamboo, after soaking and scraping away the incense. The exotic fragrance remains, perhaps a bonus if you like that sort of thing. According to Jake there may be possible performance increases, since the models "smell to high heaven . . ."

THOUGHT FOR THE DAY

"Name any aspect of aviation . . . RC models, soaring, air racing, hot air balloons, rubber-powered models, ultralights, control-liners, antique planes, warbirds, etc., . . . people involved in any one of them get so wrapped up in that particular phase that they can't (or won't) see how all those things fit together in the overall picture. The old saying about not seeing the forest for the trees." Bob Whitier, Duxbury, Massachusetts.

THOSE FINISHING TOUCHES

The late Walt Mooney used to say: "The last 10% of the model takes 90% of the time," or something-like that. *Domeduster* newsletter editor Stan Fink agrees, and has been running a series of articles on the subject, from which we've extracted a few suggestions: "A scale ship is really only half done when you've got it covered. To make it look realistic, you have to spend almost as much time 'dressing' it up as you did in building it. To some, this is quite obvious, but many others feel that they have spent

enough time already on a difficult project, and just want to see if it will fly. Still others don't quite understand the techniques available to beautify that airplane. Building a scale model is a highly disciplined form of delayed gratification.

"It is better to spend the extra time on one plane than it is to start over on another one and come to the same stopping point again

and again. We probably can't get you to change your attitude, but we'll be glad to show you several techniques to make your indoor scale model look great."

Stan has shown various ways to color tissue, including airbrushing, use of water-based art marking pens, and Easter egg dyes! Where painting is appropriate, Stan prefers acrylics, as they cover well in few coats, and



The Superdart Factory Team, consisting of Frank Faraco (L), Sweeny Hayashi, and Dave Hodges (R), pose with their AMA Delta Dart-based P-30. Highly decorated model has thin cambered airfoil and pop-up wing dethermalizer. Bill Warner photo.

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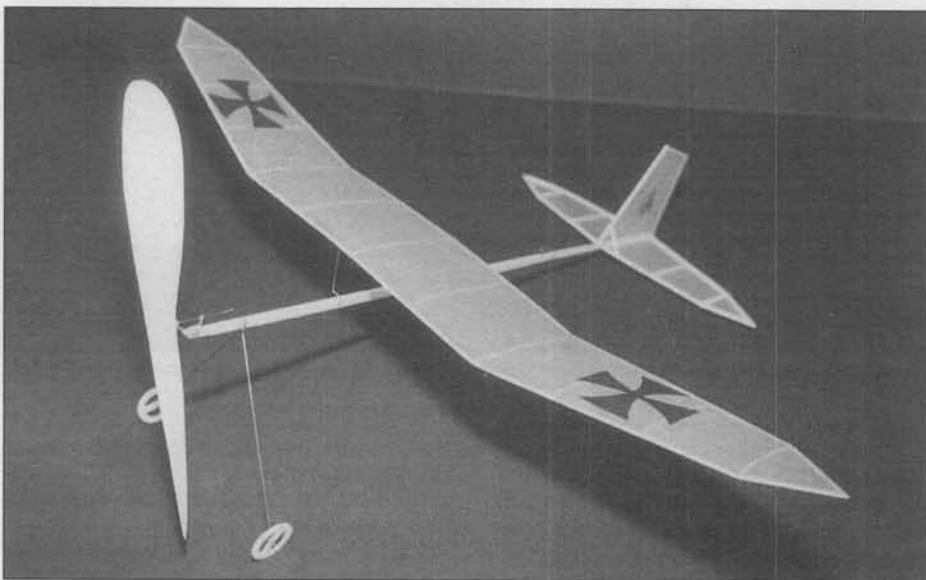
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Fritz Mueller's Peck-Polymers Prairie Bird is an RC controlled, CO₂ powered flier. Engine: Brown Jr. A-23; receiver, Micro Albin.



Megow Senior R.O.G., by Carl Stokes, of Seattle, Washington, features red tissue with black markings. Model did 2 minutes, 45 seconds in the Idaho Kibby Dome.

have no toxic fumes. Other useful tips for indoor model flyers are featured in each issue of the *Domeduster* newsletter, and if you may care to subscribe, \$10 will bring a year's worth: Stan Fink, 1810 Pine St., Philadelphia, PA 19103.

NEW YORK INDOOR TIMES RETURNS

Ed Whitten's newsletter of indoor modeling is again available. Following his retirement, Ed took a breather from publishing it for a time, however, is now back in action, better than ever. Featured are contest schedules and results, rules discussions, gossip(!), and usually a plan or two. The May '91 issue has a nice review on rubber-powered ducted-fan activities, which seem to have a most promising future. We note that Dave Aronstein's "Fanstar" has exceeded one minute duration, and R.O.G.s easily.

Subscriptions to the *New York Indoor Times* cost \$12 for ten issues (USA, Canada and Mexico) or \$25 overseas. Contact: Ed Whitten, 67 Riverside Drive (9A), New York, NY 10024.

NEW PLAN

"The Ultimate Monocoupe 110" plan is now offered by Vern Clements, in your choice of 1-inch to the foot or half-inch to the foot scales. Representing more than 700 hours of drafting time, the drawing fairly sparkles with detail and useful information.



Another Baxter-Mooney "Pussy Cat," this one by Shoichi Uchida, of Japan, in close formation with his Fred Hall designed "M-Bryo."

Featured are scale structure, every wing rib, instrument panel layout and markings. Construction suggestions for a rubber-powered model, complete with prop blank and a simple thrust adjustment device, are incorporated.

Complete information on this and other fine drawings in a fact-filled newsletter/catalog is available for \$3 (USA) or \$5 (other countries), which is refundable with order. Write: Vern Clements, 308 Palo Alto Dr., Caldwell, ID 83605.

MICRO ELECTRICS

Hi Line Limited has introduced a new
continued on page 106

"ARF PLANE OF THE YEAR"
-Model Builder Magazine, 1989



THE SKYWARD 40 FSR



Engine Size: 40
Displacement: 6.40 cc
Net Weight: 420 gr
Two Stroke/ Glow Plug
.97 HP @ 15,000 rpm
ABC Construction
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Muffler included
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4-cycle engine	20-26	48-61	60-91	120
Wing span	53"	63"	72"	108"
Length	37"	44.25"	56"	76"
R/C channels	3-4	3-4	4	4
Wing area*	449	730	909	2127

* (sq.in.)

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THE MOVO D2S FROM ITALY

UNIQUE FEATURES

This engine is being produced today in Italy in very limited volume from the original dies, molds, and tooling that produced about 5,000 MOVO model diesel engines from 1945 to 1952. Even the blue and yellow engine box, the warranty card, and instruction book, are printed from the original plates! This is not a reproduction of an old engine . . . it is a production continuation with ultramodern technology.

I DONE BAD . . . PLEASE ACCEPT MY APOLOGY. Back in the June 1990 issue of *MB* this writer baited a bunch of you with a story of the recreation of the DEEZIL compression/ignition (Diesel) made in Australia by Gordon Burford. By the time the story originated, got refined, and finally put into print . . . Burf's workshop had gone onto other stuff . . . and there were no more repro DEEZILs to be bought by you loyal readers. I'm sorry that story got your hopes up and then dead-ended them. Gordon's lovely wife, Jose (we call her Josie), typed a reply to each and every one of you who wrote wanting to own/buy a modern SAM-type vintage design diesel engine . . . we were too late!

Let's try again. As luck would have it, *2*MB*1* reader Ferde Gale, in Italy, put Sauro Zanchi (the maker of this month's engine) of Bergamo, Italy, in touch with us. Sauro's background story of the MOVO D2S follows . . . it's most interesting!

"Despite the problems caused by World War II, in the early 1940s a number of model airplane engines were developed in Europe by artisans on a limited scale. The projects were similar, but there was no commercial mass production.

"In Italy, the Milan company MOVO (MOVO is an acronym for 'Flying Models') was the first to take the initiative. Between 1945 and 1952 the company manufactured about 5,000 2cc (.12 cubic inch) compression ignition engines with 12mm bore and 18mm stroke of 1/8th horsepower. These engines were very flexible and met with immediate approval from aircraft enthusiasts both in Italy and abroad.

"Success was not slow in coming . . . from the time the engine first appeared in competitions, Italian modelers were unanimous in their approval. In 1946 the MOVO D2 was first, fourth and fifth in the Northern Italian championships. In recent years, with the



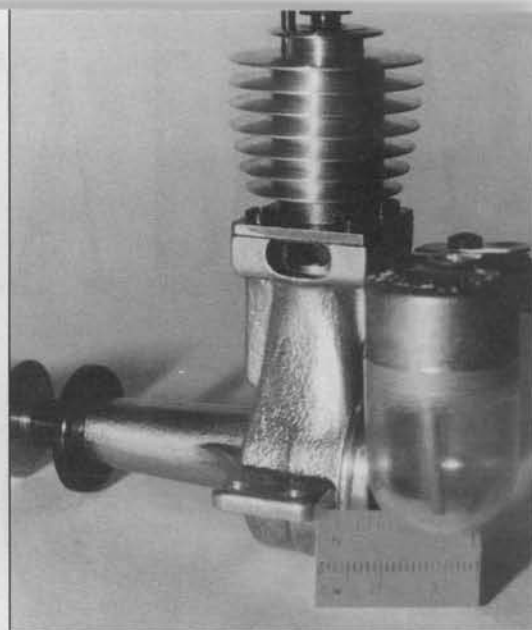
The Italian-made MOVO D2 was a thing of beauty almost 50 years ago . . . it still is, and you can own one!

growing interest in oldtimer models, a devoted amateur of these old-style engines examined the feasibility of producing a replica of the MOVO D2. After long research, the original moulds required for the castings luckily came to light and Gustavo Clerici's son, Sandro (now proprietor of MOVO), kindly consented to their use and they proved to be in excellent condition. This enabled our amateur enthusiast to progress his dream to reproduce the MOVO D2.

"There were many difficulties still to overcome and the moulds had to be adapted to modern die-casting techniques, such as injection pressure and mould extraction systems. Materials were analyzed, dimensions measured on a well-preserved original engine, the various tolerances were established together with the finishes of the machined surfaces, and a number of proto-

types were prepared and subjected to rigorous testing with positive results. Once it was clear that work was proceeding along the right lines, the first series of MOVO engines was prepared and after assembly they were all thoroughly tested. A certificate of guarantee was then issued and the instruction manual and packing was prepared, replicating the original packing made from the same materials and in the same colors as Gustavo Clerici used half a century earlier. The engine proved a great (modern) success and the first series manufactured, starting in late 1989, was sold almost exclusively to collectors and to many members of SAM 62 in Italy.

"The replica is top quality and some old SAM 62 members suggest that it is a more powerful engine than the original due to more meticulous manufacture. The engine is (currently) available in three versions:



This smaller vertical fuel tank is the "S" version that has proved so wanted by Italy's SAM 62 vintage filers.



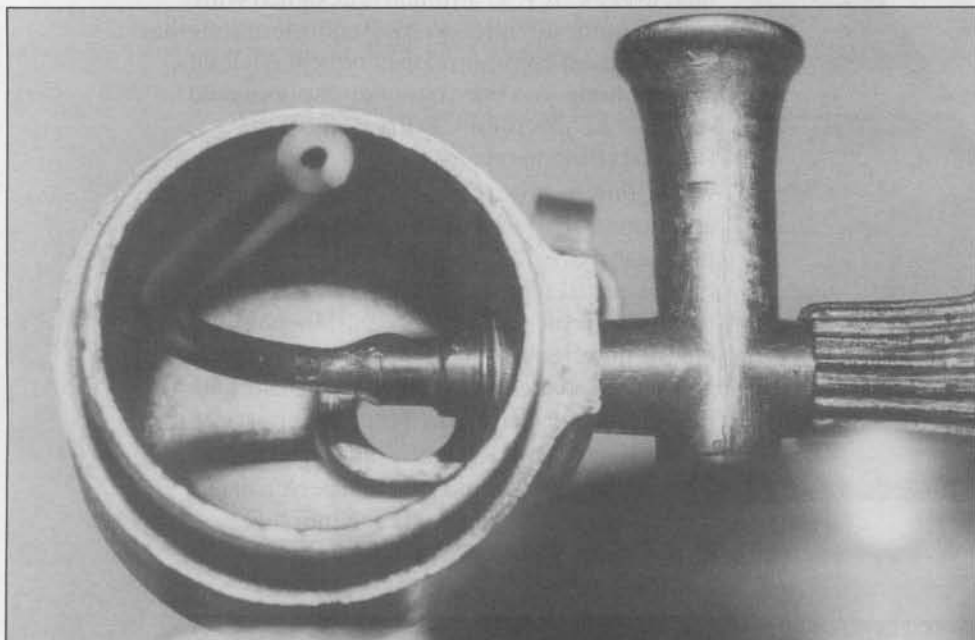
"MOVVO D2 with horizontal aluminum tank.

"MOVVO D2 with horizontal see-through plastic tank.

"MOVVO D2S with smaller see-through vertical tank (the version in this column's photos) which allows the engine to be mounted upright, inverted, or sideways. Once run-in, the MOVVO will turn a 10x6 propeller at 6,000 to 6,200 rpms."

The MOVVO D2S is an absolute gem of manufacture by modern CNC machining. It rates ten points for manufacturing excellence and ten points for design (the mounting options with the D2S version are truly ideal) and the 6,000 rpm figure gives it top performance points, too. If you like quality metalsmithing and the MOVVO D2S stately design . . . if you wanna own one . . . write to me, 1304 Palm Dr., Apopka, FL 32703, ASAP. I can help you make proper contact. The engine is a bit "pricey" at \$205.00, and I therefore feel it should be run-in on Davis Diesel's "1/2A" diesel fuel, with short rich runs, allowing complete cooling between runs on a Master Aircrow 10x6 prop. A quart can will do it . . . then the Davis "standard concentrate" fuel can be run thereafter. All quality engines deserve a careful break-in.

There may be a wait for international delivery as well as manufacture, but your money *won't* leave the USA until I have safely put your engine into the US mail direct to you! **MB**



(Top) Today's production uses the original tooling of nearly 50 years ago. Both metalurgy and metrology (dimensioning) are improved. Even the printing plates were found in A-1 condition! (Center) The camera lens looks straight down on the MOVVO D2 engine's fuel tank and shows casting quality. This version allows upright, inverted or "sidewinder" engine mounting and is most popular. (Bottom) With the tank bowl removed, we see the fuel pickup tubing simply makes a gentle bend to feed fuel into the MOVVO D2's carb.

Avoid ARF Shock



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

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

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

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FAIRCHILD 24 38" Wingspan
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CESSNA SKYLANE 36" Wingspan
31" Length
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To The ARF Claim . . .



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Electric Motor Powered

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Helicopter WORLD

1991 USA FAI F3C HELICOPTER TEAM TRIAL

BY JAMES WANG

This month we have detailed coverage of the recent USA FAI F3C Helicopter Team Trials. The real helicopter fanatics probably know that every two years there is an RC helicopter World Championship, and this year's competition will be in Australia in November. It is an international event, sanctioned by a board of members from many countries, called the Federal Aeronautic International (FAI). The RC helicopter category is called F3C. Before we go into details on the team trials, let's quickly go over the history of Helicopter World Championships for the non-contest-following readers.

So far there have only been three F3C World Championships. The

first one was held in 1985 in London... not *THE* London, but a small town near Toronto, Canada. The World Champ title in '85 was won by Mr. Shigetada Taya from Japan. Yes, this is the Mr. Taya who designed the now famous Concept 30, Concept 60, the Kalt Enforcer, and Kalt Omega. He won the '85 contest with his Omega Jet Stream design. The second place winner was Mr. Ewald Heim of Germany. Heim is the designer of one of the most popular helicopter models in Europe, the Heim Star Ranger. But Heim models have never become popular outside of Europe. The highest placing American contestant at the first World Champs was Robert Gorham, flying a GMP Cobra inside a GMP Jet Ranger. Robert placed 5th.

Close up of Dooley's beautiful Kalt Excalibur in the red and white Epsilon fuselage. Most of the serious contenders brought identical pairs of models.



These two pieces of fabulous craftsmanship belong to the second place winner, Wayne Mann, from North Carolina. They have X-Cell mechanics hidden inside Miniature Aircraft's Triumph fuselage shells. Wayne's ships were the fastest at the contest; close to 90 mph.



Helicopter WORLD



Is this what it takes to win? The Texan, Curtis Youngblood, cool and relaxed on Friday, the day before the showdown, in which he took first place.



This awesome TSK Blackstar mechanics inside a Miniature Aircraft USA Long Ranger body belongs to Robert Gorham, of California, the third member of the 1991 USA team. Robert is the only US pilot, and one of only a few in the world, who will have competed in all four F3C World Championships.



Fourth place was taken by Cliff Hiatt, from Florida. After four rounds, Cliff lost to Gorham by only half a point; 692.5 versus 693. Cliff was a real sport, he even offered to help Gorham build two new ships for the World Champs in Australia. Tom Dooley called for Cliff's flights. Hiatt's Kalt Omega in Epsilon body, with an O.S. 61 Long Stroke engine. It is a specially modified engine from Japan. Receiver and gyro are powered by a six-cell battery through a JMW five-volt voltage regulator.



Fifth place was taken by "Mr. Nice," Tom Dooley, from Atlanta, Georgia. Tom and Cliff Hiatt are both Kalt team members, flying Excalibur mechanics inside a Kalt Epsilon fuselage. Tom was on the last, 1989 USA team, and placed 9th at the '89 World Champs. Standing behind Tom is his caller, Yasunobi Muraki.



Sixth place was grabbed by an excellent flier, Dan Chapman, from Ohio. His father, Don, did most of the engineering modifications on this Schluter Champion. It was the most exotic model at the contest. It has twin tail rotors, no fins, curved downward main rotor blade tips, stealth landing gear, and the highest rotor rpm used, 1850. It was rock stable in hover.



The great looking red/yellow/white Blackshark bodies with Hirobo SST Eagle mechanics belong to Yasunobi Muraki, of Georgia. Yasu won a very respectable 9th place. This young fellow has potential.

Helicopter WORLD



This gorgeous Miami Vice pastel-color Triumph was flown by Ted Schoonard. It has X-Cell 60 mechanics and is powered by a blueprinted O.S. 60 SFN ABC.



The newly released Kyosho Concept 60 was flown by three contestants; Peter Cooke, Dwight Shilling, and Stan Olzaski. This Concept 60 belongs to Cooke. The individual flapping main rotor blade design gives the model a very soft control feel. Pete had one of the lowest rpms in hover, playing around between 900 to 1200. We will have our review of this smooth flying machine in a future issue.



Len Sabato flying a very stock Kalt Excalibur. It is powered by a Webra 61 Speed and the popular Hatori 666 muffler. The Excalibur will soon be replaced by the Alpha. As we said in our Excalibur review (MB August and September 1990), it is one of the most docile machines in hover and forward flight, and we really liked it.



Wayne Mann receives his 2nd place plaque from Contest Director Horace Hagen. Horace runs a strict and tough contest. He follows the book exactly. The night before the contest, Horace gave a two-hour pilot and judge briefing.



Robert Gorham receives the 3rd place trophy. Robert and Curtis were probably the two most relaxed fliers. He was cool as a cucumber. He is the most seasoned contest pilot in the US.



Horace set up a sound level meter to record the helicopter noise. As of now, there is no noise check requirement in FAI F3C helicopter contests. However, starting in the 1993 World Champs, there will be noise check restriction.

The second World Championship, 1987, was held in Bern, Switzerland. This time the crown was won by an American, also the youngest contestant at the meet, Curtis Youngblood. He was flying a GMP Competitor inside a GMP Jet Ranger. The third World Championship was held in Chesapeake, Virginia in 1989. This time the title was relinquished back to Japan. Dobashi, of Japan, was only 18 years of age. Defending champion, Youngblood, dropped to third place.

In such a contest of the creme de la creme, anyone in the top five is capable of winning. It is just a matter of a slight slip that can make the difference. But one thing that proved the consistency of the Japanese flying is that in all three Championships, the Japanese took home the team trophy. (The last two World Championships were covered in detail in May 1989, December 1989, March 1990, and May 1990 *Model Builder*.)

On June 1st and 2nd of this year, 19 of the best contest helicopter pilots in the US gathered at Germantown, Maryland, to duel out and determine the top three to form the team that will represent the USA at the 4th F3C World Championships. In order to even compete in the team trials contest, the pilots must have finished in the top half of at least one FAI-level contest held in the US in 1990, or prior to June 2, 1991. Even though the contest was only a two-day event on Saturday and Sunday, by Wednesday, some of the nineteen contest-

ants had already arrived. Yours truly is fortunate to live just half an hour away from the flying field, and was able to stop by the field each evening to see them practicing.

The first contestant I saw was Dan Chapman, who with his father, Don, had driven ten hours from their Ohio home and arrived on Wednesday afternoon to check out the field. Mike Mas also showed up with his lovely companion, Linda. There was one local contestant, young Pete Cooke. Pete lives only 15 minutes from the field, and he had been practicing every day for the past two weeks with his new Concept 60. By Thursday, everyone had showed up. Friday was a busy day as contestants were checking out their machines. Mike Mas practiced non-stop. Tim and Ted Schoonard went off to an empty field and practiced by themselves. Most of the fliers put in two or three flights to fine-tune the needle valves. Curtis Youngblood chose to just sit there, relaxing and watching the fun!

The celebrity pilots, such as Cliff Hiatt, Wayne Mann, Tom Dooley, and Curtis Youngblood, brought identical pairs of helicopters. Just from looking at their machines, you know these guys are serious. Their machines are meticulous. Cliff drove 1500 miles from Orlando, Florida; he meant business. After a round, I heard him say, "Okay, need to put in a new Enya 3 plug." At this level of the game, money is no longer meaningful, if there is a blade that costs \$500 and will improve performance by 3%, people will buy it. Just look at the

Helicopter WORLD



All day Friday, Tim and Ted Schoonard were practicing at another open field a few miles away from the contest field. Here Tim is tuning up his X-Cell 60. This X-Cell has a 1.5 inch longer tail boom. Notice that Tim is using a JR single stick radio. Curtis Youngblood and Dan Chapman were the other single stick users.



Len Sabato scrutinizes Cliff Hiatt's Kalt machine. The top fliers like to remove the main rotor head and the blades when they are not in use. You rarely see them folding the blades back.



Stan Olzaski flies his Concept 60 with his thumbs only. Most US pilots hold the sticks with thumbs and index fingers, while almost all Japanese fliers use thumbs only. As nearly all the radios sold are Japanese made, the switches are easier to activate if you try holding the sticks with the thumbs.



Now, don't you just want to drive this van home? This heavy-duty arsenal belongs to Tom Dooley and Yasunobi Muraki, who drove up together from Georgia. There are two Excaliburs with Epsilon fuselages, two Hirobo SST Eagles in Blackshark bodies, plus a pod-and-boom Excalibur and Eagle. This is dedication to the hobby!

TEAM TRIAL RESULTS

Name	Round: #1	#2	#3	#4	Total
1. Curtis Youngblood	210.0	235.5	240.5	242.0	718.0
2. Kenneth Mann	216.5	224.5	232.5	240.0	697.0
3. Robert Gorham	216.0	239.5	213.5	237.5	693.0
4. Cliff Hiatt	212.0	235.5	228.5	228.5	692.5
5. Tom Dooley	211.5	217.5	224.5	221.0	663.0
6. Daniel Chapman	196.0	204.5	213.5	212.5	630.5
7. Ted Schoonard	203.5	202.5	205.0	215.0	623.5
8. Tim Schoonard	187.0	209.5	202.0	210.5	622.0
9. Yasunobu Muraki	179.5	202.0	202.0	206.0	610.0
10. Dwight Schilling	185.0	194.5	195.0	215.5	605.0
11. Peter Cooke	186.0	198.5	204.5	199.5	602.5
12. Wendell Adkins	90.5	192.0	198.5	207.0	597.5
13. Stan Olzaski	168.0	167.0	184.5	217.5	570.0
14. Bob Belluomini	162.0	194.5	185.5	176.0	556.0
15. Thomas Daluslo	162.5	195.5	190.0	0.0	548.0
16. Leonard Sabato	123.5	172.0	151.0	166.5	489.5
17. M. J. Mas	176.5	112.5	0.0	0.0	289.0
18. Stan Stockman	138.0	128.5	0.0	0.0	266.5
19. Dave Finkelstein	0.0	0.0	0.0	0.0	0.0

*When two or more rounds are flown, the lowest single round score is discarded.

score for the top four places; the difference between first and fourth is only 3.5%.

