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SEPTEMBER 1992

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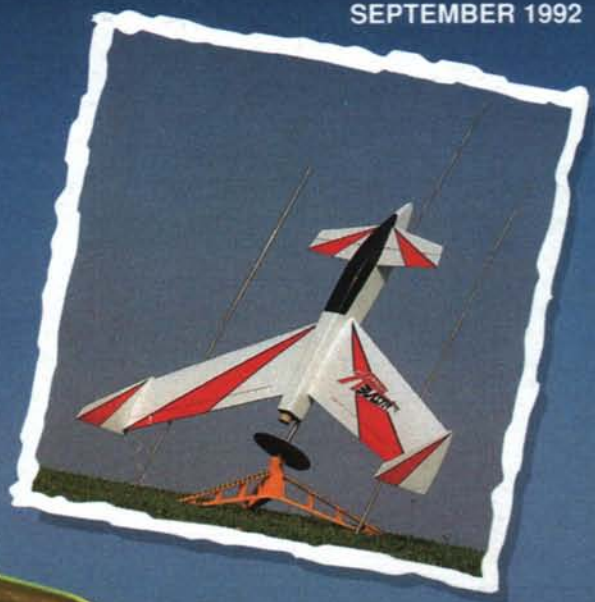

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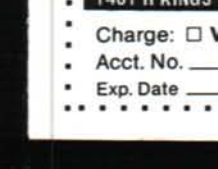

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ON THE COVER

All eyes were on Kris Larson's Klingberg Wing every time it performed at the '92 Astro Champs. See contest story on page 38. Photo by Bill Forrey. Inset, lower: 26 years after its debut, the Das Ugly Stick is still one of the most popular RC sport models—see Art Steinberg's review of the new ARF Ugly Stick from Hobby Dynamics, on page 62. Inset, upper: Skip Ruff's review of the exciting Astro-Blaster from Estes Industries is featured on page 24.

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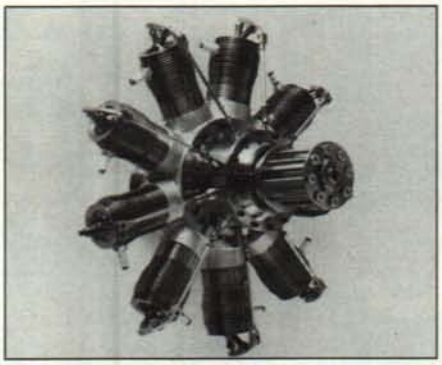
WORKBENCH BY PHIL BERNHARDT

An immensely popular feature that became something of a tradition with this magazine, beginning with the very first issue and continuing regularly for the next 20 years, was the monthly Peanut Scale construction article and accompanying full-size centerspread plan. That's well over 200 plans in all, the overwhelming majority presented by the late, great Walt Mooney, with others filling in from time to time when needed. It was mostly as a result of Walt's death in March of 1990 that the Peanut Scale feature fell by the wayside—not enough outside contributions coming in to keep it going.

THE PEANUTS ARE BACK

Beginning this month, the Peanuts are back—quite literally, by popular demand. "Please bring back the Peanuts!" has been a recurring theme in many of the calls and letters received ever since Gallant Models assumed ownership of *MB* late last year. What's that old maxim about squeaky wheels and grease?

Got a bit of a problem, though, and this is where you readers come in. We need Peanut Scale construction articles! To get the ball rolling, we've reprinted one of Walt Mooney's designs from a 1973 issue and may continue to do so from time to time for the benefit of newer readers who may not be familiar with early *MB* stuff, but we'd really like to get new material. If you have something you'd like to contribute toward this effort, don't hesitate to run it by us. Everything you need to know about preparing such an article is contained in a supplement to our Writers' Guidelines, which is available on request.



Stop drooling on the page! Although, if there ever was a miniature aircraft powerplant that could reduce a WWI scale modeler to the human equivalent of Pavlov's dog, this would have to be it. More in text.

THAT ROTARY ENGINE

An outfit by the name of Replica Engines, operating out of Orland Park, Illinois, is responsible for the stunning 1/4-scale working replica of the Gnome Monosoupape ("single valve motor") shown in the photo. The photo and a brief writeup were received too late to include in "Over the Counter," but it was just too neat to put in the drawer until next month.

According to the paperwork, the Gnome rotary is the first in what is to be a series of working museum scale aircraft engines. It's presently still in the prototyping stage, which is why no performance figures or specifications (other than an overall diameter of 9-1/2 inches) were quoted. The Gnome, a limited production item and understandably so, carries an introductory price tag of $3800. Those still interested can get more information by contacting Replica Engines, 16640 S. 104th Ave., Orland Park, IL 60462. ***MB***

Skip Ruff's unusual and completely successful Martian Spaceship, presented as a construction feature in the August and September 1991 issues of *MB*, continues to be a popular plans seller. Seen here is Ron McGuire, of Chatsworth, California, with his version along with Skip's two prototypes. When his model was ready to go, Ron packed it into his van and made the two-hour drive north to Taft so that Skip could do the test flight honors. Skip reports it flew right off the board with absolutely no trim changes required.

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- **Service and Supply Catalog** offers discounts of over $120 on merchandise, plus 12 free catalogs, four free magazines, free plans book, free model airplanes photobook, and more.
- Financial support to help local AMA flying clubs purchase their own flying sites.
- Every RC frequency now available for use in the U.S. was made possible by AMA.
- Special subscription rate to **Model Airplane News** and **Flying Models.**
- **Model Aviation** magazine subscription.
- Establishment of the first national flying site.
- A full range of educational materials.
- Help in securing and keeping flying sites, including free support materials; AMA personnel available to meet with local government agencies.
- World Championships teams selected and supported by AMA.
- Instructor training programs and insured newcomer instruction through more than 2,300 AMA-chartered clubs.
- Youth Scholarship Program awards up to $25,000 annually.
- National Aeromodeling Championships, the world's largest annual event of its type.
- Active representation with FAA, FCC and Department of Interior.
- And many other programs and benefits too numerous to list.

AMA
SINCE 1936

ACADEMY OF MODEL AERONAUTICS

1810 Samuel Morse Drive, Reston, VA 22090
Tel. (703) 435-0750 ■ Fax (703) 435-0798

Member, National Aeronautic Association

IT BETTER.

Nobody works as hard for you as AMA.

Comprehensive insurance. Flying sites. RC frequencies. Competition. Benefit programs. Nobody does it better than AMA. Nobody.

APPLICATION FOR AMA MEMBERSHIP – 1992

SEND WITH PAYMENT TO: AMA, 1810 SAMUEL MORSE DRIVE, RESTON, VA 22090 OR, FAX TO (703)435-0798

Date of Birth | Main Interest (check one only): ❑ Indoor ❑ Scale ❑ RC ❑ CL ❑ FF ❑ All | MB

For those 19 or over by July 1- check one only!

❑ **Open Membership – $40.00**
All membership and competition privileges, liability and accident/medical insurance, and subscription to *Model Aviation* magazine.

❑ **Extra Family Membership – $22.00**
For 2nd adult at same address – no publication

_____
Current Open member's name and AMA number

Options: ❑ Add $20.00 for postage/envelope service at non-US address
❑ Add $6.00 for mailing in envelope
❑ Check here for information on non-US membership

For those not 19 by July 1

❑ **Youth Membership – $14.00**
Same privileges as Open Membership

Date of birth _____

Note: For competition purposes, Youth will be categorized as Junior (under 15) or Senior (15-19).

For those 65 by July 1

❑ **Special Senior Citizen Rate – $30.00**
For those 65 or over – must submit proof of age at time of original application. Same privileges as Open member.

Print Clearly in CAPITAL LETTERS.

First Name_____ Initial_____ Last Name_____ AMA #_____

Mailing Address (number and street) _____

City _____ State _____ Zip Code _____

Total $ _____ Check ❑ MasterCard ❑ Visa ❑ Card No. __ __ __ __ - __ __ __ __ - __ __ __ __ - __ __ __ __ Exp. Date __ __ / __ __ New ❑ Renewal ❑

EVERYONE MUST READ AND SIGN

Please read and sign this declaration. Applicants without signatures will be returned.

I hereby agree to comply with the current AMA Safety Code for all model aircraft operations and the NAR Safety Code for all model rocket operations. I also understand and agree that I will abide by and comply with all changes and modifications that may be made to the safety codes during my membership period. I understand that my failure to comply with the applicable Code will result in failure of liability coverage for any damages or claim so caused. I further understand that written notice must be provided within sixty (60) days of the occurrence of any incident of bodily injury and/or property damage.

I am aware that modeling may present hazards, and I exempt and relieve The Academy of Model Aeronautics, Inc. from all liability for personal injury, property damage or wrongful death caused by negligence.

_____ _____

Signature of applicant *Parent or guardian of applicant under age 18 must also sign this form*

Membership Information

Insurance coverage is effective on the date of receipt at AMA Headquarters of a properly completed application and correct dues payment. Membership ends each year on December 31, regardless of the date a membership application is received. If a subscription is included with the membership, it begins with the first issue available for the year after a correct current application and payment are received; it expires with the issue printed in December (which is dated February of the following year). Membership rates and insurance limits are those in effect at the time of printing. Actual cost of dues and amount of insurance coverage is subject to change. Any such changes will be noted at the time of membership processing so that they may be accepted or not.

OFFICIAL AMA SAFETY CODE – January 1, 1992

Model flying MUST be in accordance with this Code in order for AMA Liability Protection to apply.

■ GENERAL

1) I will not fly my model aircraft in competition or in the presence of spectators until it has been proven to be airworthy by having been previously, successfully flight tested.
2) I will not fly my model higher than approximately 400 feet within 3 miles of an airport without notifying the airport operator. I will give right-of-way and avoid flying in the proximity of full-scale aircraft. Where necessary, an observer shall be utilized to supervise flying to avoid having models fly in the proximity of full-scale aircraft.
3) Where established, I will abide by the safety rules for the flying site I use, and I will not willfully and deliberately fly my models in a careless, reckless and/or dangerous manner.
4) If my model weighs over 20 pounds, I will only fly it in accordance with paragraph 5 of this section of the AMA Safety Code.
5) At air shows or model flying demonstrations, a single straight line must be established, one side of which is for flying, with the other side for spectators. Only those persons essential to the flight operations are to be permitted on the flying side of the line; all others must be on the spectator side. Flying over the spectator side of the line is prohibited, unless beyond the control of the pilot(s). The only exceptions which may be permitted to the single straight line requirement, under special circumstances involving consideration of site conditions and model size, weight, speed and power, must be jointly approved by the AMA President and the Executive Director. In any case, the maximum permissible takeoff weight of models is 55 pounds.
6) I will not fly my model unless it is identified with my name and address or AMA number, on or in the model. Note: this does not apply to models flown indoors.
7) I will not operate models with metal-bladed propellers or with gaseous boosts, in which gases other than air enter their internal combustion engine(s); nor will I operate models with extremely hazardous fuels such as those containing tetranitromethane or hydrazine.
8) I will not operate models with pyrotechnics (any device that explodes, burns, or propels a projectile of any kind) including, but not limited to, rockets, explosive bombs dropped from models, smoke bombs, all explosive gases (such as hydrogen-filled balloons), ground mounted devices launching a projectile. The only exceptions permitted are rockets flown in accordance with the Safety Code of the National Association of Rocketry or those permanently attached (as per JATO use); also those items authorized for Air Show Team use as defined by AST Advisory Committee (document available from AMA HQ). In any case, models using rocket motors as a primary means of propulsion are limited to a maximum weight of 3.3 pounds and a G series motor. Note: A model aircraft is defined as an aircraft with or without engine, not able to carry a human being.
9) I will not fly any model using turbojet power (axial or centrifugal flow) unless I have obtained a special waiver for such specific flights from the AMA President and Executive Director and I will abide by any restrictions imposed on such flights by them. (Note: this does not apply to ducted fan models using piston engines or electric motors.)

■ RADIO CONTROL

1) I will have completed a successful radio equipment ground range check before the first flight of a new or repaired model.
2) I will not fly my model aircraft in the presence of spectators until I become a qualified flier, unless assisted by an experienced helper.
3) I will perform my initial turn after takeoff away from the pit or spectator areas, and I will not thereafter fly over pit or spectator areas, unless beyond my control.
4) I will operate my model using only radio control frequencies currently allowed by the Federal Communications Commission. (Only properly licensed Amateurs are authorized to operate equipment on Amateur Band frequencies.) Further, any transmitters that I use at a sanctioned event must have a certified R/CMA-AMA gold sticker affixed indicating that it was manufactured or modified for operation at 20 kHz frequency separation (except 27 MHz and 53 MHz).

■ FREE FLIGHT

1) I will not launch my model aircraft unless at least 100 feet downwind of spectators and automobile parking.
2) I will not fly my model unless the launch area is clear of all persons except my mechanic and officials.
3) I will employ the use of an adequate device in flight to extinguish any fuses on the model after it has completed its function.

■ CONTROL LINE

1) I will subject my complete control system (including safety thong, where applicable) to an inspection and pull test prior to flying.
2) I will assure that my flying area is safely clear of all utility wires or poles.
3) I will assure that my flying area is safely clear of all non-essential participants and spectators before permitting my engine to be started.

over the counter

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

AEROBATIC BIGGIE

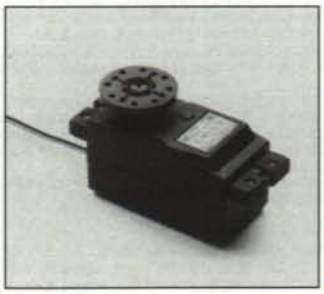
The Extra 300 pictured here is the latest in the "Performer Series" of Giant Scale kits from Ohio R/C Models. It's a completely built-up balsa/plywood aircraft of 87-inch span, with no foam or major fiberglass parts other than the glass

cowl and wheel pants. The $349 kit includes hand-cut and sanded parts, complete hardware, and full-size plans, along with instructions for building the wing in either one or two pieces. Power requirements fall somewhere in the 2.5-3.5 cubic inch range.

For further info on this and other Ohio R/C kits and accessories, call or send a 29-cent stamp to Ohio R/C Models, 4251 Lutheran Church Rd., Germantown, OH 45327; (513) 859-1660.

FUTABA WING MOUNT SERVO

Futaba's S9102 coreless motor, ball bearing servo is especially well suited to mounting in wings on account of its low profile (.87-inch) design. The S9102 pumps out an impressive 75 oz./in. of torque, measures .87x1.75x1.05 inches, has a metal final gear and weighs just 1.6 ounces. From Futaba Corp. of America, 4 Studebaker, Irvine, CA 92718.



SLOPE WARRIOR

Sig's new V-tail "Samurai" RC glider, a follow-on to the popular Ninja, was designed by Mike Pratt to be a no-holds-barred, high-performance slope machine with either pitcheron or wingeron controls, take your pick. The structure is typical of state-of-the-art models in this class—fiberglass fuselage and canopy, gray foam wing cores to be sheeted with 1/64 plywood, and balsa tail surfaces.

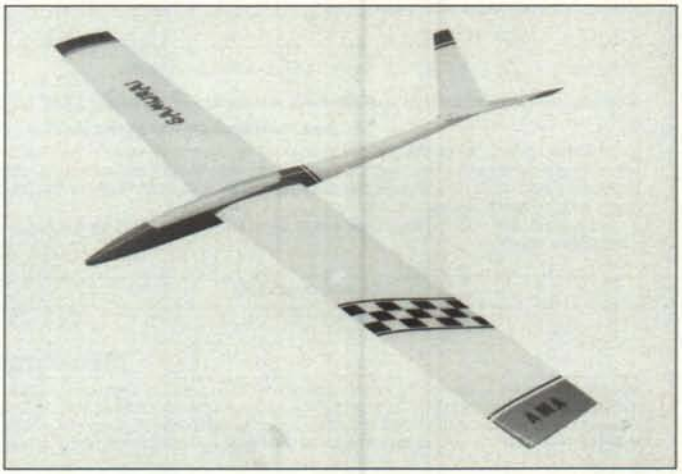
Samurai specs: span, 67 inches; wing area, 477 square inches; wing loading, 11 ounces per square foot; wing airfoil, RG-14. Wing servo requirements call for two ball bearing servos with at least 50 oz./in. of torque for the pitcheron setup, or one ball bearing servo of at least 65 oz./in. for wingeron control.

We'll be featuring a full Products in Use review of the Samurai here in *MB* within the next three months or so. In the meantime, check out the kit at your local hobby shop. It's from Sig Mfg. Co., 401-7 S. Front St., Montezuma, IA 50171.

FOAM WINGS MADE PAINLESS

It's amazing how many modelers...maybe you included...will get all turned on by a new ship such as the "Samurai" glider we just talked about, only to have their enthusiasm quenched when they learn the model has a foam wing. Not that they dislike foam wings, necessarily; it's just that they've most likely never done one before, and are wary of taking the plunge.

No need to be. As with most everything in modeling, there are a number of ways to tackle the job—you just have to learn the techniques involved. One of the best sources of information on foam wings is the video from R/C City, entitled "Wing Skinning." It sells for $29.95 plus $3 S&H, runs for about 45 minutes, and covers virtually everything you need to know about building foam wings. Order from R/C City, 215 Big Springs, Tullahoma, TN 37388.



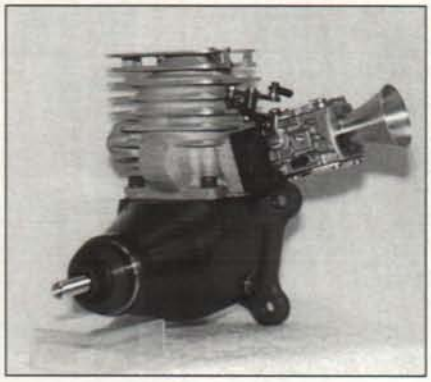
BALL BEARING SERVO CONVERSIONS

As Eloy Marez explains in this month's "Electronics Corner" column, L&M Industries has come out with a ball bearing servo conversion kit for all of the standard Futaba servos—S28, S38, S48, S128, S138, and S148, as well as the Hobby Shack Cirrus CS28, CS128, CS238, and CS248. The kit consists of four replacement servo

upper cases with bearings, for $39.95 retail. Due for release in August is a similar kit for the Airtronics 94102 servo, priced the same, as well as a $24.95 bearings-only kit that will fit all of the currently available standard servos that have a nylon bushing around the output shaft, namely the JR 501 and 507, Focus HS300 and HS500, RCD Apollo 05, Tower Hobbies TS-51, Hobbico CS-51, and the Ace Sport 330s.From L&M Industries, P.O. Box 292396, Tampa, FL 33687-2396.

BIG MAMA MOTORS

"The Ultimate in 4.2 Engines" is how the folks at Planes Plus describe their line of Precision Eagle 4.2 cubic inch powerplants, which feature a cast aluminum cylinder mated to a beautifully machined, red anodized aluminum bar stock crankcase. They're presently offered in glow and gas versions, as well as an inline twin (8.4 cubic inches) said to be perfect for Mustangs. No other information was supplied, but you can find out more by contacting the manufacturer directly: Planes Plus, Inc., 5S470-B Scots Dr., Naperville, IL 60563; (708) 416-6940.



POWER FOR YOUR GLOW PLUGS

The new Digital Pulse Glow Driver from Hobby Dynamics is claimed to be unique in that it's the the only portable one of its kind with a switching power supply. Its transistorized circuitry is designed to automatically compensate for fouled or cold range glow plugs. It comes complete with a locking glow plug connector with leads attached, and an AC wall charger for the three internal NiCd batteries, for a suggested retail of $62.99. From Hobby Dynamics Distributors, a division of Horizon Hobby Distributors, 1405 Fieldstone Rd., Champaign, IL 61821.

TUBULAR FUN-FLIER

Then there's the "Turbo-Tube," a .40-.46 powered ARF sport job from Hi-G. Just a piece of PVC pipe with wings, right? Wrong! Deceptively simple looking, the Turbo-Tube incorporates a number of innovative design and construction features. A few examples:

•All of the components—engine pod, wings, tail section, and landing gear—interlock and are retained with a total of 13 screws. No glue is used for assembly.

•The receiver, battery and three servos are mounted in the tail section for vibration isolation, easy access and the stiffest possible control setup.

•The fuselage is a specially made spiral-wound tube with fuelproof inner and outer surfaces. It comes pre-drilled and pre-cut, complete with two aluminum wing joiner tubes that also support the main landing gear struts.

The Turbo-Tube's flight performance is exemplary, according to the info received here. It's described as a "Hot sport plane...the perfect trainer for those jumping into ducted fans." The airplane is supplied complete, less engine, prop and radio, for $155 delivered. Write to Hi-G, 2131 E. Crocus Dr., Phoenix, AZ 85022.