In the contest, four rounds were flown; two each day. Contestants could drop their single lowest score. The flying order was determined randomly, but the sequence was rotated after each round. This was done so everyone had equal exposure to wind conditions and sun location, which varied from morning to evening. The weather was ideal for the two days; 90 degrees, low humidity, and wind from dead-calm to 10 mph. The 'problem' with very low wind is that it makes everyone's score better! If the wind is gusty, it really separates the men from the boys.

It was a very close race for the top four places. Even until the start of the fourth round, any one of the top four finishers could have grabbed first place. If Curtis had not flown a great fourth round, the other competitors could have nudged him out. Finally, however, when the smoke cleared and all four rounds were done, Youngblood was first. Mann edged out Gorham by four points to take second,

Hiatt trailed behind Gorham by only half a point. Cliff's last auto cost him the trip to Australia. Any of these four chaps is capable of winning the World Champs, but unfortunately only three can go. It is interesting to point out that in the most recent major contest, the Tangerine in Florida, Cliff came in first, Curtis second, Robert third, and Wayne fourth.

The night before the contest, Contest Director Horace Hagan held a two-hour pilot briefing in the Ramada Inn. One of the questions brought up was whether the pilots would prefer having more than one contest to decide who would be on the team. The drawback of multiple contests is that the pilots would have to travel all over the country at the cost of additional time and money. But surprisingly, more than half the contestants wanted to have more than one contest to determine the team.

Another issue raised at the meeting was whether or not to normalize the scores. But the most interesting issue concerned at what altitude the aerobatic maneuvers, such as loops and rolls and

entry into 540 stall turns, should be performed. A vote was taken. Eleven pilots voted for 20 feet, and seven voted for 30 feet. Of course, someone yelled out, "Wimps!" Whew, 20 feet? That is pretty low to me for a three-second slow roll. The rule says all aerobatic maneuvers should start and end at the same altitude. That means you start your rolling stall turns at 20 feet and must recover and pull out from the vertical dive no higher than 20 feet.

Horace specified that for the Rolling Stall Turn, the helicopter must 'stall' at the top of the vertical climb before the pilot initiates the 180-degree stall turn. The same is true

for the 540 Stall Turn. One judge even commented that he likes to see the model hang there before the stall turn. Tom Unger, one of the five judges, said he doesn't really care how fast the model spins around on the 540 stall turn, as long as the model stalled before the 540 starts. Wayne Mann pointed out that the spin rate for the 540 stall turn must be constant. It should not be a fast spin for the first revolution, then a slowed down spin for the last 180 degrees. On the way up in the vertical climb portion of the 540 Stall Turn and Rolling Stall Turn, collective pitch should be used to correct for any wind gust. Fore/aft cyclic should not be used because

that would cause the model to pitch, rather than stay on a vertical heading.

Another matter discussed at the meeting was that for hover maneuvers, the model's center of gravity should be the reference point. That point should be locked solidly. If there is wind, the pilot needs to use fore/aft cyclic to correct the model. Bob Belluomini pointed out that at the first World Champs, Taya was constantly using fore/aft cyclic to correct the model in hover, so the fuselage looked like it was rocking its nose up and down, but the CG never moved. Furthermore, all the pilots and judges agreed that in the hover maneuvers, if you missed the flag, or drifted away from a spot, it is better to continue, rather than try to bring the model back over the spot. The reason is that the judges sitting 50 feet away might not have noticed that you missed the flag because they are watching the model from another angle, but when you correct for it, they will notice it.

In regards to the 180-degree autorotation maneuver, Horace said that you should never stretch the auto to glide the model into the center of the 10-meter box. The rule says you must spiral the model in on a steady turn rate and plunk it right into the center of the 10-meter box without any pause or straight flight. Horace said the crowds may roar and cheer when they see a pilot stretch that helicopter 50 feet into the box, but judges should severely downgrade it. It is better to land the model outside the center circle, or even outside the 10-meter box, than to stretch the glide. And when the model lands, the skids need to be parallel to the sides of the box to get maximum points. This is why almost all the contestants used a constant tail drive unit. Constant tail drive units continue to drive the tail rotor in autorotation to permit heading control.

Every pilot is supposed to have a caller (This has been omitted in Pattern). The purpose is to yell out 'start' and 'end' of each maneuver. And, the caller cannot talk or advise the pilot during the maneuver. He cannot say, "You are too high, or too low," etc. At the meeting, Cliff asked if he could call out the maneuvers himself. Horace's response was that maneuvers must be called out using a megaphone, so the answer was, "Sure, if you can fly and hold a megaphone at the same time!" Well, Cliff decided to have Tom Dooley call for him.

Before the contest got started, I had a quick chat with Curtis. Curtis is presently a college student studying mechanical engineering in Texas. He will be graduating with his Bachelor degree in Spring 1993. However, he said that if he made the team, he would take the next semester off, because he would be missing two weeks of school in the Fall to go to Australia for the World Championships!. Well, these top chaps are very serious! They all practice almost every day.

Curtis's dad, David Youngblood, is also an engineer, working at a university nuclear particle accelerator. He devised many innovative engineering ideas on their models. Even though they are flying pod-and-boom



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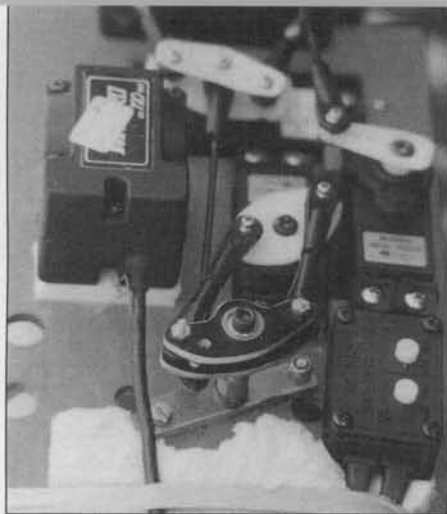
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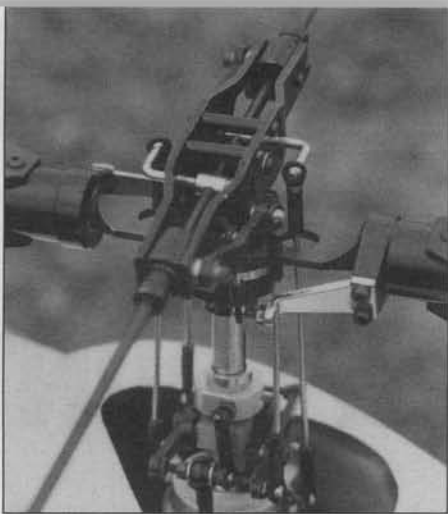
Inside Curtis Youngblood's X-Cell 60. A homemade double ball bearing push-pull bellcrank is used for collective control. Push-pull helps provide even loads on the servo output shaft to prevent side loads.

X-Cell's, there are some extra goodies. As shown in the picture, they devised their own push-pull control mechanisms. Now Miniature Aircraft USA has made available a plastic servo tray, and optional push-pull collective control mechanisms for the plastic tray. The push-pull is also sold by itself. The purpose of push-pull on any control is not to reduce any twisting load on the servo shaft, but rather to prevent the shaft from bending. This is also why expensive servos like the Futaba 9201, JR 4031, and Airtronics 93735, all have two ball bearings to support the servo output shaft; it is to prevent the shaft from bending and tilting.

David modified the stock JR servo by replacing a capacitor with one of a different value, and he said it improved the servo resolution. I can believe that, because I remember I once repaired a servo and also changed a capacitor, but the resolution got worse. I must have gone the wrong way! David also added a circuitry inside the JR receiver to count the number of hits and error bits that the PCM receiver was receiving in a flight. He said most of the time the receiver does not get any hits. But if someone else on the same frequency switched on, then there will be lots of hits! The number of hits is indicated by three LED's. Each one lights to indicate a particular number was received.

As the Japanese team won the 1989 World Champs with 30% MG fuel, every contestant is trying the 30% nitro fuel. Magna/Coolpower 30 was the most popular. But interestingly, Curtis used K&B 500H, which only had 12.5%. The reason that Curtis uses K&B 500 fuel with great success is because he keeps his rotor rpm fairly constant. He uses 1800 for hover or forward flight. Other contestants copied the Japanese trend of running very low rpm in hover, around 1300, and then rev up the motor to 1700 or 1800 for forward flight aerobatics. This type of flying style requires the high nitro to lug the motor for torque at low rpm, and high revs in forward flight.

It was noticed at the contest that the fastest



Closeup of the TSK Pearl III hingeless main rotor on Robert Gorham's TSK Blackstar. Robert, and David Finkelstein, had the only hingeless main rotors in the contest. TSK is the only manufacturer in the world that makes hingeless rotors for 60-size models.

helicopter belonged to Wayne Mann, using a ringed engine. It used to be that top Americans preferred ABC engines for power, but now many are back to ringed engines. Wayne's explanation was that ringed engines have less friction. Furthermore, the long-stroke engine is making a comeback. Cliff Hiatt and Wayne were both using long-stroke engines. Presently, O.S. short-stroke SFN engines are made strictly to satisfy the American market, they are not even sold in Japan. The Japanese all use long-stroke and ringed engines.

As shown in one picture, Wayne rotated the tail rotor on his X-Cell mechanics from the left side to the right side. The reason, as we have explained before, is that it is more efficient to blow the thrust cleanly away, rather than impinging on the fin. But simply moving it to the other side would also re-

verse the rotation direction of the tail blades. Ideally, we want the tail blade to swing upward into the main blade downwash to improve the tail rotor efficiency. Therefore, Wayne had to move a beveled gear inside the tail rotor gear box from one side to the other. It can be done easily on your X-Cell.

The Schoonards must be quite happy, because X-Cells did very well at the contest, and four of the top ten pilots were flying X-Cells. Out of all the 60-size machines on the market, the regular X-Cell 60 represents a very good machine for the buck. As I pointed out in our review in November 1990 *Model Builder*, the X-Cell 60 is a nice all-around machine for hot dogging and smooth flying. My X-Cell has not given me any grief at all, and I really like the way it flies.

Incidentally, a common trend among many models is to use the new Torrington bearing starting system instead of the traditional cone-start system.

Finally, the fun part of the team trial was that after the contest was over on Sunday, I whipped out my radar gun that I bought for the speed record attempt and clocked anyone who wanted to check their flight speed. Cliff Hiatt was the first to jump on it. I stood at the end of the runway, and he gunned his machine straight at me from a dive. That was pretty intimidating! Cliff's Kalt Omega with the Epsilon fuselage consistently averaged around 80 plus mph. The highest pass reached 84 mph. Then Robert Gorham decided to take a shot at me. His TSK Blackstar with Long Ranger fuselage did 85 mph. Robert was flying so low, I had to sit on the grass. On one pass he could not be more than two feet above my head. I have gone out flying with Robert since 1980, so I know his ability. But still, that was too much thrill, and I passed the radar gun to someone else

continued on page 95

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20 YEARS & COUNTING

The contest has its official name: "The Northwest Regional Control Line Championships." It has its nickname: "The Regionals." Some people call it simply "Eugene." But Paul Gibeault of Calgary, Alberta, who hasn't missed the gathering in over a decade, has perhaps the best description: "Mecca."

West Coast control-line model aviators made their annual pilgrimage to Eugene, Oregon, on Memorial Day weekend, 1991, for the 20th time, and there was a special electricity in the air for this milestone competition.

It did no harm at all that the weather over the seven-circle site was the best in several years, with a slight overcast to limit the sunburn, but no rain to dampen spirits. It was the end of a three-year stretch of inclement weather that had fliers saying that, "The weather was better at the old site." That

was a reference to the five-circle site just across the road that the contest occupied for its first 16 years. The Prop Spinners' site moved across the street with expansion of the Eugene Airport, four years ago.

The fact that No. 20 was something special was heralded by the pastel blue T-shirts all over the field, with the picture of a classic stunt on the front and the commemorative inscription: "20th Annual Northwest Regional Control Line Model Airplane Championships - Eugene Prop Spinners, Eugene, Oregon, May 25-26, 1991." On the back was the logo of Eugene Toy & Hobby, one of the great hobby shops that caters to control line fliers, and has brought a truckload of discounted CL merchandise to each of those 20 Regionals.

There was nothing unusual about the presence in the parking lot of cars bearing license plates from every western state and

Canadian province. The Eugene contest is a large enough event that, like the U.S. Nats, it draws not only competitors but spectators from around the region. It's as much a social event, a convention, and a seminar, as it is a competition. Nor was anyone surprised by the array of 119 sparkling (and we do mean eye-popping) trophies and thousands of dollars worth of merchandise prizes. That's the Regionals!

But there were some things that set No. 20 aside from some of its predecessors, which portend good things to come for control line flying in general, as well as in the Northwest region.

Frank Macy, left, Tim Strom, and Jim Cameron prepare trainer plane while young flier waits for a lesson. When one plane had a problem, they were able to switch to another in seconds. Young Tim taught several fliers, including some adults.



Scale modeling made a giant leap forward at the 1991 Regionals, with the largest total entry in the three scale classes in the contest's history. Back in the 1970's, the Regionals offered AMA Precision Scale as its only replica class. In the early 1980's, Profile Scale was added and became popular. With a slight decline in entry, it was changed to Sport Scale for the past several Regionals. At the urging of some contestants, the decision was made to split Sport Scale into two classes; Profile and Sport, for 1991.

What a payoff! The unprecedented line of planes spread out for judging drew a crowd of spectators and photographers. The entries were concentrated in the sport and profile classes, but some of the sport scale planes easily could have competed in precision scale. Contestants indicated they'd be back and bring along their flying buddies from home. The 1992 contest could draw one of the largest scale entries seen in modern CL history.

One of the most successful aspects of the '91 Regionals had nothing to do with competition, but demonstrated how a simple idea, well executed, can promote the hobby, provide good public relations and generate lots of plain old fun.

A newly emerging modeling association from Portland, Ore., had received permission in advance to sign up kids and interested spectators for some free flying lessons at the Saturday lunch break. They figured a half-dozen or so kids might be interested. The Portland group, known as the Portland Fireballs and spearheaded by Jim Cameron and Frank Macy, arrived with seven simple trainer planes with attractive lines, conceived by Frank, and a bullet-proof construction designed by Jim.

A crew of expert fliers was ready to give lessons, and it was lucky that they were well prepared. Kids started lining up early and just kept coming. The lessons were carried over to Sunday afternoon and some 30 new fliers got two or three flights each over the two days. The new fliers included adults as well as youngsters, and at least one was a local television reporter in a dress and high heels. (The reporter successfully completed her first flight and promptly fell down from dizziness . . . all of which was captured on videotape and shown on local television's 6 p.m. news).

As a testimonial to Jim's construction techniques, the Portland club took home all seven of the planes undamaged.

The Regionals has always been a contest open to "firsts" and in 1991, was the scene of what may be one of the most significant "firsts" in control line model aviation. In an effort to increase the safety of control line model aviation, both for participants and spectators, the 1991 Regionals was the first . . . in the world, as far as is known . . . to require automatic shutoffs on AMA fast combat planes.

The goal of the rule was to assure that, in the event of a line cut or break, any "fly-away" plane would immediately and automatically shut itself down and fall harm-



Scale was big at the 1991 Regionals. Don Chandler, California, with his P-51B Mustang.



Jim Cameron teaches a young flier during 1991 Northwest Regionals' free flying lessons. Some thirty kids, and adults, took lessons.

Sport scale B-17, by Merle Mohring, of California, demonstrated revolving turrets and other high-tech features, some operated by radio control. It turned in a great flight.





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lessly to the ground. For historical perspective: The Prop Spinners dropped fast combat from the schedule in 1990 after concerns about flyaways were raised by the site owner, the City of Eugene, and by club members. Though there never has been a significant accident at the contest related to flyaways, a couple of years in a row in which flyaways attracted some unfavorable attention, resulted in the decision to drop the event.

But club members never intended that move to be permanent . . . fast combat was the spectator favorite and always one of the most popular events from a contestant standpoint, having drawn 20 entries in 1989.

It was hoped that the shutoff requirement would spark some research and development among combat fliers and provide a demonstration that could bring the long-discussed flyaway shutoff into reality. That's just what happened.

Three competitors showed up, a small number but highly significant in that they brought three entirely different shutoff designs, all three of which were flight tested and appeared . . . short of actually cutting a plane loose as the ultimate test . . . to meet all the requirements of an automatic shutoff. All were designed to arm themselves in flight and trigger with the loss of centrifugal force, and all demonstrated that they were working properly by being tripped (in the shutdown position) when the planes landed.

The double-elimination contest went off without a hitch. The shutoffs caused no problems for the contestants. In the most desirable of all circumstances, there were no flyaways to give the shutoffs their ultimate test. But combat was back and the safety factor was significantly improved.

Your columnist was one of the three entrants. I stepped aside from my duties as combat event director for the contest, in order to demonstrate in competition the shutoff which I designed to get the ball rolling on shutoff research and development. That shutoff was described in this column last month.

My shutoff mounts on the inboard side of the plane, using one of the motor mounts. It is armed by centrifugal force, triggered by the lack of CF, and operates by pinching off the fuel

line. It uses a small alligator clip, a piece of brass, a few small bits of wire and a couple of wheel collars, costs about 50 cents to make and takes 15 minutes to build. It requires no modification of the plane.

Two-time national champion Norm McFadden, of Lynnwood, Washington, showed up with a shutoff that worked by a different principle, but was even simpler than the one described above. Norm's presence was significant in that it represented an endorsement of this safety concept by one of the true top guns in the combat category, and one of the most respected airplane designers, engine reworkers and general combat experts. Norm is the designer of the pressure regulator used by many top combat fliers.

Norm's shutoff mounts on the outboard side of the motor mount and, like mine, is armed by centrifugal force and triggered by the cessation of CF. Norm's shutoff dumps the fuel when activated. It requires a bent piece of music wire, a T-fitting and an aluminum fixture. A metal-cutting saw, drill and some pliers are required for its construction. It should cost about 50 cents to build and take about 15 minutes to build. Norm is preparing a detailed description of how to build the shutoff for publication in this column next month.

Frank Boden of Burnaby, B.C., brought a shutoff design that was more complicated,

1991 REGIONAL RESULTS

1/2-A Speed	Fred & Joyce Margarido	104.25 mph.
A Speed	Fred & Joyce Margarido	165.38 mph.
B Speed	Frank Hunt III	93.06 mph.
D Speed	William Nusz	204.7 mph.
Jet Speed	William Nusz	194.31 mph.
FAI Speed	Chris Sackett	171.55 mph.
Formula 40 Speed	Paul Gibeault	159.79 mph.
.21 Sport Speed	Glen Dye	127.88 mph.
AMA (fast) Combat	Norm McFadden	
Slow Combat	Dick Salter	
1/2-A Combat	Dick Salter	
Fox 35 Combat	Roy Nakano	
Class I Navy Carrier	Terry Miller	299.0 points.
Class II Navy Carrier	John Hall	205.7 points.
Profile Navy Carrier	John Hall	223.3 points.
.15 Navy Carrier	John Hall	188.2 points.
Precision Scale	James Fuller	184 points.
Sport Scale	Merle Mohring	152 points.
Profile Scale	Grant Heistamp	138 points.
Class I Mouse Race	Paul Gibeault	4:50.78.
Junior Class I Mouse Race	Tim Strom	10:54.74.
Class II Mouse Race	Paul Gibeault	10:39.59.
Rat Race	No entrants	
Slow Rat Race	Richard McConnell	10:31.8.
Scale Race (Goodyear)	Paul Gibeault	9:06.8.
Northwest Goodyear	Joe Rice	12:59.65.
Junior Northwest Goodyear	Tim Strom	12:38.5.
Northwest Sport Race	Henry Hajdik	9:56.
Junior Northwest Sport Race	Tim Strom	10:01.
Northwest Super Sport Race	Richard McConnell	4:15.
Balloon Burst	Roy Nakano	
Junior Balloon Burst	Tim Strom	
Old-Time Stunt	Don McClave	290.25.
Nostalgia Stunt	Don McClave	481.5.
Beginner Precision Aerobatics	David Finney	181.
Intermediate Precision Aerobatics	Barry Shandel	423.
Advanced Precision Aerobatics	Ron Holloway	459.5.

using an air dam, counterweight and fuel dump system that does require some modification to the airplane, but it performed its intended function.

Looking elsewhere around the field, entry was heavy in the Profile Carrier event, indicating an upswing among the "happy hookers." Entry was strong, as usual, in both the speed and aerobatics events, and down a little in the racing and combat arenas, but still strong enough for some good competition. The highest event entry of the contest was in the senior-open balloon bust class, which is always a popular event for both novices to competition and for experts who enjoy a little low-key activity, and it's not as easy as it looks!

The traditional Grand Champion awards were presented to the fliers who scored the highest number of points over a variety of events. This year, Dick McConnell, of Seattle, Washington, edged out repeat champion Paul Gibeault, who took the second-place grand champion trophy. Third place went to John Hall, of Sumner, Washington.

The precision aerobatics concours d'elegance trophy went to Alan Resinger of Delta, B.C., Canada, and Bob Emmett of Renton, Washington, took the old-time/nostalgia stunt concours trophy.

Please see results chart on the preceding page for the first-place winners at the 1991 Regionals.

It was De Hill of the Tulsa Glue Dobbers who gave us the idea of starting our "newsletter of the month" feature, which began with the May edition. It seems only appropriate that we get around to featuring De's own newsletter, "Round & Round."

Before continuing, a reminder to newsletter editors: De Hill is trying to set up a network of exchange newsletters and invites anyone who puts out a regular club newsletter to send them to him as well, both for exchange purposes and for listing on his master list.

In the same vein, your MB columnist also hopes to be on the list for all regular newsletters. I plan in a future issue to publish a listing of all the newsletters I currently receive. Newsletters are a great way to pull in all the "stray" modelers who are building and flying without benefit of information exchange with other modelers in their area, or without knowledge of local club activities.

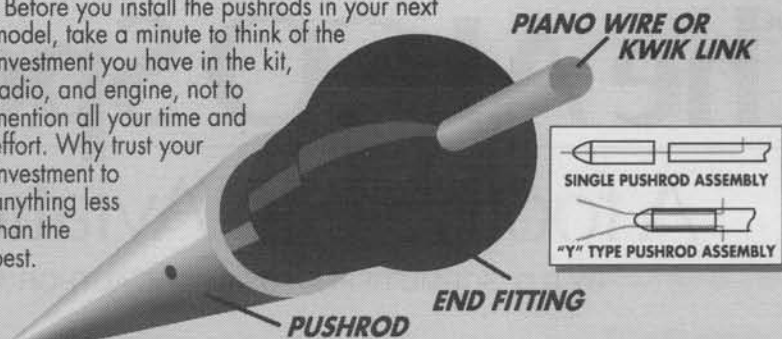
De's address and the column's address are listed below.

The name of the Tulsa newsletter comes from the great tradition of the control line column that for many years was published in *Model Airplane News* when it was an all-round modeling magazine. (Incidentally, "Round & Round" also is the title of a column in an independent CL newsletter that disappeared from the Western scene three years ago, but is about to make a comeback - more information on that topic below.)

continued on page 96

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A footnote in Aviation history

BY R.G. SCHMITT • PHOTOS BY THE AUTHOR AND FRED D. WOLFE

The year is 1930. Charles Lindbergh had flown the Atlantic just over two years before the world, and America in particular, had come down with a bad case of Aviation fever and many knew the only cure was to "feel the wind beneath their wings." Yet the world was plunging into the deepest Depression ever experienced, and money for flying was scarce indeed. Still, to a few, the desire to fly was so strong that they would find a way to achieve flight, even if they had to create it themselves.

Thus was the real birth of the "home-built" phenomenon. World War I surplus aircraft Jennies and Standards had all but disappeared from the market, and besides, they were too expensive to maintain and operate. But it was possible to build, for very little money if one were clever and handy enough, a small single or two-seater which could be constructed and hanged in a garage, trailed behind the family car to the nearest "flying" field (maybe a pasture?), and soon the harsh world could be left behind.

Such an airplane was the ALCO Sportplane designed by John M. Allison, an aeronautical engineer from the University of Kansas, who, while still a student, taught himself to fly in a home-built of his own design in 1922. After graduation, he became associated with his brother in a firm manufacturing parts and kits for modified war surplus planes, and for home-builts. In his detailed "how-to-build" article in the 1930 *Glider and Flying Manual* (Fawcett Publications), he states that this design would cost only \$100 to build, exclusive of engine!

Engines have always been a problem for home-builders, even till today. Many home-builders opted for automotive engines, because of their availability and low cost. Prime examples; B.H. Pietenpol with his Model "T" Ford-powered Sky-Scout and Model "A" Ford-powered Air-Camper (today Volkswagen and Corvair engines are used). Others chose to go the "motorcycle" route, such as Ed Heath (of "Parasol" fame) with his Heath/Henderson conversion. And, of course, the ever-present Harley "74" V-Twin, modified and used by many builders

(and available for only \$15, used!). Many other builders chose to build their own, starting from readily-available casting kits costing about \$35.

There were actually several small (under 50 horsepower) aircraft engines available, such as the Aeronca opposed-twin of 35 hp, the three-cylinder Anzani radial (also rated at 35 hp) and, from England, the opposed-twin Bristol "Cherub" of 32 hp. Unfortunately, the cost of these engines was far beyond the pocketbook of most builders - the cost of the "Cherub," for example, was \$1270 in 1928 dollars, when one could buy a new Ford coupe for \$600!

The engine which tempted many builders, however, was a small opposed-twin which was Lawrence-designed and built in quantity to power the WW I flightless training plane, the Penguin. These engines were still available in the late '20s and early '30s, new, in-the-box for \$100! We pay more than that for a good model engine now. It was rated at 28 hp, but its output was probably more like 24 hp.

The Lawrence C-2 engine, which was chosen to power the ALCO Sportplane, was cheap, light, fairly dependable, easy starting, and easy to maintain. HOWEVER, being a two-cylinder opposed engine with just a single-throw crankshaft, it vibrated beyond belief, and if it didn't shake the airframe apart, it was sure to give the pilot one horrendous headache! Several remedies were available to the home builder; one being a new two-throw crank designed to fit inside the existing crankcase, but which required "bent" connecting rods, as in some two-cylinder outboards. Another remedy, also featuring a new two-throw crank, included a new crankcase which staggered the cylinders, but allowed the use of the standard connecting rods.

One should not, however, have any vibration problems with our electric powered, 1-1/4"=1' replica of this interesting lightplane from the Golden Age of American aviation, powered as it is with a 50-watt motor, such as the HiLine "ELF-50." The author has attempted to make this design as accurate a scale model as possible, as regards the airframe, considering the limitations of model

materials and construction techniques. Aerodynamic-dictated changes were two in number; four degrees of dihedral was added, as the author's model was built without ailerons, and flown three-channel. If a modeler builds the ALCO with ailerons, the dihedral can be eliminated. Further, the author thinks models still look better with maybe just a trace of dihedral... it keeps the wings from looking as though they are drooping!

The model may still be flown three-channel, utilizing ailerons (differentially coupled) and elevators, and no rubber, although the author has not tried this configuration. The prototype was also designed and built with a horizontal stabilizer and elevators approximately 30% larger in area than the scale surfaces. This was done to allow the builder more latitude in the placement of components, and location of final balance point. The scale outline is given on the plan, but if the builder chooses to so build, he should be aware that the final balance must be on the "scale" location.

Construction overall is, in most cases, conventional. The wing is best built by first constructing the spars completely, then building the wing panels one at a time on the spars, and only then completing the center-section. If the builder is using "built-up" ribs, the upper capstrips must be cut from 3/32-inch quarter-grained medium sheet, 3/32-inch wide. The lower caps may be cut from 3/32-inch square medium strip.

To begin construction, the leading and trailing edges are first pinned down to the plan, then the lower capstrips are fitted and glued in place. The spars are then positioned and glued, and the simulated "compression spars" and "drag and anti-drag" rigging, which is made from 1/32-inch round bamboo, doped silver, to represent the cables of the full-scale original (a good source for 1/32-inch bamboo is your local establishment that serves Mai-Tais). The wingtips are also bamboo, 1/16-inch round, to represent the 1/2-inch diameter steel tubing of the actual aircraft (these can be obtained at your local grocery store, sold for kabobs, etc.).

It is recommended that the tips be completely formed with heat (soldering iron,



heat gun, electric kitchen range, even a turned on electric light bulb) before gluing in place (a scrap plywood form may assist in getting the correct shape). The upper capstrips may then be fitted, noting that at the trailing edge, they lay along side the lower caps (this gives a much stronger trailing edge joint). To complete the panel while it is still pinned down, add the upright braces between the upper and lower caps. Note that the root ribs are not installed at this time.

If the builder selects not to use the built-up rib construction, but opts for the solid ribs, the construction sequence is somewhat different. The spars are first positioned on the plan, then the ribs are glued in place, next the leading and trailing edges, and finally the bamboo tip. It is not practical to try to cut openings in the solid ribs to fit the "drag and anti-drag" simulated rigging, but it is advisable to use the mid-span "compression" struts to reinforce the 3/32x3/8-inch ply strut pads, which are fitted between the two indicated ribs, and butted up to the spars.

The second panel is completed in the same manner as the first, and then the center-section ribs are glued in place on the spars. If the builder is using "solid" ribs, it will be necessary to modify the root ribs, as the spars are flush with the lower surface of the wing, as must the pre-drilled plywood wing hold-down pads, the spar cannot set on the pad as it will with the built-up rib construction. Instead, the pads are notched into the ribs as shown, but will be butted to the spars. Also, with the solid rib construction, cut the spar notches in the root ribs only as deep as necessary to accommodate the spars.

The center-section can then be completed with the addition of the leading and trailing edges, and the upper and lower 1/32-inch sheet skins. If the builder has not pre-shaped the leading and trailing edges prior to assembly, the next step would be to shape the airfoil section completely (the author uses a

continued on page 76

(Left) Two views of the completed model. Note the scale structure, the ideal proportions, and the simple lines. As a contemporary is reported to have remarked, "It's nothing but a BIG model." (Below left) Test pilot Phil Oestricher and the author discuss control surface response (see text). (Below right) A fly-by . . . if you listen carefully, you can almost hear the irregular exhaust "bark" of the Lawrence "two-banger."

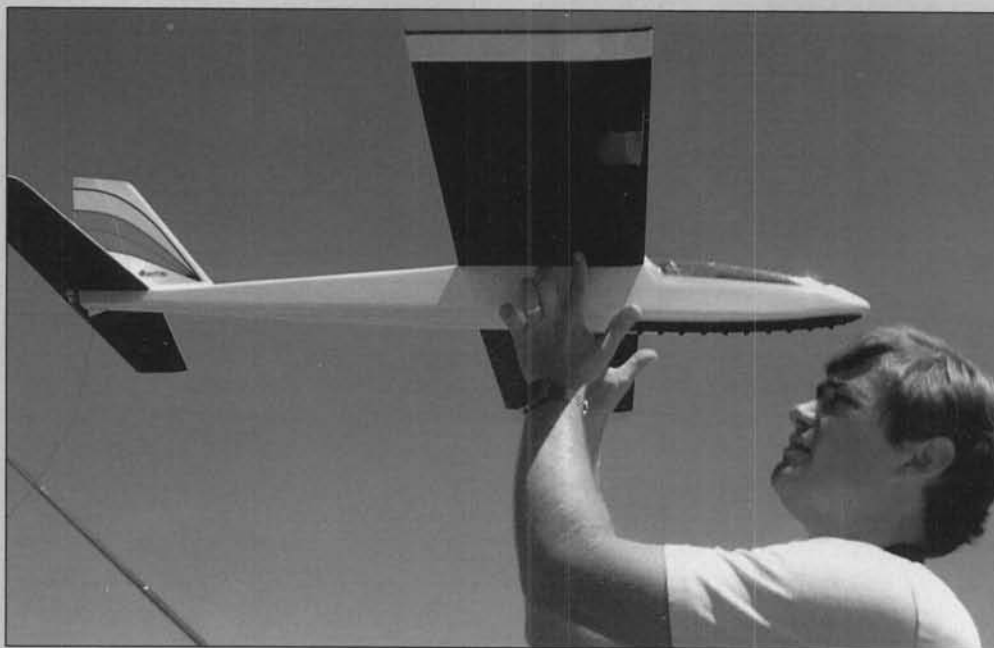


BEGINNER'S TIPS CONTINUE

Roger Jaffe of San Diego writes in response to my first segment of beginner advice regarding what types of sailplanes make good trainers, and what types of launching equipment are best to buy.

"Dear Bill, I read with interest your RC Soaring column in the August issue of *Model Builder*. I have been an active modeler for eight years, and after running through the gamut of aircraft kits, I couldn't agree with you more. I have given the same advice to many new modelers in San Diego who ask my opinion of how to start in the hobby. I have found that, at least in my club (the Stadium Air Force) that not too many people start with sailplanes. Most people here start with ... [engine powered] ARF specials and probably 50% of them get disgusted with it and give it up.

"I have maintained that a sailplane is the only way to go ... particularly in San Diego, as we have one of the best slope soaring sites in the world (Torrey Pines). This method insures the greatest amount learning in the least amount of time with the least chance of



Tips for beginners continues ... Checking that the longitudinal balance of a new model matches manufacturer specs helps to ensure a safe flight.



Check that the stabs are in neutral before the first test glides. From the REAR of the model check rudder and elevator movement. See text.



"Do as I say, not as I do." Hand glide by tossing glider into wind, with wings level and nose pointed toward ground about 100 feet away. In photos, author has pointed nose slightly up without realizing it until seeing photos. Well balanced glider quickly settled into normal landing approach, with nose pointed slightly down.

damage to the plane.

"Keep up the good work, and if you get to San Diego, look me up. We fly at the Stadium after 8:00 a.m., seven days a week (except during Stadium events). Thermals, Roger Jaffe."

Well, Roger, I just might "keep up the good work" on the same theme this month and the next. Calls are flooding in from beginners across the US who are asking for particular advice and are telling me they appreciate the beginner orientated press (kinda rare these days). So, let's get on with it!

TIPS FOR BEGINNERS INSTALLMENT NO. 3: NOW THAT IT'S BUILT, WHAT DO I DO NEXT?

In keeping with the theme of the last two columns, "Lone eagles learning how to fly," this month we'll take the next step: pre-flight preparation, test glides, and early hi-start flights.

Relying on an experienced group of fliers for help is always the fastest and best way to learn how to fly. However, lacking any

local soaring group or formal club, it isn't always possible. If this is your situation, and you are the "lone eagle," welcome.

STEP 1. DON'T ... "JUST DO IT"

It is said that fools rush in where angels fear to tread (apologies to Nike shoes for the puns). In model soaring, fools rush in, switch on, throw the glider, then crash and go home disgusted ... and to some other hobby. The object here is to avoid being foolish by first realizing you DON'T know it all, and it probably ISN'T as easy as it looks.

Be as prepared for flight as you possibly can ahead of time by drawing on the experience of others. Allow me to volunteer for you!

For the beginner who CARES about the future of his (or her) modeling investment (time and money), there is no more TERRIFYING MOMENT than the first flight with that very first pride-and-joy glider. For this individual, the anticipation of the potential disaster that lies ahead produces an ANXIETY that most often is counter-productive. The fear of the unknown, the fear of failure,

the fear of great loss, or the fear of "looking stupid" in front of friends or strangers ranks high in setting up beginners for a fall. The cure is to be prepared for success in every way possible and break into this game slowly.

LACK OF KNOWLEDGE frequently leads to a modeling disaster, and sometimes is itself an anxiety generator. Like a self-fulfilling prophesy, your nervous tension and resulting "insufficient data" brain-lock may justify your early fears during an emergency situation. Flying IS NOT as easy as it looks! However ... (trust me) FLYING SAILPLANES IS NOT DIFFICULT ... IF you take it one step at a time, learn at your own pace, and always be careful!

In many sailplane kits the instruction manual will contain a section on learning how to fly. If it does, follow the manufacturer's recommendations. Lacking this information, you will need to follow these basic steps to get your aircraft safely into the air and back on the ground again.

This month's installment will help the absolute beginner get past the first "mo-



The hi-start launch begins with a straight arm toss, straight ahead, wings level, and fuselage level or slightly nose up.



Immediately out of your hands, the glider rotates (nose up) into the sky.



Follow through the toss. As soon as possible, get your right hand back on the right stick of the transmitter for course corrections if needed.



Properly trimmed, free of warps, and hook in the right place . . . ANY model will launch this straight and true! Note almost vertical attitude soon after release.

ments of truth" (avoiding ill consequences), and reward the follower with early success and satisfaction. So ... let's take a few minutes and think it through together.

Before you step up to the cliff or to the hi-start for that heart-pounding, gut-tightening maiden flight, become acquainted with your new model. SET IT UP RIGHT. Learn the absolute BASICS OF FLIGHT with your glider at a slow and easy pace. This will give you CONFIDENCE in what you are doing. The EXPERIENCE you gain will be invaluable brain data that will give you "instincts" about flying.

Keep in mind, no amount of book reading can help you fly if you don't get out and try what you've read about.

STEP 2: PRE-FLIGHT THE MODEL

Thorough pre-flight inspection is the most important step you can take to assure success. Once completed, your model will be ready for a little test flying. You will be surprised at just how well it will fly, too!

ACHIEVE THE PROPER BALANCE POINT. This first step has to do with the mass (weight) of your model and its even distribution around the center of gravity (CG). Critical to your model's inherent "hands-off" stability is its proper balance. There are two balance checks that you need to perform.

LATERAL BALANCING. The wing is by far the biggest influence on the lateral (side-to-side) balance of a model. Therefore, it is really the only thing that needs to be checked.

On a flat, hard table top, rest the assembled wing in a perfectly level position right side up. The center dihedral (V-bend) angle will be the line at which the only contact with the table will be made. Without upsetting the wing in the least, remove your hands and see which wing half drops to the table first. Repeat this step a few times to be sure one wing half really is heavier than the other.

If the difference is only slight, and it usually is, then one, two or whatever num-

ber of short, flat-head screws can simply be screwed into the lighter side's balsa wing tip block until balance is achieved.

If this is not practical, then a small opening in the covering material can be made with a razor blade. Then the proper weight can be glued to the inside of the wing tip block or between the spars. A small patch of covering material can be placed over the small hole and the wing is done.

Don't worry about show-grade looks, trainers quickly become beat up and patched anyway. In the future, when looks will be more important to you, balance the wings before covering.

(If your model has plug-in wing panels, you'll have to use your own inventiveness to come up with a method of checking the lateral balance.)

LONGITUDINAL BALANCING. The fore-and-aft balance of the model can only be achieved with the model virtually ready to fly. The wing must be mounted in place, the radio gear installed, and the pushrods linked up with servos and control surfaces.

The side view of the fuselage on the plan or in the instruction manual should show where the "CG" point (or more properly, the balance point) is. Mark the CG point on your fuselage side at the wing saddle where it is easily seen with the wing mounted. If the model is in proper balance, this is the point where it should rest horizontally when supported under the wing near the wing root.

To test the balance of the model, I have found that your two index fingers are the only tools you really need. They may not give a precise result (you could be off by as much as an eighth of an inch), but trainers are so very stable that "close enough" really is good enough at first. You can always fine-tune the balance after a few test flights.

Balancing the model outdoors is tricky. Breezes and gusts of wind will cause you endless frustration. The photo of yours truly

balancing the Great Planes Spirit on index finger tips took many minutes of waiting till the breeze quit long enough for the shot to be taken. Do all your balancing indoors, it's easier and better.

CHECK FOR WARPS. This preflight check is best done at home where you can do something about a bad situation should it be discovered. You need to be near a heat gun or iron and 110 AC.

What you are looking for are twists in the flying surfaces (wings and stabs). A wing twist causes erratic flying results that will drive you crazy. Get rid of warps.

Check for warps by sighting down the bottom of the wing. Big warps will be obvious at first glance. Smaller ones will take a careful eye. You can also check the bottom surface from 90-degrees behind the trailing edge and several feet away (10 feet or more). A third method is to take two long (24 inches or better) straight edges and place one at the root and the other at the tip end of each wing panel. Place them parallel to the ribs. Now sight down the wing again. The two straight-edges will not appear parallel if a warp is present.

To cure a warp, twist the wing in the opposite direction of the warp and reshink the plastic film covering material. This is going to take some experimenting with various amounts of twisting force and heat, so be patient. Recheck and reshink until no more warps are present.

If the plans call for washout, this is one warp that is intentional. Washout is a twist in the wing tip panel where the trailing edge is higher (typically by 1/8" to 1/4") than the leading edge. This twist must be equal on both sides of the wing. This twist will help prevent tip stalls.

CHECK CONTROL SURFACE THROWS. Finally, you've reached the last preflight check. It is a very important step, so get it right.

Place the model on the ground or up on a

table. Switch the transmitter on first, then the receiver (a very good habit to get into). **STAND BEHIND THE MODEL!** Move the right hand transmitter stick to the right. The trailing edge of the rudder **MUST ALSO MOVE RIGHT!** Move the stick left and watch the rudder move left. If it moves opposite, flick the servo reversing switch for that channel and recenter your rudder (if needed) with the adjustable clevis.

PULL the right hand transmitter stick back toward yourself. (Imagine yourself diving down in a full-size glider. To get the nose up you would "pull out" by pulling back on the joy stick. It's the same with a model.) The trailing edge of the elevator surface **MUST MOVE UP** as you PULL BACK. If it doesn't, flick the servo reversing switch for that channel and recenter your elevator (if needed).

Check for any binding. If present, relieve the binding. Make sure you have the recommended throws. If not, get the throws right by adjusting servo output arms and control horns.

Recheck that with the transmitter trim tabs in their center position the rudder and the elevator are in neutral (not deflected).

If you have spoilers, make sure they come up equally and in unison. If not, adjust them. The left hand stick which is ratcheted and used for throttle in power plane applications has adjustable trim in the "stick back" position only (idle throttle adjustments, you know). This should be your spoilers closed position.

STEP 3. TEST GLIDE THE SAILPLANE

CHOOSE THE SITE. The area you choose for your first test flights should have tall grass if possible. This will cushion the impacts which result from your mistakes.

Don't be embarrassed, everybody makes mistakes, just don't let them be costly ones.

If tall grass is not available, use an athletic field with mowed, green grass and soft, irrigated soil. Avoid asphalt, dirt and concrete at all costs!

ASSEMBLE THE MODEL. Take your time and do the job right. If you have done any work on the radio system since your pre-flight check, then recheck your rudder and elevator throws. Make sure you didn't cross the elevator and rudder servo leads!

If your sailplane wing is the rubber band hold-down variety, use only two No. 64 bands per side for the test glides (three per side for winch or hi-start launching). This will make it easier for the wing to pivot out of harm's way in the event of a crooked landing.

Switch the radio system on and note the wind direction. Walk down wind from any and all obstructions at least 60, paces if not more. It is amazing how far a glider will fly in ground effect! It is best if you can get centered on the field just in case you turn off to the side while test flying.

Turn to face the wind. If it is more than just a gentle breeze, if it is really blowing hard, postpone your test flights! Discretion is the better part of valor.

Hold the sailplane above your head with

your right hand (if you are right handed), glider nose pointed into the wind, wings level, and fuselage slightly nose down. The transmitter will be in your left hand with your thumb hooked inside the gimbal next to the spoiler stick. Don't worry that "nobody is driving" at the moment of release, if you did your pre-flight checks thoroughly and your trims are in neutral ... all will be well for at least a second or two after you release the model, if not for the entire glide to the ground!

Take a step forward and toss the glider forward, aimed at the horizon. Follow through with your toss; your right hand must end up at the transmitter, thumb and index finger on the right stick.

If you throw it with just enough force to end up with the perfect flying speed, you might not need to give any further control inputs! Trainers are so stable they are like free flight models. They often fly themselves better when they are left alone!

If you throw too hard, the glider will nose up slightly right after release. Provided you didn't REALLY over do it, don't worry. The glider will slow down and level off on its own.

If you did over do it, and/or the model is somehow badly out of trim or balance, the nose will continue pointing up. This is bad, but don't panic. Immediately push the stick forward SLIGHTLY (perhaps a 1/4 to 3/8-inch) for a brief moment until the nose is pointing SLIGHTLY down, then release the stick.

Conversely, if the nose is pointed down too steeply after release and it looks like a fast impact is imminent, immediately pull back the stick SLIGHTLY until the nose is level, then release the stick.

Normally, after the release, a properly trimmed, properly thrown sailplane will reach and maintain a steady descent to the ground. You can either let the model safely land itself (which it will most assuredly do), or you can very gently ease the stick back SLIGHTLY (1/16-inch) as it gets to within half-a-foot or so of the ground. This will flare the landing (level-off the steady descent) and slow the final landing speed to a mere crawl. (Don't pull in so much up that the sailplane "balloons" upward, or it will stall.) Hold this very slight back stick pressure until the model touches down and then release the stick. It will slide to a stop.

The biggest mistake beginners make is in misjudging flying speed and over controlling the model. Proper flying speed is achieved in a steady, downward glide path. Sailplanes ALWAYS fly downward as they have no engine or motor to fly upwards. Gravity is a glider's only motivating force, and it always pulls downward. If the glide path is steady and doesn't increase in dive angle and steadily accelerate, or porpoise through the air like an asthmatic dolphin, you are in good trim flying at a good flying speed. At this point, small adjustments of the elevator trim tab can affect small changes in forward speed.

If the glider porpoises and you aren't over-

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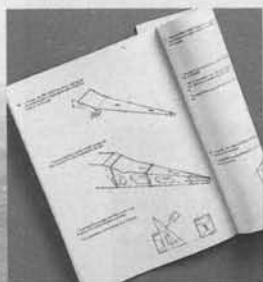
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controlling the plane, and the elevator trim is in neutral, then perhaps another 1/2 ounce of nose weight is in order. Add weight until a steady glide is achieved.

Conversely, if the plane dives excessively, remove nose weight a little at a time until the plane glides steadily onward. At no time should you move the balance point further than the recommended range.

If you think going outside factory balance range is necessary, it probably isn't. You probably have an incidence problem where the angle of the wing compared to the angle of the stab was somehow changed from factory specs during construction. Add or remove shims under the wing (cardboard or balsa work well) until steady flight at neutral trim is achieved.

For porpoising that can't be balanced out with weight, add shims under the trailing edge of the wing, thus reducing the wing's angle of attack. For excessive diving, add shims under the leading edge of the wing, thus increasing the wing's angle of attack.

Once the size of the shim is determined, make it a permanent change. Glue on a permanent wedge of wood of the same thickness evenly on both sides of the wing saddle.

STEP 4. PRACTICE A GENTLE TURN

Run through an afternoon's worth of test glides. You will get to know your plane quickly and develop a bit of experience at

the same time without risking damage to the plane.

Once you have mastered the steady glide path, initiate a gentle, 45-degree turn. After the toss, give a moment of gentle left rudder, then release the stick. Did you notice a very slight diving tendency and an increase of speed? That's because the plane was banked a little to the left and the wing was no longer lifting straight up which it has to do to lift all of the glider's weight. Instead, it was lifting up and a little to the LEFT. This loss of purely vertical lift causes an increase of sinking speed. A little up elevator helps keep the nose level, the speed constant, and the turn going further.

Did you also notice that the plane straightened up all by itself after the rudder returned to neutral? That's because trainers are very stable animals ... get into trouble and often letting go of the stick gets you out of trouble. It works ... provided the sailplane has enough altitude to recover its dynamic balance.

STEP 5. THE HI-START LAUNCH

Because the majority of you out there have no local slope to fly from, and undoubtedly you all have a flat field, we'll now get out that hi-start you bought and really grab some air with that trainer of yours.

The hi-start is nothing more than a giant rubber band catapult anchored at one end with a metal stake, and with some monofilament fishing line attached to the other end

to give you extra altitude. That parachute or streamer at the end of the fishing line helps pull the ring off your tow hook at the top of your tow and helps you find the ring once again after you land.