FOX'S TUNED PIPE .60

The highly regarded Fox Eagle .60 ABC is being produced in a special tuned pipe version, called the Eagle .60 ABC Deluxe. The only difference between the two is the Deluxe's raised exhaust port timing, which yields even more brute power and rpm when used with a tuned pipe. Priced at $209.95 retail, from Fox Manufacturing Co., 5305 Towson Ave., Fort Smith, AR 72901; (501) 646-1656. **MB**

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Red Baron R/C Hobbies
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HOMEWOOD
Homewood Toy & Hobby
2830 So. 18th St.
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ANCHORAGE
Anchorage House of Hobbies
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#2 2812 Spenard Rd. 277-7778
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Hobbycraft, Inc.
800 E. Dimond Blvd. #136
PH: 907-349-5815
ARIZONA
PHOENIX
Frank's Hobby House
15203 N. Cave Creek Rd.
PH: 602-992-3495
PRESCOTT
RC Things
621 Miller Valley Rd. Ph: 776-2410
PRESCOTT VALLEY
Valley Hobby Shop
8332 E. Hwy. 69
SEDONA
My Hobby Shop
2650 W. Hwy 89-A, Ph: 282-1290
YUMA
The Hobby House
507-E 22nd St.
ARKANSAS
FT. SMITH
Duke's Model Airplanes
5305 Towson Ave.
FT. SMITH
Village RC Hobbies
3112 Cavanaugh Rd Ph:646-3701
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Hope Hobby Barn
Rt. 4, Box 1880, Melrose Lane
LITTLE ROCK
Sherrill's House of Hobbies
3408 S. University Ave.
UALR Plaza Shop. Ctr
PH: 501-562-8230
LITTLE ROCK
Sims Discount Hobbies
9501 Rodney Parham #11
CALIFORNIA
BURBANK
T & A Hobby Lobby
3512 W. Victory Blvd.
PH: 818-842-5062
COVINA
Covina Hobby Center
140 N. Citrus, PH: 213-331-1910
GLENDALE
Robin's Hobby Service
1844 W. Glenoaks
HAWTHORNE
Chuck's Model Shop
13505 Hawthorne Blvd.
LANCASTER
Smith Brothers Hobbies
1223 W. Ave. I.
MONTROSE
Montrose Hobby
2623 Honolulu Ave.
NORTHRIDGE
Smith Brothers
8941 Reseda Blvd., PH: 885-8636
ONTARIO
Hobby Club U.S.A.
10771 Monte Vista Blvd.
PH: 714-628-4300
SACRAMENTO
Dave's Radio Control Hobby
2007 El-Camino Ave.
SACRAMENTO
Graphic Hobby House
2610 Marconi Ave.
SACRAMENTO
R/C Country Hobbies
4191 A Power Inn Rd.
PH: 916-731-5868
SAN BERNARDINO
Bennett's Clocks & Hobby Shop
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SAN FRANCISCO
Francisco Hobbies
1920 Ocean Ave.
SAN LUIS OBISPO
S.L.O. Hobbies
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SANTA MONICA
Evett's Model Shop
1636 Ocean Park Ph:452-2720
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Poor Richard's
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PH: 805-497-3864
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Colpar Hobbies
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Custom Hobbies
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PH: 303-789-9411 or 781-4106
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The Hobby Hut
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LAKEWOOD
Action Hobbies
6790 W. Colfax, Ste 100
PH: 303-233-6275
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Colpar Hobbies - West
3355 So. Wadsworth Blvd. G119
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BRISTOL
Bristol Hobby Center, Inc.
641 Farmington Ave, Bristol Plza
PH: 203-585-7273
COLUMBIA
RC Hobby Shop
155 Rt. 66 E.
GLASTONBURY
Davis Hobbies
45 A Wells St., Fox Run Mall
PH: 203-633-3096
NORWALK
Al's Hobbies
54 Chestnut Hill Rd
SOUTH WINDSOR
Nutmeg Air Crafters
51 Edwin Rd
STAMFORD
Barn Owl Hobbies, Inc.
256 Hope St
WATERFORD
Shore Line Crafts
5 Hayes St.
DELAWARE
WILMINGTON
Brandywine
1918 Zebley Rd
FLORIDA
BOYNTON BEACH
G & C Hobbies
3469-6 W. Boynton Beach Blvd.
BRANFORD
Scotts Guns & Hobbies
Route 3, Box 240
COCOA VILLAGE
Spare Time Hobbies
23 Stone St.
FT. LAUDERDALE
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6800 N. University Dr.
FT. WALTON BEACH
Dave's Hobby Hut
509 N.E. Eglin Pkwy
JACKSONVILLE/ORANGE PARK
Hobby & Merchandising
175 Blanding Ph: 272-6315
7279 103 St. Ph: 772-9022
9825 San Jose Ph: 268-7224
9851 Beach Blvd. Ph: 645-7171
MERRITT ISLAND
Big Boy's R/C & Hobbies
46 E. Merritt Ave.
MIAMI
Crown Hobbies
7439 Coral Way
MIAMI
Hobby Nut, Inc.
11420 SW 184th St., Eureka Plz.
PH: 305-235-9584
MIAMI
Orange Blossom Hobbies
1975 N.W. 36th St
OCALA
Rob's Baseball & Hobby World
7651 S.W. State Road 200
ORANGE PARK
A & B Hobby House
369 Blanding Blvd.
ORLANDO
Bob's Hobby Center, Inc.
7333 Lake Underhill Rd
PH: 407-277-1248
ORLANDO
Central Florida Hobbies, Inc.
5600 W. Colonial Dr #311
ORLANDO
Colonial Photo & Hobby, Inc.
634 N. Mills St
PENSACOLA
Bobe's Hobby House
5719 North W. St
PLANTATION
Universal Hobbies
141 So. State Rd 7
PH: 305-581-9360
ST. PETERSBURG
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1025 Industry Rd
PINELLAS
Hobbies Unlimited
967 N. Mayo Trail
WILLIAMSBURG
Two Way Radio of Williamsburg
309 Main St.
LOUISIANA
BASTROP
Quality TV Service, Hobby Korner
703 E. Cypress
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Hobby Towne
3112 College Dr., Suite A
BATON ROUGE
Hobby Towne
6996 Airline Hwy
MANDEVILLE
Mercury Hobbies, Inc.
70178 Damare Rd. Ph: 892-7204
METAIRIE
Hobby Hut Hobby Shop
709 David Dr. Ph: 504-733-4629
MAINE
BATH
The Hobby Shoppe
94 Front St.
GREENE
Clay-Bowl RC Hobbies
Rt 202
PITTSFIELD
Hallett's R/C Planes
65 Somerset Ave., Ph:487-3058
WASSALBORO
Cliff Piper Radio Control
Route 201, Getchells Corner
RR 1, Bx 280, Ph: 207-877-0445
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Stonelegh Cycle & Hobbies, Inc.
6717 York Rd
CROFTON
G.P.A. Hobbies
2431 Crofton Lane, Ste 6
MIDDLETOWN
Larch Lane Hobbies
18 Larch Lane, Ph:301-473-4587
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Brodak's Hobby Shop
810 N. 3rd St.
WESTMINSTER
Bobby's Hobby Lobby
65 E. Main St.
MASSACHUSETTS
CANTON
Advanced RadioControl Hobbies
323 Turnpike St. #8
CHICOPEE
J & J Hobbies
133 Frontenac St. Ph: 592-1472
EAST FALMOUTH
R/C Hobbies
153 E. Falmouth
EAST LONGMEADOW
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600 N. Main Ph: 413-736-7711
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McManus Hobby Shop
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Hanson Hobby, Inc.
830 Main St.
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89 Center St. Ph: 413-243-2651
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George's Hobby Shop
22 Merrimac Square
NORTHAMPTON
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Ray's R/C Specialties
12 Sherman St. PH: 757-5883
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Rockford Hobbies, Inc.
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16962 Oak Park Ph: 429-9911
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37932 N. Sheridan Rd
PH: 312-662-4544
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IOWA
AMES
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136 Main St., Suite 101
CEDAR FALLS
Bob's R/C Supply
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1639 47St. NE, Ph:319-393-4383
CLINTON
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423 11th Ave. So.
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Bud's Hobbies & Crafts
133 W. Broadway
DES MOINES
Hobby Haven
7672 Hickman Rd
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528 2nd St
LeMARS
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PH: 712-546-5960
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3201 Viking Dr. Ph:712-255-8190
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SALINA
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410 Hart
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2269 N. Amidon PH: 838-3011
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FLORENCE
Hobby Hangar
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HENDERSON
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241 Second St.
LEXINGTON
Hobby Center
1025 Industry Rd
PIKEVILLE
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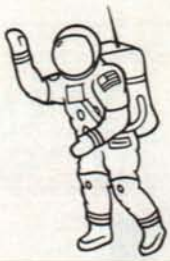
1/4 SCALE SPACEWALKER II



KIT NO. RC-59

Designed by HAROLD HESTER

SPECIFICATIONS:
Wing Span: 84 in.
Wing Area: 1110 sq. in.
Length: 60-1/2 in.
Weight: 11-13 lbs.

RECOMMENDED ENGINES:
.90-1.20 2-Stroke
1.20-1.60 4-Stroke

Although highly popular with the giant-scale crowd, our 1/3-scale Spacewalker is simply too big for some modelers to haul around. In response to all of the builders who asked for a smaller version, we bring you the 1/4-scale Spacewalker II!

Legal for IMAA and QSAA fly-ins, this is a 1/4-scale model with the heart of a sport model. It's made for flying! The thick airfoil and long tail moment of the Spacewalker II makes for very stable low-speed handling. At full-throttle, it will do all the aerobatics you ever dreamed of.

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Look close - this Spacewalker's a two-holer!

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DEAR JAKE

Advice for the Propworn

DEAR JAKE:

What's the best kind of vehicle for transporting model airplanes to and from the flying field? Some guys have station wagons or vans, while others in our club own pickups or utility vehicles like Broncos or Blazers. What's best?

Car Shopping in Carlsbad, CA

Dear Shopping:

That's hard to say. My airplanes arrive at the flying field in my minivan, but they usually leave the field in the truck that empties the dumpster.

Jake

DEAR JAKE:

Here's a joke you may want to use in your column:

Traveling salesman: "How much would it cost to change the frequency of my RC set?"

Farmer's daughter: "Twenty dollars, same as in town."

I am the inventor of this joke, but you may use it for free. I have many others, some just as funny as this one. Would you like to see them?

Gagster in Gaithersburg, MD

Dear Gagster:

I have enough material right now, but one of my colleagues is always looking for fresh ideas. Why don't you send everything you have to James Wang, care of this magazine. I'm sure he'll love your stuff and I know he'll thank me for suggesting it.

Jake

DEAR JAKE:

I am a fisherman and a model boat enthusiast, and I have found a way to combine my hobbies.

I like to fish for bass. As you may know, an accurate cast to exactly the right spot is often the key to enticing a fish to strike. But many times, overhanging branches, weeds, stickups or other obstacles prevent me from casting a lure to the desired spot.

Then I had a brainstorm to use an RC electric boat (nice and quiet) to deliver the lure or bait precisely to the exact spot. I set up a little servo-actuated release clip that would hold the fishing line at the lure. I would steer the boat through and around the obstacles to the desired spot. The fishing reel would be on free-spool, so that line would be let out as the boat progressed. When the boat was in precisely the right place, I'd use the transmitter to release the clip and drop the lure in the water. Then I would pick up the fishing pole and work the bait while retrieving it.

I couldn't wait to try this out. I took my system to my favorite farm pond where I knew many lunker bass lurked. There was one spot that I always knew would hold a big bass, but I could never work it because it was so thoroughly surrounded by overhanging branches. I tied a shad-colored surface plug to my line and clipped it to the release mechanism on the little boat. As slowly as possible (so as not to spook the fish), I navigated the little boat under the trees and around some logs and rocks to a perfect spot. By remote control, I released the lure into the water. I waited a few seconds, gave the lure a twitch, and prepared for a strike. Suddenly, the surface roiled and a huge bass leaped out of the water and crashed down on....my little boat! I think he swallowed it whole. I tried the transmitter, but I couldn't steer the fish toward the boat. I reeled in my lure, untouched.

What went wrong?

Angler in Andersen, TN

Dear Angler:

Well, your idea was at least half-brilliant. You just had the fishing line tied to the wrong thing.

In fact, you may have started a whole new industry—radio controlled fishing lures. Battery-powered, self-propelled, remote-controlled little bugs, plugs and poppers that you steer right to the fish. Of course, if a fish should happen to break the line, you lose your $850 lure. But hey, that's fishing.

Jake

DEAR JAKE:

In your opinion, of all the choices across the country, what's the best trade show to attend?

Tom in Scottsdale, AZ

Dear Tom:

That would have to be the Wife Swappers Convention in Vero Beach, Florida.

Jake

DEAR JAKE:

If a golfer puts spin on a golf ball, it slices or hooks. If a pitcher puts spin on a baseball, it curves. If I could put "spin" on my model airplane, could I get it to turn without using any control surface deflections?

Thinker in Thousand Oaks, CA

Dear Thinker:

No, but you could pick up the 7-10 split if the wingspan was wide enough.

Jake **MB**

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SOPWITH TABLOID

BY CHRIS MOES

The 1913 Sopwith Tabloid was an entirely new concept in aircraft design. When one considers its contemporaries, it is truly a classic example of compact simplicity. Designed and developed before the first world war, it proved to be the shape of things to come during the war years.

The prototype flew in public for the first time at Hendon, England, in November of 1913. With Harry Hawker as pilot, and one passenger, it achieved a level speed of 92 mph and climbed to 1200 feet in one minute. On April 20, 1914, Howard Pixton flew a float-equipped version to victory in the Schneider Cup Race at an average speed of 86.78 mph (nearly double the speed of the 1913 winner).

It was at about this time that Tabloids entered military production, retaining the wheel and skid landing gear of the prototype, but otherwise they were similar to the Schneider machine. Major J. T. McCudden, V.C., recorded the arrival of the first pair of R.F.C. Tabloids at St. Quentin, France, in August of 1914: "They did not avail us much as fighting machines, in that they were not fitted in any way with firearms, but they could and did perform excellently from a scouting point of view."

Left: It took a long time to hand-carve a propeller back in the old days, so you can't blame 'em for trying hard to save them. All wire struts have been faired with epoxy and balsa.

Military production of Tabloids stopped at around forty. Most of these were equipped with LeRhone 80-hp rotary engines, were covered in clear doped fabric, used wing warping in lieu of ailerons, and had the skid-wheel landing gear.

And so goes a brief history of this interesting, elegant, but not-so-well- known aircraft. Now, let's look at the model.

Why did I choose to build a model of the Tabloid?

First of all, I love biplanes. For those of you who have flown

biplanes...well, you know what I'm talking about. For those who haven't, you're really missing something.

In my search for a suitable scale subject, I came across three-views of the Tabloid. It really has a great deal going for it; lots of area, simple yet attractive lines, and reasonable moments (which meant I shouldn't have to add any lead).

It also had landing skids to be contended with. Well, they were beneficial on the real one, so there's no reason why they shouldn't be useful on the model. In fact, because of the skids, the landing gear can be far enough back to eliminate ground looping without having to worry about noseovers.

Most important, my models (usually scale) have got to be a little different. The Tabloid fits this specification nicely.

Aside from its landing gear, the model has a few other unique but advantageous characteristics. The fact that the fabric need only be clear doped helps keep the weight down, especially in the tail. Mine is under three pounds.

The cable-controlled tail surfaces are perhaps a bit more work to install, but are well worth the effort. They are surprisingly direct in their action and look great.

When I designed the model, I was equipped with only a three-channel radio, so the prototype's lack of ailerons looked very inviting. With the dihedral increased slightly from scale, the model is a marvelous performer with only R.E.M. controls.

I can already imagine people thinking, "I know, I'll beef it up, add ailerons (later Tabloids did have them), and use that new .35." Well, please resist the temptation. Build light, use only enough power to safely fly it, and I can assure you, you'll be amply rewarded.

The model is really quite standard in construction, and many details are given on the plan. There is, however, a lot to be done; this is no "weekender."

FUSELAGE

The fuselage sides are framed up using 3/16 sheet in the front, with 3/16 square longerons and uprights in the rear. Note that the diagonals are set below the outer face. They should sit flat on the plan when building the left side, but will have to be raised 1/16 inch off the plan when building the right side.

Plywood and 1/4-inch balsa doublers are added once the sides are removed from plan.

Aligning the fuselage sides is an easy task, since they are parallel from bulkheads F7 and F8 forward. This is done with the sides upside down on a flat surface. A carpenter's square is really all that is needed (which is why a top view does not appear on the plans). With the tail pulled together, cross braces are added, their lengths taken from the plan.

Cabane struts are added before completing the fuselage top. They consist of two inverted U's, with dimensions taken from the side view. Coathanger wire is sufficient for the job, and simplifies making the Z-bends at the fuselage exit points. Do not add the cross braces and fairings until after the covering is complete.

The landing gear is bent from piano wire, bound and soldered. Note that the axle is held in place by rubber bands. The butt ends of the upright struts restrict fore and aft movement, while the rubber provides shock absorption. Wheels are best held in place by soldered washers (most realistic), though wheel collars could certainly be used.

Unusual cowl shape originally housed a LeRhone 80-hp rotary engine.

TAIL SURFACES

Both the horizontal and vertical stabilizers are flat, with rounded edges. The curved outlines are laminated from six strips of 1/32x3/16-inch balsa, soaked in warm water and using aliphatic resin glue as an adhesive. They are then curved around a waxed balsa form, or simply around regularly spaced straight pins.

Control horns should be added after most of the sanding is complete, but before covering.

WINGS

The wings are really quite simple to construct. Don't be frightened by the vast number of ribs and riblets. When building wings, I like to build both outside panels completely, then prop them up to the correct dihedral around the center section plan, and "fill in" the center section. A little washout on the tips would do no harm.

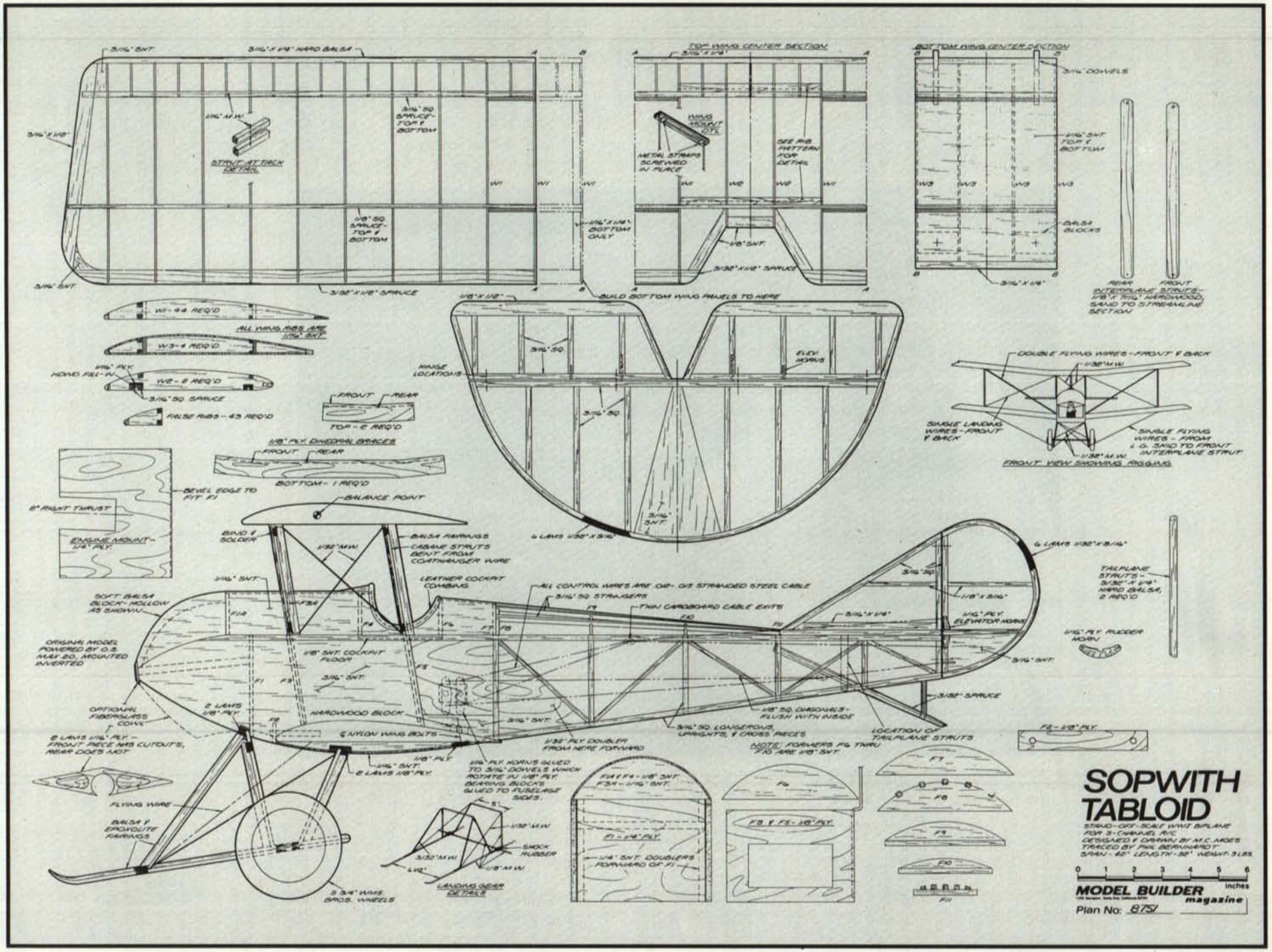
Once the bottom wing is removed from the plan, it should be securely fixed to the fuselage with rubber bands, masking tape, etc., and the lower portion of its center section constructed. It is then ready for mounting, using the common dowel/bolt method.

Don't put the strut mounting pins in place until after covering and don't forget the 1/4x1/16 strips at the lower wing roots (these are necessary for covering).

COVERING

After final sanding, the plane should be given three coats of clear dope, sanding between coats. The sheet areas must be filled with sanding sealer. A thorough job will really pay off, since the nose of the original was actually covered in aluminum. Thus, any wood grain showing would totally destroy the effect. Do not get any sealer on any of the open framework areas, since this is clearly visible beneath the covering.

Next, a suitable fabric must be prepared. I started with


TOP WING CENTER SECTION
BOTTOM WING CENTER SECTION
BUILD BOTTOM WING PANELS TO HERE
FRONT VIEW SHOWING RIGGING
SOPWITH TABLOID
STAND-OFF SCALE WWI BIPLANE FOR 3-CHANNEL R/C
DESIGNED & DRAWN BY M.C. MOES
TRACED BY PAUL BERNHARDT
SPAN - 42" LENGTH - 32" WEIGHT 3 LBS.
MODEL BUILDER magazine
Plan No: 875

Silron, though any of the popular silk-synthetic, woven covering materials would do.

This must then be dyed to approximate the color of the unbleached materials used on aircraft of this period. The dye I used was a mixture of tea, onion skin and some commercial blue dye. The tea provides red, and the onion skins provide the yellow. Mixed in the correct proportions, these two (toned down by the blue) should produce the desired shade. Experiment first with small samples of the material to be used. Then, when it is right, dye at least two square yards of material. This is how much is actually required, however, making some extra is recommended for patching any damage later on.