Read the hi-start's instructions to find out how to assemble it and how much pull is necessary to launch your size glider.

TOW HOOK POSITION. The tow hook of your glider should be placed where the plans indicate. If the plan omits this location, place the tow hook on the bottom of the fuselage about ten degrees forward of that balance point you had earlier. (This hook location can be moved back a little at a time later on to get a steeper and higher launch, but wait till you have more experience.) Never place the hook behind the CG or you are asking for an aborted "pop-off" tow and possibly a crashed plane.

GET SET TO LAUNCH. Get the hi-start all set up. Switch on your radio system and double check that everything is working as it should (right is right, back stick is up elevator). Slide the tow ring over the tow hook. Start pacing off distance directly down wind away from the anchor stake and build up tension in the elastic band. If you have no idea how much tension is enough, guesstimate that it will be about four times the model's weight to start with, more later if you aren't getting very high tows. Remember the pull tension, or the paces back, or the

that basic can be beautiful.

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Kit includes engine mount, C.G. spinner, featherlight wheels, formed cowlings and wheel fairings.

spot where you released the model for future reference.

One thing that will help you get fantastic hi-start tows is wind. Any breeze at all will help you get higher launches over dead calm air.

THE LAUNCH PROCEDURE. If other models are in the area, check the sky. Do not launch into them, wait till they are out of your way. Check down the hi-start line. If anyone is walking near it, wait till they pass by.

With the line tension built up to where you want it, raise the model over your head and a little behind it. Keep the wings level and the nose slightly up above the horizon during the throw. Bring your arm forward as if you were tossing it (actually the hi-start pulls so hard you just quit resisting it). **KEEP YOUR ARM STRAIGHT!** If you don't that stab is going to whack you in the head as it passes by. And, if it breaks off, you are in deep trouble!

CAUTION! If there is any disadvantage to hi-starts it's that you can't shut them off once they get going. If you break that stab on your head and let go of the model ... well it's back to the hobby shop for another glider kit! It will Rocketeer itself all the way down the field until the rubber runs out of energy! Before that happens, the wing will be cleaned off as well as any piece of remaining stab. It is a dangerous thing to have happen, which

is why people shouldn't be near your line before you launch! Also, old rubber can break, hurl down the field at blinding speed, and it can raise a big fat welt and black-and-blue bruise on someone's leg if it hits them!

THE CLIMBOUT ON TOW. Anyone who has flown a kite on a windy day will marvel at the similarities of the hi-start launch. After the model leaves your hand it will rotate skyward and gain speed. It climbs out just like a kite. All you have to do as a pilot (normally) is work the rudder control a little to keep it going straight up the line.

If the model starts to veer left and right violently, you need to feed in a little down trim or down stick. Before you launch again, consider moving the tow hook forward 3/16 to 1/4 of an inch and resetting the trim to neutral.

If the model moves forward rapidly and doesn't gain much altitude, try a little up trim or up stick. Before you launch again, you might want to move the tow hook back 3/16 to 1/4 of an inch at a time until the launch gets steeper, then reset the trim to neutral.

THE TOW RELEASE. Normally, at the top of the launch the rubber will be fully relaxed. If there is wind or thermal lift on course, it may still have some tension in it. If it's relaxed, just fly straight and the tow ring will fall off with the help of the "chute" or streamer. If under tension, a quick little pulse of down stick then up stick followed

immediately by down stick to level the nose will pop the "chute" off with an audible "pop."

STEP 6. SET UP TO LAND

Fly around the sky making only gentle turns and straight away courses. Eventually you will lose altitude and need to land. Beginners should always **PLAN AHEAD** for long, long straight ahead landing approaches. This makes big fields a must. Make the entire first flight one big landing approach. Make your last upwind turn at a safe (for you) altitude and then head directly upwind. Let the model land itself straight ahead, gently settling in. Don't force it down. Don't flare very much or too high.

You did it! Now go do it again and again. Remember not to over control the model, and if you do, to let go of the stick to recover.

Get lots of "stick time." Next month we'll discuss thermal flying to lengthen those flights and grab some serious altitude.

ANY QUESTIONS?

As always, if you need to contact me for soaring related questions, my phone is ready. All I ask is that you call between 7 p.m. and 9 p.m. Pacific Time, Monday through Friday. I can also be reached on weekends, but my schedule is unpredictable. Phone (714) 245-1702, or write to Bill Forrey, 3610 Amberwood Ct., Lake Elsinore, CA 92530. Note the new ZIP code, please! I prefer phone calls.

MB

PRESSURING THE WEBRA QUICKEE 500

The Quarter Midget community lost a friend recently when Al Grove, of Pennsylvania, died unexpectedly. Al has been a fixture at most races in the midwest, and traveled from Toledo to Florida to compete in an event he loved. Everyone I know has an "Al Grove" story, because everyone liked him and it's tough to think of him not being around anymore for the good times we had after the racing was finished. We fortunately go on with things, but the after-racing parties won't be the same without the little guy, and our regrets go out to his family and his wife, Julia.

Sometimes it's difficult thinking three months ahead; like right now I'm heading out the door to the Nats, yet by print time the Nats are old news and other than the reports which will follow this, many people are already aware of who did what; therefore, when scribbling magazine articles you must think future.

Since this is the case, the Fall season is upon us and only a few races remain in the cold weather areas, and the others are winding down to a precious few. This is really weird!! Gads, it's 90 degrees outside!

Recent races in the NCPL (North Central Pylon League) area, which is basically Iowa

to Minnesota, indicate Quarter Midget is still alive, with regular contests being held occasionally. I received a report from Phil Zuidema about a recent race, and I'd like to use Phil's words in describing one 'happening,' because it would be outright plagiarism if I didn't.

As he put it: "Ron Gage flew his plane into

they fall asleep. Are you there Ronnie?? Gads-amighty! Hope the real reason isn't boredom!!!

Included herein is a sketch of a pressure tap installation used on Quickie 500 engines that I received from Pete Bergstrom, and his explanation follows:

"The new Quickie 500 from Webra is a fantastic engine that turns some great RPM's and has been making some heads turn on the Q-500 circuits over the past year. There have been some problems that a few people have run into while running the engine with the Dynamix (Slide Bar) carb. Hopefully, what I'm about to present should solve all of your problems.

"The first thing that the Dynamix carb needs is lots of muffler pressure. This carb was originally designed for pattern competition, to be used with

a tuned pipe, which provides a tremendous amount of pressure.

"The muffler that is provided with this engine, while doing a superb job of increasing the performance of the engine over previously available versions, does a lousy job of providing any pressure to the tank in the typical pressure tap installation.

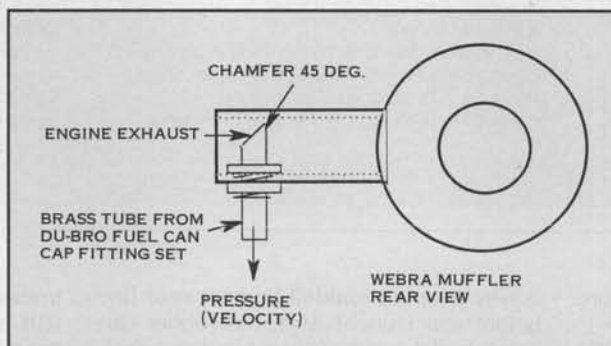
"You can solve this problem very easily by installing a slightly modified piece from a Du-Bro fuel can cap fitting, set right in front of the exhaust port of the engine with the chamfer pointing at the exhaust port.

"I also install a Fourmost Products One-Way Check Valve in the pressure line between the muffler and the tank, to lock pressure into the tank while running. This setup will provide enough pressure to the tank so that if you were to run the engine and pinch off the fuel line to shut it off, when you let go of the line, fuel will pour out of the carb (Sounds like you must pull the line to keep from flooding the carb.-wy).

"With this amount of pressure, there is no problem richening the mixture as before, nor is there a problem with the engine going lean as soon as it is launched and the propeller unloads."

My thanks to Pete for his ideas and I hope he sends more!!

MB



the ground coming around Number 3. It just kept losing altitude and Ron watched it go in, mesmerized by the speed (or something!). Knock, knock, hello Ron! Ron said he was so relaxed he just spaced out."

Now doesn't that describe how great and relaxing pylon racing is???? "He just spaced out." Amazing! Usually it's, "Katie bar the door," when I'm out there, so I'm really surprised that someone can be so relaxed

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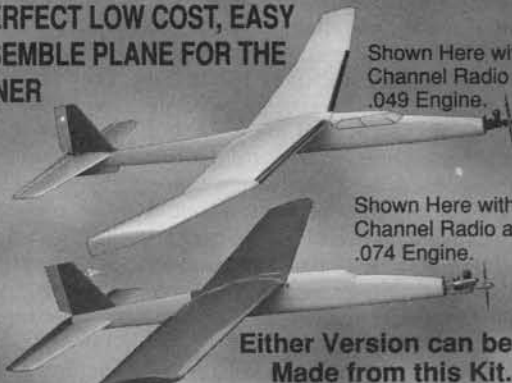
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razor plane on the leading edge, and a sandpaper block on the trailing edge), and then lightly sand the completed structure all over. The center-section and wingtip gussets are then added, and faired into the structure (sanded). These gussets not only contribute to the strength of the wing, but also prevent unsightly wrinkles from forming in the corners of the covering when shrunk. The completed wing structure should then be sprayed with two thin (50-50) coats of clear dope (can be tinted if the builder wishes to duplicate the spruce structure of the original), sanded lightly again all over, and set aside.

As the outline of the vertical stabilizer and rudder is of laminated construction, the initial step is the fabrication of the required form. Trace (or duplicate) the plan form onto a sheet of paper, and contact cement it to a piece of scrap 1/8-inch sheet. Cut out to the inner outline, sand, and brush the edge with

melted parafin (or rub with a candle). The actual outline is four laminations of 1/8x1/32-inch strip, which have been soaked in vinegar for several hours, then wrapped around the form, and held in place with strips of drafting tape till dry. When dry, the laminations can easily be bonded together with thin CA while still on the form.

After the CA has set up, the outline is transferred to the building board, and the internal structure added. The builder is given the choice of using the scale hinge-line (indicated on plan), or a second line, a 1/2-inch further aft. The aft hinge line is recommended, as the model is very sensitive to rudder inputs, and, unless one has a dual-rate transmitter, it is very easy to over-control the model. While still flat on the plan, remove the building pins, and block sand. Remove from plan, turn over, and repeat. Round the leading edge and tip, but leave the trailing edge square. Give the assembly two coats of thinned dope, sand again, and set aside. Leave the fin and

rudder joined until you are ready to install the hinges.

Unless the builder is constructing a competition scale model, it is advisable to build a somewhat larger fin and rudder, as the model is almost "directionally neutrally stable" in scale. A larger vertical surface makes the model considerably easier to fly.

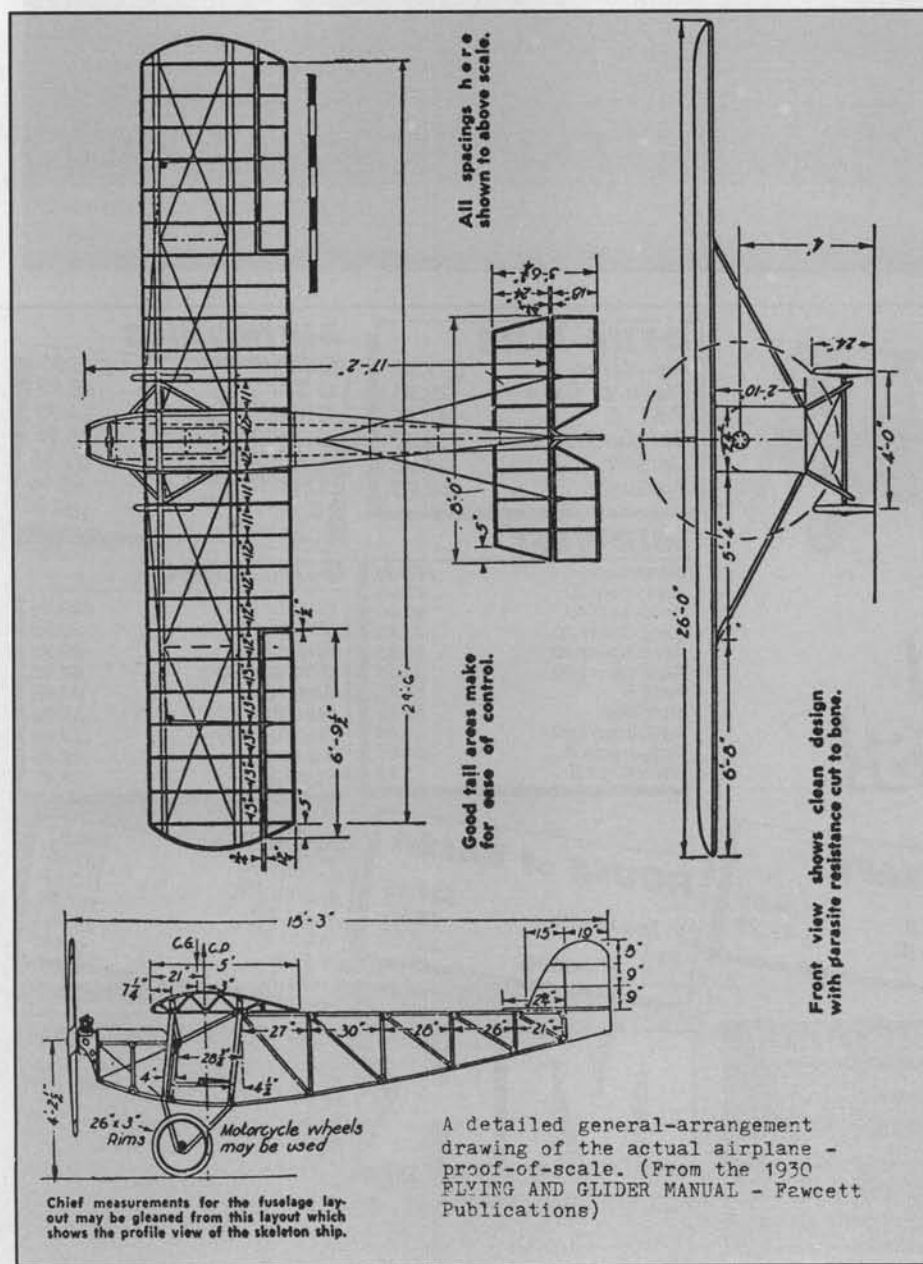
The horizontal stabilizer and elevator are built flat on the plan. Spars should be cut from hard or very firm 1/8-inch sheet. Taper as indicated. Note that the center of the elevator spar is a piece of 1/8-inch dowel, shaped as shown, and firmly cemented to the elevator spar halves. Install the tips (1/8-inch square) and ribs (1/16x1/8-inch), let dry, and block sand each side. Again, round the leading edge and tips, but leave the trailing edge square. Accurately bend the .032 MW stiffener, and cement in place with CA. Dope, sand all over, and set aside.

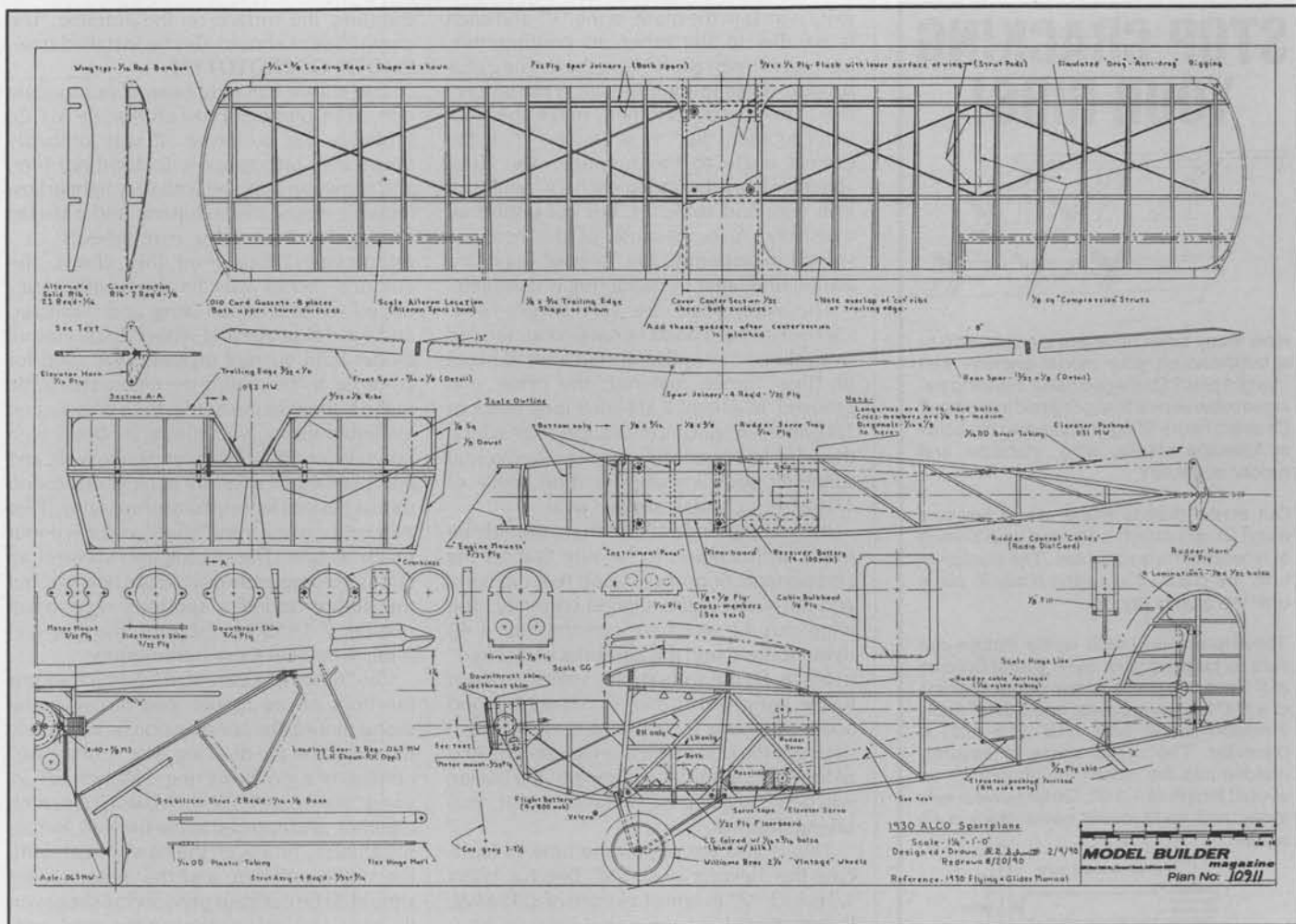
FUSELAGE

Begin fuselage construction by cutting out the "firewall" and the "cabin bulkhead" from 1/8-inch plywood. Select hard 1/8-inch square for the longerons, and medium 1/8-inch square or 1/16x1/8-inch for the uprights, crosspieces, and diagonals as indicated on the plan, except the forward cabin uprights, which should be of spruce for greater strength. Because of the sharp curve of the lower longerons, it is highly recommended that they be pre-bent before assembly. The author soaked the first 12 inches of the longerons in vinegar (in a deep, narrow flower vase) for about three hours, then taped them to a pre-cut form of 1/4-inch plywood until dry (Soaking in boiling water, or steaming, also will allow a curve to be set in the longerons).

Note that the fuselage sides are not symmetrical in the "cabin" area, but the builder may still build one side over the other, if this is kept in mind. Accurately mark the location of, but do not install the "cabin" bulkhead at this time.

Remove the fuselage sides from the plan, and separate. Set sides on the upper longerons, align them at the rearmost upright, bind with a rubber band, and place cabin bulkhead in marked location (do not cement yet). Carefully draw front of fuselage together, inserting "firewall" in correct position, and bind with rubber bands. Do not cement. Check alignment, glue cabin bulkhead in place. Carefully insert and cement cabin area cross members in place, including the 1/8x3/8-inch ply cross pieces (wing attachment) which are undrilled at this point, making sure that the structure remains square and true. Hold with rubber bands and temporary diagonals if necessary. When set, add "instrument panel" and forward cross members, and "firewall." Be sure that the longerons bend uniformly; assist with steam or vinegar if necessary. Then, starting at the bulkhead, work station-by-station towards the tail-post, inserting cross pieces and diagonals as you progress, always being conscious of the structural alignment, particularly in twist. Add floorboard, and all gussets not previously installed. Even though they





FULL SIZE PLANS AVAILABLE - SEE PAGE 106

can't be seen after the fuselage is covered, to carry through the scale structure, install the firewall "cable" reinforcement (1/32-inch bamboo, doped silver).

At this stage of construction, it is necessary to decide the internal equipment arrangement. The plans show the arrangement used by the author in his original model; the rudder servo mounted high so that the rudder "cables" would be in line with the scale location of the rudder horn. This shelf also provided a good location for the receiver battery. All other equipment is mounted on the floorboard as illustrated. It is also advisable at this time to determine the direction of rotation of your elevator servo, so that it may be positioned with the output shaft either pointing right or left, so that the elevator horn can be on the bottom side of the elevator, and the pushrod isn't required to go up through the horizontal stabilizer (see drawing). The elevator horn may be positioned either on the right or left as necessary.

After the internal arrangement is settled, draw in on the plan the route of your control cables/pushrods, to determine the location of the fairleads. The author used 1/16-inch ID plastic tubing, held in place with CA, and, of course, the covering.

Carrying the scale structure concept further, the author's model was covered back from the firewall to the cabin bulkhead with

1/64-inch plywood, to represent the 1/8-inch plywood sheathing of the full-scale airplane. (It sure makes a rugged nose). To cover the upper cowl more easily, make a pattern of the exact shape required with paper, transfer it to the plywood, cut out, and immerse in boiling water for 15 minutes. Remove from the water, and bind to a two-inch diameter form (the author used a juice glass) with bandage, and dry in an oven at 250 degrees. Also, thin aluminum (a litho plate) could be used. Cement (or bond) in place.

Sand the fuselage structure well all over, removing any protrusions which will interfere with a smooth covering job. Make a small drill jig from scrap plywood, which will accurately locate the four small holes in the lower side of the fuselage. Use as a reference plane the lower edge of the fuselage, and key to the cabin bulkhead. The two outer holes are 3/32-inch diameter, and are for the landing gear support tubes, and the two inner holes are for the wing strut positioning grommets. They are drilled 1/16-inch diameter. After the holes are drilled in both sides, insert the landing gear support tubes, which are 1/16-inch ID aluminum tubing, 2-5/8 inches long. When inserted through the fuselage, they barely protrude on each side. They must be well cemented into both the skin, and the structure, and to accomplish this, it is recommended that

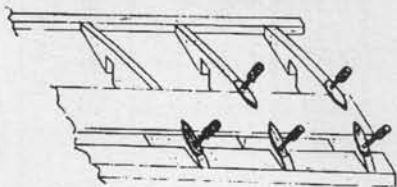
"thin" CA be used liberally, both inside the fuselage and where the tubing comes through the ply skin. If you can't locate any small flanged grommets, short (1/4-inch) lengths of 1/16-inch ID tubing may be used, CA in place. The tailskid may also be installed at this time, cemented to the 1/8-inch sheet "fill" at the station indicated.

To complete the wing mounting provisions, temporarily position the wing in the correct position, making certain it is centered, and at exactly 90 degrees to the longitudinal axis of the fuselage. This can be determined by measuring from the tailpost to each wingtip (these measurements must be identical, with the wing correctly positioned and centered). Then, using a sharpened pencil, accurately locate the position of the wing hold down bolts in the plywood fuselage cross-members (four places) from the existing holes in the wing center section. Drill four holes, 5/32-inch diameter, and insert from underside of crossmember, a 4-40 "blind" nut in each hole. Cement in place with CA, being careful not to get any into the threads.

The completed fuselage structure should then be sanded all over, given two thin coats of dope, sanded lightly, and set aside.

The landing gear halves are bent as shown using the drawing as a pattern; bend the lower "V" first, leaving about 1/2-inch of wire on each "leg." Note carefully that this

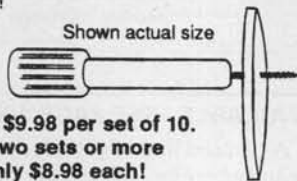
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extra wire is in the plane of the "V" and each is parallel to the other (to confirm this, attempt to insert each "V" in the landing gear support tubes in the fuselage without forcing). Then, and only then, make the final bend in each "leg" to set each "V" at the correct angle to the fuselage. The axle/spreader bar is bound to each "V" with soft iron wire and soldered, but not until final assembly. Also, because of the heat involved in soldering, the "fairing" is not installed until after the soldering is complete.

The wing struts are very simple 3/32 x 5/16-inch hard balsa or basswood, sanded oval, slit on one end to accept a small piece of "flex" hinge material, the other end grooved to accept a 3/4-inch long piece of 1/16-inch OD plastic insulation, from which the wire has been stripped. The horizontal stabilizer strut is merely a short piece of 1/16x1/8-inch bass, sanded oval.

It is recommended that a trial assembly be made at this point, to be sure that all the components fit properly, and that the wing and tail surfaces are aligned correctly. The wing may be attached with the four 4-40 nylon screws, and the tail surfaces "tacked" in place. Fit the wing struts... they are held to the wing with a No. 2, 1/4-inch wood screw. Be sure to leave at least 1/8-inch between the side of the fuselage and the end of the strut, so in case of impact, the plastic will bend, and slip out of the grommet, thus saving the strut.

This is also the opportune time to fabricate the elevator push-rod. Bend a 1/16x 1/16-inch "Z" in one of a length of .032 MW. Engage the top innermost hole of your servo output arm (or disc), feed the end of the wire through the fairlead, and position the servo in its proper location. Hold with servo tape. Measure from the end of the fairlead to the elevator hinge line. Make a 90-degree bend in the wire at this point, and then, cut the push-rod in two, approximately two inches from the end of the fairlead. Remove the servo and push-rod from the airframe. On the cut off end, complete the "Z" bend, and trim to length. Set aside.

The model may then be disassembled, and lightly sanded all over in preparation for covering. The choice of covering material is up to the builder, but it is most highly recommended that very serious consideration be given to the covering weight. The author used Silkspan, but Micafilm and silk (if one doesn't get too enthusiastic about filling the weave of the silk, and getting a high gloss finish) are both reasonable substitutes. Most plastic films are too heavy. After covering and doping (if required), the control surfaces should be hinged with "flex" hinge material such as that made by "Radio South," cut into strips 1/8-inch wide by 1/2-inch long. To use, one merely makes a cut about 1/4-inch deep in the surfaces to be joined, inserts the strip into each surface, and puts a drop of CA into the joint. The paper covering on the polypropylene draws the CA into hinged surfaces by capillary action, and there the hinge stays. It is best to flex the hinge a number of cycles, before

installing the surface on the airframe. The control horns should also be installed now.
PHOTO OF PROTOTYPE

The author has only been able to locate one actual photograph of a full-scale ALCO, probably the prototype. It was probably taken with orthographic (colorblind) film, and shows an airplane with very light (translucent?) wings and stabilizer, and a darker fuselage and fin (also wire wheels... motorcycle?) Based on this photo, the author's model was finished with clear-doped white Silkspan wing and stabilizer, and a red fuselage and wheel discs. Floquil model train enamel pigment was used for coloring, by permitting the pigment to settle in the bottom of the bottle, then drawing off the liquid above, and refilling the bottle with butyrate (or nitrate) thinner. Shake well, and add to an equal quantity of clear dope, and thin as desired for brushing or spraying. Two thin coats give a very "solid" color without much weight. The photograph showed an airplane completely devoid of markings, but the author added a spurious registration number ("1930") in tribute to the time and pilots who flew these home-builts.

The "dummy" Lawrence C-2 which adorns the front of our model also serves as the motor mount, the construction being clearly illustrated on the drawing. The "crankcase" consists of a mounting ring (1/4-inch balsa), and a "crankcase" (1/2-inch balsa) cemented together, and epoxied to the firewall. Before installation, however, the downthrust shim, the sidethrust shim, and the motor mount should all be cut from plywood as shown on the plan, stacked together on the crankcase, and the two mounting screw holes (7/64-inch) then drilled in position, thus assuring alignment. The holes in the crankcase are enlarged to 5/32-inch, and a 4-40 blind nut CAed in each hole on the rear face, after which it may be installed on the firewall. The two dummy motor mounts are cut from 3/32-inch plywood, and are also epoxied to the firewall as indicated.

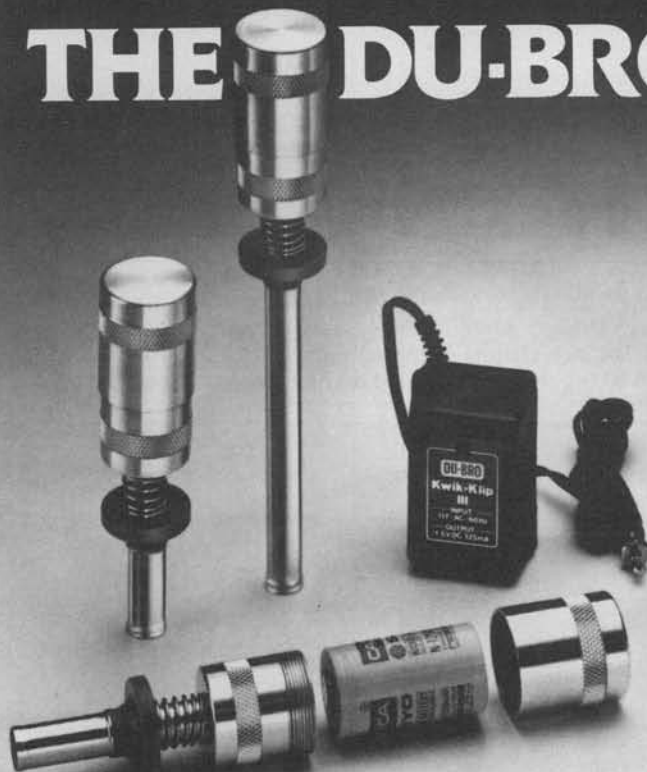
To replicate the cylinders on our little engine, one can spend as much or as little time as wished, from store-bought Williams Brothers cylinders, to stacked card and balsa discs complete with push-rods and rocker arms (no, it did not have rocker box covers). To make the cylinders on his model, the author used two 3/4-inch diameter corks, cut off to 3/4-inch long, and drilled 1/8-inch down through the center. The corks are then slipped on a short piece of 1/8-inch dowel, chucked up in a handi-grinder (or drill), and grooves cut every 1/16-inch, 1/8-inch deep with a razor saw blade, then cemented in place. The entire dummy engine is then given two coats of sanding sealer, sanded, and given two coats of aluminum dope. The cylinders are then colored dull black, and the motor mounts colored to match the fuselage.

The model is now ready for final assembly. Complete the landing gear by inserting both sides into the support tubes, bind and solder the spreader bar/axle in place, and

continued on page 108

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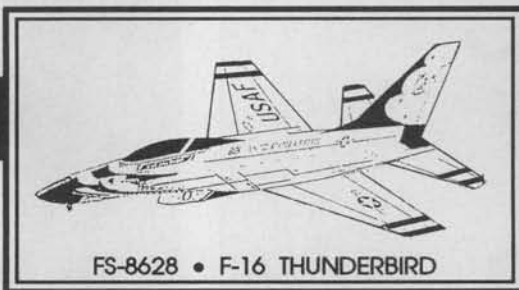
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IN SEARCH OF THE ULTIMATE

CORRECTION

A typo error on page 51 of the September '91 issue offers Sal Taibi's six-foot span 'Brooklyn Dodger' plans for 50 cents! The correct price is \$8.50. Special 3/8x1-1/4 inch trailing edge stock is also available for \$1.50, for a total of \$10.00, shipped postpaid in the U.S., in a tube.

Last month, I noted those model designs that have made a permanent niche for themselves in this free flight hobby/sport. Many of them are synonymous with their designers. It is difficult to separate Carl Goldberg from the "Sailplane" or the "Zipper," for example, or Sal Taibi from the "Spacer" or the "Starduster." Both of these gentlemen made contributions that have spanned more than one generation. Perhaps it is this sense of timelessness that makes both the designs and the designers revered by all of us who fly free flight today. We have a foot in the past



Ray Newman, Granger, B.C., Canada, launches his Winged Yankee design over the head of the camera operator. Ship was designed by Sal Taibi and powered by an O&R .23. Newman photo.

while we are enjoying the present.

This month, I would like to present for your consideration a trend setting nostalgia era mystery model and a three-view of a very contemporary Wakefield that were

Bill Lynch with F1J model; placed second at Sierra Cup. Augustus photo.



designed by the same guy, Hank Cole. Hank has been with us in this hobby for a long time, and his three-view shows that he is still active and still searching for that ultimate rubber powered ship. So, let's get on with the column.

OCTOBER THREE-VIEW: HC 17 TILTWING F1B BY Hank Cole

This article by Hank Cole and the three-view comes from the pages of *Scatter*, the newsletter of the SoCal Aero Team. Subscriptions to this fine monthly FAI newsletter can be yours by contacting Bill Bogart, Editor, at 14837 Los Robles Ave., Hacienda Heights, CA 91745. The cost is \$15 for 12

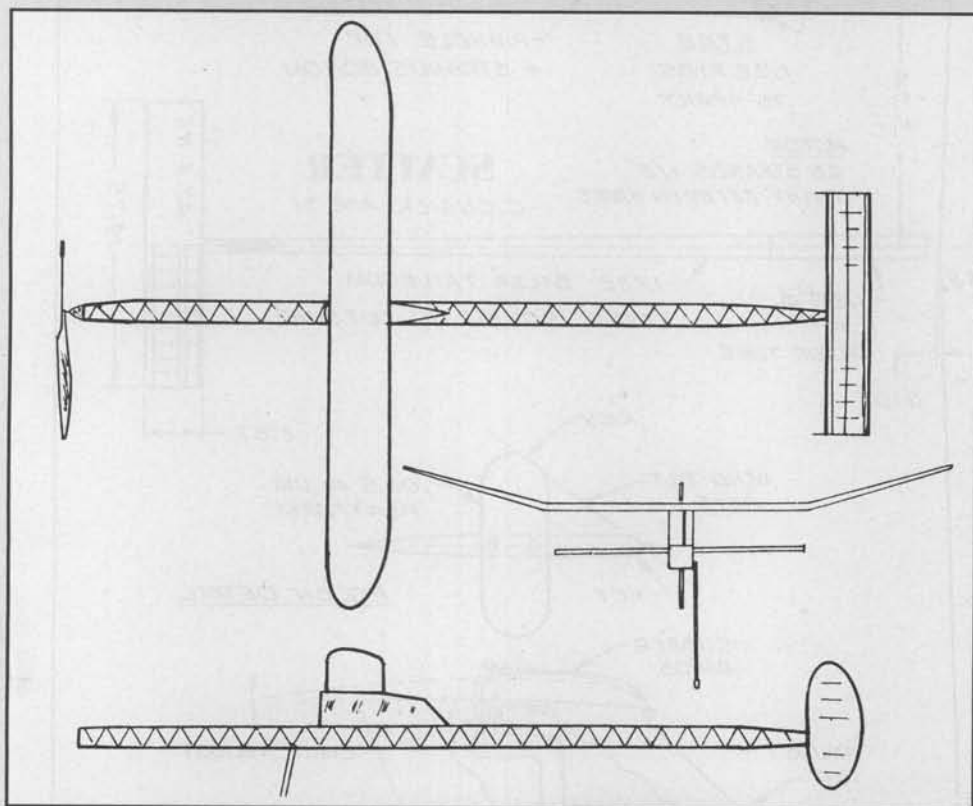
1989) so that the results could be used to optimize future models. All of the wings have a taper ratio of 0.5 and are built flat. This gives an elliptical lift loading which gives maximum performance, but is usually not used because of wing dropping problems when the wing stalls. I figured that this could be solved with turbulators. (Ed. note: Bob White does it with washout, thus changing the span loading) My initial flight tests on HC 15 were conducted with a clean wing and, sure enough, there was a wing dropping problem. Experiments with various turbulators led to a combination of leading edge and trailing edge turbulators on the

thin pylon mounting minimizes this effect.

"The next problem was the wing incidence. For the initial burst, you would like to have the wing set at zero or less. For the glide, you would like to have it positive three to five degrees, so that the fuselage flies at a slightly positive angle to the local airflow. HC 15 was initially built with a variable incidence wing mechanically linked to the rubber motor. I had so much trouble with the mechanism that I converted it to a conventional timer-controlled VIT. Then in 1988 I saw a writeup in the *Free Flight Digest* by Jim O'Reilly on a way to change wing incidence with torque, which was used by Serro of Spain in the 1979 World Championships at Taft. In this method, the wing is hinged at an angle to the flight line and held down with a spring. The torque causes the wing to rotate about the hinge line which results in a tilt and change in incidence. I liked the idea but thought that it needed to be improved to be competitive with contemporary designs. With a Coupe as a test bed, I tried a number of ways of working the idea into a pylon design and finally came up with the one on the plans. It is adjustable, has low interference drag, and releases the wing on impact.

"Early in 1990 I found that the model could do five minutes plus in early morning air, which appeared to be neutral, and decided to use it as a flyoff model. The first contest it was used was the S.C.A.T. Annual. The four-minute flight was easy, but on the five-minute flight, it developed a late stall and did only 4:40, which resulted in second place. After the meet, I ran a bunch of stall flight tests by trimming it up and flying it in turbulent air. I found that when it was flying right/right, the stall would not iron out. However, when it was trimmed to fly right/left, it would recover. So I switched to right/left. At the next contest, Big Al's Shootout, it ran into turbulence in the morning round, stalled once and quickly recovered to do the five minutes. In my Nordic years, I found that some flew better left and others flew better right.

"The final test of the model was at the Sierra Cup. For the first five rounds, I used HC 15 and HC 16, cracking the pylon on one and losing the other in a booming thermal. Thus I used HC 17 Tiltwing in rounds six and seven and the flyoff. I used the thermal adjustment on the five- and seven-minute flights, but on the last flight with the wind steady and air cooling off, I switched to



OCTOBER MYSTERY MODEL

issues.

Hank wrote, "The HC 17 Tiltwing is the third model in the tapered wing series which I started developing in 1986. All of these models have the same wing and stab configuration but different airfoils. My plan was to build very accurate wings which could be tested for optimum aspect ratio (see my articles in the NFFS Symposiums 1970 and

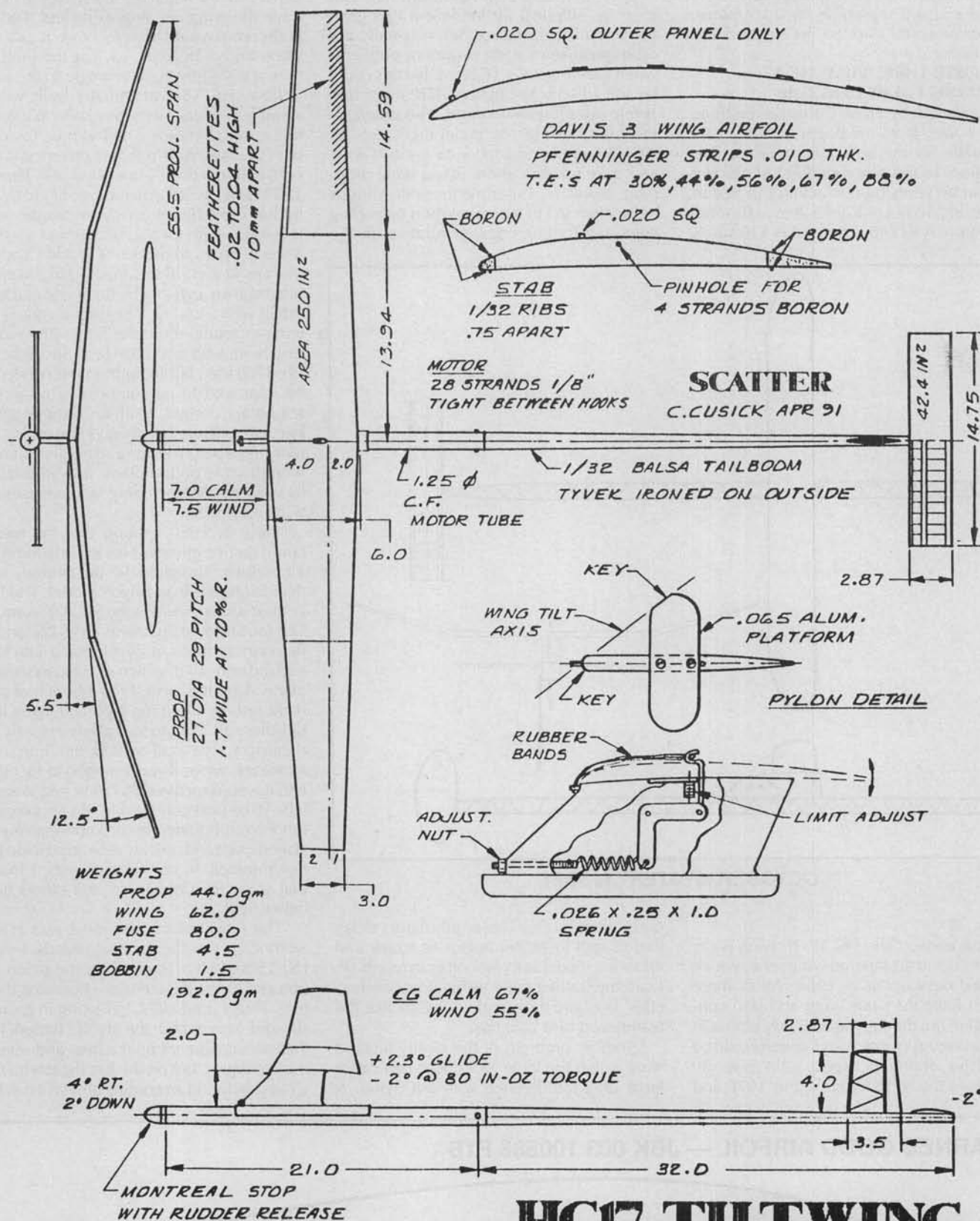
outer wing panel. These turbulators delay the tip stall to higher angles of attack and allow the model to fly smoothly in rough air. I call the trailing edge turbulators 'featherettes' because they angle outward like the feathers on bird wingtips.

"Another problem of the highly tapered wing is that the large root chord can cause large drag interference with the pylon. A

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UPR	2.67	3.92	5.66	7.64	8.52	8.64	8.19	2.24	5.88	4.15	2.15	1.08						
LWR	-.32	0.01	0.68	1.75	2.51	3.04	3.33	3.36	3.11	2.52	1.52	0.85						



HCl7 TILTWING

F1B by Hank Cole

SCATTER MAY 1991

1990 SIERRA CUP WINNER

the dead air adjustment, picked out my best energy-testest tan motor and wound it to 130 in. oz. and launched as fast as I could. The result was 5:44 for first place.

"The all balsa sheet on the wing is tapered from 1mm at the root to .02 in. at the tip. The lower surface is put on a form. Ribs are added one by one and cut in line with aluminum templates at the end of each panel. Upper surface is applied with epoxy on every other rib and contact cement in between. A final cut on the upper surface is made between templates to get an accurate airfoil. The tail boom is rolled around a 'Sears' short pool cue which has a linear taper. Thinned white glue is painted on the outside and on a strip of Tyvek. With the cue held in a vise, the Tyvek is ironed on the outside. The tailboom, complete with rudder and all fittings, weighs 14 grams. The pylon fits on a saddle which is made by laying carbon matte and fiberglass over Saran Wrap on the fuselage. This is taped to the fuselage with electrician's tape so that the wing can be moved for balance adjustment. The wing rotates about the axis shown and is keyed. On the new ship, HC 18, I have replaced this with an internal hinge which plugs into the wing so that keys are not needed. My present adjustment on the wing is minus four degrees at 80 in. oz."

"Two wing positions are used, depending upon wind conditions. When I move the wing forward to set up the aft CG for calm weather, the stab incidence must be changed as well. Of course, the amount of change must be determined in test flying."

Thanks to Hank Cole for the design and the article, to Craig Cusick for giving the three-view a professional touch, and to Scatter for printing this article.

OCTOBER MYSTERY MODEL

As noted in the introduction to this month's column, Hank Cole is also the designer of the Mystery Model. I offer this clue only because it is no coincidence that the HC 17 and the Mystery Model are both significant developments for their time. For the 40 years that have passed since this month's Mystery Model hit the news, to be still developing improved methods of obtaining optimum performance is a noteworthy feat, and Hank is still at it.

Now, here's a bit about the October model. This ship was designed to be a change from the usual models flying in the late 1940's and early 50's. It was common practice during this period to fly Wakefields and Unlimited Rubber models that were short fuselaged. When Hank flew this ultra-long ship to contest wins on the West Coast, the Mulvihill trophy and in International competitions, other modelers paid attention. This was the first of the successful ultralong fuselage ships. It was given several names along the way, but the one that we are looking for is the one that it had when it appeared in a national magazine. Good luck!

And with the new format for Mystery Models, you need not be the first one in line with the correct answer. All you need to do

continued on page 102



Terry Kerger at Lost Hills with F1J Maverick. Placed second in Patterson FAI Challenge. Augustus photo.



David Raymond with his "Hooty Owl," a marvelous electric flying wing conforming to the rules of a new category created by the Atlanta TTOMA club. Behind him George Perryman piecing together his electric EX-30, which later went OSS. Mueller photo.



Fritz Mueller's Mulvihill can be converted into a winter Coupe by changing the rubber and adding 24 grams of weight contained in a half ping-pong ball, which also adds volume to the fuselage. In the 1990 Peach State contest, this model was third in the Coupe event and third in Rubber Unlimited, right behind Perryman and Raymond. Photo by Fritz Mueller.

Products

I • N • U • S • E



The RCFS package contains a special dual joystick controller, 12-page instruction manual, and program diskette. The helicopter simulator uses the same controller to run a separate program.



One of the six program testers who contributed comments to this review is shown running RCFS on IBM PC compatible with CGA graphics. The programs also run on AT class computers with CGA and EGA graphics.

DAVE BROWN PRODUCTS'

RC FLIGHT SIMULATOR

BY DAVID GARWOOD

The Dave Brown Products RC Flight Simulator (RCFS) puts a simulated RC model airplane on your computer screen and lets you take off, fly, perform aerobatics, and land (or crash), all in the relative comfort of your home computer room.

RCFS's purpose, like full scale flight trainers, is to provide an opportunity to practice flying in an environment where the cost of making mistakes is small. RCFS can be used by beginners just learning to control a model airplane, as well as by experienced RC pilots practicing new maneuvers before trying them

in the air.

To thoroughly examine the program and to include the experience of both low and high time flyers, this review is based on the observations of six people with varying flying experience. One tester had never flown RC, four had some experience, and one had flown RC for over two decades.

The package contains a program diskette, an instruction manual, and a special dual joystick controller. It features two gimbals, four trim tabs, dual rate aileron and elevator buttons and a reset button. The controller is designed to work and feel like a four chan-

nel Mode II radio transmitter, with the aileron and elevator controls on the right stick and throttle and rudder on the left.

RCFS has versions to run on Apple, Commodore, Tandy, IBM PC, and PC compatible computers. I tested RCFS version 2.1 for the IBM PC on an AT&T PC 6300 with CGA graphics. The controller requires a game port that accepts a 15-pin "D" connector. Sometimes this comes built into the computer, and sometimes it's purchased as a separate plug-in expansion card. On mine, the same add-in card that accepts a joystick runs the RCFS "transmitter."

The instruction booklet is clear and I had no problems installing the program or the controller box, or running the program. The program is not copy-protected and will run from a hard or floppy disk.