Before covering the wings, brush melted parafin wax on the top surfaces (but not the edges) of the tips and trailing edges. This will eliminate the problem of unwanted "stick-down" of the material in these areas.

When covering in general, try to do a neat job of any overlapping, eliminating it if possible, since this would be quite noticeable on the finished plane.

Give the whole model a thorough clear dope job; at least seven thinned coats. Clear fills much slower than color, and any holes in the fabric soon will collect oil and moisture.

However, don't completely fill the grain of the material, since this is one case where fabric grain looks much better than high gloss. The nose, of course, can be filled with sanding sealer to achieve the smooth, no-grain finish necessary in this area.

CONTROL SYSTEM

Rudder and elevator horns should be painted medium brown. Now, cut the fuselage cable exit guides from thin cardboard, and, using cellulose type cement, glue them in the appropriate locations. Once dry, the exit holes can be cut through the covering, and the cardboard painted silver.

Bellcranks are cut from 1/16-inch plywood and mounted on 3/16-inch dowels.

All control wires are .012-.015 multi-strand steel cable. These are attached at the ends by forming loops and fixing them with crimped 1/16-inch O.D. aluminum tubes about 1/4-inch long.

For the rudder, attach one 20-inch length of wire to each end of the bellcrank. For the elevators, attach one 40-inch length, by the middle, to each end of the crank (this will have the net effect of two 20-inch lengths at each end). These wires are threaded through the appropriate exits, and the bellcrank dowel assemblies are held in place by 1/8-inch plywood bearing blocks. Once the glue has dried, the wires can be attached to the control surface horns.

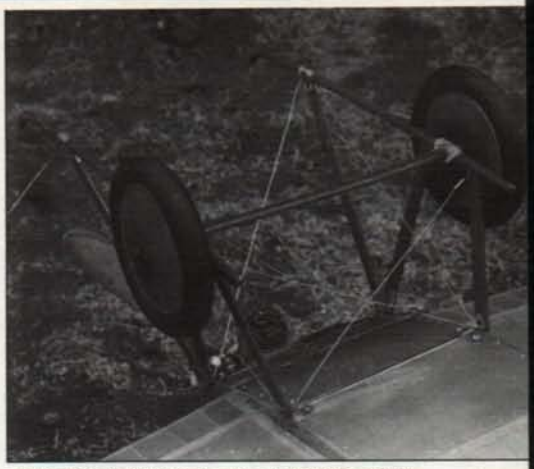
By using this system, the servos can be connected to the bellcrank with adjustable links, thereby allowing trim adjustments to be made in the usual manner. With the control wires snug (but not too tight), an absolute minimum of play can be achieved.

OTHER DETAILS

Ordinary straight pins were used as rivets on the fuselage. Holes must first be drilled in the appropriate locations, then 1/4-inch cut-off pins can be glued in place. The location of the rivets can seen in the photographs. This job takes a bit of time, but is well worth the effort.

Seam lines were simulated using 1/16-inch striping tape. The dummy access hatch (right side only) was made from cardboard. Once these details are complete, the front fuselage can be sprayed silver.

Once the inside of the cockpit has been painted black, the cockpit combing can be added. After a thorough soaking in water, a



Detail photo of the landing gear; note how the axle is bound to the skids with rubber. Williams Brothers 3-3/4 inch vintage wheels.

The slant-front Sullivan tank is just right for this installation, where the short nose moment can cause problems. Mill is an O.S. .20 RC. An O.S. .26 four-stroke could also be used to good advantage here, as the heavier weight would make balancing the ship easier. Would sound great, too.

The sum total of the decoration on the Tabloid is right here. Controls are operated by stranded steel cables. Curved outlines are laminated 1/32 balsa strips.

strip of soft leather can literally be molded in place. Use masking tape for this job, and allow about an inch overall for shrinkage. After the leather is dry, it can be removed, cut to exact length with the seam at the rear of the cockpit, and cemented in place.

Rigging the model is an absolute must, since it not only looks good, but also holds the interplane struts in place. These are fabricated from multi-strand wire. Loops are formed at the fuselage ends, using crimped aluminum tubing, and are attached to small hooks on the fuselage and upper cabane with small rubber bands. They are attached at the interplane struts by threading them through pre-drilled holes and knotting.

The engine is mounted using bolts and blind nuts. Use the side and down thrust indicated; though it may seem excessive, it is necessary. The tank is mounted sideways directly behind the engine. I used epoxy to hold a four-ounce slant-style tank in place. A sheet metal heat shield is definitely required behind the exhaust outlet. I still have the grisly remains of the tank I used on my first flight, "sans shield"!

You may want to add a scale cowling around the engine. However, I ran into some cooling problems with mine, so I don't really recommend this. I now fly without it.

Once the strut fairings have been added, all struts can be painted medium brown. Don't omit the stab struts, since they add considerable strength in this area.

With the radio mounted as far forward as possible, the plane should balance at about a third of the chord back from the upper wing leading edge. I didn't have to add any nose weight, but this will be necessary if the CG is any farther back.

Markings consist only of a registration number and the company name on the rudder. Later Tabloids did have the full R.F.C. decor, with rudder stripes, roundels, etc.

Now, the big choice: "To weather or not to weather." I did, and I think it looks good. I used clear dope, "dirtied up" with some brown and black, sprayed on in the appropriate areas. If you are inexperienced in this area, practice on a "scrap" model first, since there is a tendency to overdo it, and any mistakes are virtually irreversible at this stage.

FLYING

With a warp-free structure, the Tabloid is a very docile flier. It is not exactly aerobatic, though it will do inside loops, stall turns (as only a biplane can), chandelles, etc.

Takeoffs are very much like a tricycle geared plane, with absolutely no ground looping tendency. Landings should be made well above stalling speed. Put the tail down immediately after making ground contact, or the skids may catch in the grass. If this problem persists, don't overlook the simplest solution; curve the skid tips up a bit more (or cut the grass!). Flying over pavement is okay, but because of the narrow landing gear, wingtip skids might be a wise addition.

Good luck with your Tabloid! ***MB***

There's a change in the air

Introducing the new Concept 30 SR

When Kyosho introduced the Concept 30 three years ago, it was a breakthrough in .30 helicopters. With its simplicity, extreme durability and friendly, predictable flight characteristics, it set a new standard in the helicopter industry. Now, with the new Concept 30 SR, Kyosho has set the standard once again.

The SR starts with all the great performance features of the former SX and then goes even further. Its rotor diameter and tail boom have been "stretched" in order to produce a slightly larger Concept 30. The result is a helicopter that approaches the smooth flight characteristics and superior autorotations of a .60 heli, while maintaining the simplicity, lower cost and maneuverability of a .30.

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Longer main blades; larger, stiffer landing gear; more rigid servo structure and tail rotor pitch plate; and a total useable pitch range of 24° also help make the Concept 30 SR Kyosho's most advanced .30 heli yet.

A complete lineup for all your heli needs

Although the SR can be flown by pilots of any skill level, its high-performance upgrades make it perfect for the challenging maneuvers of advanced and competition fliers. The more economical 30 DX is durable and easy-building, making it an excellent choice for beginners. If you're looking for the ideal in .60 helis, the Concept 60 offers smooth flight and stunning aerobatic capabilities for everyone from first-timers to top level competitors. The electric-powered EP Concept comes 85% preassembled and requires only minimal set-up—just charge the battery and you're ready to go.

Of course the SR and all Concept helis are backed by Kyosho's Total Support Program, which includes monthly newsletters, excellent parts availability and answers and advice from the Concept Hotline team.

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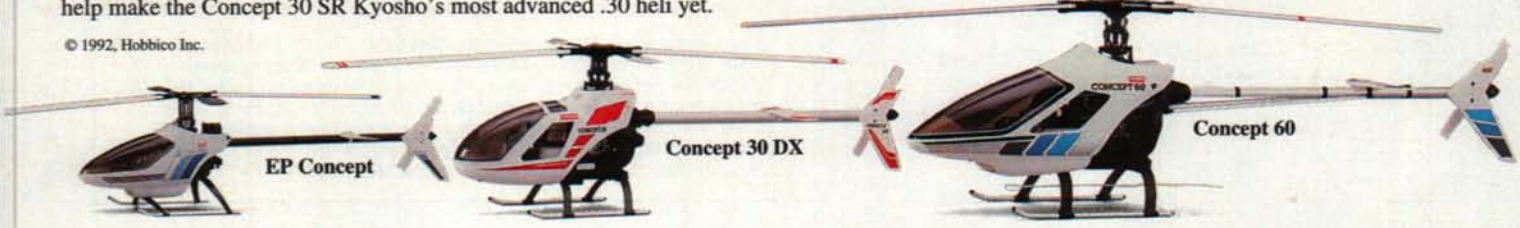


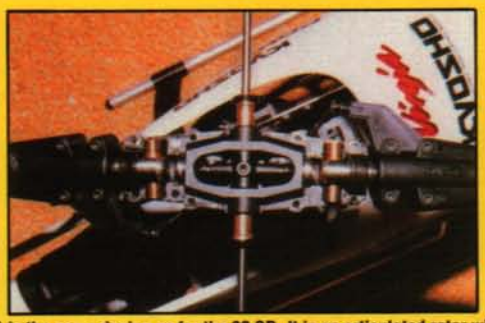
Kyosho Concept 60 and Concept 30 SR

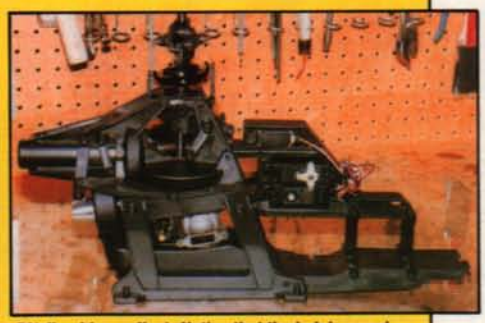
BY JAMES WANG

Presented here is the first installment in an extensive review of two excellent Kyosho helicopters, the very new Concept 30 SR and the successful Concept 60. The format of the review will be to point out the unique features of both machines, then discuss their flight characteristics, and finally, give some hints on setting them up.

The Concept helicopter line was introduced by the Kyosho Corporation in the summer of 1988. So far there have been six different Concept model helicopters, all but two of which were designed by Mr. Shigitada Taya, the 1985 F3C model helicopter World Champion. The distinguishing thing about the Concept line

Above: *Model Builder* flight test member, Mike Donnell, hovers the Concept 60 for James to photograph. Both the Concept 30 SR and Concept 60 are extremely docile in hover, yet very aerobatic in forward flight. The 60 is fast and responsive; the 30 SR is more forgiving and relaxing to fly. Left: The Concept 60 is very easy to assemble. James Wang and Mike Donnell spent about 25 hours on it, from opening the kit to flying. The parts are bagged according to the subassemblies. The instruction manual has more illustrations than words, so it is very easy to follow.





Left: The main rotorhead for the Concept 60 (shown here) is the same design as for the 30 SR. It is an articulated rotor with a 5% flap hinge offset. Notice that the hub is round and smooth, which makes it aerodynamically cleaner and reduces drag. This enhances flight speed and autorotation inertia. The Concept 60 has more reserve rotor inertia than other 60-size helicopters using the same weight blades. The Bell-Hiller mixer assembly is below the hub. The swashplate is used for cyclic control only. Center: The inside of the Concept 60 main rotorhead. The flybar at the center is controlled by push-pull lever arms. The flapping hinge is about 1-1/2 inches away from the center of the main rotor shaft. The flapping hinge is supported by two brass bushings, which can be replaced with optional needle bearings. Between the flapping hinge and the plastic blade grip is a black O-ring for giving some "spring" restraint to the blade flapping motion. Right: The main frame assembly for the Concept 60. The frames and servo tray are molded from glass-filled nylon and are more pliable than a metal frame. Our author's Concept 60 has survived two crashes with no damage to the frame or servo tray.

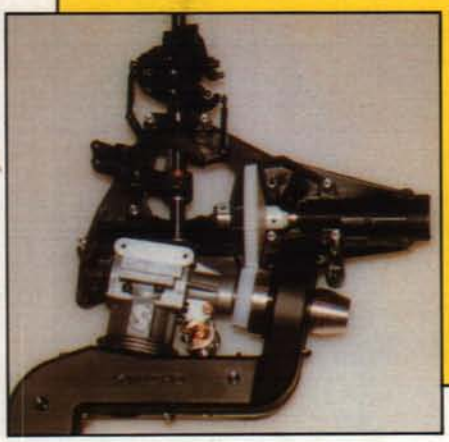
is that it departs from the traditional metal side frame design and uses a truss design with most parts molded from composite plastic. Also, the engine sits in a unique upside-down manner with the crankshaft facing the tail for easy starting with conventional electric starters. An articulated flapping rotor design is used for docile handling characteristics, however, by increasing the control throws, the Concepts can also be very agile at the same time.

By using good engineering judgement, Mr. Taya has created a line of wonderful flying machines. Ever since I first flew my Concept 30 DX in 1988, the Concept 30s have become my favorite flying machines, mostly because they are so relaxing to fly. They have forgiving and unintimidating flying characteristics unrivaled by any other model helicopter currently on the market.

During the years that the Concept 30s were selling like hotcakes, rumors were going around that a 60-size Concept was secretly being developed. In the summer of 1991, the rumor became a reality when the Concept 60 was officially revealed. I have tested my Concept 60 extensively for the last few months, including over 200 flights and two crashes. Let me tell you what I have learned.

First off, the Concept 60 is *not* inexpensive. However, there is nothing else like it on the market. With a pair of Zig-Saw GP-9II fiberglass blades on mine, the stock bird does 70 mph straight out of the box. And that's with a standard muffler, not a tuned pipe. It is also very docile in hover and slow forward flight. The model does great fast forward flight without the optional lead-lag hinge. With the optional lead-lag hinge, the model becomes slightly more pitch sensitive in high speed flight, but this effect can be reduced with extra flybar weight. The lead-lag hinge improves the hover, and prevents the fuselage from oscillating laterally when using a fast rotor speed in hover.

What most modelers like about the Concept 60 is its appearance; the lines are fluid and slick. Kyosho also sells an almost-ready-to-fly Jet Ranger fuselage for the Concept 60, as well as a sleek-looking fuselage called the Interceptor. The Interceptor is a limited production fuselage designed for FAI and high speed flight, and retails for around $400. Personally, I love the look of the Concept 60 canopy.



The guts of the Concept 60. Shown here are the engine (S.T. 60H), centrifugal clutch, cooling fan surrounded by the cooling shroud, tail rotor pickup and reduction gear, main rotor shaft with the sliding collective pitch collar mechanism, fore/aft cyclic bellcrank, swashplate, and Bell-Hiller mixer.

The Concept 30 SR was introduced in the spring of 1992. The 30 SR replaces the earlier SE and SX models. The layout of the 30 SR is similar to the other Concept 30s, hence, it took me just one full day to complete the SR kit.

The SR includes almost all of the features that modelers have said that they would like to see on their own Concept 30. The SR has slightly longer main rotor blades and a longer tail boom for better autorotations and greater forward flight speed. With no modifications, you can get +12 to -10 degrees of collective pitch travel, which gives the SR awesome hotdogging capability. The main rotor blade grip is a one-piece molded plastic unit, instead of two pieces (top and bottom halves) as on the earlier 30s and the 60. The long double ball link between the flybar and the Bell-Hiller mixer used to be a molded one-piece unit; now it has threaded ball links on both sides. This is because the main rotor shaft is 7mm taller than before, and it also allows fine adjustments to maximize the collective and cyclic pitch travel. Also, the inner swing arm on the mixer is now metal, instead of plastic.

The canopy for the Concept 30 SR is the

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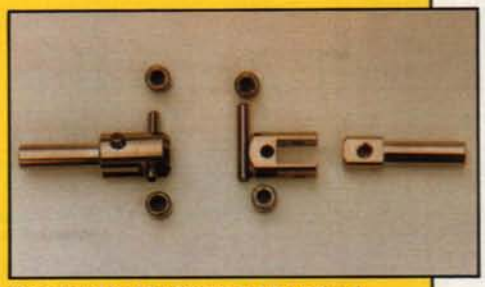

The optional lead-lag hinges, and the optional needle bearings for the Concept 60. The lead-lag hinge allows the blade to swing fore and aft freely. A free lead-lag motion eliminates the air resonance in hover. The text has more detail on this lead-lag hinge.

The stock Concept 30 SR wood blade (bottom) compared to the fiberglass Shogun Concept blade. James designed the Shogun blades for all versions of the Concept 30. The Shogun blade is slightly shorter and has a wider chord than the stock blades, and has a taper starting at mid-span to help reduce induced drag. The special blade tip geometry promotes blade tip vortex rollup to enhance performance, while the forward protrusion helps prevent blade tip stall. The fiberglass blades weigh about 95 to 100 grams each.

ESTES INDUSTRIES'

ASTRO BLASTER

PRODUCTS IN USE BY SKIP RUFF

PHOTOS BY ALAN DAVIS

One of the most enjoyable aspects of this hobby is seeing a whole new category of flying machine introduced. Such is the case with the subject of this review, Estes Industries' new Astro-Blaster, a rocket-propelled RC glider which launches vertically under rocket power and glides to earth conventionally, *a la* the Space Shuttle.

Those who have been involved with model rockets are probably aware that rocket propelled free flight gliders, referred to as "boost-gliders," have been around for decades. While not the first manufacturer to produce for commercial sale a radio controlled RC boost-glider, Estes has been manufacturing model rocketry supplies for as long as I can remember, and is certain to become a familiar name among RC'ers with their radical-looking entry into this new field.

Very similar in planform to the Burt Rutan Vari-Eze and Long-Eze homebuilt aircraft (which are futuristic looking in their own right), the Astro-Blaster is a swept-wing canard with vertical fins mounted on each wing tip. Pitch control is handled by the canard, or foreplane, and roll by conventional ailerons on the wings. No rudder control is needed or provided for, and as there is obviously no throttle control, a simple two-channel radio will suffice. Due to the model's small size, however, a mini or micro RC system is required. The small size does permit the use of standard model rocket launch hardware (with a 3/16-inch launch rod) and standard D-11P motors, so those already into rocketry will not need to purchase any additional exotic paraphernalia.

The kit includes all of the usual items, including control linkage hardware, needed for construction. Full-size plans as well as an illustrated 12-page construction/flight manual are included also. The quality of

A good shot of the 'Blaster in action. The airplane accelerates *very* quickly and a light touch on the sticks is imperative while under power, but it handles like a conventional model and won't surprise you with any "unusual" flight characteristics.

The author's brand-new rocket plane, displayed here to good advantage by the lovely Miss Heather Hollinger of Taft, California.

the kit I received was good. Although the wood supplied was, for the most part, pretty firm (it may well need to be due to the flight speeds involved), the die-cutting was the best I've seen in a long time.

Designed for the experienced RC builder/flier, the model goes together quite rapidly with its all sheet balsa, foam wing core construction. The instructions, though not elaborate, are certainly sufficient and should, along with the full-size plans, insure little difficulty in assembling the model. Mine was one of the very first kits from the very first production run, and as such, glitches—such as the incorrect part numbers on page 2—were to be expected. However, everything I could find wrong was of a very minor nature (I didn't even catch the part number mistake until after the model was completed, and then only when someone else pointed it out to me!). Corrections have already been made for subsequent production runs.

Following are a few hints which may be of some benefit to Astro-Blaster builders. Before applying the 1/32-inch balsa wing skins to the foam cores, the instructions suggest cutting or sanding a small groove down the top of the left core to run the receiver antenna through. Figuring that the contact adhesive on the wing skin would make it difficult to poke the antenna through the entire length of the finished wing panel, I cut away enough foam at the front of the left panel to allow the inner portion of a nyrod to be inlaid in the groove, with the 1/4x3/8-inch balsa leading edge glued on over it. The nyrod is just big enough to allow the antenna wire to be run through it easily if a little talcum or baby powder is applied first.

After the wing is glued in place in the fuselage but before the engine mount and rear cover plate are installed, the instructions tell you to attach the aileron pushrods and clevises to the aileron torque rods using needle nose pliers through the rear opening in the fuselage. I found this to be pretty difficult and ended up cutting a 3/4x 3/4-inch access hole in the top of the fuselage, right above the linkage. When finishing, I simply covered over the hole, figuring I could cut the MonoKote away if I ever needed access to the area again.

When covering the wing, be very careful not to cut into the balsa wing skin when trimming away excess material. Only 1/32 of an inch makes the dif-

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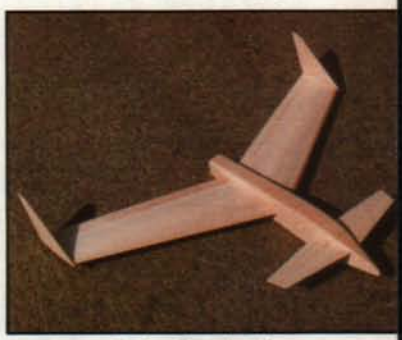
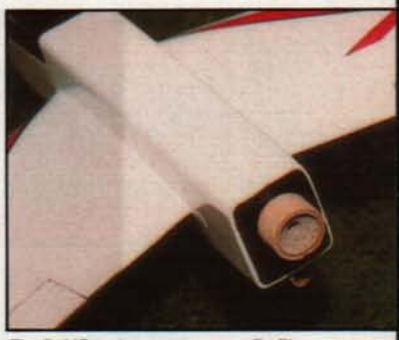


Despite its radical configuration, the model goes together quite easily. Would make a terrific RC slope glider, or try mounting a hot 1/2A engine on the rear for some really wild powered aerobatic flying!

A small radio is a must in the 'Blaster's limited fuselage interior. Futaba S133 servos and R114P receiver seen here. Radio battery is towards the rear of the fuselage, under the wing.



The D-11P motors are an easy slip fit inside the motor mounting tube. It's not readily visible here, but there's a small metal clip that holds the motor in place and keeps it from falling out when the model is on the launch pad.

All set to go! Note the two guide wires out at the wing tips, which stabilize the model while on the launch pad.