USING THE SIMULATOR

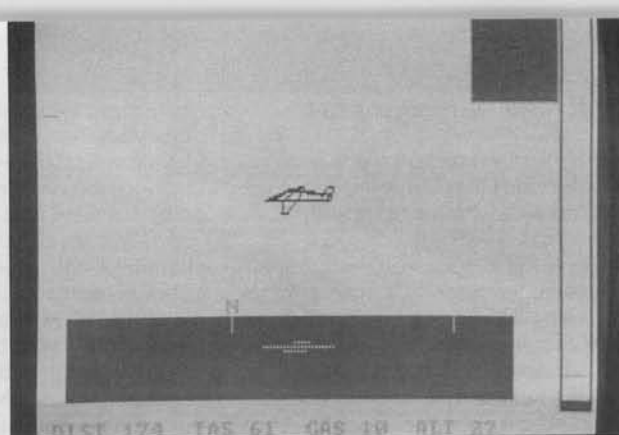
The opening screen shows a low wing tri-cycle gear model airplane on the ground about 30 feet away. When you advance the throttle the model moves further away and picks up speed. With a little back elevator stick the model takes off and rapidly gets smaller. With appropriate aileron and elevator control input you make a smooth 180 degree turn and bring the model back. How about a roll? No sweat! This baby does beautiful consecutive axial rolls. Let's try a Cuban-8. Looking good entering the first loop, and the half roll is smooth as silk. The second loop and half roll looks great!

I'm starting to feel like I can handle a fast pattern plane. Now for some inverted flight. Whoops! A dive into the ground due to control reversal. The screen flashes, gives a crash noise, and reports the cost to repair the plane is \$104. Whew! Boy, am I glad I'm flying the simulator and not a model.

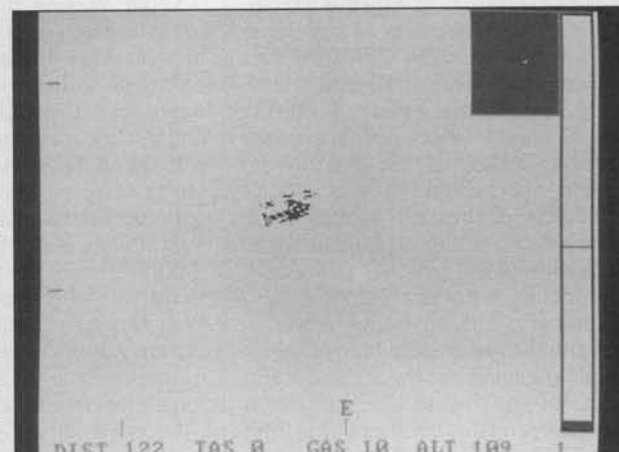
There are limitations on what can be presented visually on the computer screen. Most serious, perhaps, is the inability to include peripheral vision. Humans can see much more than the single object they focus on. In life, while you're looking at a model airplane you can see the ground, clouds in the sky, and (sometimes) other planes. In RCFS, your view is like looking through a camera which is automatically pointed at the model. Your peripheral vision is cut off.

The program gives references to help you stay oriented. A horizon is shown when the plane is near the ground, a moving bar along the right side of the screen tells you how far the camera is pointing up, and the plane's altitude is given at the bottom of the screen.

You'll notice that the plane gets smaller as it gets further away, and quickly gets too small to see clearly. The instructions mention this is designed to reflect reality, and much care went into this part of the program design. Interestingly, only the testers with little or no RC experience complained about



The RCFS airplane after takeoff and left turn. In addition to the airplane image, the horizon line is shown with the airplane's shadow. Box in upper left is a bird's eye view of the flying field, and bar in the box along the right shows how far "up" you are looking.



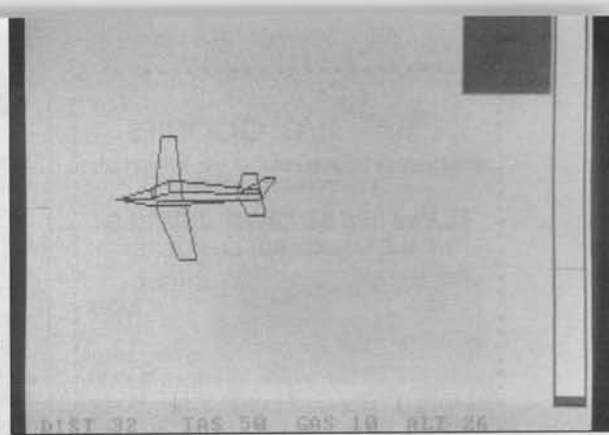
The RCFS helicopter shown at a DISTANCE of 122 feet, TRUE AIR SPEED of zero, GAS 10 means ten minutes flight time left, at an altitude of 109 feet. The "E" means the pilot is looking east to see the helicopter, and this corresponds to the dot off the left end of the runway in the map in the upper right.

the airplane image getting too small on the screen, while the experienced RC pilots did not. The program designers wisely provided a zoom control which enlarges the image of the plane, making it more visible at a distance.

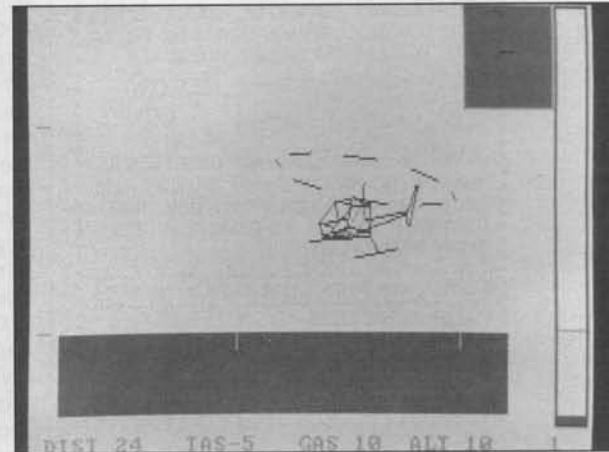
The RCFS program compensates for the fact that different airplanes fly and feel differently by allowing the user to vary twelve parameters: stall speed, lateral stability, longitudinal stability, aileron sensitivity, elevator sensitivity, rudder sensitivity, drag, power to weight ratio, snap spin sensitivity, spin rate, weather vane effect, and fuel supply.

A range of control is offered for each parameter, and you can set up a plane to be very stable, very sensitive or degrees in between. This is an important feature that allows the program to simulate the flying characteristics of many airplanes. The instruction booklet contains a chart of these parameters, their range of values, and sample parameters for trainer, intermediate, and advanced airplanes. If you want to simulate a specific airplane, you're on your own to experiment with the parameters until it feels right.

When the 20 year RC veteran tried the program he declared initial or default setup model was "too stable," and modified the



The RCFS airplane comes in for a close pass. Numbers at the bottom of the screen show DISTANCE from the pilot is 32 feet, TRUE AIR SPEED is 50 feet per second, GAS means ten minutes flying time remaining, and ALTITUDE is 26 feet above ground level.



RCFS helicopter makes a close pass, simulated here at 24 feet away, flying at five feet per second, with ten minutes remaining at an altitude of ten feet. At low altitudes the horizon is shown in the main display of both the airplane and helicopter simulators.

aileron sensitivity, lateral stability, and longitudinal stability parameters to make the model fly just like he thought it should. The program handles variability well.

An interesting and fun feature is the "test pilot special" mode which randomizes these parameters to simulate an airplane that's out of trim, tail heavy, oversensitive to controls, or worse. Flying in this mode is humbling and educational.

THE HELICOPTER SIMULATOR

The Dave Brown Products' RC Helicopter Simulator (RCHS) and the RCFS use the same controller. The simulated helicopter is capable of aerobatics, including loops and rolls. The variable parameters in RCHS are: cyclic roll sensitivity, cyclic pitch sensitivity, tail rotor sensitivity, drag, thrust/weight ratio, weather vane sensitivity, speed/pitch couple, yaw inertia, fly nose or tail, fuel supply, and switchless inverted. Not available in the RCFS but included in RCHS is the option to set wind speed and wind direction.

I asked two experienced RC helicopter pilots, to try the program and comment. One thought the default setup was too stable, but after modifying some of the parameters felt it presented a realistic simulation. The second pilot preferred flying a setup more stable than the default parameters. Both pilots

continued on page 91

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CORNER Continued from page 34

because a lot of correspondence was received to the effect that it was the dye in the black coated wire which was the culprit, or catalyst maybe!

In any event, this corrosion, which starts at the negative terminal, will in time travel the whole length of the wire, but only to its first point of termination; a switch, charge plug, or whatever . . . it never seems to bridge to the next wire. Once the wire has been attacked, it is impossible to solder to or to clean off, and should be replaced at the first symptom.

In the ensuing years, a lot of opinions have been received on the subject, as well as published by a number of "experts" in various publications, as to why this strange NiCd type of AIDS is taking place. Some made sense, 'til disproved with facts and numbers; others were downright ridiculous, such as the one where a writer, after listing his (to him) impressive credentials, stated that the cells leaked at the seal on the positive end, after which the residue crept along the side of the cell to attack the negative wire . . . with no explanation as to why the positive wire, which is closer by a couple of inches, is never affected!

Quite frankly, I don't know why this happens, and I have never claimed to know. I will admit to having had theories now and then, most of which also got shot down sooner or later, and this latest example from our friend in Nyark, with the plainly and completely blackened unconnected white wire, disproves all theories . . . mine and all the others.

My conclusion, and I think the only one we should accept, is not to worry as to the why, as we obviously have no control of it, but to accept it as we do any other equipment failure . . . with the exception that this is one for which we can and should check periodically. In the case of you guys who have flying seasons (Ha!), I would definitely put an inspection of all negative wires on my check list for the beginning of each year's flying. Those more fortunate amongst you should make a point of making such a test every time you check your batteries for proper capacity. More about that later.

By the way, Cheers and Jeers for B.R. Kaczmarek; Cheers for realizing that there comes a time when radios should be retired, and Jeers for attempting to salvage the batteries. Use them in your flashlight, or broadcast radio, or something, but NOT in your RC equipment! To repeat myself: NiCds are cheaper than airplanes!

Still on the subject of batteries, it recently occurred to me that RCers have fallen into another terminology trap, though at least this one was not caused by someone inventing an acronym because they were not familiar with or understood an already established term. I am referring to:

BATTERY CYCLING AND BATTERY CAPACITY

It seems that too often, myself included, we refer to cycling a NiCd battery when we

really mean testing it for capacity, such as is done with instruments such as the Ace RC Digipace. By the way, did you know that the Digipace II is now in production and available? A review is in the works.

Anyway, cycling correctly refers to the charging and discharging of a cell or battery, either through normal use, or in a test procedure. Actually, the term "cyclic" is used by the real authority, the battery industry, to designate using a battery in a charge/discharge situation, as in an RC system, to differentiate from what is referred to as a "standby" application. An example of the latter is a rechargeable battery in an alarm system, where it is kept under a constant trickle current, but is seldom called upon to produce power unless the alarm is actuated.

While cycling does in fact take place when one tests a cell or battery for capacity, the two differ in that in the latter case, the discharge current is carefully monitored down to the specified discharged voltage and by simple arithmetic (current x time) the actual stored capacity in Amp or Milli-Amp Hours can be determined.

I know that such lack of standardization in terminology is not likely to start airplanes dropping out of the sky, but if we are going to do it at all, we ought to do it correctly. Right? So in the future, I will remember (try to, anyway!) to refer to battery capacity testing as Battery Capacity Testing . . . if I forget, feel free to remind me!

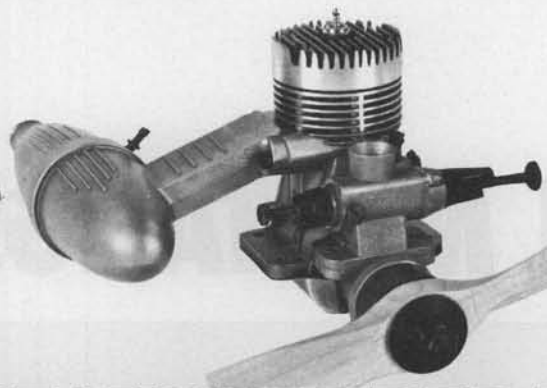
I don't recall if I ever mentioned it here, but I know I have done so in conversation with more than one flier friend. I refer now to the:

AMA RC EQUIPMENT LISTING

In truth, I have been a little uncomfortable with it, feeling that if I could see loopholes, which I could, those with more reason to look for them could probably find them of a size large enough to accommodate a full size 747. My biggest concern has been in what constitutes an "independent laboratory." Who certifies them and their testing procedures, i.e., who is checking the checkers? First though, I must clarify what seems to be a point of confusion with many: The list as published in MA is not that of "AMA Approved Equipment." It actually states that in the opening, and also states that the information on which it is based was received from the primary company offering that equipment in the US market. Repeat: Such equipment is not AMA blessed!

It appears that my concern, call it curiosity if you will, was not without grounds, as last April, our AMA released a paper addressing exactly that subject. After first reviewing the history and intent of the program, the release lists three separate areas in which discrepancies exist, or are possible:

(1) In some cases, manufacturers are continuing to use model names and/or numbers on present equipment, that pre-dates the time when the equipment actually was manufactured by guideline standards. This is a source of confusion for the modeler. I would be sorely tempted to use words other than "confusion."



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(2) A second concern centers around discrepancies that may exist between listing and published advertisements for the equipment. Again, names and/or numbers are the focus of the concern. A request is included to industry which asks: *Using the listing as it is presently constituted, please review these elements.*

And last (3), more in the area I wondered about: *Concern centers around a possible misinterpretation of the element of the actual testing procedures. During this past year, the Guidelines were reviewed for technical clarity. . . . This review revealed significant differences between the way the different testing laboratories performed the tests. It is believed that these differences stem mainly from different engineering interpretation of the Guideline requirements . . . a testing laboratory review of the way testing was accomplished is appropriate.*

That is it in a nutshell, complete copies are available for the usual SASE to those interested. And, of course, our old friend, AMA Technical Director Bob Underwood, is available at Headquarters to answer your questions or take your comments. I don't believe I am the only one with doubts; I distinctly remember one of my friends, on reading that a particular brand of RC equipment had made the list, commented, "They either lied or paid somebody off!" But I would advise that before we start raising any sort of "AMA blew it again" hue and cry, we consider that in doing something for the first time, as is being done here, mistakes are bound to be made. Also, we all know later what "they" should have done in the first place, or "Hind sight is 20-20."

What to do in the meantime? It is some-

thing of a dilemma, one that none of us in the flying ranks are able to do much about, not having the equipment to do our own testing. I would say to pay close attention to what equipment is operating successfully in your area, disregard claims made by those retailers who are only selling some specific equipment but are not it's primary importer or manufacturer, and if any doubt exists, especially when an expensive system is involved, try to get written commitment of some sort, even a brochure from the manufacturer that it does in fact, both transmitter and receiver, satisfy the recommended technical standards. In that manner, you will have something of a leg to stand on if time proves that it wasn't up to par when sold and you have to fight for an update or replacement.

Whatever problems, confusions, interpretations and opinions we have, one thing remains . . . we are going to fly. And as such, we are going to need a:

FREQUENCY CONTROL SYSTEM. There are many, and more have appeared in our various publications since the introduction of our newly authorized frequencies. There are major differences in one to the other, but they all have one thing in common, they all require markers of some sort, bearing channel and frequency information. Some of you will be perfectly willing to live with clothespins marked with a felt tip marker, and if someone forgets and takes one home, why just make another one! The problem comes in who to blame next weekend when they both show up at the field, and an airplane is lost! True, there may not be a 100% human error-safe frequency control plan, but there is a way to make yours professional looking, and with only a little bit of monitoring, keep

down unauthorized duplications. And that is with the use of the new frequency control stickers, clean and neat, now available from Ace RC.

We have brought you a sample here, full-sized as available from Ace in selfsticking weather-proof vinyl. Obviously, they need to be added to your particular system, no matter how simple or how involved; their job being only that of channel identification. Ace's "pasties" are available singly and in sets grouped by bands. Single stickers, Part No. 50L93+Channel Number (50L9335 for Channel 35 as shown, etc.) are priced at 98 cents for TWO.

Sets are grouped as Low/High band, Even/Odd channel numbers, one sticker of each number, as follows:

50L930L - 72 MHz Even Channels, Aircraft 12-36.....\$4.95

50L930LO - 72 MHz Odd Channels, Aircraft 11-37.....\$4.95

50L930U - 72 MHz Even Channels, Aircraft 38-60.....\$3.95

50L930UO - 72 MHz Odd Channels, Aircraft 39-59.....\$5.95

50L930S - 75 MHz Even Channels, Car/Boat.....\$5.95

Personal to Tom Runge, Ace R/C. Though a gentlemen's agreement was in effect within the industry and ROAR (Radio Operated Auto Racers) not to supply or use the odd 75 MHz channels, one of the major suppliers, without as much as an "excuse me," started shipping systems on those frequencies soon after the hold on them was over. Whether we like it or not, clubs and racing facilities will be needing ID's for those channels also.

Eloy Marez, 2626 W. Northwood, Santa Ana, CA 92704. **MB**

**STRICTLY
SCALE**

BY AL TUTTLE

FLY A P-51 MUSTANG!



(Top) Stallion 51's TF-51D dual control Mustang, seen here at Titusville, Florida. (Above) TF-51D "Crazy Horse" taking off at Kissimmee, Florida.

Did you ever, in your wildest dreams, think that you would or could fly one of the best fighters of WW II? I don't mean ride in one, but actually fly it! There are several two-seat P-51 Mustangs around the country that do sell rides. However, there is only one place in the world where you can actually fly a full-blown, dual-control Mustang and you **DON'T HAVE TO BE A PILOT!** The aircraft is owned and operated by the Stallion 51 Corporation of Kissimmee, Florida, and trains qualified pilots to obtain an FAA letter of authorization for the North American WW II P-51 Mustang fighter. Even though they train qualified pilots, they also perform introductory or familiarization flights in their TF-51 Mustang.

Stallion 51 Corporation is no "Cedar Yopantz" flight operation. This is a going, growing operation with a bright future. If I have your attention to this point and you are

mildly interested, your next question is: "What are the pilot's qualifications, and what kind of shape is the bird in? After all, it is nearly fifty years old!"

The two pilots and owners are Doug Schultz and Lee Lauderback. Doug did his flight training at Pensacola, Florida, earning his wings in September, 1970. After fleet training in the F-4 Phantom, Doug made two cruises with VF-161 aboard the *USS Midway*, logging 158 combat missions before hostilities ended with North Vietnam. Doug helped set up the Navy's first fleet adversary squadron, providing fleet pilots with Soviet-

Lee headed up the flight operations for Arnold as chief pilot and director of flight operations, and piloted Arnold's jets and MD 500 helicopter. Currently, in addition to instructing in the Mustang, Lee performs acceptance flight testing and consulting work in the jet and helicopter industry. He first flew Mustangs in 1977 and has amassed in excess of 13,000 hours in all types of aircraft and helicopters. In addition, he has flown the F-15D Eagle, TA-4 Skyhawk, and the T-33. He also competes in soaring contests and has held several sailplane records.

Stallion 51 acquired the Mustang in mint

sence of armor and armament, the only differences from the D-Mustang are the bigger two-person canopy, and a taller vertical stabilizer for added directional stability and rudder control.

The rear seat instrument panel is complete with the exception of radios, gear handle and fuel and start switches.

OK, you have decided that you just might go for it, but first you want to see this aircraft. As you can see in the photo, it is silver with blue trim and white invasion stripes with the name "CRAZY HORSE" painted on its nose. A look into the wheel wells reveal that the



Stallion 51's MIG 17F, North Vietnamese insignia. First pics of plane in its new colors.

style dissimilar fighter opposition air combat training exercises. After three years flying as an adversary, Doug began flying for a major air carrier, while continuing in the Naval Reserve flying fighters. Doug has accumulated nearly 6,000 hours in various fighter aircraft, and has a total of over 13,000 hours.

Lee Lauderback began flying in 1966. After receiving a scholarship to Louisiana State University and majoring in Aeronautical Engineering, Lee furthered his education by being graduated from Embry Riddle Aeronautical University with degrees in Aeronautical Sciences and Business Management. While earning his degrees, he also served as a flight instructor for the university and flew for the Florida Forestry Department. Shortly after graduation from ERAU, Lee began working for noted golfer and businessman, Arnold Palmer. For 16 years,

condition in early 1987. The aircraft is a two-seat TF-51 and started out as a single seat F-51D. It is a Cavalier conversion, remanufactured to North American specifications. The airframe was completely rebuilt by Cavalier Corporation in 1973. This particular plane had a long career in the USAAF, the Air National Guard, and the air forces of Indonesia and the Dominican Republic. It is equipped with a heavier duty 1950 HP version of the Merlin, rated at 2250 HP Max War Emergency Power, limited to five minutes. This is a feature that is never used as it can literally tear the guts out of the engines, which are hard to come by these days. The engine is rebuilt every 350 hours by Lee's twin brothers. Mechanical perfection and cleanliness are obvious commitments of Stallion 51 Corporation. This aircraft is really safe!

Aside from the rear cockpit and the ab-

insides of the gear doors are even polished, with no sign of dirt or crud anywhere! The aircraft is in better shape than when it was new. That does it! Your mind is made up! Let's go fly this thing.

First, there is a forty-five minute to one-hour briefing held in the training room. This is a one-on-one briefing with just you and the pilot. At this time, you will be briefed on the Mustang's flight characteristics, etc. The traffic pattern and landing approach will be illustrated on the blackboard and the location and speeds that you will lower the flaps and gear. All in all, a thorough briefing. It is done in such a manner that unless you are a complete blithering idiot, you will have no problem understanding it. You will next be asked what maneuvers you would like to do. You will be told that you can fly the aircraft as aggressively as you want, because you ARE NOT GOING TO HURT IT! Once you



MIG 17F on takeoff roll, at Kissimmee, Florida.



MIG 17F. Here she comes . . . full A/B, lots of noise! Doug Schultz pilot.



There she goes. Awesome!



MIG 17F is off and running! Note gear retracting.

have decided on the maneuvers, you will be talked through each one as **YOU WILL BE DOING ALL THE FLYING!** Yes, my friend, aside from starting the engine, you make the takeoff, flight, and landing. Of course you will be closely supervised by the pilot in the front seat.

After the briefing, you are taken out to the aircraft and strapped into the rear seat. At this time you will be given a comprehensive briefing on the instrument panel and controls.

After the flight, which is of one hour duration, you will be taken back to the room for a debriefing, at which time you will receive a certificate that you actually flew a TF-51 Mustang.

For added icing on the cake, there is a video camera mounted in the top of the vertical stabilizer, with a wide angle lens, which shows an overall view of the plane from the rear of the canopy forward. In fact, you can be seen in the rear cockpit and if you want you can turn your head and look back into the camera lens to show your friends that it is you. There is another video camera mounted on the left hand horizontal stab tip that gives an overall view of the left side of the plane, gear and flap operation and other nifty things. Both cameras are tied into a VHS video recorder that records *everything* from the time you step into the cockpit until you step out. The aircraft's intercom and radio system is also recorded.

You also get a copy of this tape. I have seen some of these tapes and they are fantastic, to say the least, as the resolution and colors are excellent.

There you have it. Plan your own hour or more of aerobatics, low level "sightseeing," air combat maneuvers, landing circuits . . . whatever you've dreamed of doing in a Mustang, regardless of your experience! The aircraft is located in Kissimmee from October to June. Kissimmee is just a few minutes from Disney World and Epcot Center. From July through September, the aircraft is rotated between Nashua, New Hampshire and Latrobe, Pennsylvania. Stallion 51 headquarters are in Kissimmee and open

continued on page 98

SECOND ANNUAL



Milwaukee

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SIMULATOR *Continued from page 85*

agreed that the RCHS did a good job of simulating the RC helicopter, and both agreed that the program could save money because the training it provided can help to avoid crashes and repairs.

When one tester tried the heli simulator in Instructor Pilot mode, he exclaimed, "The nose/tail is reversed!" and a few seconds later added, "I've always wanted to try this."

I asked, "You mean you wouldn't reverse nose/tail orientation on your Bell 206 Jet Ranger, just to try it?"

Still flying the simulator, he said, "Freakin' right!"

I inquired, "So maybe the RCHS is doing its job?"

He replied, "Yeah, it sure is."

Neither program is difficult to learn to use. If you've spent time on "full scale" PC flight simulators, like those made by Electronic Arts, Microsoft, Spectrum Holobyte and others, you'll adjust almost immediately to this one. If you've flown RC planes before you'll also adjust quickly, and may be surprised to find how much realism can be achieved with a computer program. Yes, a computer plane can stall, can be out of trim, and can be overcontrolled.