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I will comply with the 1992 SFA Safety Code and my Flying Site Safety Code for all model aircraft operations and the NAR Safety Code(s) for all sport rocket operations including any changes or additions which may occur during my membership period. I understand that my failure to comply with the codes will result in loss of liability coverage for any damages or claim. I understand that written notice must be provided immediately upon the occurence of any incident of bodily injury and/or property damage. I also understand that no claim will be accepted sixty (60) days after the expiration of my policy. I hold harmless the Sport Flyers Association, Incorporated trade membership organization for any personal injury, property damage or wrongful death which may occur. Current membership and coverage effective through December 31, 1992.

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1. I will not deliberately fly my model aircraft over spectators.
2. I will not fly my models in the presence of spectators until I have learned to fly safely.
3. I will not use metal propellers.
4. I will not buzz, tail, or harass any aircraft, car, animal, or any object in the air or on the ground.
5. I will test fly any new or repaired aircraft before flying in the presence of others.
6. I will abide by all safety rules established at any field where I fly and any state or local regulations governing model flying. I will always obtain prior permission from property owners before flying. I will not fly any models in a careless, reckless or dangerous manner.
7. I will not use hazardous fuels nor fuels containing tetranitromethane or hydrazine.
8. I will not use any explosives in conjunction with model flying whether on the model, in the air, or on the ground. Rockets will be flown in accordance with the Safety Code(s) of the National Association of Rocketry. A fire extinguisher must be present when using pyrotechnic smoke candles. Authorization may be secured from the SFA for special events.
9. I will not power my models with turbojet engines.
10. I will not fly my model higher than 400 feet unless it is flown in uncontrolled airspace, or unless it is a sport rocket flown in accordance with the Safety Code(s) of the National Association of Rocketry.
11. I will not fly model aircraft within three miles of any airport unless I have received permission from the FAA or I am flying at an authorized radio control flight field.
12. I will always perform a ground check of my model before flight.
13. I will use only those radio control frequencies currently allowed by the Federal Communication Commission.
14. I will extinguish any fuses on my Free Flight model upon completion of function.
15. I will only launch Free Flight models at least 100 feet downwind of spectators, cars, or anyone not directly involved with the flight.
16. I understand that SFA insurance does not cover activities related to the flying of Control Line models.
17. I will retrieve any lost model with great caution, considering all circumstances thoroughly before proceeding, and will never attempt to recover a model from a power line.
18. Whenever possible, I will use a starter or stick to start my airplane. I will not prop with an unprotected hand.
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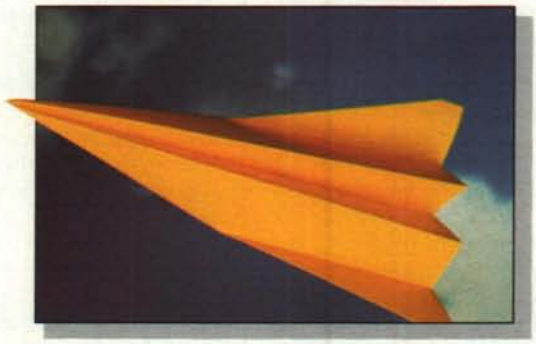

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SFA announces their Summer Air Fare membership effective July 1, 1992. Those joining after July 1, 1992 can do so for only $15, and receive all the benefits of SFA membership good through December 31, 1992.

These benefits include $1,000,000 in liability coverage underwritten directly by the General Agents Insurance Co. (Gainsco), and the only directly underwritten liability coverage program for model aircraft operation.

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Summer Air Fare members will receive the SFA discount long distance PhoneCard; MODEL BUILDER Magazine for just $10 a year; and 25% off all MODEL BUILDER plans; participation in the random monthly member give-aways of Carl Goldberg Model kits; and the Zero Claims Awards Program.

To join, just call (800) 745-3597, or fax your application to (214) 522-0868 for immediate approval.

Sport Flyers Sponsors U.S. Scale Masters Championship

SFA is sanctioning the U.S. Scale Masters Championship and has become an official sponsor. The Scale Masters Championship and the 22 regional Scale Master qualifiers have represented the premier showcase for the best builders and fliers of scale model aircraft for the last 14 years.

The event is directed by Harris A. Lee, a WW II carrier pilot (he flew an F-6) and professional movie model maker for 20th Century Fox. The 1992 Championship will be held at the Irving R/C Fliers Association club site located within Northlake Park in Irving, Texas.

Call (800) 473-0220 for additional information on qualifiers, event schedules and special discount travel reservations.

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October 15 - 18
Eldorado Dry Lake
Nevada Palace Hotel
Las Vegas, Nevada

George Meyer Memorial Fly-In
October 16 - 18
Irving Northlake Park
Irving, Texas

SCHNEIDER CUP RE-ENACTMENT™
LAKE HAVASU CITY, ARIZONA

Schneider Cup Re-Enactment
October 30 - November 1
Nautical Inn Resort
Lake Havasu City, Arizona

Scale Masters Championships

September 16-20
Irving Northlake Park
Irving, Texas

For More Information on SFA Sanctioned Events, Call 800-473-0220

ALL-AMERICAN FAVORITES

The growth of Old Time Stunt as a competitive event in the past few years has spun off a kit bonanza for control line model aviators in general, even those not interested in OTS competition itself.

For the true old-timers of the hobby, those elder statesmen who learned to fly in the 1940s on Jim Walker's Fireball and its many cousins, the OTS movement is a matter of nostalgia. For others, who grew up after those early days of CL flying, OTS has provided an opportunity to see, build and fly the great old designs of the past.

That's because a number of manufacturers now are turning out top-quality kits of those old designs. Many of these kits are being made by small "cottage industry" shops, which in itself may be a benefit to consumers, as these garage-based manufacturers are able to put a little more loving care into their products than a big factory could.

No matter who is making them, it appears in general that the OTS kits available on the market today are better quality kits than those originally manufactured. Manufacturing techniques have improved, in addition to the re-engineering that the manufacturers have done, applying the knowledge that has been obtained in the four decades since the heyday of the OTS designs—when the planes weren't "old timers" at all.

By a happy accident, we recently came into possession of not one but two versions of one of the all-time greats, Hal deBolt's All American Senior, which was kitted by Dmeco in 1951. As a result, we're able to provide some comparison of two kits of one of the most popular OTS competition planes, which can also be an attractive sport plane. We haven't had a chance to build ours yet, so we'll have to provide an update, with pictures, in a later column. But just from picking through the boxes, we can give a little bit of a preview.

In general terms, the All American is a full-fuselage, 51-inch span, flapless stunter with a relatively short fuselage of 24-1/2 inches. The engine sits upright after the fashion of the period. Though the kit plans variously describe the engine as something between a .19 and a .49, the plane is of the size normally considered to be appropriate for .35-.40 power. I plan to use the venerable Fox .35 in mine.

Grant Heistand with the fuselage framework of his electric-powered scale Boeing 314 flying boat. We'll publish a report on the finished product when it's available. See text for details.

Nathan Sturman, an occasional correspondent from Shibukawa, Japan, was proud of this P.A.W. diesel-powered Kimura Skylark .15...until it met its untimely demise as the result of failure of an aluminum retainer spring on the pushrod at the flap horn. Nathan recommends solder!

Remember Riley Wooten of "VooDoo" combat fame? Here he is with the deBolt "All American" stunter that his company, Flite Line Products, is currently kitting—see text for more. Photo was taken at the Vintage Stunt Championships in Tucson, Arizona, earlier this year.

Our kits came from Golden State Models (formerly A-J's Free Flight Service) of Kingsburg, California, and from Flite Line Products of Lubbock, Texas.

While the finished product of the two kits should be virtually identical, there are some differences in the approach used by the two manufacturers. Looking first at the plans, both kits provide full-size plans based on the original Dmeco drawings. The Flite Line kit uses what appears to be a direct reproduction of the Dmeco plans, with some editing and updating. Golden State has put the plans on a larger sheet of paper, modernized and rearranged some of the drawings and provided separate drawings of the two asymmetrical wing panels, which helps with clarity.

Builders should bear in mind that the drawings, true to the original, are for clockwise flight—the Flite Line plans note that for counterclockwise flight (the modern standard), the wing must be installed upside-down and the tank reversed from the position shown on the plans. This is important because the All American's inboard wing is 3-1/2 inches longer than the outboard!

Both manufacturers have included a brief instruction sheet that supplements the plans, indicating some important points that aren't obvious. Golden State makes one point that should not be overlooked: "We have built several of these models from the kits and we have found that you *must* know how to read plans and you *must* in some cases ask for help from knowledgeable modelers, as this is not one of the easiest models to build."

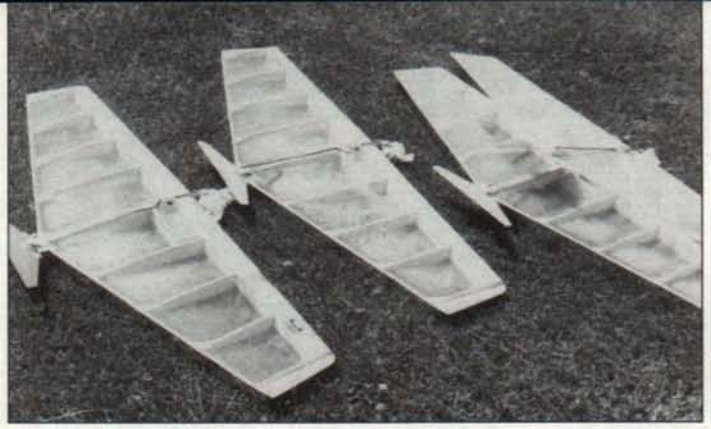
Both manufacturers provide a full hardware package, excluding tank and wheels, but including bellcrank, landing gear and leadouts. The Golden State kit includes silkspan covering material.

The approach to balsa wood is one area where the two manufacturers differ. The Golden State kit provides sawn parts, which is considered by many builders to be the superior method of making kit parts. Wood quality appears to vary—experienced builders may find themselves following the common practice of replacing a few of the parts with better wood.

The Flite Line kit provides die-cut parts. However, the kit I received has the highest quality balsawood I have ever seen in a kit. I have no way of knowing whether the kit was assembled especially for *Model Builder* or taken from regular stock, but every piece of wood was the lightest, straightest, clearest-grain balsa possible.

It's hard to say much more about the kits until they've actually been built, but at first glance it appears that both manufacturers have devoted considerable care in producing fine model airplane kits for the experienced builder.

If you don't find them in your local hobby shop, here's how to contact the manufacturers: Flite Line Products, Route 9 Box 437, Lubbock, TX 79423; or Golden State Models, 2368 Ave. 396, Kingsburg, CA 93631.



Dan Rutherford has opened an exchange of information and products with Russian modelers. Here are some Russian combat planes seen at the 1989 Nats in Washington state.

One of the racing events that takes appearance into account is Goodyear (Scale Racing). Here is a shot of a nice-looking (and fast) Goodyear plane from the author's 1989 Nats photo archive.

RUSSIAN MODELING

The United States' unofficial control line model aviation ambassador to Russia, Dan Rutherford, has made another trip to that country and restocked his supply of Russian engines and accessories for sale to modelers elsewhere.

As the supply of items is limited and changes rapidly, I won't attempt to list them here, other than to say that it is a varied list. If you are interested in finding out what Dan has available, you can get on the mailing list for his informal newsletter, which also includes some often humorous and enlightening accounts of his trips abroad.

The address is: Dan Rutherford, 4705 237th Place S.E., Bothell, WA 98021. His FAX number is (206) 486-6495 (Attention Dan Rutherford/481-5760). You can telephone Dan at (206) 481-5760.

A HELPING HAND

Control line model aviators are always quick to help a fellow modeler in need. It was therefore not surprising that Californians Bob Kampmann, of Sacramento, and Grant Heistand, of Burbank, responded quickly to the question posed in the May issue of this column by Phil Plumbo of St. Paul, Minnesota. Phil was looking for how-to information on electric-powered control line model aviation.

Bob recommends that Phil and others interested in electric flight pick up a copy of Mitch Poling's book, *Building and Flying Electric Model Aircraft*, which is sold in hobby shops. The book includes a chapter on control line flying with electrics, and also has information on how to contact the Black Sheep Squadron, a Southern California club that has some expertise in electric CL flying.

Grant Heistand is one of the Southern California fliers who have been working with the electronic control systems for scale models, featured here in a two-part series in the April and May '92 issues. Grant says he has been experimenting with electric-powered control line for the past year.

As of his writing this past April, he was completing construction of a scale Boeing 314 for electric power. With a 62-inch fuselage and an 88-inch wingspan, it should be an impressive bird. Power was to be with four Astro cobalt 05 motors in series, powered by 28 1500mAH cells.

Grant's first electric project last year was a converted Sig Cub, 78-inch wingspan, with an Astro 25 turning a 9x4 prop.

"It flew surprisingly well for being all plywood, and I was able to do three touch-and-go's during a 5-1/2 minute flight," Grant writes. "With a new foam wing, the plane's performance was tripled, since the weight savings amounted to almost three pounds.

"The Cub would take off after a six-foot takeoff roll and flew realistically at about 12 miles per hour! Truly, I had found the answer to my dreams! I pulled the gas engines out of all my other scale jobs and tried all of them with electric power—yes, even the profile Wildcat!

"As I learned more about wing loading and how to build light, I realized that I needed a new kind of airplane with better performance, incorporating all the knowl-

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A GOOD CONTEST IS...

OUR COLUMNIST'S VIEWS, FROM THE PERSPECTIVE OF BOTH A CONTESTANT AND A C.D.

The contest season is in full swing in most parts of the country. This means a contest every few weeks, within fairly easy driving distance, in my section of the world; more populated areas may have one or more every weekend.

What to do, where to go? Do you go to a big contest that may be a full day's drive away, or stay home and go to the small local affair just down the road? If you want to improve as rapidly as possible, do you go to as many contests as you can, or is staying home to practice on most weekends and just hitting the "major" events a better strategy?

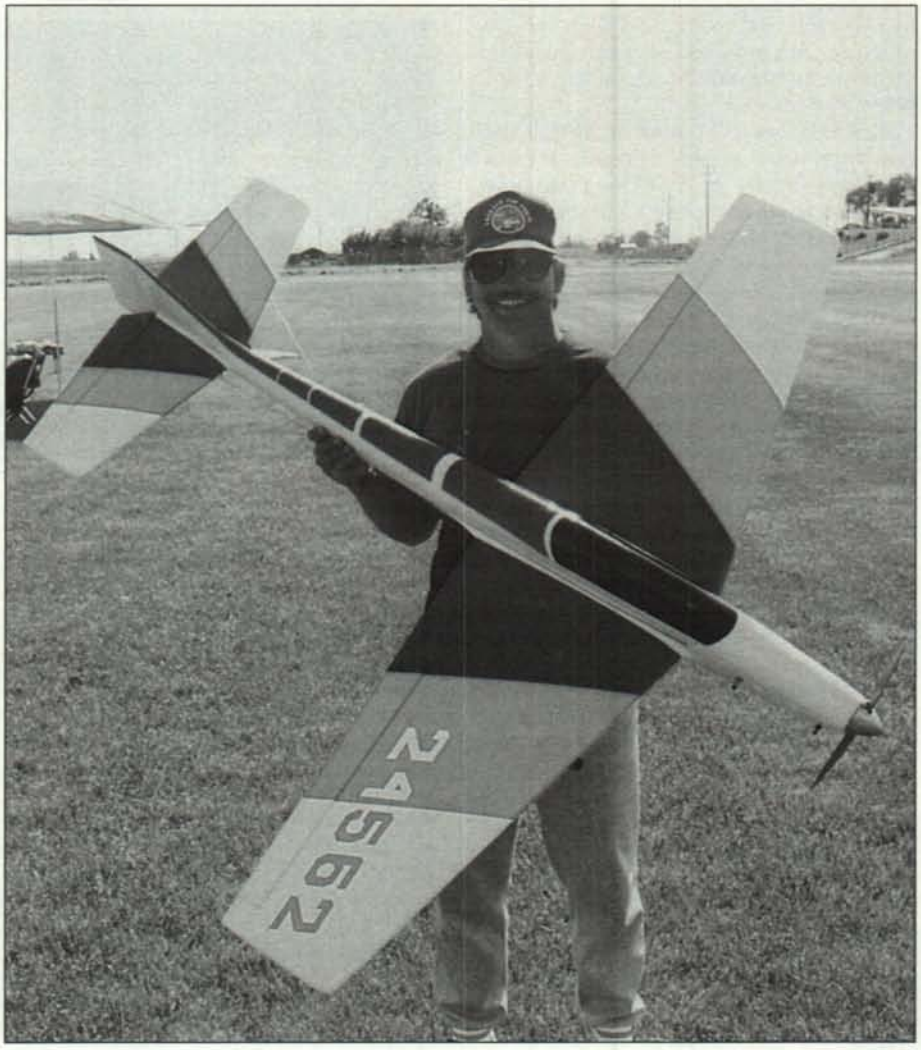
Wherever you go, you will hear people talk about this event being "good," or that event being "bad." What makes a good or bad contest? Weather? Luck? Lots of help? A good C.D.? Is a bad contest better than no contest at all? Do you tell a C.D. that his event leaves something to be desired, or is it better to just not go back?

If you are a C.D. or club official, how do you go about putting on a good contest? What does the contest management owe the competitors for their entry fees? Should the emphasis be on running a tight, "by the book" event, or should you keep things easy and loose, and focus on the social end of things? Is it acceptable to ask the entrants (if necessary) for help with tasks like judging, scribing, and running scores?

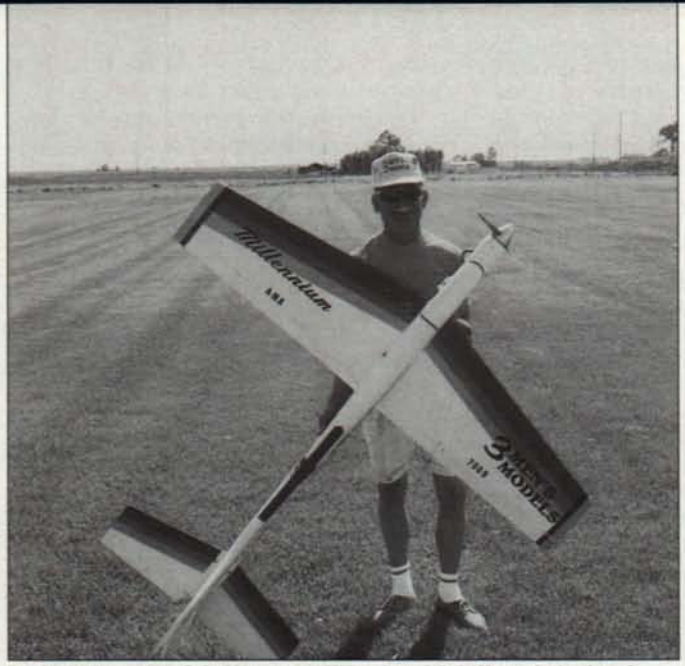
Obviously, most of the questions above could start an instant (and spirited) discussion under the average sun shelter or motorhome awning. What follows are strictly my own opinions, formed by the contest experiences I've been lucky or unlucky enough to have had, both as a competitor and a Contest Director.

A GOOD CONTEST IS NOT DUE TO LUCK

Good contests are not a result of luck; they result from planning and hard work. In the world of competitive aeromodeling, luck has a great deal to do with the weather and natural disasters such as mid-airs, but if luck is a significant factor at a contest aside from those two categories, then something is wrong with the way it is being run.



Above right: The second generation of McClellans. Ray's son Gary holds the Eclipse he flies in the Advanced class. Right: FAI pilot John Nosler's new "Perfecto" design. A huge airplane; note the tail extension on the table!



Ray McClellan and his O.S. 120 powered Millennium. A Dale Moore design from 3 Men's Models.

Novice flier Larry Gardiner competes with this modified Ultimate Kaos. Good starter ship.

A contest means competition, and the basic, underlying principle of competition is fairness. This is the First Law of Contests: They must be fair for all who enter.

We make rules and laws to ensure fairness. In this society, all of us are raised with at least the idea of fair and equal justice before us. The spirit of fairness is an integral part of our national consciousness; it is embedded in the structure of our language, taught in our schools and churches, and is constantly reinforced by our popular culture in the form of books, songs and TV shows. An injustice, either perceived or real, provokes instant righteous anger within us. We can't help it.

At the same time, a contest is as much a social event as it is a competition event. At contests, you often hear: "We're just here to have fun," or, "This is supposed to be a good time, right?" This is the sound of people reminding themselves not to take it too seriously, that it is a competition among friends, not a war to the death, and that minor injustices should be overlooked and forgotten in the spirit of Good Sportsmanship. A funny sort of dichotomy, yes, but human.

If you go look up "sport" in the dictionary and run down all the various definitions, you see that this attitude of confused ambivalence has persisted for long enough to be thought of as normal. It might be hard to explain all this to a little green dude from Tau Ceti, should one park his saucer in your pit area, but most of us are good with the concept, having dealt with it since long before preschool. And all this comes down to the Second Law of Contests: They should be fun for all who enter.

The Third Law of Contests is very simple: In any situation where the First Law conflicts with the Second Law, the First Law takes precedence.

Having said that, I will now say this: when people say "good" and "bad" in reference to contests, they really mean "fair" or "unfair" about 75% of the time. The other 25% of the time, they mean "well run" or "poorly run." Size, weather, field food quality, the amount of work that might be expected of a contestant and the grade of toilet paper found in the latrine do not enter into the matter, except as very peripheral considerations.

AMA RULES APPLY

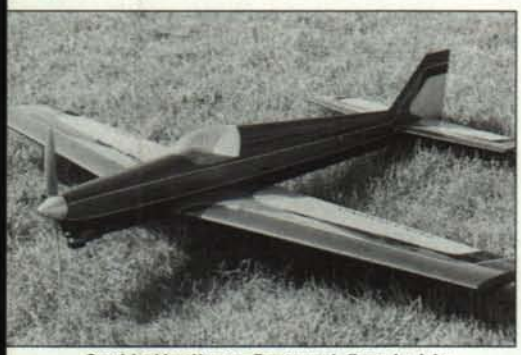
The contract that exists between management and contestant is based on the AMA rules and is pretty explicit. The contract gets signed at registration; the contestant promises to fly safely and abide by the rules and the C.D.'s decisions. By posting the sanction, the C.D. promises that he or she will run the fairest contest under those rules that time, space, and local conditions permit, and that any exceptions to those rules made for local reasons will be published, posted, explained, et al, *before* the contest starts.

Beyond this signed and sealed agreement under the official auspices of the AMA, both entrant and management owe one another a little something extra if the whole thing is to really work well. Management (meaning all of the officials plus the sponsor or sponsoring club, not just the C.D.) owes a "we care" attitude. This means caring about the sort of experience that each competitor has, communicating well, listening to concerns and suggestions, and yes, even complaints. It means setting up a system and field procedure that is clear and well-understood by the contestants, paying attention to start times, being available to handle problems as they arise, and at least a hundred other things.

One of the things it most emphatically does *not* mean is an instant "my way or the

The pit scene at the Othello, Washington spring contest. Beautiful site, and a well-run contest, thanks to contest director Terry Hane.

FAI pilot Bob Crump with his brand new Chidgey Typhoon. All balsa, 1000 sq. in. wing, YS 120 powered, JR PCM-10, 9.75 pounds. It flew very well.



Good-looking Hanson Runaround, flown by John Foglesong in Sportsman. YS 120 powered and very quiet.

Very pretty new Meridian by Canadian Keith Jarley. YS powered, Futaba radio.

highway" attitude on the part of an official whose decision is questioned. This kind of arrogance is unnecessary and at odds with the Second Law. It will also rapidly cause people to find other ways to spend their free weekends. An official, especially a C.D., should always remain in control of a situation, but a little tact and diplomacy sandwiched around a short explanation is a lot more effective than the Saddam Hussein approach. As a C.D., I personally have found that the closer I adhere to the absolute letter of the rules, the fewer problems I have and the easier my decisions are to defend.

The contestant, besides basic good sportsmanship, owes the contest management the benefit of the doubt. And presently, in these days of few officials and many contestants, he or she should also expect to help out a little when asked. There are many ways and styles of staffing and running a good contest, and most of them can work well. Things may be done differently where you last flew; that doesn't mean that they were done better.

It amuses me to watch a person's attitude towards contest officials change after they become a Contest Director themselves and run a few contests. They become a little slower to criticize and a lot faster to empathize. Realize that the C.D.'s job is tough and high-pressure, and that he or she probably isn't having as much fun as you are. That C.D. has to take care of the First Law mostly alone, but your own personal attitude can help a lot with seeing that the Second Law is obeyed by those around you.

The reason for the absolute ascendancy of the First Law over the Second Law should be obvious. Fairness makes fun possible; a lack of fairness makes fun a lot tougher to come by. People will tolerate bad motels, long drives, short runways, and crummy weather to return to a contest that they thought was fair, but a couple of experiences with an arrogant official who ignores the rules, or a crew of locally biased or grossly ignorant judges, will run them off faster than a shotgun loaded with rock salt, and blue skies, great field food, parties, barbecues, and a beautiful flying site won't bring them back.

SMALL VS. LARGE CONTESTS

As far as small contests vs. large contests goes, both have their problems and their merits. I usually have a better time at medium-sized contests with around 30 fliers; they tend to be more relaxed, with lots of time for both socializing and flying. Larger contests seem to generate their own powerful intensity, and more contestants usually mean more potential problems, more crowding, more delays and more confusion.

On the other side of the fence, small local contests sometimes apply the rulebook selectively, and can have as many problems as a major event. Here, the "Rule of the Road for Restaurants" often applies: If the parking lot is empty, there might be a reason. And many large events have become large events because, over the years, they have proven to be consistently well run, fair contests. There is no hard-and-fast rule. You must go and pay your money and make up your own mind.

Which brings up another point: If you didn't have a wonderful contest experience for reasons you believe were under the control of contest management, should you say something? My opinion is yes, even though I've bought some occasional trouble for myself this way in the past. But if you don't say anything, nothing changes. As a C.D., I would much rather that someone tell me about the things they didn't like and give me a chance to change or improve, as opposed to just not coming back. If they don't come back, how do I know how their beefs?

Of course, this situation calls for a medium-to-large application of tact in a private setting. Nobody likes to be called a fool in public. In fact, nobody likes to be called a fool at all. Use politically correct terms like "intellectually challenged" or "cognitively disadvantaged" and smile a lot. And please, before you take this step, be very sure that you have thought the matter through and have a case based on something more solid than your own emotional state. Sit down, cool off, and let a round or even the rest of the contest go by. Your attitude may change. The exception, of course, is when you have a situation related to pilot or spectator safety, and then immediately is not too soon to speak up.

CONTESTS ARE GOOD PRACTICE

As to whether it is better to stay home and practice or go to a contest, the answer isn't even close for me. Go to the contest. Six rounds at a contest in front of judges are worth about 30 practice flights, simply because you are really, really concentrating on doing your very best flying. And a big part of learning to fly pattern is learning to fly in front of judges. Practice is a no-pressure situation. This is why you hear, "I usually fly better than that" so much. For my money, if you can't do it in front of the judges, you can't do it yet, and there is only one way to find out if you can do it in front of the judges.

You hear about the extraordinarily bad or good events, but most contests fall somewhere in between, and they are most often just as good or bad as you make them. The party most responsible for the contest experience you have is you, so get out there and have some fun!

NEW PRODUCTS

Out on the product front is a new gadget from Greg Frohreich, the fellow who produces Lite Flight adjustable axles. In addition to his very fine 7075-T3 aluminum axles and his wing adjusters for pattern aircraft, Greg now has a nifty little fueler that he calls a "Fuel Dot." It will easily hold the pressure of a YS. He does business at 15449 North 25th Avenue, #1078, Phoenix, AZ 85023; (602) 863-3315.

The good people at Vinylwrite Custom Lettering, who do the best job on custom lettering I've ever seen, have a new procedure for applying the sticky-backed letters to solid MonoKoted surfaces, such as pattern plane wings. It used to be that the transfer tape would tend to pull the covering up from the surface as you peeled it off. The new idea is to stick the stuff in the fridge for a half-hour or so before you apply it. The cold "relaxes" the adhesive a little, and makes the job much easier. They also now have a new bunch of colors and fonts, plus the ability to scan artwork and cut custom logos for your ship. They are at 16043 Tulsa St., Granada Hills, CA 91344-5339; (818) 363-7131. ***MB***

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2nd—Wayne Mann—**X-Cell.60**

Int.— **1st**—Robert Akers—**X-Cell .60**
2nd—Eulace Mallory—**X-Cell .60**
3rd—Kent Officer—**X-Cell**

1991 Kyosho .30 Challenge

FAI— **1st**—Wayne Mann—**X-Cell .30**
Int.— **1st**—Kent Officer—**X-Cell .30**
Novice—**2nd**—Jim Robertson—**X-Cell .30**
4th—Mark Ghebelian—**X-Cell .30**
Scale— **1st**—Ted Schoodnard—**X-Cell Hughes**

1991 Michigan Champs

FAI— **1st**—Wayne Mann—**X-Cell .60**

1991 N.J. "Nats Tune-Up" Contest

FAI— **1st**—Lance Murphy—**X-Cell .60**

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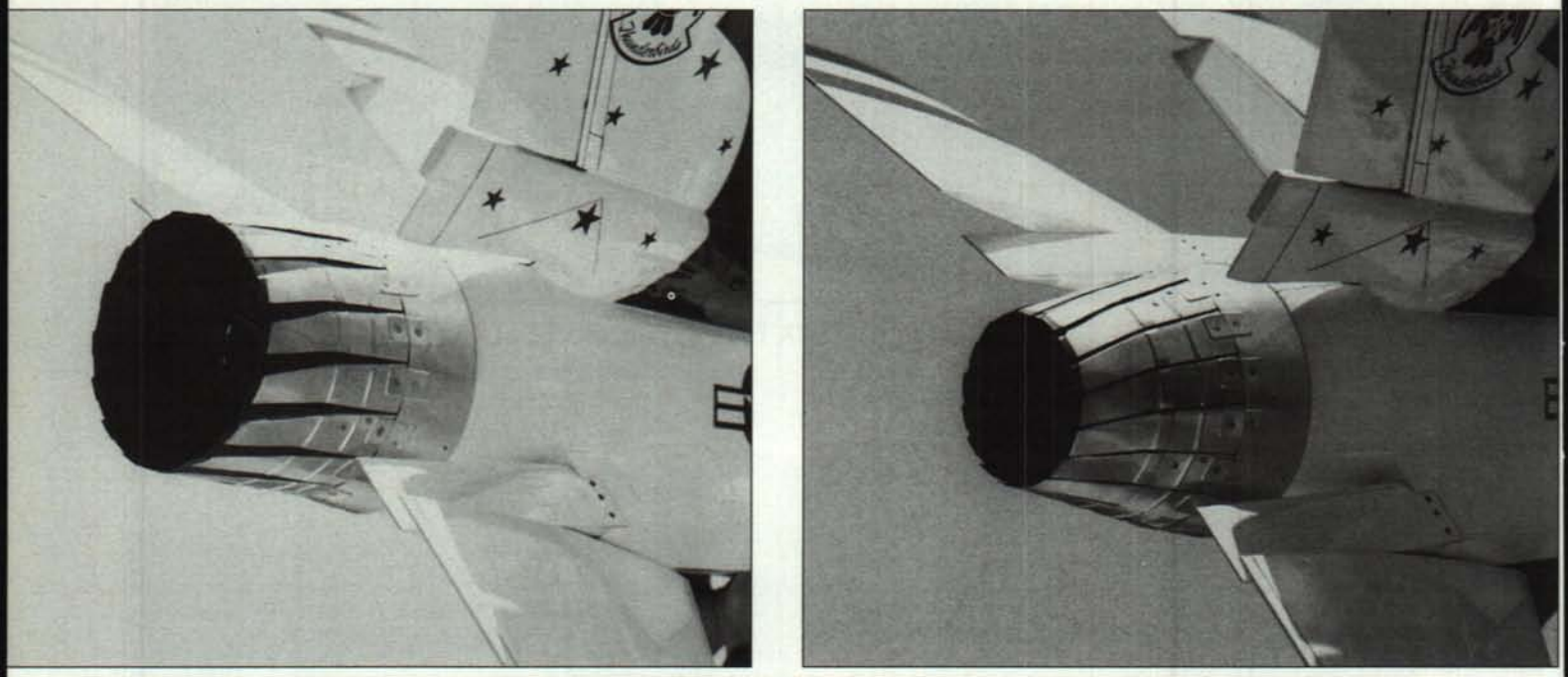
JUST FOR JETS: A VARIABLE GEOMETRY EXHAUST NOZZLE

THIS INGENIOUS DEVICE FROM A FLORIDA INVENTOR COULD RESULT IN SOME DRAMATIC PERFORMANCE GAINS IN THE FIELD OF RC DUCTED FANS



Views of the extremely clever variable geometry exhaust nozzle developed by Walter Rozmus of Port Orange, Florida, shown in the open (high thrust) and closed (high velocity) positions. We'll keep you informed on the details of this intriguing device as they become available.

A ducted fan model's outlet area is a compromise. The outlets are sized such to not only give adequate thrust for takeoff, but to have the model be fast in flight. Walter Rozmus of Port Orange, Florida has designed a device that allows the thrust on a ducted fan model to be varied from maximum thrust on takeoff to maximum velocity in flight.

According to Walter, with the nozzle open the area is increased, thereby increasing the thrust necessary for takeoff. On takeoff you do not need velocity. While in flight, closing the nozzle, thereby decreasing the area, increases the velocity, which increases the speed of the model. The variable exhaust nozzle or cone shown in the photo is 5-1/2 inches in diameter at the attachment point on the fuselage. It opens to 5 inches and closes down to 2-1/2 inches.

Walter made a test stand to check the design and come up with some performance figures. Static test data shows a 28 to 33% increase in thrust from a closed-cone diameter of 3-1/2 inches to an open diameter of 5 inches (Up to 13 pounds of thrust was developed with a 5-inch opening.) During static testing, the cone was not closed below 3-1/2 inches because of the risk of stalling the fan, which could result in damage to the propulsion unit. Cone diameter is controlled via a single servo.

Rozmus' device allows the thrust on a ducted fan model to be varied from maximum thrust on takeoff to maximum velocity in flight.

Walter has applied for a patent on this device and has a patent pending number. The unit is being readied for flight testing, which will be done by Bob Fiorenze, internationally known modeler, competitor and hobby shop owner. Most scale modelers are aware of Bob's credentials.

The cone designer, Walter Rozmus, was in the automotive industry for 35 years as a project scientist and holds something on the order of 280 patents. One of these patents is the Cold Weld process, where you take two non-ferrous materials and butt them together cold—no heat, electricity, or

chemicals required. This process is widely used in the wire industry. The company he worked for did have three aerospace divisions and he was involved with them as well.

Walter plans, in the beginning, to manufacture a few of these units. Ultimately, he is open to negotiation to either sell the manufacturing rights, or sell the the patent outright. For more information on this device, contact Ron Wilson at (904) 767-2218. Ron is a modeler who flies ducted fans. Walter is Ron's neighbor, which is how this whole thing came about! I will keep you posted on the progress of this device.

BUILDING TIPS

When constructing a built-up fuselage structure, the common practice is to build one side directly over the other so that both will be exactly the same. Constructing the first side is no problem. However, prior to constructing the second, you have to sand the first side to eliminate any protrusions or unevenness. In some instances a large amount of sanding is required. Not only are the high spots being sanded, but in some cases the rest of the side material is being sanded away as well, leaving a weakened side.

One of the most common causes of this is that square sticks are not always *exactly* square. Prior to constructing the fuselage, place all of the square sticks together on a flat surface and rotate them until the top surfaces of all the sticks are even with one another. Mark an "X" on these surfaces. When constructing the sides, be sure the Xs on the sticks are facing upwards. This method will eliminate 90% of the aforementioned sanding.

When it comes to making templates, there are a number of methods and materials that can be used. I know of one modeler who uses a copying machine to copy the patterns for the pieces to be cut out. He then attaches the copy to the wood with rubber cement and proceeds to cut out the part. Lotsa work!

The method that works best for me is the freezer wrap paper method. Go to your local grocer and purchase a roll of Reynolds' opaque, plastic-coated paper freezer wrap. It comes in a roll 18 inches wide and 48 feet long, which should hold you for a while!

Place a sheet of this paper, smooth or plastic side *down*, over the pattern and trace the pattern with a #2 pencil. Lay the template, shiny or plastic side *down*, on the material to be cut out. Using a MonoKote or sealing iron, iron the template on the material. Use enough heat so that the plastic becomes tacky and adheres to the pattern surface. Don't use too much heat, as you can weld the wrap to the material, making it extremely difficult, if not impossible, to remove. Experiment a bit to get the proper heat. After cutting out the pattern, simply remove the paper template by lifting up one corner and pulling it straight back on itself. Simple and inexpensive.

FLIGHT SYSTEM MONITOR

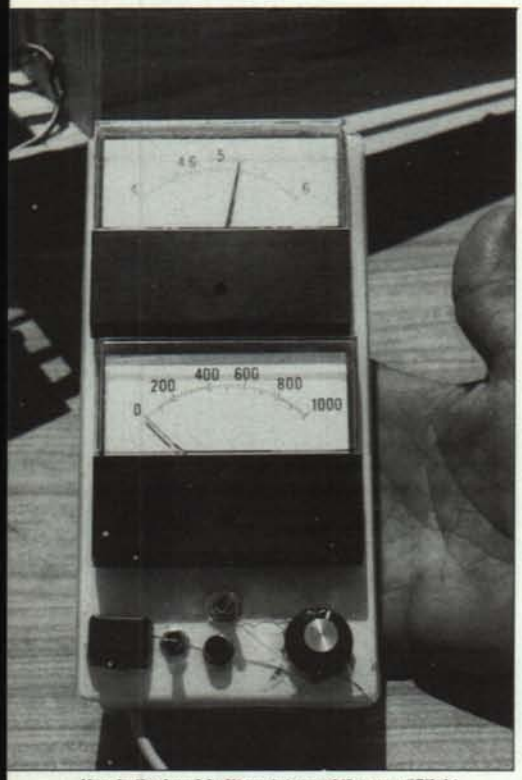
I saw what could be a handy gadget at a fly-in the other day. It's called a "Flight System Monitor" and was being demonstrated by Charles Crowely. It is being manufactured and sold by Checkrite RC Products of Winter Garden, Florida. It combines an expanded scale voltmeter and milliammeter in one unit. The unit that was shown to me is the prototype; the production unit will be housed in a square case and the two meters will be a bit smaller. The unit comes with a three-wire mini-plug, to be wired into the receiver switch harness. The unit plugs into the flight system via a phone jack. The milliammeter shows you the amount of current your system is drawing in the quiescent state, and the ESV meter shows the battery voltage under that particular load.

The ESV has a switchable load that can be set to test any flight battery from 250 to 2000 mAH. The milliammeter reads up to one amp, which should be plenty. It should be invaluable when installing control systems.

Example: Say you are installing the elevator servo. First you check the servo current drain both under no load and while being cycled with the transmitter. Next, hook up the pushrod and elevator and cycle the system again. Any binding of the elevator or stalling of the servo at its end points will be seen on the milliammeter as an excessively high current drain. Do this individually for each control surface (flaps, throttle, gear, etc.) and record the individual readings.

After the system is completely installed, check the current drain in the quiescent mode and while moving each control.

Top: An exceptionally nice building job on this 58-inch Fokker D-8, displayed here by its builder/pilot, Fred Strauss, of Long Island, New York. He's our featured Modeler of the Month. Center: Fred's Fokker started out as a Ben Buckle FF kit from England. Power is an O.S. Wankel, which makes for exceptionally realistic performance. Above: The hand-done lozenge pattern on Fred's D-8 was copied from the cover of an issue of *WWI Aero* magazine.



Here's the hand-built prototype of the new "Flight System Monitor" to be produced by Checkrite RC Products. It's a combination ESV and milliammeter, and can give a more accurate indication of your RC system's batteries' condition than just a standard ESV by itself—more in text.

Record these readings. Before or after each flight, plug in the meter and check your flight system for any changes in current draw due to binding, dirty pots, etc. The battery can be checked under the proper load. The ESVs that most of us use are only putting about a 125 mil load on the flight pack and are basically useless for the larger capacity batteries.

As part of his demonstration, Charles had two flight packs, one of which had a known bad cell. The use of one of the popular brands of ESVs indicated that both packs were good and were okay to fly. The Flight System Monitor ESV, which put a greater load on the pack, immediately revealed the faulty flight pack. The unit can also be used to check your battery charger's output during charging of the flight pack.

MODELER OF THE MONTH

Fred Strauss hails from Long Island, New York, and is an avid scale modeler. The photos of Fred's Fokker D-8 attest to that! He joined what is now the AMA in 1939. He didn't have the money to build and fly free flight, so he bought the 10¢ Megow kits, built them and sold them for a quarter. He attended an aviation trade school in New York, went to work for Grumman, joined the Navy, got his wings and flew TBMs and SB2Cs as a carrier pilot.

After the war, he went back to Grumman and worked in the Experimental department. He flew a lot of control line and got into RC in 1965. He then bought a full-size airplane and didn't get back into RC until his retirement about four years ago. We modelers who know him are sure glad he did. I met Fred when he joined our club a couple of years ago, as he and his charming wife, Kitty, spend part of their winters here in central Florida. Fred also belongs to the Nassau Fliers and the LIDS of Long Island.

Fred's sons gave him an O.S. Wankel engine, and when he was bench-testing it he found he would have to put it in a model that had a large cowl opening to allow plenty of airflow. What model to build? Fred is a subscriber to *WWI AERO, The Journal of the Early Aeroplane,* which has many photos of WWI aircraft. Perusing one of these issues, he came upon the Fokker D-8. What better model to stick that Wankel in?

The model in the photos started out as a Ben Buckle free flight kit, designed for a .19 engine. (Ben had a model manufacturing plant in the U.K. and produced many original design models. Unfortunately, he passed away a couple of years ago.) Fred modified the kit quite a bit to make it into an RC model. He put lots of carbon fiber and an extra spar or two in the wing. He added extra struts in the cabane area, for the simple reason that there were no diagonals in the cabane birdcage. These struts give the wing added support in that area.

The wing between the landing gear is at 0° incidence, as any variance will throw the flight trim all out of whack. Fred fabricated extra fittings to readily adjust the landing gear wing to the proper incidence after assembly. The plane is covered with Super Shrink Coverite. The lozenges are right out of a WWI magazine, scaled down. It is a five-color daytime camouflage scheme.

According to Fred Strauss, the Germans had four-color and five-color camouflage patterns, and in addition to the day camo they had night camouflage. The lozenges were not applied haphazardly. Fred said it was just like everything else the Germans do—very precise. He had to make five different patterns, one for each color. He used watercolor pens and two coats of Sig dope as a sealer and for fuelproofing.

The wheels and Spandau machine guns are from Williams Brothers. The cowling is built up out of balsa and plywood. The cowl is covered with white MonoKote. The black "Vs" are MonoKote, also. Fred had to make an extension out of brass tubing to vent the exhaust past the cowl.

The model has a wingspan of 58 inches, a fuselage length of 38 inches and a flying weight of just under 5-1/2 pounds. An 11x5 prop was used on the test flights. Fred says the plane flies well, but is a bear in a crosswind. Fred was a bit apprehensive about the model being too heavy, but the first flight revealed it to be quite agile and the Wankel had adequate power. Fred says the O.S. Wankel .30 is about equal to the output of a typical sport .40.

Let me close with a quote from Fred: "The first flight on a new airplane is when all the dreaming stops and the reality and challenge come forward. You either meet it or you don't." Amen to that!