FUTURE POSSIBILITIES

While this program is useful now, it shows even more promise in the future. I can see the day when RCFS becomes an industry

standard, and kit manufacturers list RCFS setup parameter numbers in their ads to describe how their model flies. With these numbers, modelers can "fly the plane" on their own computer, or one in a local hobby shop, creating a new way to "try before you buy" a kit.

Magazine kit reviewers of the future might publish RCFS setup parameters that describe how a plane flies from their own hands-on experience. These reviews will provide a more accurate description of a model's flight characteristics than we can now with words and photographs alone.

USER RATINGS

All four program testers with less than five years RC flying experience felt the simulators were worth the cost because they avoided crashes while learning to fly. Each agreed that use of the programs would reduce the amount of instructor time needed to get an RC airplane in the air and safely back on the ground.

The two testers with more than five years experience expressed a split opinion. One thought the helicopter simulator was worth the cost because real life crashes are likely to be reduced, but he wouldn't spend the money on the aircraft simulator because "It makes the landings too easy, and that's mainly where new fliers get into trouble."

The other experienced pilot thought the airplane simulator was well worth the cost but the heli simulator wasn't because it

lacked realism. He felt that it needs scenery and obstacles to avoid to simulate real life RC helicopter flying.

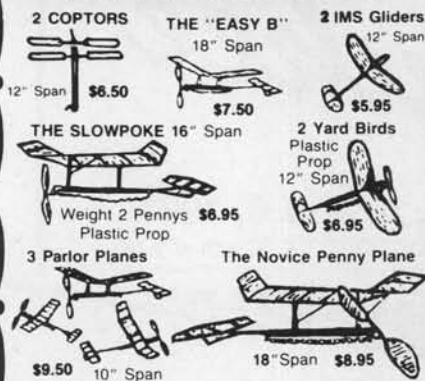
RCFS and RCHS each list for \$159.95. If you have one, you can buy the other program for \$53.95 and use the same hardware. These programs deliver what's promised. While nobody claims you can learn to fly RC with a computer simulator alone, five out of these six reviewers feel the programs can provide substantial training benefit and save money in crash repairs.

Is there room for program enhancements? I think so. I'd like to see wind in the RCFS, and graphics for more than one aircraft type. It's disconcerting to fly a plane that handles like a Telemaster and looks like a Tiporari. I believe both simulations could be improved by adding motor noise that varies with throttle position, an image of a runway or helipad to land on, a solid rather than wire frame aircraft image, more scenery, and more detail in the parameter tables in the instructions to make simulation of specific airplanes easier.

Both programs are valuable for beginners learning take offs and landings, and for experienced RC pilots who want to practice Immelmann turns and Split-Ss before risking a model. With RCFS you can fly in any weather and don't have to wait for the frequency pin.

For more information contact Dave Brown Products, 4560 Layhigh Road, Hamilton, Ohio 45013; (513) 738-1576. **MB**

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AEROBATICS *Continued from page 18*

pate. Naturally, this is exclusive of the 10% I mentioned previously. Nothing works with those people.

I also see some renewed enthusiasm happening. This is an easy prediction, because it has started already. Some people are eager, some are determined, and more than a few are a little anxious and uncertain, but the net result is that practically nobody is looking to be bored in '92. I said before that the good pilots should still win, providing they practice . . . and they should. However, a shake-up like this always favors those folks who can learn and adapt the fastest, and those who are willing to work the hardest. There will be a giant opportunity for these types of people to move to the head of the line next year. In the same vein, the fossilized types who have been winning on autopilot and halo-factor for years may find the going a little bumpy if they retain their old practice habits (like, two flights the night before a contest).

The new patterns are printed here for those who wish to practice, with the exception of the FAI patterns, which I believe have yet to be finalized as I write. Get thee to the field and burn some fuel.

Of other matters I have little to report, save a glowing (natch...we don't run ignition) review of Performance Specialties new "true" ABC piston and liner for the O.S. Hanno Special. Nice, nice, nice, wow, oh boy, and nice again. Those of you who thought this engine couldn't run any stronger were wrong. An aluminum liner version exists also, which is two ounces lighter and is said to provide superior heat transfer. This is probably the ultimate, elegant solution for a nose-heavy condition. Contact Performance Specialties at P.O. Box 3146, Gardnerville, NV 89410; telephone (702) 265-7523. See ya at the field —Rick.

MB

MODEL DESIGN *Cont. from page 26*

it continues to be a nuisance.

The purposes of the shear pin are, of course, to keep the wing mounting bolt from popping out of the slot except in a crash, and to keep the wing aligned on the fuselage.

It just came to me that if we use two wing mounting bolts instead of one, both of those requirements can be met by the two bolts, and no shear pin is necessary. An excellent way to solve a problem is to eliminate it.

In the super slip-off wing mount, I propose to widen out the "slot" to nearly the full width of the fuselage, or perhaps to most of the chord, and use two mounting bolts through the wing to engage the ears of this wide "slot". There will be notches in the center of the ears to locate the wing bolts, thereby keeping the wing aligned and keeping it on the plane except in crashes. I will have to add means to adjust the amount of the detenting action.

Normally I try out new ideas before I mention them in MD&TS, but this one shows too much promise to wait; (and Bill Northrop isn't about to wait longer for me to mail in this column. Slave driver. Ogre. Tyrant.)

Anyway, if I do all the development, that robs you of doing some of it; and the joy of developing new ideas is what this column is all about. I'm going to put this shearpin-less slip-off wing mount on a model I'm now building, and will report on it ASAP. But meanwhile, you try it. Send photos and details for inclusion in MD&TS.

PARTING WORDS

Atop the Washington Monument, a small boy was overheard asking his father where the Pentagon was. Father replied, "See that hexagonal building over there? That's the Pentagon."—Readers Digest.

Write to Francis Reynolds, 3802 127th Avenue NE, Bellevue, WA 98005-1346; (206) 885-2647.

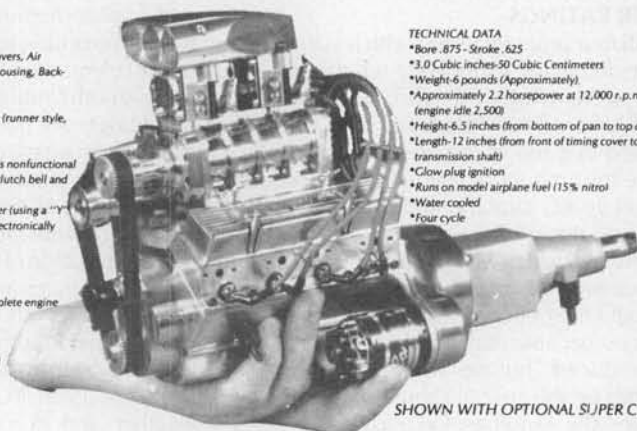
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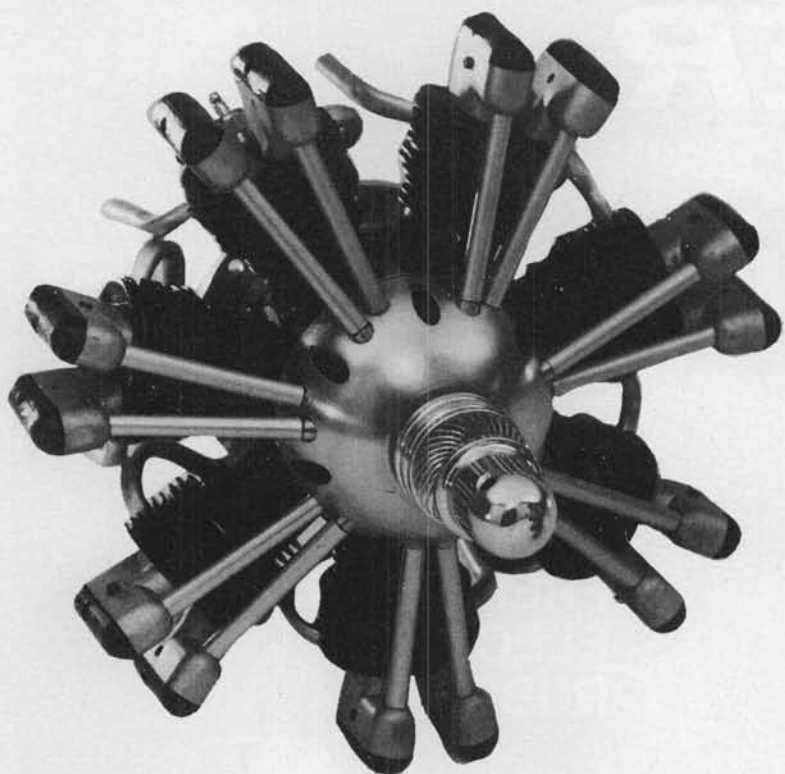
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who would like to watch RC helicopters homing in on you at 80 mph, and all you see is just the helicopter nose. Next, Dwight Schilling armed his pod-and-boom Concept 60 for a go. It did 81 mph on the best pass. Wow! that is not bad at all for a pod-and-boom.



The TSK tail rotor gear box on Gorham's machine is a work of art. This unit and the tail rotor gear box on the Kalt Excalibur and Omega are all metal construction and beautifully machined. There is almost no slop in the flapping, lead-lagging, or feathering directions. If you want perfection, you have to pay the two hundred bucks for this unit.

Fuselage helicopters fly faster because they have less flow separation on the rear half of the body. Pod-and-boom models have turbulent flow separation right behind the back of the canopy. There is a low pressure region developed there to suck the model backward. At 12.5 pounds, Robert's machine was also the heaviest. This is one example of what I have said before; that if the engine has power, then, a heavier machine will have faster top speed, but slower acceleration. But the machine that was really trucking was Wayne Mann's X-Cell 60 hidden behind the Triumph fuselage. That engine was hauling the model at close to 90 mph! The trend of today's FAI helicopters is

like the FAI pattern planes of the 70's and early 80's, where speed is everything. Speed helps you carry through the roll to reduce the amount of negative pitch needed, and also stretches it out to look prettier. Speed and momentum give you that nice big loop. Speed, momentum, and clean aerodynamics give that high vertical rise for the 540 Stall Turn and Rolling Stall Turn. But Curtis

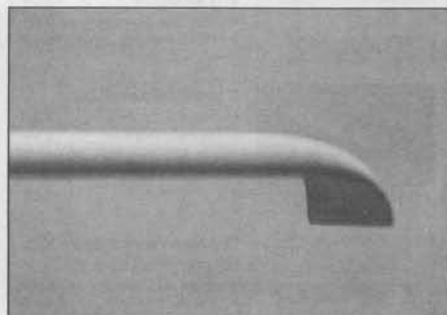


A completely radical tail rotor design on Dan Chapman's Schluter Champion. It has a Schluter Magic tail rotor gear box and two Schluter tail rotor hubs. Don Chapman says it improves forward flight tracking due to air tunneling between the two discs.

pointed out that heavy machines only improve hover on windy days. He added that the drawback of a heavy machine is that it may sit there, but once perturbed it takes more to bring it back. But behind all this fancy equipment, it's the pilot who counts. There is no substitute for talent and practice, practice, practice.

The whole event was run flawlessly and no one complained. This is because a month before the team trial was held, the two local heli clubs, the Montgomery County RC Club in Maryland, and the Miniature Rotary Wing Club of Virginia, planned the event thoroughly. As I live an hour away from both clubs and I am a member and know almost

all the workers, I know they worked very hard. While they were sweating to keep the contest going smoothly, yours truly was enjoying the flying, taking pictures, and writing this report. These volunteer workers made the team trial happen, and they deserve a big hand. The five judges also received plaques for their volunteer work. It is not easy sitting there from 8am to 5pm



Front view of the radically curved blade tip design on Chapman's main rotor blades. The curved tip was carved from a block of balsa and CA glued to the tip of the blade. Don calls it 'hooked tip.' He says it reduces the forward flight top speed by three or four mph, but the model now tracks in forward flight and goes through the turns a lot better.

watching the same maneuvers over and over. You begin to see stars!

Well, I believe this time the US will bring back the team trophy from Australia, because this is the best team we have seen, and each member is gung ho about RC helicopters.

James Wang provided a four-page checklist of specifications on the helicopters used by 18 of the 19 contestants (Dalusio's not available) at the 1991 US FAI F3C Team Trials. As we didn't have space available to publish it, readers may obtain a free copy by sending us a legal size S.A.S.E., addressed to Model Builder, FAI Heli Specs, 898 West 16th St., Newport Beach, CA 92663. **MB**

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CONTROL LINE *Cont. from page 65*

The Tulsa Glue Dobbers is a club that has existed for many years, serving Oklahoma modelers. "Round & Round" is a fairly new newsletter, Vol. 2, No. 3, at this writing in May. Club dues of \$15, or \$6 for a newsletter subscription only, can be sent to Gary Potter at 4417 S. Hudson Place, Tulsa, OK 74135. Potter is the club president. Clyde Case is vice president, treasurer is Bill Coulson, and De Hill is secretary and editor.

Vol. 2, No. 3 includes a report on the third annual Vintage Stunt Championships in Arizona, a report on a Glue Dobbers foam wing-cutting seminar, an interview with noted German stunt expert Klaus Maikis, a report on an Oklahoma City contest, advance news about a contest in Topeka, Kansas, a club flying field lawn-mowing schedule, club meeting and fun-fly calendars, contest flyers and some nostalgic ads.

To correspond with "Round & Round," write to De Hill, 5811 S. Utica, Tulsa, OK 74105.

Above we mentioned that "Round & Round" is a column in another newsletter. Some CL fliers will recall that that's the title of a column written by your MB columnist during the last two years of publication of "Flying Lines," the newsletter of Northwest CL model aviation, which was published from 1979 through mid-1988.

"Flying Lines" was started by your columnist and Mike Hazel as an attempt to form a communications network among Northwest modelers during a time of declining contest activity in the late 1970s. The newsletter was successful beyond our dreams and was a key to a tremendous upsurge in contest activity in the 1980s. With strong Northwest and National circulation, FL contained contest results, a calendar, regional standings and records, technical articles and columns on all the events, classified ads and photos.

Unfortunately, it grew to the point where the editor and publisher were spending all their modeling time on the publication and not much on modeling. I resigned as editor after 1985 and became a helper, while Mike carried it on for two more years. Then it was turned over to another modeler who published a couple of editions before it went out

of existence.

Mike has now decided, with the urging and assistance of some other Northwest modelers, to resume publication of FL in an attempt to reestablish that Northwest communications network. The newsletter will have a slightly reduced schedule and will be tailored to require a little less labor by the editor.

One of those provisions will be to limit circulation to Northwest modelers as much



One of the many profile scale entries, a Grumman F3F.

as possible. Mike has established a press run limit and will give Northwest modelers first crack at being on the list. As before, FL will contain a contest calendar, standings, records and technical articles, along with free classified ads.

For Northwest modelers who want to "plug in" to regional activity, FL can be obtained by sending \$14.50 for nine issues (\$18 in U.S. funds for Canadian subscriptions) to Mike Hazel, 1073 Windemere Dr. N.W., Salem, OR 97304.

For those outside the region, who may be interested in looking at FL as a model for independent newsletters in their own areas, Mike will be willing to send single copies for \$2.

• • •

One of the biggest and best contests in the stunt/precision aerobatics realm is the tremendous Vintage Stunt Championships put on annually by Mike Keville in Mesa, Arizona. Following up on the smashing successes of the past three years, Mike announces that VSC IV is already scheduled for March 21-22, 1992. It's at Christopher Columbus Park in Tucson. The annual banquet is scheduled for the Rodeway Inn-North at Grant Road and Interstate 10, which also is the recommended lodging for competitors.

Competition is in Old Time Stunt, in glow

and ignition categories, and in Nostalgia Stunt. Mike reports that there will be an increased emphasis on faithful reproductions of the old designs at VSC IV.

Pre-entry forms will appear in *Stunt News*, the publication of the Precision Aerobatics Model Pilots Association. Rules to be used at this contest are available from Tom Morris, 1019 Creek Tr., Anniston, Alabama, 36206.

We'd like to mention other upcoming contests if we get the news in time. This column is written four to five months before it is published, so remember to get your contest dates in early.

We couldn't let a month go by without some product news, and Jim Bradley of Bradley Model Products provides just the tonic. His own letter speaks eloquently . . .

"You might think it odd that a free-flyer would write to the control-line columnist for *Model Builder*, but personally being involved in F1A competition at the national and international level, I can appreciate that a lot of your readers are always looking for a fine advantage or edge. I read all the specialty columns because I find several things of interest to me that I can apply to my flying. A tip you might pass on to your readers. (Agreed, and the free flight columns are a tremendous source of good building information for CL modelers; smart CL modelers have a tremendous respect for the skills of our brother F1Aers.-jt)

"I doubt that most of your readers would be interested in towhooks and DT timers but they might be interested in all the various carbon fiber products that I carry. Carbon fiber is becoming very common to modeling, and not just some exotic material that the fanatics use. In the cured sheet form it is no harder to use than plywood but is a lot stronger. CA's and epoxies are the best glues to use with it, so it lends itself to quick and strong building.

"When requesting information a self-addressed, stamped envelop is really appreciated . . ."

Jim's catalog contains a wide variety of sizes and thicknesses of carbon fiber sheets, carbon fiber mat, carbon fiber tow, carbon fiber yarn and carbon fiber rod. It's going right to the top of my stack of product catalogs. To get a copy of the catalog for your stack, write Bradley Model Products, 1337 Pine Sap Ct., Orlando, FL 32825.

In the interest of helping modelers find success with their varied projects, we occasionally help a flier put out the call in this space for some elusive item that will help finish a job. In that spirit, we pass along that Robert Stover of 201 Hall St., Mauston, WI, 53948, is searching for the crankcase for a Fox 29X engine. If anyone could help him out, he'd appreciate a note. Robert is a "convert" from RC flying, returning to CL after many years on the "other side." Welcome back, Robert!

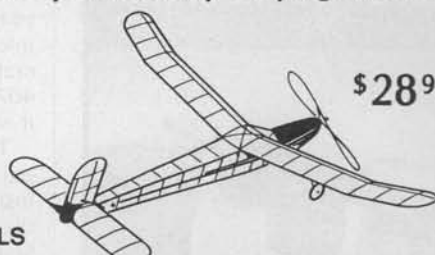
Club news, photos, questions, contest information and technical tips are welcomed. Write to John Thompson, 1145 Birch Ave., Cottage Grove, OR 97424. **MB**

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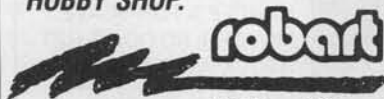
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SCALE *Continued from page 90*

year-round. You can call them to get all information, the present location of the aircraft and the cost of the flight. Telephone 407/846-4400. The cost? It ain't cheap! But it is well worth it!

These guys also have a MIG 17F! It is painted black and has North Vietnamese insignia. This aircraft is one of three airworthy civilian-owned examples in the United States. It was built in China in 1957, imported by Dean Martin, of Burlington, Vermont, in 1988, and acquired by Stallion 51 in September 1990. Paint is Ditzler acrylic enamel, the same paint that I wrote about in the June '91 issue of *MB*. In fact, the photos of the MIG is the first outing for the aircraft in its new colors. I work part time for PM Productions, a video outfit that is doing a promotional video for Stallion 51, so I was very fortunate to be able to get these photos exclusively and close up. As can be seen by the photos, I was only fifty feet away when the MIG went past in full after burner! Talk about heat and noise!

Doug and Lee operate the aircraft in high performance aerobatic and simulated air combat demonstrations at air shows throughout North America and offer it in support of Navy and Air Force Reserve and Air National Guard combat training.

After successful testing in early 1950, during which the prototype attained supersonic speed in level flight, the MIG-17 was put into immediate series production. It began reaching operational units in 1952 and was designated 'FRESCO A' by NATO.

The following are the particulars on this aircraft:

Aircraft: Mikoyan-Gurevich MIG-17F.

Manufacturer: State Aircraft Factories, China.

Year: 1957

Type: Fighter/Interceptor.

Engine: One WPS (Klimov VK-1F)
centrifugal flow turbojet; 750 lb.
thrust basic, 7495 lb. with afterburner.

Fuel Capacity: 373 gal. clean, 584 gal.
with auxiliary tanks.

Wingspan: 31 ft., 7 in.

Length: 36 ft., 4 in.

Height: 11 ft., 0 in.

Combat Weight: 10,330 lb.
(ammunition + 1/2 internal fuel)

Armament: Two 23mm cannon;
80 rounds each. One 37mm cannon;
40 rounds. 1100 lbs. of bombs.
Air-to-air/ground unguided rockets.

Radar: 4.5 NM boresight ranging.

Maximum Speed: 711 mph at 9840 ft.
(1145km/h at 3000m).

Approach Speed: 155 mph.

Stall Speed: 125 mph clean,
110 mph landing.

Time to climb to: 10,000 ft.: 1.4 min.
30,000 ft.: 3.3 min. 50,000 ft.:
7.8 min.

Ceiling: 54,500 ft. (16,600m).

Range: 620 mi. at 40,000 ft. clean. 1050
mi. at 40,000 ft. with auxiliary tanks.

Endurance: 1 hr. 17 min. at 17,000 ft.

clean. 2 hr. 20 min. at 17,000 ft. with
auxiliary tanks.

Acceleration: 8G positive placard limit.

12G positive structural limit. 3G
negative placard limit.

It is no wonder that this aircraft gave us fits
in Vietnam!

• • •

Ever purchase a piece of equipment such as a starter, fuel pump, kit, etc., that has a warranty card? What do you do with it? If you are like the majority of us, and the unit operates OK out of the box, you chuck the card into the nearest trash can. Sure, it may be for only ninety or one hundred twenty days, so what good is it? The unit should operate with no problems for that length of time. If it is a kit, the warranty will have expired before it gets built.

The manufacturer puts the warranty card in to not only guarantee the product but to aid you if a problem arises with the unit in the future. Say after a few months your starter or electric fuel pump rolls over and plays dead. You send it back to the manufacturer for repair. The first thing to be done is to look in the records for your card. If it's there, it will prove that you are the *original* owner of the unit, and if the repair is expensive, or not repairable, the company will work with you where both parties will be satisfied. If there is no record of you as the original owner, there is no way of knowing whether the unit had been purchased at an auction or from a friend, etc., in other words, the manufacturer doesn't know how much it has been used/abused, and you have no way of proving how it got into its condition. Consequently, the manufacturer is not going to go out of its way, or bend over backwards to save you money on a repair or replacement.

If it is a kit, and during the course of construction you found bad wood or parts missing, what do you do? You sent in your warranty card when the kit was purchased, but the warranty ran out before you started construction. Simply get in touch with the manufacturer and, dollars to doughnuts, they will replace the defective or missing parts at no charge. If you didn't send in the card, you are out of luck!

The warranty card serves another important function. If a fault or problem arises with a unit, the manufacturer can inform you of these problems. A good example of this was a few years ago when Byron Originals ran into a problem with their power prop system. Because of their warranty program, they were able to inform the customers of the problem. The customers were asked to return their power prop systems and were given a two-bladed system until the power prop systems could be replaced with the modified system. And this was at no extra cost to the customer! The bottom line is: Send in those warranty cards!

• • •

Several readers have asked about the best method to use to cover foam cores with balsa sheeting. There is no *best* method. Whatever works for you is the method to

use. The spray or brushed on contact adhesive works very well on foam cores with small areas. However, when used on large area wing cores as in giant scale models, these adhesives will lift in high humidity conditions, which result in humps and bumps on the wing surface, and loss of structural integrity. This is definitely not good, especially on your super scale model that you labored over for many hours.

The method that works for me is this: Using a straightedge, the balsa sheeting edges are trimmed to assure a good fit when gluing. With the sheeting placed on a flat surface, the sheeting is placed side by side and held in place with masking tape running along the length of each edge joint. The assembly is turned over and the edges glued using thin CA. After the CA has cured, remove the masking tape and, using #150-grit sandpaper and a sanding block, sand one side of the sheeting as smooth as possible. The joints are easily sanded by squirting CA remover onto the sandpaper and lightly sanding the joint. The CA remover softens the adhesive, allowing the joint to be sanded smooth with little effort.

The foam cores are removed from their sleeves and lightly sanded to remove any flashing and bumps that might be present. I use a hand vacuum to remove the foam dust and residue.