Al Tuttle, 4223 New Haven Court, Port Orange, FL 32127; (904) 760-4246. ***MB***

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18TH ANNUAL ASTRO CHAMPS

ASTRO CHAMPS

Contest Director Jo Lupperger measur Skinner's landing for bonus points. Jim won Seven-Cell Sailplane with this ship, which boasts a built-up balsa sheeted wing with flaps deployed by rubber band power—once per flight!

Right: Jerry Bridgeman and his 05-size, but 60 powered F3E ship called SE-XI (Snipe Electric, Mark 11). Climbouts were literally beyond-vertical "Zs" just to keep it in sight! With that kind of performance, it's not surprising that Jerry took first in Unlimited Sailplane. Far right: This year's Astro Champs marked George McLemore's first-ever entry in an RC contest. His was one of four Lanzo Bombers entered in Seven-Cell Old Timer. Below: One of SoCal's most avid competitors, Ross Thomas, flew in both the Seven-Cell and Unlimited Old Timer events with his Playboy Cabin (left) and Lanzo Bomber.

BY BILL FORREY

May 2nd and 3rd of this year was the time and Fairview Regional Park, in Costa Mesa, California was the place for the first half of the 18th Annual Astro Championships. This half included the Sailplane and Old Timer events, plus Seven-Cell Pylon Racing. The second half—to include Scale, Pattern and Pylon Racing (again)—will be held in November.

Eighteen years have come and gone since the first Astro Championships were planned. That should be ample proof for one and all that radio controlled, electric powered flight is past its infancy and well into young adulthood. Technological advances in batteries, speed controls, motors, radios, and model aircraft design and construction techniques over the years have brought electric power to a position of practicality and respect in the modeling community. Anytime an RC model (regardless of energy source) can climb directly overhead to the limits of visibility in 12 to 18 seconds, like world-class, modern electric F3E ships can, you can assume you are dealing with a power that is sufficient for any application in modeling.

Thanks to the cooperation of the participants of this year's Astro Champs, this reporter was able to assemble a rather complete table of useful and interesting electric power data, plus a few interesting comments about the "human" aspects of the models flown. This information provides us with a unique and unprecedented, special look at what is being flown in California by some of the world's premiere E-power fliers.

CLASSES OF MODELS FLOWN

Five different classes were flown each day: Seven-Cell Old Timer, Seven-Cell Sailplane, Unlimited Old Timer, Unlimited Sailplane, and Seven-Cell Pylon Racing.

No motor or cell type limitations of any kind were imposed, other than a max of seven cells in the seven-cell classes. This makes for ultra-simple, protest-free competitive flying at its finest.

One of the truly great things about electric flying at the Astro Champs is that anyone wishing to enter can assemble a com-

Chuck Grim's Astro Mini Challenger was the only sub-05 model entered in the Champs. All things considered, he did very well with the little direct drive 035 Astro Cobalt on six cells and a Graupner 7x3 folder.

Sixth place in Seven-Cell Sailplane went to Joe Matsumoto and his flap-equipped original design that bears a strong resemblance to the Airtronics Sagitta.

Original designs accounted for about half the entries in Seven-Cell Sailplane. Shown here is Don Nigg and his fourth place finisher.

Left: All eyes were on Kris Larson's Klingberg Wing every time he flew. Addition of electric power brought the flying weight up to 42 ounces, for a wing loading of 14 ounces per square foot. Above: The Klingberg Wing's power system—Astro 05 FAI, Leisure Electronics long gearbox, and Sonic-Tronics 11x6 prop, all enclosed in a standard clear plastic canopy.

petition-worthy model from a combination of off-the-shelf components and a little old-fashioned desire. Everything needed for that "competitive edge" is readily available through local hobby shops and/or national modeling supply houses.

EVENTS FLOWN

With the exception of Seven-Cell Pylon Racing, all of the events flown at the Astro Champs were variations of the limited motor run, climb-and-glide format. In each case, the object is to climb as rapidly as possible before motor cut-off is called, then stay aloft for the prescribed duration.

Scoring was man-on-man, i.e., best duration time within each heat is scored 900 (plus landing bonus, if any); all other heat scores are normalized to the 900 as a percentage of the best flight times (plus landing bonus). For example, if the best time were 180 seconds (900) and a second pilot made 90 seconds (50% of the best time), then he would earn half of the 900, or 450 points (plus landing bonus).

Landing bonuses were determined by a runway style landing. Here the object is to land as close as possible to the centerline of the "runway" for the best bonus points; Sailplane classes could earn a max of 100 points, Old Timers a max of 10.

Primary considerations in model design for this format are obvious: highest possible power-to-weight ratio, best possible glide (sink rate and glide ratio), and best possible handling.

DAY ONE, ROUND ONE: THREE-MINUTE DURATION

In Round One, all classes flew to a max of three minutes (180 seconds) after motor cut-off. Each class was given a prescribed motor run time which varied according to class climbing ability. The Seven-Cell Sailplane class was allotted 20 seconds of run time; Seven-Cell Old Timer, 30 seconds; Unlimited Sailplane, 10 seconds; and Unlimited Old Timer, 20 seconds. Run times are meant to be in balance to max time: just enough to do the job if your design is competitively built, if you are a good pilot, and if lift is

present. Early in the morning, when this task is flown, lift is weak and skies are gray.

DAY ONE, ROUND TWO: SEVEN-MINUTE DURATION

In Round Two, all classes flew to a max of seven minutes (420 seconds) after motor cut-off. Each class was allotted a motor run time as follows: Seven-Cell Sailplane, 40 seconds; Seven-Cell Old Timer, 50 seconds; Unlimited Sailplane, 20 seconds; and Unlimited Old Timer, 30 seconds. By mid-afternoon, when this task is flown, it's a real challenge to make the extra four minutes of duration, even with the extra motor run time. Working lift is a must.

DAY TWO, ROUND THREE: FIVE-MINUTE DURATION

In Round Three, all classes flew to a max of five minutes (300 seconds) after motor cut-off. The Seven-Cell Sailplane class was allotted 30 seconds of run time; Seven-Cell Old Timer, 40 seconds; Unlimited Sailplane, 15 seconds; and Unlimited Old Timer, 25 seconds. Early morning conditions made the five-minute task challenging.

DAY TWO, ROUND FOUR: FIVE-MINUTE PENALTY-DURATION

Round Four was a variation of an event which was run in previous years. Here every contestant in every class is given the same task. Fly your best possible flight within a five-minute (total) window. You are given one unlimited motor run which counts toward your total time aloft, but every second that your motor runs is *subtracted* from your total time aloft. Penalties

EQUIPMENT USED AT THE ASTRO CHAMPS

PL.	POINTS	MODELER	MODEL	WING SPAN	WING AREA	FLYING WEIGHT	WING LOAD	MOTOR	FOLDING PROP	CELLS	MOTOR CONTROL
7-CELL OLD TIMER											
1	3,356	SKINNER, JIM	PLAYBOY SR.	67	576	40	10.0	AFI-05F-GM	K&W-13x7	7-900	BAL OSC4
2	3,349	CIAMBRONE, STEVE	LANZO BOMBER	70	650	42	9.3	AFI-05F-G	SNC-13x7.5	7-900	KYO ON/OFF
3	3,116	BALLASCH, JOE	PLAYBOY SR.	67	576	44	11.0	AFI-05F-G	K&W-13x7	7-1000	BAL OSC4
4	2,901	HOLLINGER, CHUCK	1941 "NOMAD"	67	650	44	9.7	AFI-05-G	REV-13.5x8	7-900	BAL OSC4
5	2,865	THOMAS, ROSS	CABIN PLAYBOY	67	576	48	12.0	AFI-05F-G	K&W-12x7	7-900	BAL OSC4
6	2,843	WESTLAND, GARY	LANZO BOMBER	60	550	40	10.5	AFI-05F-G	SNC-13x7	7-800	BAL OSC4
7	2,675	BOIES, BOB	LANZO BOMBER	70	650	40	8.9	CP-05-GL	REV-11x6EW-NF	7-800	KYO ON/OFF
8	2,302	WESTLAND, RAY	PLAYBOY SR.	67	576	45	11.3	AFI-05F-G	SNC-13x7	7-800	BKR ON/OFF
9	2,213	WAHLSTEDT, ART	CABIN PLAYBOY	67	576	44	11.0	AFI-05-G	??	7-900	??
10	2,169	McLEMORE, GEORGE	LANZO BOMBER	70	650	46	10.2	AFI-05-G	??-12x6	7-??	TEC SP-1801
11	532	REED, HAROLD	— UNKNOWN, DNF —								
7-CELL SAILPLANE											
1	3,876	SKINNER, JIM	OD: NO NAME	72	525	43	11.8	AFI-05F-GM	SNC-10x6	7-900	BAL OSC4
2	3,803	SLIFF, BOB	OD: "ELECTRIFIER"	86	662	42	9.1	AFI-05F-G	HH-??	7-900	BKR ON/OFF
3	3,663	NORENBERG, LOWELL	OD: "ZEBRA"	76	510	45	12.7	AFI-05F-G	K&W-13x7	7-900	SKY ON/OFF
4	3,641	NIGG, DON	OD: NO NAME	70	500	40	11.5	AFI-05F-G	K&W-12x7	7-900	ELDON ESC
5	3,338	NAVE, JOE	GOLDBERG ELECTRA	78	663	49	10.6	AFI-05F-G	K&W-13x7	7-900	SKY ON/OFF
6	3,054	MATSUMOTO, JOE	OD: SAGITTA-LIKE	96	850	60	10.2	AFI-05F-G	??-13x7.5	7-900	SKY ON/OFF
7	3,012	HOLLINGER, CHUCK	OD: "VOLTERA II"	72	520	39	10.8	AFI-05F-G	REV-11x8	7-600	SKY ON/OFF
8	3,000	CRON, AL	MIDWAY ULTRA Mk.IV	86	750	56	10.8	AFI-05F-G	HH/TAIPAN	7-900	SX/SWITCH
9	2,779	LARSON, KRIS	KLINGBERG WING	78	650	42	14.0	AFI-05F-GL	SNC-11x6	7-900	SIM SOFT-ST.
10	2,729	WESTLAND, RAY	L.J.M.P. ELECTRICUS	72	580	51	12.7	AFI-05F-G	SNC-13x7	7-900	BKR ON/OFF
11	2,597	GRIM, CHUCK	AFI MINI CHALLENGER	60	425	29	9.8	AFI-035	GRP-7x3	6-900	BKR ON/OFF
12	2,473	PANTZAR, DICK	AIRTRONICS ECLIPSE	78	660	58	12.7	AFI-05F-G	MAS-10x6	7-900	SX/SWITCH
13	1,505	WESTLAND, GARY	— UNKNOWN, DNF —								
14	1,394	SCHOFRO, STEVE	— UNKNOWN, DNF —								
15	1,189	NEHRING, CURT	— UNKNOWN, DNF —								
16	1,082	WETHERILL, FRANK	OD: "QUASIMODO"	79	668	40	8.6	AFI-05F-GM	CUS 17x6	7-800	BAL OSC4
UNLIMITED OLD TIMER											
1	3,595	WESTLAND, GARY	PLAYBOY SR.	77	780	81	15.0	AFI-25F-G	SNC-13x7	17-800	BAL OSC4
2	3,524	THOMAS, ROSS	LANZO BOMBER	80	816	90	15.9	AFI-40-G	HH-12x7	26-800	BAL OSC4
3	3,059	NORENBERG, LOWELL	SCHMAEDIG STICK	77	818	73	12.9	AFI-25-G	K&W-13x7	16-900	AFI 205
4	2,981	HOLLINGER, CHUCK	1941 "NOMAD"	67	650	46	10.2	AFI-05-G	REV-13.5x7.5	9-900	BAL OSC4
5	2,882	TAYLOR, BOB	GOLDBERG SAILPLANE	78	864	104	17.3	AFI-40-G	REV-14x6-NF	21-1000	AFI 205
6	2,533	NAVE, JOE	SCHMAEDIG STICK '37	74	703	66	13.5	AFI-15F-G	??-13x7.5	10-900	GRP P-MOS45
UNLIMITED SAILPLANE											
1	3,775	BRIDGEMAN, JERRY	SE-XI SNIPE	64	475	87	26.4	AFI-60F	CUS 12x7	27-900	CUS S. NEU
2	3,639	SLIFF, BOB	OD: "GNOME 3M"	118	1178	112	13.7	AFI-60F	FRD 14x7	24-1000	S&W ??
3	3,507	SKINNER, JIM	MOD. SE-5 SNIPE	72	505	66	18.8	AFI-25F	SNC-10x6	16-900	AFI 205
4	3,072	NEU, STEVE	OD: "TANGENT"	64	475	55	16.7	KLR-70/4	NEU FOLDER	10-1200	CUS S. NEU
5	2,941	WESTLAND, GARY	L.J.M.P. OLYMPIAN	92	824	68	11.9	AFI-25	SNC-10x7MOD	17-800	BAL OSC4
6	2,850	NORENBERG, LOWELL	OD: "ZEBRA"	76	510	45	12.7	AFI-05F-G	K&W-13x7	7-900	SKY ON/OFF
7	1,779	NAVE, JOE	GOLDBERG ELECTRA	78	663	49	10.6	AFI-05F-G	K&W-13x7	7-900	SKY ON/OFF
8	248	HEFFERN, L.T.	— UNKNOWN, DNF —								
7-CELL PYLON RACE (TOP 3)											
1		NEU, STEVE	CAD-CAT	32	180	??	??	AFI-05F	GRP-6.5x6.5	7-1200	BKR ON/OFF
2		PETERSON, TROY	CAD-CAT	32	180	??	??	AFI-05F	GRP-6.5x6.5	7-1200	BKR ON/OFF
3		GIBBS, DUANE	CAD-CAT	32	180	??	??	AFI-05F	GRP-6.5x6.5	7-1200	BKR ON/OFF

05F = (TYPICALLY): "AFI-05 MOTOR, FAI WIND"
ACE = ACE R/C INC.
AFI = ASTRO FLIGHT INC.
AF0 = ASTRO FLIGHT ZERO LOSS CONN.
AIR = AIRTRONICS
APP = ANDERSON POWER POLE CONNECTORS
BAL = JOE BALLASCH'S LEISURE ELECTRONICS
BAN = GOLD BANANA PLUGS
BKR = BECKER

B.MGT. = ACE BANTAM MIDGET SERVOS
CIR = CIRRUS R/C SYSTEMS (HOBBY SHACK)
CP = CHECK POINT FERRITE CAR MOTOR, 16 TURN, DOUBLE WIND
CUS = CUSTOM MADE BY MODELER
DEN = DEANS 4-PIN GOLD CONNECTORS
DNF = DID NOT FINISH. LEFT EARLY.
EW = EXTRA WIDE (REV-UP PROP)
FRD = RUDY FREUDENTHALLER (FRG) MADE

FUT = FUTABA
ga = GAUGE (WIRE)
G = GEAR MOTOR
GL = LEISURE LONG GEARBOX
GM = GEARBOX CUSTOM MODIFIED
GRP = GRAUPNER
HH = HOBBY HORN
JR = JR PROPO
KLR = KELLER MOTOR

KYO = KYOSHO
K&W = K&W
MAS = MASTER AIRSCREW
MPX = MULTIPLEX
NF = NON-FOLDING PROP
OD = ORIGINAL DESIGN
RCD = RCD RECEIVER
RCP = RACE PREP GOLD CONNECTORS

are assessed for each second you are aloft after the five-minute window. It pays to keep that motor run as short as possible and yet still be able to fly the full five minutes. By mid-afternoon, when this task is flown, winds are higher, and lift drifts quickly. This is the most challenging task.

Strategy and knowledge of your aircraft are vital to obtain the best possible score. How observant of lift patterns are you? If the air is dead, how high do you need to climb to make a landing at exactly five minutes? What is the minimum altitude you need to search for lift? If you know where the lift is, how short a motor run can you live with to fly over to the lift and work it? Is the lift strong enough to take you up and away? If no lift is anticipated, do you climb longer for a better glide time, or risk others finding lift with shorter run times? You can worry yourself sick over this one!

1992

CONN./ WIRE	RADIO	SERVOS	RX B
APP/??ga	FUT/RCD	FUT S133	100
TAM/14ga	ACE	ACE B.MGT.	BEC
APP/14ga	AIR	AIR 501	270
APP/13ga	AIR/RCD	JR 305	170
APP/13ga	AIR	FUT S20	250
BAN/13ga	CIR	FUT S33	BEC
DEN/14ga	FUT	FUT S133	BEC
BAN/13ga	AIR	AIR 501	110
TAM/??ga	AIR	AIR 501	650
DEN/??ga	FUT	APOLLO	?
APP/14ga	FUT	FUT S33	150
APP/14ga	CIR	FUT S133	270
APP/??ga	AIR	FUT S33	250
APP/??ga	AIR	FUT S33	250
APP/14ga	AIR	TT S189	250
APP/13ga	AIR	FUT S133	250
APP/13ga	JR/RCD	JR 305	100
APP/??ga	AIR	AIR 102	450
APP/14ga	FUT	FUT S133	BEC
BAN/13ga	FUT	FUT S33	BEC
APP/12ga	ACE	ACE B.MGT.	250
APP/MPX	FUT	FUT S48/20	250
??/??	FUT	FUT S33	250
BAN/13ga	AIR	AIR 501	250
APP/13ga	AIR	FUT S33	250
APP/14ga	FUT	FUT S33	250
APP/13ga	AIR/RCD	JR 305	170
AF0/??ga	FUT	FUT S33	600
APP/??ga	AIR	AIR 102	600
BAN/10ga	AIR	AIR "MINI"	100
APP/13ga	CIR	FUT S148	500
AF0/14ga	FUT	FUT S33	250
BAN/12ga	MPX	"SMALL"	250
BAN/13ga	AIR	FUT ??	250
APP/??ga	AIR	FUT S33	250
APP/14ga	AIR	TT S189	250
APP&AFI	AIR	"MICROS"	100
APP&AFI	AIR	"MICROS"	100
APP&AFI	AIR	"MICROS"	100

REV = MODIFIED FROM REV-UP
SIM = SIMPROP
SNC = SONIC-TRONICS
SKY = HIGH SKY
TAM = TAMIYA
TEC = HI-TEC
TT = THUNDER TIGER
?? = BRAND NAME OR DATA NOT RECORDED

Above: Just a few of the models owned and flown by the father-son team of Ray (left) and Gary Westland. Seen here are a Playboy Sr. (took first place in big gun Old Timer), Lanzo Bomber, Cabin Playboy, and an LJMP Electricus and Olympian. Below: Joe Nave must have spent some time with the Highway Department, judging by the color scheme on his Goldberg Electra. Bottom: An interesting mix of old and new: on the ground is Chuck Hollinger's original design "Nomad," published in *Air Trails* in 1941. The model Chuck is holding is his "Voltera II," another original design, which he flew in the Seven-Cell Sailplane class.

SEVEN-CELL PYLON RACING

One heat was scheduled on Saturday, two heats on Sunday. Ten laps around a triangular course as fast as possible made one heat. Contestants were required to have two battery packs on Sunday for continuous flying if necessary. The course and rules were straight out of the 1990 AMA rulebook.

SEVEN-CELL SAILPLANE

Original designs were plentiful, at about half the total number entered for this class, and they were dominant in the standings. It isn't until you get to 5th place that you find a manufactured kit, and 8th place for a partial kit. Design experimentation is still going on in this class and doing well, too.

First place winner, Jim Skinner, flew a no-name, original design model which reflects his free flight background. The model's long tail moment and small tail group, skinny fuselage, rubber band powered flaps, high aspect ratio, and monocoque structure wings all point to a definite free flight heritage. Jim used clear MonoKote to cover the balsa with trim colors applied to the wing tips for visibility.

Jim's fully skinned wings are built up from 1/16 balsa ribs, not foam cores. The spars only go out 10 inches from center; the monocoque skins handle the rest of the load. Flaps are pulled down via rubber band power. The flaps are "spring loaded" and can only be triggered once by flap servo actuation. While this may have its disadvantages, in the event of early flap deployment, Jim will never break servo gears!

SEVEN-CELL OLD TIMER

By definition, the model designs available for use in the Old Timer events are those which were designed, kitted or published prior to 1943. This means there are a finite number of model subjects, and a minute number of commercially available kits. The plans available are quite numer-

continued on page 82

HUNTINGTON H-12 PEANUT

BY WALT MOONEY

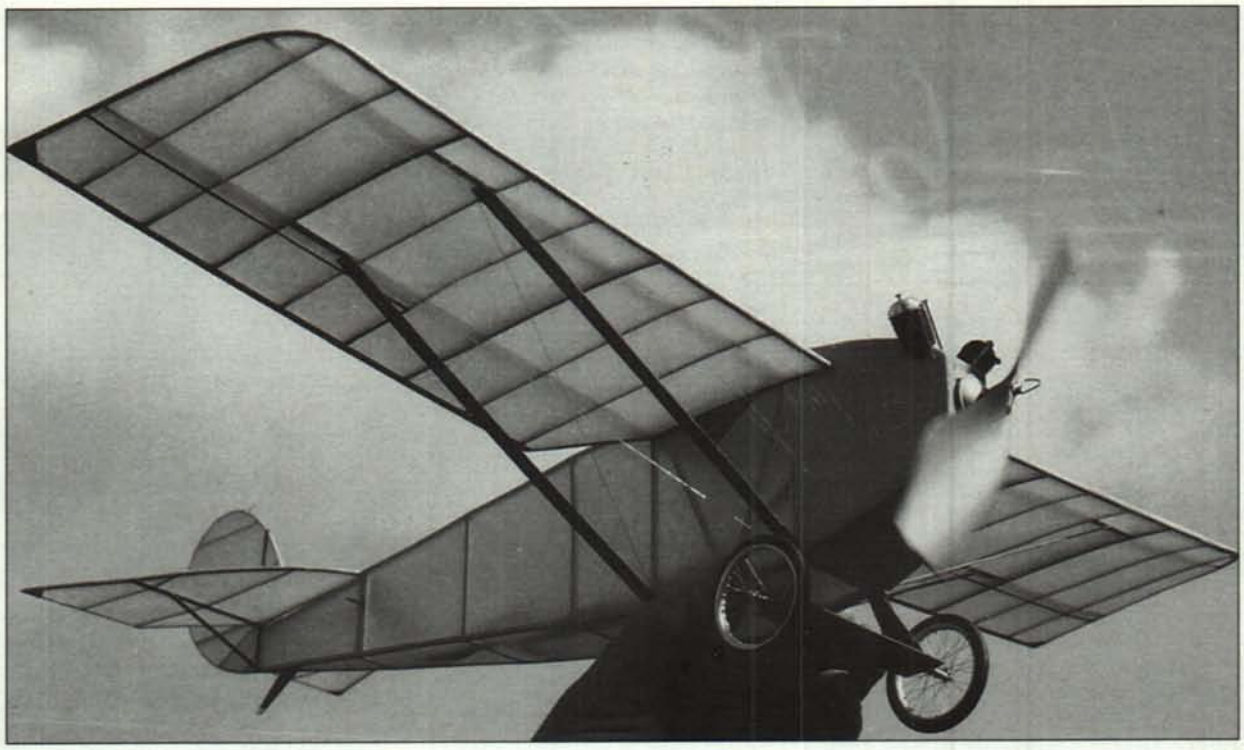
Editor's note: As mentioned in "Workbench," this issue marks the return of the Peanut construction feature that proved so popular in years past. Presented here is an old favorite, Walt Mooney's Huntington H-12 monoplane, reprinted from the June 1973 Model Builder.

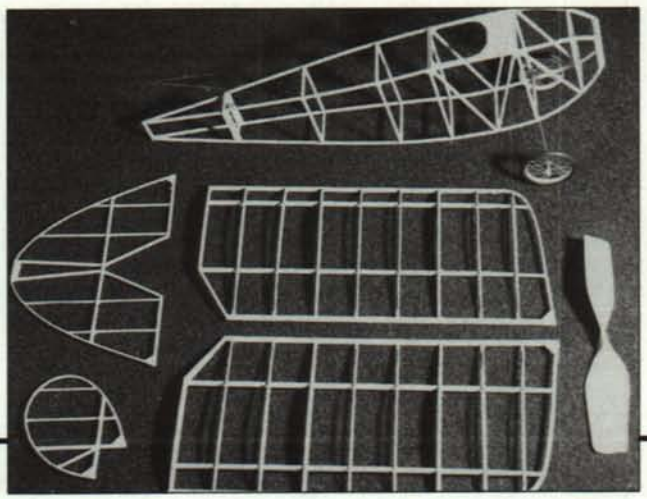
The H-12 is actually a two-for-one feature; in addition to the full-size Peanut plan on the following two pages, we also offer a 19-inch version—see our plans service listing on page 86. Come to think of it, doubling those plans on a copying machine would get you started on a terrific Jumbo Scale project. All sorts of possibilities exist for this neat little ship. We hope you enjoy it.

This is a model of one of the first homebuilt airplanes in the United States. Not that all the first airplanes weren't really built at home, but this was designed after WWI and was actually intended to be built by amateurs. It used a two-cylinder "V" type engine, undoubtedly out of a motorcycle. It was an honest attempt to create an airplane that could be built for minimum cost.

The Huntington H-12 was built very simply and therefore makes a simple model. We have designed the model in a larger size (19-inch span), but in a format that will be reduced in the magazine to a full-size Peanut Scale plan. You can therefore build a Peanut model from the magazine plans, or for a nominal price, you can purchase the larger plans from the *Model Builder* Plan Service.

Both sizes of the Huntington have been built and both fly well. However, it would be dishonest to claim that the model





Above: The Huntington was the first genuine U.S. homebuilt. The structure was purposely kept simple for the amateur plane builder and mechanic. Proportions and surface areas are especially well suited for FF scale. Right: Bare bones of the 19-inch version of the H-12. Tail heaviness resulted in changing to the heavier, stronger and more easily built sheet balsa nose shown on the plan.

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Slab - Rudder - T.O.C. Contestant

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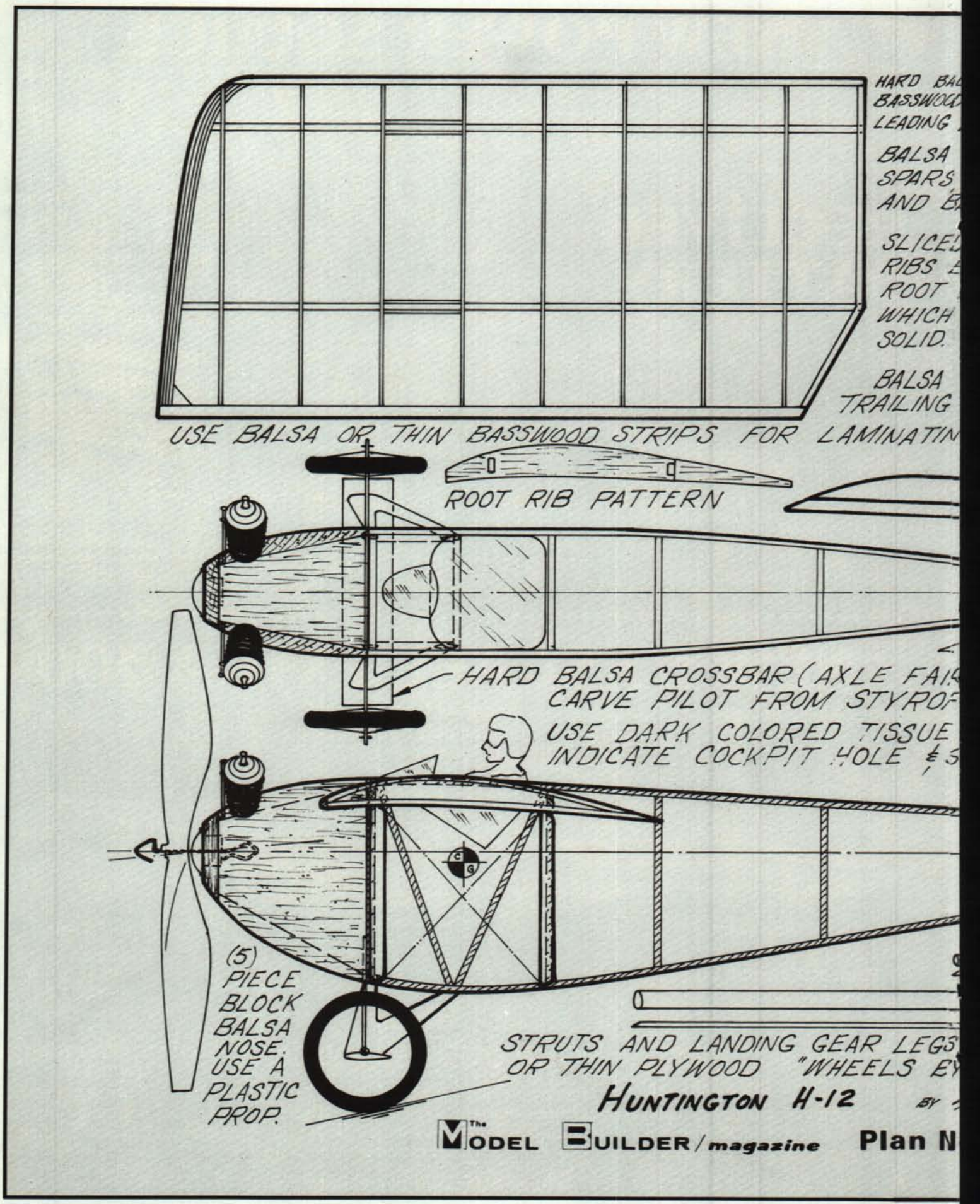
HARD BA
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AND B
SLICE
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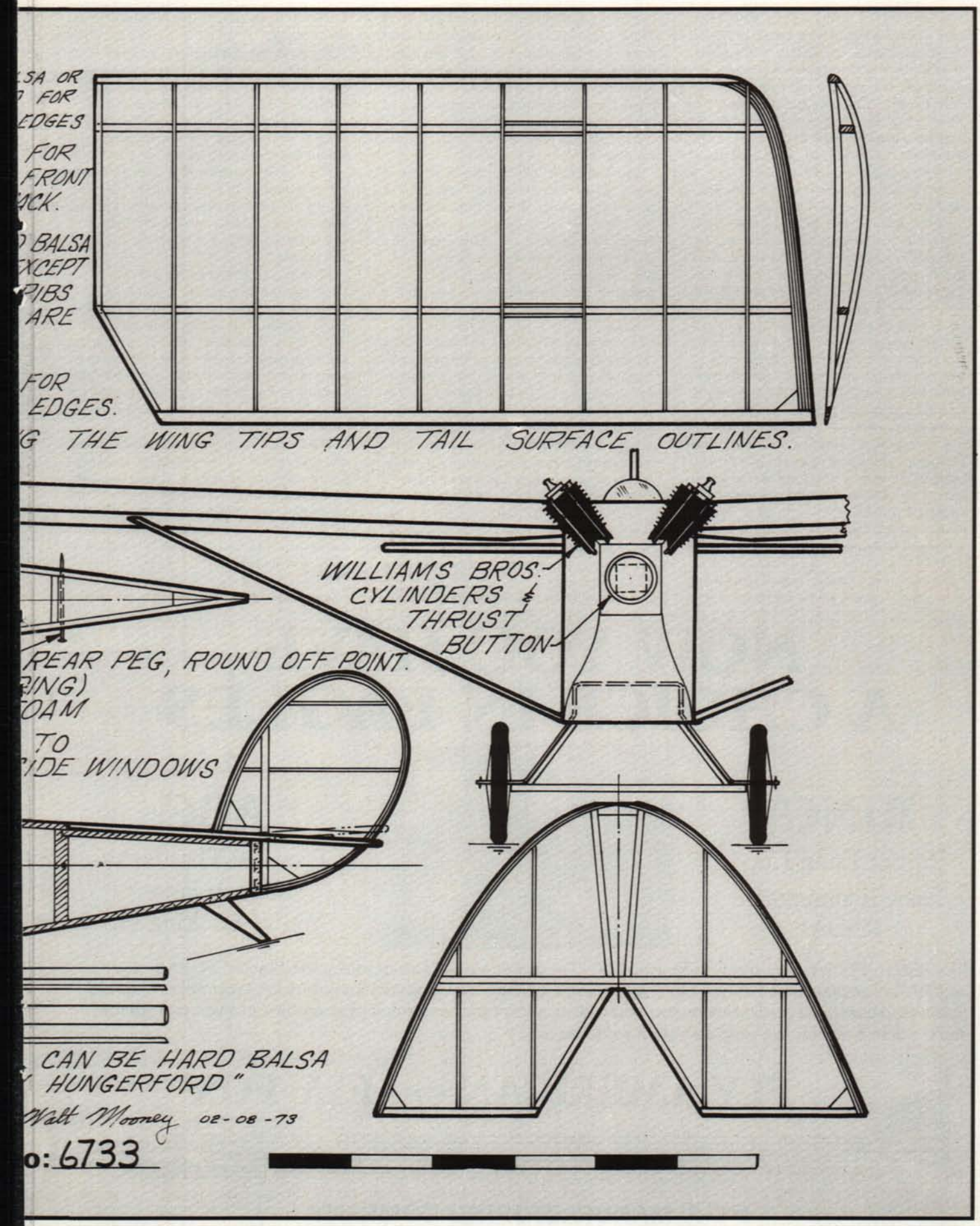
SOLID.
BALSA
TRAILING
USE BALSA OR THIN BASSWOOD STRIPS FOR LAMINATIN
ROOT RIB PATTERN
HARD BALSA CROSSBAR (AXLE FAI
CARVE PILOT FROM STYROF
USE DARK COLORED TISSUE
INDICATE COCKPIT HOLE
(5)
PIECE
BLOCK
BALSA
NOSE.
USE A
PLASTIC
PROP.
STRUTS AND LANDING GEAR LEGS
OR THIN PLYWOOD "WHEELS E
HUNTINGTON H-12
BY
The MODEL BUILDER / magazine
Plan N


SA OR
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FOR
FRONT
ACK.
BALSA
XCEPT
IBS
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FOR
EDGES.
G THE WING TIPS AND TAIL SURFACE OUTLINES.
WILLIAMS BROS.
CYLINDERS &
THRUST
BUTTON
REAR PEG, ROUND OFF POINT.
RING)
OAM
TO
IDE WINDOWS
CAN BE HARD BALSA
HUNGERFORD"
Walt Mooney 02-08-73
o: 6733

flew right off the board. Before it could be trimmed into a stable flight pattern it had to be ballasted to the CG shown on the plans. In addition, it was necessary to add the up elevator shown in phantom on the plans and in the photos. With these adjustments, it was obvious that the nose of the model could have been made stronger and heavier, so the plans were drawn this way. One side benefit from this modification is that a block nose as shown is easier than bending the longerons for the former built-up front end.

Construction of this model is as simple as a little box fuselage monoplane can be. Try to keep the model as light as possible while still retaining adequate strength. Most of the strip balsa should be medium weight. The leading edges of the wings should be hard balsa or even basswood or spruce if desired. These are the parts of the airplane that must survive the hardest knocks.

The wing tips and the tail outlines were laminated. Use .012 by 1/32 basswood, available at model railroad supply stores. Three layers were used around the tail and five layers were used for the wing tips. These thin basswood strips laminate easily using white glue or Sig-Bond for the adhesive. The outlines for this model were wrapped around a line of pins pushed through the plans and into the board to form a guide for the correct shape. The pins must not be spaced more than about an eighth of an inch apart in the sharp bend areas, and waxed paper over the plan is a must to keep the laminations from sticking to the plan. You can cut out a cardboard pattern to laminate around if preferred, using masking tape to hold the laminations to the form. This system must be employed if you are using balsa for the laminations in the interest of lower weight, but with basswood in the thinner sections it isn't really necessary.

Standard assembly methods are used everywhere else. Make the various components by pinning the outlines down over the plan and then cementing the cross pieces or ribs in place. Don't omit the gussets in the corners of the surfaces. Without the gussets, the tissue covering will definitely wrinkle in the corners when it is shrunk.

Note that the landing gear wire is cemented into the fuselage, but that it is not cemented to the landing gear struts or to the landing gear cross axle. This will allow the wire to flex under load without putting any of the load into the wooden landing gear structure. While this technique is not strictly scale (the original airplane didn't have a wire landing gear structure), it hardly affects the appearance and is tremendously more durable.

Details make the model, and there are several that can be used to advantage on this one. First, Fulton Hungerford's wire wheels are used. Williams Brothers' nose thrust button and cylinders are also used. The propeller on the large version is by Testors, but any suitable plastic propeller is really okay.

Struts on the model were made of thin plywood and are thinner than those shown on the plans. If you use balsa for the struts, use hard balsa and stick to the plan thickness. The diagonal wire braces between the wing struts are made from 4-pound test monofilament fishing leader.

The cockpit opening and side windows are simulated with blue tissue doped over the lighter fuselage covering. I don't know how they ever got away with that tiny windshield, but there it is—make it out of thin plastic.

An open cockpit model deserves a pilot. Mine was carved out of a piece of very lightweight styrene foam, the kind used for packing radios and other delicate equipment. It's fairly easy to come by and adds almost no weight to the model. The pilot is painted with plastic model paint and cemented to the model with white glue or epoxy. Regular dope or model cement will dissolve styrene.

The model in the photos flies nicely and will make perfect takeoffs and landings in a reasonably smooth area. It's powered with a single loop of 3/16-inch flat rubber 12 to 14 inches long, and requires about 1/16-inch of down thrust to keep the nose down under the initial power burst. It is adjusted to fly in wide left circles. Best time so far is only 30 seconds, but it's capable of much more under the right circumstances. ***MB***

AIRFOIL PLOTTING BY COMPUTER

I've cranked out this column on a computer word processor for the past three years, written a book with it, and used a personal computer for a little bit of design work, but I'm not very accomplished in communicating with the beast. I know what I want, but sometimes I don't know the exact word, or punctuation, or abbreviation, or whatever, that it demands before it will cooperate. Talk about stubborn! The most stubborn person in the world can't hold a candle to a computer. It says, "You do it *exactly* my way or we don't do business; and I don't always choose to tell you what my way is."

I really prefer model airplane challenges to computer challenges, but when a computer program offers to improve my ability to design, build or fly models, I may be interested enough to learn to use it.

Anyhow, I now have a computer airfoil plotting program, and have used it successfully. The program is from Cygnet Software, 3525 Del Mar Heights Road, Suite 237, San Diego, CA 92130; (619) 792-8021. The owner, Bernard Crowe, is a modeler as well as a computer programmer.

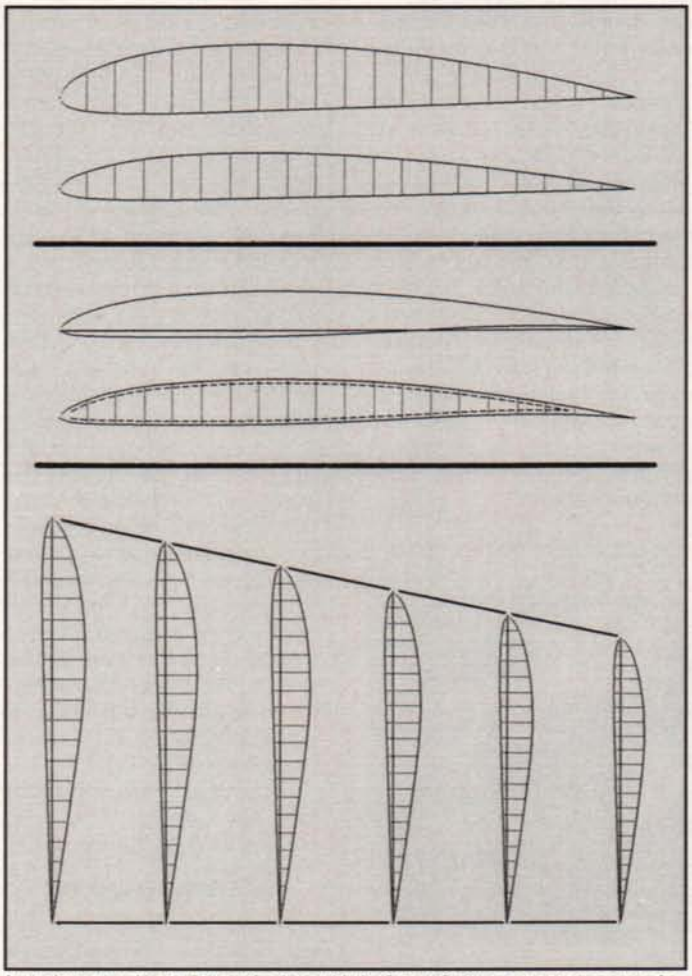
The name of the Cygnet program is *Foiled Again!!!* The program is for IBM-type machines and requires a dot-matrix printer. A complete, 26-page, *Foiled Again!!!* user's manual is provided, and the program is "user friendly."

Foiled Again!!! will plot 94 different standard airfoils from the two disks I have. Cygnet says they will be putting out a number of disks with other airfoils in the next six months. I have the first of this series, which includes all of the Selig-Donovan and Fraser soaring airfoils, Epplers and many others.

I was a little disappointed when I first looked at the airfoils these two disks provide, because they are mostly modern soaring and antique types; very few NACA airfoils, for instance. I almost always use an NACA 0015 symmetrical on my sport aerobatic models, and the disks didn't have it.

My concern was short-lived, however. It is easy to do your own simple programming, to increase or decrease either the thickness or camber, or both, of any of the airfoils listed. They did have an NACA 0009 symmetrical foil. In two strokes on the keyboard, I had it thickened to the 0015 I wanted. There were other symmetrical airfoils I could have changed just as easily. Or I could take any one of about 90 non-symmetrical airfoils, reduced their camber to zero with a couple of keystrokes, and made hundreds of symmetrical foils of any thickness and thickness distribution.

So if you have enough of a background of aerodynamics to know the airfoil shape you want, and it isn't in Cygnet's current data, you can easily and rapidly tailor the closest one to suit your specific needs. The chord length can be specified anywhere between half an inch and 24 inches.



Just a few examples of what can be done with the Cygnet Software computer program for plotting airfoils. Top: The standard Clark Y and the same airfoil thinned to 8% thickness. Center: An HQ3.0/8 with and without skin thickness allowance. Bottom: The Eppler 205 section plotted in incremental lengths for a tapered wing. Airfoil plots courtesy of Bernard Crowe of Cygnet Software.

In the competition free flight and RC sailplane phases of our hobby, the choice of airfoil can sometimes determine the winner. Also, in pylon racing, pattern, and CL stunt, speed and combat, the airfoil selection is important.

My modeling efforts are restricted to RC sport aerobatics these days. Consequently, I like a fully symmetrical airfoil so I have the same performance inverted or upright, and in both inside and outside maneuvers. Also, a 15% thickness is a good compromise between speed, max lift coefficient, stall characteristics and spar structural depth.

The thing I am personally going to enjoy most about using the *Foiled Again!!!* airfoil plotting program is its ability to greatly simplify the design and construction of tapered wings. I usually design tapered wings for my models because they are superior both structurally and aerodynamically, and I like their looks.

With this program, all I have to do to get an exact pattern for every rib in a tapered wing is to specify the root chord, the tip chord, and how many ribs there are, and it will print all of them. It then is very simple to tack-glue (with rubber cement) the resulting patterns to sheet balsa, cut out the ribs, and peel off the patterns. The program also can plot out all the ribs in an elliptical or parabolic wing, can plot the ribs for a geodetic wing structure, can allow for wing skin thickness, can change the thickness of the trailing edge, and can probably do other things I haven't yet discovered.

In plotting a rib shape that has been corrected for skin thickness, the program takes off some of the true airfoil as re-

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HANNAN'S HANGAR

BY BILL HANNAN

"With sticks of balsa I must play. And tissue thin and wire like hair. And launch it all upon the air."

Our lead-in this month is part of a whimsical poem by Stuyve Pell, of Princeton, New Jersey. The point it offers is that we need to step back from the more serious aspects of our hobby now and then, to re-examine our priorities. Are we taking ourselves too seriously?