The next step is to glue the sheeting onto the foam cores. The best adhesive that I have found for this is PIC Coating Pox. This is a 5:1 mix epoxy that has 100% solids, no wax, and a very low odor level. It also stays flexible after curing. Lay the sheeting onto a flat surface with the smooth side down. Be sure not to mix up more than two to three ounces at any one time for each cover application, as pot life is only five minutes. However, once spread out onto the balsa the pot life is extended to approximately sixteen minutes, depending on temperature and humidity. I mix two ounces at a time.

After mixing, pour the epoxy down the center length of the sheeting and using a 1-1/2" to 2-inch wide brush, spread the epoxy over the entire sheeting. Use a squeegee to remove excess epoxy. Place the sheeting onto the appropriate core and place the core, sheeting down, into its sleeve. Mix up another batch of epoxy and repeat for the other sheeting. Place the sheeting onto the exposed side of the core and place the sleeve over the sheeting. With sheeting, core and sleeves aligned, place assembly on a flat surface and weight down with books or whatever is available. Cure time is approximately six hours, but I usually allow the assembly to cure overnight. After curing, remove assembly from the sleeves. You will find that this epoxy sands extremely well and that adhesion to the foam is exceptional. Because of the outstanding adhesion, I use this epoxy on all foam cores, large and small. Use of this adhesive will make sheeting/foam core separation a thing of the past.

If you have any questions, you can reach me at 4223 New Haven Court, Port Orange, FL. Phone (904) 760-4246.

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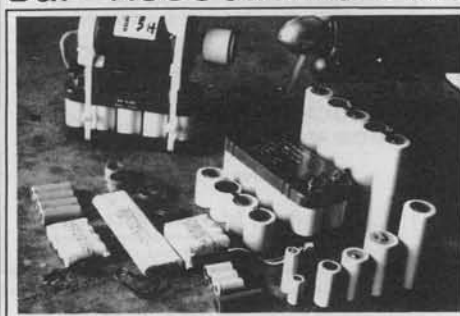
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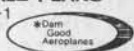
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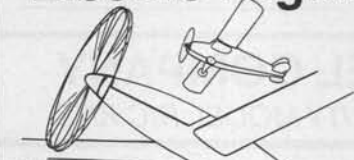
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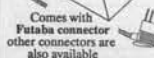
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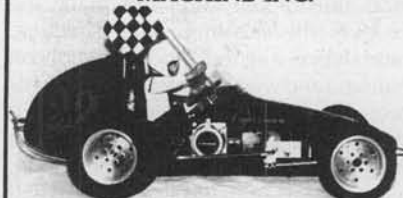
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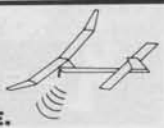
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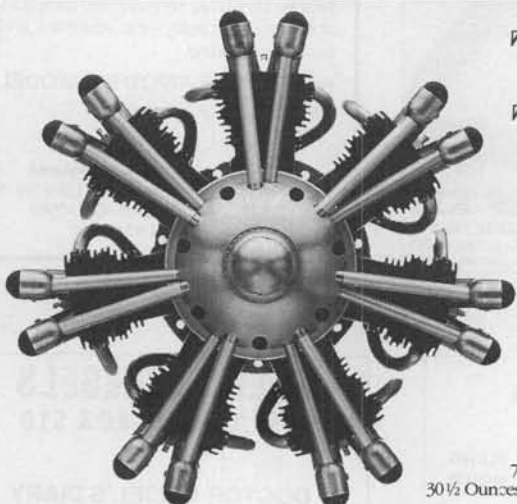


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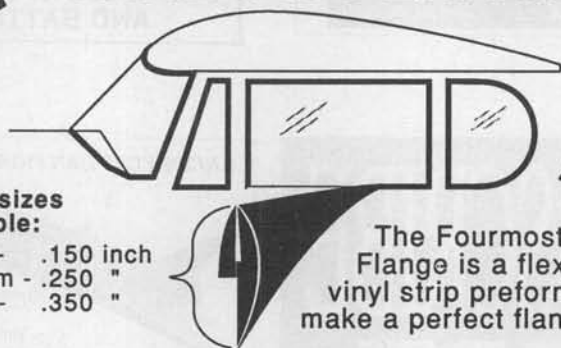
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FREE FLIGHT *Continued from page 83*

is to put the name of the model on a postcard, along with your name and address, and if it comes in within a month or so of the publication of this month's magazine, it will be placed in the proverbial "hat" with the other eligible entries. The winner will be pulled and will receive a free subscription to *Model Builder* magazine . . . one heck of a deal, if you ask me. Time to guess the name, so get to it.

OCTOBER DARNED GOOD AIRFOIL: JBK 003 100586 F1B

Keeping with the rubber-powered model theme set by the two Hank Cole examples, I would like to present to you the Wakefield airfoil used by J.B. Kristensen of Denmark. This section is used on his VIT-equipped ship. This airfoil is used without any carbon fiber reinforcement and on the main panels, he uses a sheeted leading edge top camber. On the tips, he changes to a rib and false rib arrangement to keep the section pure.

The companion stabilizer section is the Gott. 795, a flatbottomed section with a raised and rounded leading edge. The stab is only 48 sq. inches with the model's balance point at 67%. Kristensen has been a strong competitor in European venues for the past 13 years or so. This section is his latest and bears investigation for your next Wakefield.

MORE RUBBER DOIN'S . . .

THE LATEST ON THE GOLLYWOCK

The Gollywock, an Old Timer Rubber Stick model, has been rejuvenated and is now out as a Midwest Kit. This is known as the Gollywock II and still features the old machine cut 12-inch prop. Recently, I ran across the following article in the VAMPS newsletter, editor Phil McCary, 532 College Dr., #212, Henderson, NV 89015.

"Don Reid received a postcard from Don Bekins, a respected member of SAM 27 and CD of the RC events at SAM CHAMPS '89. SAM 27 is having a build-a-thon project of Gollywocks, with mass launches at a fun-fly, and noting that Don Reid did very well at the SAM Champs, we thought that Don's advice would be well received in our own bulletin and, most importantly, should serve to launch us into organizing our own Gollywock mass launch at Gananoque early in the summer. All the information you need to build and trim one is available. Here is Don's reply."

Thanks for your note. As a confirmed Gollywock fan, I'm happy to pass on my experience. I've built both the new Gollywock as kitted by Midwest as well as the "original" with the sheet rudder and no stab tip fins. I can't find any significant difference in performance of the two variations.

I was fourth at the Lawrenceville Champs flying the New Gollywock and the 12-inch diameter x 13-inch pitch prop as shown on the plans. At Jean, I flew the "original" with light 'C' grain for the rudder and the 13 1/2-inch x 16-inch prop. I've built another "original" this winter with a built-up rudder. Even though I've had no problems with the sheet rudder, I'm happier with the built-up

from a potential warping point of view.

In all cases I use 40 grams of rubber, made up of eight strands of 1/4-inch or 16 strands of 1/8-inch. I normally wind to a torque of 45 in. oz. So far I prefer the new tan FAI rubber despite some other opinions. I find the power burst of the tan to be identical to the dark, with the only difference being about 10%, more turns with the tan and an extended prop run at the low end.

The 12-inch x 13-inch prop provides a rocket climb like no other model I've ever built. If one can handle the power it gives good results, but with a very short prop run of about 25 seconds. I think it's best suited to windy conditions. The prop run of the 13-1/2 inch version is over 50 seconds and the altitude gained is at least as high as with the 12-incher.

I fly right power/left glide, using right thrust and left tab, with the stab level or slightly high on the left side. Balance point is between 70% and 75%, back from the leading edge of the wing. The DT setup uses the fuse in the tail.

I try to build light, while still retaining the necessary strength. Good target weights are:

Wing 20 grams
Fuselage 22 grams
Stab and Rudder 10 grams
Prop Assembly 24 grams
Rubber 40 grams
Total 116 grams

At Jean, I had two flights of about 3:45, under what seemed to be neutral air, with a 2:17 on the first flight due to a stall I picked up on the glide. Good luck with your build-a-thon.

Something from the above may have missed your attention. Note that Don Reid mentioned the 13-1/2 inch prop. This is now permitted under SAM rules, and it does replace that little 12-inch version that came in the original kits. Its use on the original Gollywock has been verified by none other than Wally Simmers, the designer of the 'Wocks. If you want to build a little more competitive Gollywock, try the 13-1/2 inch version.

JETEX ANYONE?

I saw this little announcement in the *Fresno Model News*, and it is perfect for those of



EELEK stands for "Eelektrik." Mueller is holding this EX-30 next to his P-30 for comparison.

you out there who wondered what ever happened to Jetex. If you are interested in pursuing more information about this little powerplant, you can now subscribe to a Jetex newsletter. Roger Wathen is the editor. He can be reached at 3242 N. DeQuincy St., Indianapolis, IN 46218. U.S. subscription rate is \$8 per year.

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Jim Bradley passes along some good information about his carbon fiber supply service. He notes that CF is becoming more common in modeling and not just some exotic material that fanatics use. In the cured sheet form, it is no harder to use than ply-

wood but is a lot stronger. CAs and epoxies are the best glues to use with it so it lends itself to quick and strong building.

Jim sells many different CF products as well as Towline glider supplies such as a circle towhook, towline, and an electronic D.T. timer. If you are interested in more info, all you need to do is drop Jim an SASE, and he will send you his catalog of new and exotic equipment and supplies. Bradley Model Products, 1337 Pine Sap Ct., Orlando, FL 32825.

If you have questions for me, my address is 5066 NW Picadilly Circle, Albany, OR 97321. **MB**

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PLUG SPARKS *Continued from page 32*

Jim Adams immediately investigated this claim and could find no supporting evidence after a series of tests. Adams referred the matter to Joe Klause of Kustom Kraftsmanship who conferred with Bill Schmidt and Stan Nadler of Modelectric. Klause then dissected a coil with the finding that Modelectric coils do not have polarity.

Stan Nadler further adds that switching battery polarity can *sometimes* cause a very *minor* difference in spark. This is not due to coil polarity but rather to random molecular alignments in the coil wires. This is something that cannot be readily deduced, but the important point is to remember the reduction of spark is, at best, five percent. Also this five percent drop occurs only when

other parameters are marginal.

Bill Schmidt also adds that if such were the case, coils would be marked plus and minus. Automobile coils are marked this way and have an internal safety spark gap to prevent insulation breakdown and internal shorting.

Not too many modelers know that pulling off the high tension lead and checking the spark by holding the lead near the cylinder fins, is bad from the respect that if the gap to the fins is too great, the energy must go somewhere. Absorption by the oil is not good and repeated triggering will probably cause damage to the coil. Using an electric starter and/or cranking for 10 to 15 seconds will cause repeated absorptions of energy leading to the creation of carbon paths (or in layman's terms, a *short*).

To wrap up this report, it is indeed gratifying to see the modelers take such an interest in the claim that "proper" connection to the coil tabs is important from a polarity standpoint. This columnist commends Jim Adams, Joe Klause, and Bill Schmidt for their investigative work.

READERS WRITE

Received a rather pleasant surprise in the form of a letter from Sal Taibi, enclosing a photo of his latest creation, a Class C Pacer with an Orwick 64 powering this model.

Sal reports he has just been advised by Bob Larsh this larger design has been approved by the SAM Board of Directors. Actually, in Photo No. 10, it is a little hard to distinguish this Pacer from his others as they are all decorated with the same color scheme.

For the benefit of the "Doubting Thomas"

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B&P Associates	99
Beemer R/C West Distributors	98
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Byron Originals, Inc.	33
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Coverite	96
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Micro-X	96
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Millcote Corporation.	99
Miniature Aircraft USA	3
Minimax Enterprise	103
Model Builder Subscriptions	93
Model Expo	78
Peck-Polymers	97
Radio Control Dev. (RCD)	Cover 3
Radio Controlled Models/RAM	74
R/C Systems, Inc.	27
R/C Buyer's Guide	91
R/C City	14
RJL Industries USA	60
Robart Manufacturing	98
Sheldon's Hobbies	36-39
Sig Manufacturing Co., Inc.	11, 46
Skyward Research & Development	51

Technopower II, Inc.	102
Teleflite Corporation	10
US Boat & Ship Modeler Subs	33
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Vortex RC Helicopters	60
Win A Radial Engine	94

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types, an excellent photo of Sal with his Super Cyclone powered large Pacer appeared on the last page of Chapter 9 in the "Model Plane Annual, 1941-1942." These books were quite the bible at that time, as Frank Zaic had produced his last publication in 1939 and no one picked up the slack.

MORE READERS WRITE

Bud Perry, Jasper, Alabama, writes to send in Photo No. 11 of a J.K. Coppage "Buzzard" with the comment, "I'll bet this is one you haven't seen built."

True enough. For some reason, whether the model appears to be too bulky on the Frank Zaic 1938 Yearbook plans or the construction is complicated escapes this writer's understanding. As can be seen, the model, as built by Bud, has a 66-inch wingspan, using a Hornet (Lindberg) 19 for power, and looks really sharp!

Other originals on the model include Trexler air wheels, clear Mica-film covering with Black Baron orange epoxy. Also featured is a Floyd Carter ignition system and a Futaba three-channel radio.

Perry asks if J.K. Coppage is still alive? If so, does anyone know of his whereabouts? Perry feels such a pretty design would have had at least one or two follow-ons. Bud feels this model isn't the only one he developed.

SAM 100

If this columnist made the comment that John Delagrange, SAM 100 Newsletter editor, was an admirer of Emilio "Mickey" DeAngelis, this would be the gross under-



Photo No. 13. The late Willard "Buck" Zehr with his well-stocked model trailer, attached to RV. "Where they go, I go."

statement of the year.

As proof of the foregoing statement, Photo No. 12 is offered as proof of how much John likes Mickey's designs. Seen in the photo are three sizes of the DeAngelis design, "Miss Fortune X." This model is quite popular with all members of SAM 100 of which Mickey is an enthusiastic member.

This writer is presently drawing up plans to this design. Interestingly enough, Mickey's plans show two versions, high and low thrust line designs.

OBIT NOTICE

Just about the time we went to press reporting the sickness that was affecting

Willard "Buck" Zehr, this reporter received a call from Bucky Walters of SAM 39 in Ohio that Buck passed away Friday, July 5.

We are going to miss this boy, as Willard was always available for contests and best of all, running meets. "Buck" will be remembered for his smile and sly humor, just the attitude for handling contestants.

To wrap up the column, we feature Photo No. 13 showing Buck Zehr with his special model trailer for hauling all his airplanes to the meets. Buck is seen with a Playboy Senior 80. There are no less than five or six models in the trailer. Buck always came to fly!

MB

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HANNAN *Continued from page 51*

power system intended for small electric models in the 18 to 20 inch span range, which means the system is readily adaptable to numerous designs intended for rubber power. The 19-inch span General Aristocrat shown in one of our photos was simply enlarged from a Peanut Scale plan, and has proven to be an excellent flier.

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SPEAKING OF SMALL

The most recent static scale display model kit from the Williams Brothers spans a mere 3-5/8 inches! Intended as an HO gauge model railway accessory, it would also make a cute desktop conversation piece. The tiny Corben Super-Ace kit is molded from styrene, and consists of 16 parts. It is the first of a projected series of HO size model cars and aircraft. Ask for it at your local hobby shop, or contact: Williams Brothers, 181 Pawnee, San Marcos, CA 92069.

LIGHTNING

Former P-38 pilot Dick Howard alerted us to a brand-new book devoted to the Lockheed Lightning. Compiled by Warren M. Bodie, it is expected to be the most comprehensive coverage of the machines ever published. Although we have seen only a few proof pages, the book should be a winner, with its more than 300 top-quality photos, 275 pages, profiles and accurate 3-view. For complete description and pricing, write to: Widewing Publications, Post Office Box 238, Hiawasee, GA 30546. When contacting any of the above companies, we would appreciate a mention of where you read about these products. Thank you!

PHILATELY ANYONE?

Evidently quite a few of our readers are dual hobbyists . . . that is they actively participate in pastimes in addition to model building. Modeler Carl Hedley, of Florida, showed us several stamps actually promoting model aircraft. One, from the Soviet Union, depicts a youngster holding what appears to be a "gas" powered old timer free flight. Another, from Brazil, features three fliers preparing to launch nondescript model gliders. In the background, a ghostly portrait of famous Brazilian pioneer designer/aviator Santos-Dumont looks on.

A series of stamps from Korea show a towline glider, a young girl with a rubber-powered R.O.G., a control line model, an

RC staggerwing Beechcraft biplane, and finally, a model helicopter.

The current U.S. 40-cent stamp should also be mentioned, as it pays tribute to Bill Piper and one of his bright yellow Cubs!

REALLY SMALL STUFF

Stefan Gasparin, the master machinist who makes those microscopic CO₂ engines in Czechoslovakia, favored us with a booklet about the subminiature works of Soviet artist Nikolai Syadrisky. Nikolai has been making mini-masterpieces for more than 20 years. For instance, he crafted the world's smallest book, nineteen times smaller than the previous record-holder. It consists of 12 pages, each of which contains 8 lines of poetry. Two of the pages are illustrated with portraits, and are so thin that they may be turned with a sharply-pointed human hair!

Another mini-marvel is a chess set which is mounted on the head of a pin, and Syadrisky's model frigate, complete with extensive rigging, measures a mere 3.5 millimeters long, and is composed of 337 separate parts. During 1960, Nikolai made the world's smallest electric motor, with the usual armature, stator, windings, etc., but smaller than a poppy seed!

Aviation has not been neglected: In 1978, Nikolai created a special figure in honor of legendary pilot/author Antoine de Saint Exupery, a "Little Prince" less than 1 millimeter high, and a solid gold model airplane only 2 millimeters long! So don't complain that Peanuts are too small to handle. . .

SIGN-OFF TIME

Glenna Tarango, secretary/treasurer of the Arizona Flying Aces Club Cactus Squadron, envisions a model flying contest which would be totally impervious to weather conditions: The idea is for all participants to gather in some location protected from the elements. The Contest Director "spaces" the contestants and, on the count of three, each person imagines his or her own plane in flight: "Picture it way up there; maybe even going out-of-sight! The winner will, of course, be discerned by the CD or the most enlightened contestant. (If all else fails, play high card or draw straws). The winner then imagines receiving the Metaphysical Trophy, and becomes CD for the next contest." **MB**

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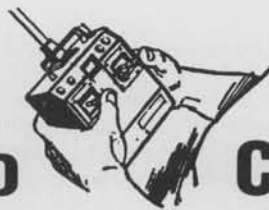
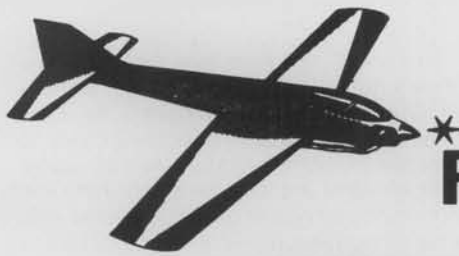
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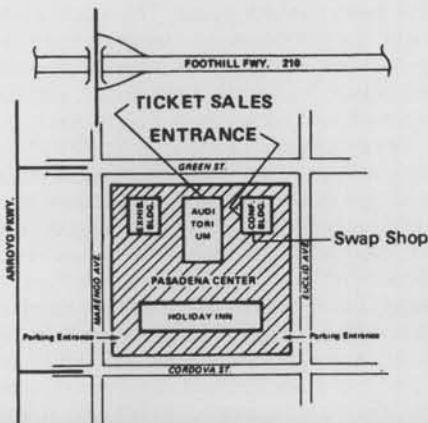
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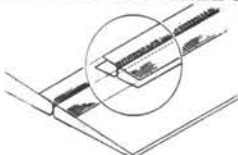
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ALCO Continued from page 78

add the fairing strips. Cover with silk, and
dope to match the fuselage. Install the wheels,
and retain with a washer soldered in place.
Install the tail surfaces, being certain that the
horizontal stabilizer is exactly parallel to the
wing mount. Shim if necessary. Add the
stabilizer support struts as indicated. The fin
and rudder are installed next, exactly per-
pendicular to the stabilizer.

The next operations are installation of the
radio gear receiver, servos, and switch, which
will vary with each individual installation.
When the elevator servo is installed with the
partial pushrod installed, it may be joined to
the aft portion (which has been engaged to
the elevator horn) by means of a short piece
of 1/32-inch ID brass tubing, coupling both
pieces, and soldered in place when the
servo is set to neutral, and the elevator at
zero angle.

If the builder has chosen to duplicate the
rudder "cables" of the author's model, a few
hints may be helpful. First, bend two small
"S" hooks from .032 MW. Cut two lengths of
dial cord (or 10# fish line) about 30 inches
long. Holding the fuselage vertical, drop
one end of each length down through the
fairlead, into the "cabin" area. Retrieve, and
tie an "S" hook to each "cable." Secure with
a drop of CA. Insert "S" hooks into the
innermost holes in your servo output arms.
Slip a short length (1/2-inch) of 1/16-inch ID
plastic tubing over each line, then insert
through hole in rudder horn, then, back
through the plastic tubing. With the fuselage
still vertical, attach small equal weights (four
to six ounces) to the ends of the lines (the
author used machine washers). Adjust rudder
until it is perfectly aligned, then slip the
tubing up to within 1/2-inch of the control
horn. With the weights still applying tension,
put several drops of CA into the tubing.
When set, cut off the extra line (and weights),
and dope the tubing "bronze" (to represent
a turnbuckle).

Install elevator pushrod as described
above. If the builder is creating a real scale
model, it might be worth the extra scale
points (and effort) to make the elevators
cable controlled also.

The final steps are the installation of the
propulsion system and final trimming. The
motor is, of course, attached to the motor
mount with the screws provided (they are
metric) so don't lose them! Be sure the
openings in the motor mount are clear, and
do not restrict the cooling air into the motor
in any way. Note also that sandwiched
between the motor mount and the engine
are the "sidethrust" shim, and the
"downthrust" shim. They have been made
separate, so that adjustments may be made
to one without affecting the other. Use the
position of the flight batteries to determine
the position of the assembled model's bal-
ance point. Be certain it is within the limits
shown on the plan, preferably towards the
forward location. If necessary, the receiver
battery may also be used to help locate the
balance point as desired.

The sidethrust shim may be shaped as
shown, to give approximately two degrees
of right thrust. If less is required, the shim
may be reshaped with a sanding block to
give just the correct amount, so that rudder
trim changes are not necessary between
power on and power off flight. If more side
thrust is required, the shim may be sanded to
a knife edge, and if that is not sufficient, the
flyer has no alternative but to make another
shim of 1/8-inch ply. The author's model
required 2.3 degrees.

Before discussing the "downthrust" shim,
the author must tell you of the initial test
flights of the "ALCO." To say it flew "off the
drawing board" would be putting Baron
Munchausen to shame. As you probably
have noticed, there is already two degrees of
downthrust built into the firewall. The au-
thor assumed that this would be adequate
for the first flights (how wrong can you get?).
Although the model glided well with no trim
required, the first powered flight was nearly
disastrous. The model, hand launched,
immediately went into a steep climb, which
got steeper as the speed increased. More
and more down stick and down trim were
put in as fast as the fingers would move, but
the climb became more and more vertical
until finally the motor quit (the model was
equipped with a Benson "Bump" motor
controller, which turns the motor off on a
full down elevator signal). The model came
right straight down . . . fortunately in tall
grass. The damage was minimal and the
model was ready to fly the next day, only this
time with four degrees of downthrust!

Second verse, the same as the first. Next
day, with six degrees, the model was flyable,
with full down trim, and some down stick
held in. Next day, with eight degrees built
in, the model only required two notches of
down trim, and flew as shown in the pic-
tures. To completely eliminate the need for
down trim, it does require somewhere be-
tween eight and ten degrees of downthrust .
the final amount is to be determined by the
builder . . . so be aware start out with at least
eight degrees!

MB

For your reference - here are the weights
of the original model:

Airframe	Structure	Covered & Doped
Wing & Struts	41g	60g
Tail Surfaces	8g	15g
Fuselage	38g	49g
Landing Gear	32g	35g
	119g	159g
Propulsion system		
Motor, prop, & prop adapter		88g
Battery, fuse, & wiring		128g
		216g
Radio		
Receiver (2-channel)		25g
Two S-33 servos		38g
Motor control		15g
Switch and wiring		10g
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		123g
Total Weight:		498g

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