MODELER'S MOTIVATION

Model editor Fred Henderson, writing in the November 1973 British magazine *Air Enthusiast,* asked: "What really motivates the aircraft modeler? ...Are we really, as many of the fair sex of our acquaintance aver, little boys at heart with a penchant for remaining so, indulging in an innocuous form of escapism? ...We are often asked what practical use can a model of an aeroplane possibly have; how we can possibly justify the innumerable hours of patient application that have been absorbed by something which, once finished, does nothing useful?

"The Rat Baron," by Tim Hayward-Brown, of Australia, is his interpretation of Harry Barr's 1979 *Model Builder* "Hangar Rat" design.

"...At such times we are tempted to indulge in a little precocity; to quote the old adage that a thing of beauty is a joy forever, and to ask what useful purpose is served by the *Mona Lisa* occupying wall space in the Louvre. After all, Leonardo da Vinci, between knocking off La Gioconda and *The Last Supper,* indulged himself in the odd models of his early concepts of flying machines. Aeronautical modeling is simply another art form, and what motivation is needed by an artist? Furthermore, does everything *have* to have a practical use? If aeronautical modeling gives pleasure to some that behold the end product, then it *has* a useful purpose."

LANGLEY'S STEAMER

Robert Sennett, of Warsaw, Indiana, favored us with an article by Frank G. Carpenter, an eyewitness to a flight of Samuel Pierpont Langley's 14-foot span, steam-driven, tandem-wing model, which was flown from a houseboat over the Potomac River. We extracted the following comments: "I saw this machine, made chiefly of steel, weighing as much as a four-year-old boy, yet so large that it would just about fill the average parlor, moved by a steam engine which was a part of it, dart forth from the launching stage and fly in an almost straight line over three-quarters of a mile.

"...It continued to fly in the straight horizontal line until the water which furnished the steam was exhausted, when it slowly but gracefully swept down and rested upon the water. It lighted so gently that not a bit of the machinery was injured, and had it not been that evening shades were falling, it could have been flown again. I have never seen any inannimate thing look so like a thing of life."

Remember now, this flight took place during 1896, long before the Wright brothers flew!

INTER-GNATS

Tried a Pistachio Scale model yet? 'Tain't easy to build such a tiny (eight-inch wing span) model, let alone make it perform properly. Yet, the recent World Pistachio Inter-Gnats in Florida attracted 41 of them, representing five different countries, including England, Israel, Japan, Switzerland and the U.S.

Certainly such models can severely tax one's patience and dexterity. However, consider the plus side of the ledger: What other type of flying model may be entered on an international level so economically? The cost

How would you like to cut out the wing ribs for this one? Akira Igami, of Japan, launches his 20-winged Phillips multiplane. And, yes, it does fly!

of the construction materials is minimal, as is the postage required to mail such a model to contests anywhere in the world. So far, events for Pistachios have been conducted in Belgium, England and the U.S.

Another advantage is the relatively small flying site needed; actually not much larger than needed for the Mini-Stick models. Both genres have surprising popularity among spectators, incidentally.

Returning to the Florida event, conducted by the Miami Indoor Aircraft Model Association, we were pleased to note the outstanding variety of entries: Nieuport N1-D sesquiplane (the top scale pointer), Sopwith Triplane, Fokker triplane and a D.VIII, Lockspieser canard, Waco E bipe, Messerschmitt M-18 and M-20, Renard R-17, Curtiss Jenny, Dyke Delta, Handley Page Sayers, and even a Gossamer Condor!

Top duration was achieved by the Messerschmitt M-20, which stayed aloft for 59.3 seconds. The smallest model, a "Ridotto" Wee Bee, spanning

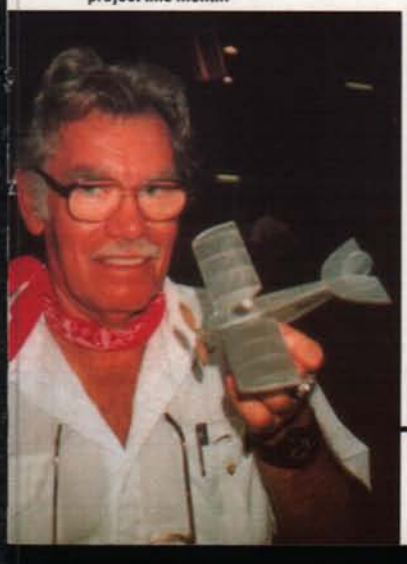
six inches, flew for 33.1 seconds. Our thanks to Doc Martin, Dave Linstrum and Mike Arak for sharing their contest reports.

SPEAKING OF THE GOSSAMER CONDOR

Dr. Paul MacCready, famed for his leadership of person-powered aircraft teams, is also a supporter of simpler forms of aeronautics. He and some of his associates recently appeared on a Public TV creativity program, testing small flying wing gliders with a group of children. Then too, Mark Fineman sent us a clipping from a Connecticut newspaper showing MacCready flying a Delta Dart model (described as a "rubberband-powered glider") at a New Haven grade school. Fun!

FAREWELL BUTCH HADLAND

One of England's best-known aeromodelers, Butch Hadland, passed away during April. A first-rate craftsman, Butch specialized in free flight flying scale, with particular interest in indoor competition. He authored numerous articles, and also designed kit models. Once a professional modeler, he had more recently taught aircraft maintenance and theory. Long active in proxy contests, including those sponsored by *Model Builder* many years ago, it seems rather ironic that he died within a few days of the Florida Inter-Gnats, in which one of his models took part. Our condolences to his family and worldwide circle of model building friends.



Artist Millard Wells holding his Huntington H-12 Pistachio, which flew for 48.8 seconds. By coincidence, the H-12 is also our featured Peanut construction project this month.

RC ORNITHOPTER FOLLOW-UP

In an earlier Hangar column we mentioned the radio controlled ornithopter successfully flown by Jeremy Harris of Ohio and James DeLaurier of Canada. Thanks to Lee Sheets, of Park Forest, Illinois, we have additional information: Spanning nearly 10 feet, the 10-pound craft is the result of some 20 years of experimentation. Its best duration as of mid-April was 2 minutes, 46 seconds, with the limiting factor being the capacity of its fuel tank. Powerplant details were not provided, however the model's configuration is conventional, resembling a high-wing trainer, except for the flapping wing panels, and the controls apparently include a regular rudder and elevator.

Another of Fritz Mueller's creations is this CO_2 powered autogyro, with exceptionally slow-turning rotor blades.

COMMERCIAL CORNER

New products continue to arrive, and here's a summary of the most recent.

SAM Italia Annual is the first in a proposed series of Italian "Old Timer" publications. The softbound 96-page book presents a comprehensive look at Italian modeling history, and even Old Timers in the Soviet Union. Subjects range from fairly simple gliders to esoteric engine powered free flight and control line types. Model engines also receive considerable coverage, ranging from compressed air through diesels and gas types. Usefully, the text features both the Italian and English languages. If you like obscure and unusual plans, this item belongs on your bookshelf. Price and ordering details may be obtained by sending two International Reply Coupons (available from most Post Offices) to: Roberto Marzoli, President, SAM Italia, Via Cavour, 1 20043 ARCORE (M1) Italy.

Fritz Mueller's Brown Junior CO_2 powered, radio controlled G-Ray-02 looks as if it would be equally at home underwater!

CO_2 NEWS: Among the propulsion choices for our models are the CO_2 power-plants now gaining more followers, as the advantages of CO_2 become more widely known. Currently such systems are being manufactured in England, Czechoslovakia, the former Soviet Union and the U.S. A comprehensive book on the subject, authored by Klaus Jorg Hammerschmidt, has just been published in Germany, and we will present a complete description of it in a future column.

Meanwhile, Thomas Ogden, 27 Cortland St., Norwich, NY 13815 has formed a sort of clearing-house for CO_2 enthusiasts. Presently he is asking anyone interested to send him their names and addresses, with the object of exchanging ideas and information. He offers copies of the Czechoslovakian *Modela* systems translated to English, for a very reasonable 50 cents.

Ken Ketner, P.O. Box 65135, Lubbock, TX 79423, is currently marketing new Telco units. Write to him for prices and details.

Peck-Polymers has long been a supplier of Brown Jr. and other brands, as well as Williams Brothers nylon propellers for such powerplants.

On the other hand, if electric models are your specialty, you should be aware that HiLine Ltd., formerly operated by Tom Schmitt and Don Srull, is now owned and operated by Dave and Marie Rees, who intend to continue the product line, in-

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George Benson's "Clark-Y Bostonian," so-named for its lifting fuselage, is a perfect example of uninhibited design.

MB GOES TO OZ

A report on the 1992 Australian Old Timer Champs

PLUG SPARKS BY JOHN POND
PHOTOS BY BOB MUNN, JOHN FRENCH & JOHN POND

Part of the Twin Pusher Flyoff, l to r: Brian Beasley, Max Starrick and Basil Healey. Brian won with an O.O.S. flight, fortunately was recovered the following day.

Because this year marks the tenth running of the Australian Old Timer Championships at Canowindra, New South Wales, this columnist was commissioned to report on the Champs staged annually by the parent body, SAM 1788 (so numbered to recognize the founding date of the first colony in Australia).

Old Timer events are Old Timer events; that is to say, most all of the events started in the U.S. are carried in the SAM 1788 program. There is one major difference between the U.S. and "Oz" contests in that whereas U.S. contests will have four or as many as six RC events in one day, in Australia, one event is spread over one whole day, giving a rather laid-back attitude while all the time trying for a max flight.

Australian clubs break up the entries into groups of five or six, with a team captain responsible for seeing that all his members get in their flights for each particular round. Both the Texaco and Duration events have five rounds; the best four count. Those contestants having four maxes are then required to make a mass flyoff with no max. The last Duration event found eleven models in the flyoff, with at least six of them being Playboy Seniors powered by McCoy .60 engines. Winning times were all over 40 minutes!

Lionel Jones successfully competes with this big nine-foot Ben Shereshaw "Champion," placed 3rd in Texaco Open. O.S. 61 4/c is fitted with his own design camshaft-driven breaker point setup.

Fine flying shot of Dennis Parker's free flight Ohlsson 60 powered Goldberg Sailplane. Took 2nd in the O.T. Power event.

The max time requirements for those events seem rather low, but one must remember that the idea of flying Old Timers in Australia is to get as many fliers as can be mustered for the flyoffs. This is always quite spectacular to watch. Max time requirements for Texaco is ten minutes, while the Duration events call for five-minute flights. With 55 pre-entries in Texaco and 48 in Duration, the team captains have their work cut out for them in seeing that those on conflicting frequencies do fly in the hour-and-a-half round.

The Australian SAM Champs have a feature that I particularly like, and that is the processing of all models for conformity to plans, weight, and size. The first day of the Champs is set aside for checking both models and radio frequencies. The latter must be done prior to the meet by a licensed radio technician and certified correct as to frequency. If one considers there are better than 40 frequencies available, and the spread between them is very close, this item is important.

While this is going on, the Control Line Stunt event is run at the park area adjoining the building employed for processing. Ever since its inception (about six years ago), this event has proven to be very popular. Of course, like all events, the best designs dominate the flying. In this case, the Veco Chief powered by a Fox 35 was by far the best flier and winner.

Other events held on days following the Texaco and Duration events are the 2cc gas event (a combination of Texaco and Duration), 1/2A Texaco, and O.T. Glider. All in all, there are five days of flying, processing, plus the Annual General Meeting and the Awards Banquet, all quite similar to the U.S. program.

John Abbott placed 2nd with his Veco Squaw, a popular vintage control line design.

Well, after that lengthy introduction to Australian O.T. flying, let's get into the odyssey of my wanderings, participation and general coverage of the Aussie O.T. Champs.

To begin with, after I had decided to attend, arrangements were made with John Quigley of Sydney to stay at his place and drive to Canowindra in central N.S.W., about 200 miles west of Sydney.

Packing posed a bit of a problem, as I took along a box slightly larger than a standard suitcase, containing a Gordon Light Wakefield, a Vic Sorenson Single Stick Pusher, a FF Arden .09 powered Strato Streak, and a 1/2A RC Texaco Anderson Pylon. These were just to keep me busy on the side, as I already had models waiting for me in Australia—an Orwick .64 powered Lanzo Bomber for Texaco, a 76-inch wingspan Dallaire Sportster, and an Italian DG-67 O.T. glider. This plus the box and Quigley's models completely filled his Ford Taurus.

Harold Stevenson, well-known speed engine manufacturer, shown with one of his M/S engines in a Zipper.

View of the RC flight line showing some of the 55 pre-entries in the very popular Texaco event. Interestingly, the two Texaco events were not completely dominated by Lanzo Bombers, as is frequently the case in the U.S.—see results.

Anyone contemplating going to Australia will be confronted with a one way trip of 8,000 miles, with at least two stopovers, adding up to better than 19 hours on your duff...ouch! Getting through the Australian customs was rather simple. Having only one bag and the model box made declarations easy to pass.

Gordon Burford (kneeling), noted Aussie engine builder, is seen here with his Elfin 1.8 diesel powered Lanzo Bomber, along with Anthony and John French, plus author John Pond.

Naturally, the first order of business was to open the lightweight aircraft box to ascertain hangar rash. With a box built with lightness in mind, the first day in Sydney was spent repairing tissue holes, cracked wood spars, and using mending tape to repair tears and rips in the various type coverings.

Next on the list was to get the RC sets certified on short notice. Fortunately the proprietor of "Wings N' Things" in Gladesville was most cooperative in having the set certified and did it in two days. Great service!

After rounding up a new Acubra hat, a folding director's chair, and miscellaneous fuel ingredients, we were ready to go! (Sydney is a big town of three million, so considerable travel was involved.) Outside of the main freeways, most all highways (and even some freeways) are two-lane roads. When one considers that Australia has two million less population than California, one can understand the tax base and the amount of highway funds available. A good job is done for what they can finance!

Ray Martlew of West Australia couldn't get a McCoy 60 for his RC Playboy (a very popular combination down under) so used a Mamiya 60 instead.

A word of caution to the traveler to the hinterlands of Australia: make darn sure you have your accommodations reserved well ahead of time! I was lucky to find a room left vacant by a free flighter leaving for a big meet elsewhere.

All that was left was to settle down for a beer. Australian beers are, for the most, excellent pilsners. As such, there is terrific competition among the states for beer sales. Every state has its own beer they take pride in. Best way to get in trouble is to ask for a Carlton draft (or Fosters), a Victorian beer, in South Australia. You soon learn to order West End beer!

THE CONTEST

Canowindra (pronounced Can-an-dra by the Aussies) is a small farming town claiming to be the "Ballooning Capital of Australia." The fall weather, for the most part, is excellent, with mild temperatures and little wind. It was for this reason that Canowindra was picked as the permanent site of the Australian SAM Champs.

One of several Super Quakers that appeared using a Rossi 40. This one by Mark Collins of Melbourne is equipped with a retracting single wheel as per the original.

The field(s) is generally a little different each time, as the area is rotated for crops. This assures you will always have a smooth, grassy surface from which to fly. In addition, with the very low wind velocity (ideal for ballooning) and low prospects for rain, it is small wonder that the field is so popular with the SAM group.

After processing the models, I joined Quigley at the Canowindra Municipal Park for

A Midwest "Jabberwock" rubber cabin model built by Bruce Abell and flown by John Pond.

the O.T. Control Line event. No question about it, practice has made Quigley outstanding with an old Fox .35 powered Veco Chief. Quite a good group from the Ryde-Epping Model Aero Club was on hand on a Sunday. The club has been successful in obtaining use of the field for their activities. What a great change compared to the general attitude in California!

The following day, competition started in earnest in the RC Texaco event. Two types of Texaco events were run: the first, similar to that flown in the U.S., allowed any type of engine (including four-strokes) and of fuel. Most surprising was the repeat performance by Bruce Knight, SAM 1788 treasurer, in winning this particular event. A very steady flying Lanzo Bomber with a four-stroke Enya 60 did the trick.

Standard Texaco was won by Californian Dennis King, an active SAM 21 member, using his old Powerhouse powered by an Anderson Spitfire with spark ignition. He also was a repeat winner at Canowindra. This Texaco event is for original size models using the fuel provided by the officials. The Spitfire engine, as manufactured in the U.S. by Marvin Miller, runs excellently, a credit to the fine workmanship of Miller and the excellent restoration of the original dies. Those who have ordered this engine have not been disappointed.

Might be interesting to point out that three Californians showed at this meet: Dennis King, John Pond, and Bob Munn. Speaking of Bob, he had a beautifully silked Carl Hermes "Hayseed" that flew as good as it looked. The reader won't find him in the results, as Bob was anxious to see friends in Adelaide (about 60 miles away) that evening. Would you believe it, on four consecutive max flights, he deliberately avoided the landing circle so he wouldn't have to stay for the fly-off!

The landing circle abandoned by the parent SAM body in U.S. still acts as a great separator in Australia for those wishing to make complete flights. The landing circle is in force for all the RC events, so one eventually gets used to the idea of planning ahead to land in the same general area.

SAM 1788 also uses the SAM Champs as a vehicle for the Annual General Meeting, where the membership can express its opinions. The new president, Joe McGuffin, ran an excellent meeting without much controversy. The main subject was the approval of the revised SAM rules and their incorporation into the MAAA national rules. In the end, it was decided that all future SAM meets are to be governed by the rules published in the Model Airplane Association of Australia rulebook.

Good flying shot of a Grosse Flying Wing, built for RC 1/2A Texaco by John Bannerman, SAM 1788 vice-president.

Our intrepid columnist, John Pond, seen with his long-wearing Acubra Australian cowboy hat. Note all the Australian commemorative badges from past meets.

Little-seen Modelcraft "Scout" in flush wing configuration, by Alan Laycock of Canberra, A.C.T.

This should warm the heart of Mike Granieri as John Quigley placed in Open Texaco with Mike's M-G Cabin design.

Half-A Texaco day was another beauty, with Playboys dominating the action. As a sidelight, during the Duration events, I walked up and down the line and counted 24 Playboy Seniors with McCoy .60 engines. Talk about boring holes in the sky! In the flyoffs, the winning time was over 40 minutes with seven other Playboys circling under the same big cumulus cloud. This did make for another long day.

What! Pond with a Lanzo Bomber? This one with a hot Orwick 64 was a handful to fly in both the Texaco and Duration events.

That night, the annual Awards Banquet was staged in the Canowindra Service Club. Prizes consisted of large, well-made plaques. Much to my surprise, I was

Gorgeous overhead shot of a Carl Hermes "Hayseed" flown by Bob Munn, one of the three Californians attending the SAM 1788 O.T. Champs.

honored by awards consisting of an honorary membership in SAM 1788 and a most unusual SAM Appreciation Award to those who have made SAM what it is today.

Inseparable pals, John Quigley and Basil Healey, test flew Pond's Italian DG-67 RC glider at the Canowindra Caravan Park.

We have so far been talking about the largest portion of the meet, radio control, but there was a pretty fair turnout for the free flight O.T. events. These were held upwind of the main RC flying area. During one of the afternoons while at the "Roach Coach," John French pointed out a small FF rubber scale model, a "Chambermaid," up against a large cumulus cloud. Although it had only a 22-inch wingspan, the yellow color gloved against the blue sky for what seemed an eternity before disappearing.

During this time, Dennis Parker (owner of the errant model) drove by with Bruce Abell on the outside following the model. As it turned out, the model drifted toward town allowing them to follow the model for over 30 minutes. The model landed about 300 yards from the field!

Another surprise was the twin pusher by Brian Beasley, which went out of sight on a real boomer. One doesn't often witness twin pusher flights like that, as the tremendous drag of the open sticks and rubber pretty well rule out any sort of a decent glide. Believe it or not, it was recovered the next day. In short, it was simply great free flight weather.

Well, it couldn't last forever. On Monday, April 20, a stiff, cold wind came up and never abated. Finally, around eleven o'clock, the 2cc Gas and the O.T. Glider events were scrubbed. This was truly a disappointment, as three of us all had Italian O.T. gliders—John Quigley with an R-42, Basil Healey with a "Gibli," and I had a DG-67. Nothing left to do but to pack up and head towards Wakerie, site of the 45th MAAA Nats. But, that's another story! ***MB***

10TH ANNUAL SAM 1788 OLD TIMER CHAMPS

CONTROL LINE

1. John Quigley (Chief/Fox 35)
2. John Abbott (Squaw/Frog 500)
3. Geoff Shaw, Jr. (Nobler/Fox 35)
4. Albert Fisher (Chief/OS 29)
5. Derry Brown (Chief/Merco 35)

RADIO CONTROL

Texaco Open

1. Bruce Knight (Bomber/Enya 60 4/c) 4009
2. John Bannerman (Westerner/Enya 40 4/c) 3728
3. Lionel Jones (Champion/OS 61 4/c) 3499
4. John Quigley (MG Cabin/OS 60 4/c) 3468
5. Joe McGuffin (Dallaire/Enya 46 4/c) 3384

Texaco Standard

1. Dennis King (Powerhouse/Spitfire) 3544
2. Allan Mowat (Bomber/Enya 60 4/c) 3222
3. Paul Baartz (Bomber/OS 61 4/c) 2466
4. Alan Wooding (Miss America/Cyke) 2460
5. Don Newell (Dallaire/OS 61 4/c) 2451

1/2A Texaco

1. Ian Avery (Playboy Cabin) 2747
2. Basil Healey (Playboy Cabin) 2615
3. Geoff Shaw, Jr. (Playboy Sr.) 1840
4. Paul Baartz (Anderson Pylon) 1806
5. Michael Moore (Playboy Cabin) 1680

Duration

1. Lionel Jones (Playboy/McCoy 60) 4279
2. Craig Thornton (Playboy/McCoy 60) 4018
3. Tom Watson (Bombshell/Dooling 61) 3700
4. John Whittaker (Super Quaker/Rossi 40) 3648
5. Wayne Vaughn (Super Quaker/Rossi 40) 3627

Duration Standard

1. Ron Goldsworthy (Playboy/OS 61 4/c) 2775
2. Harold Stevenson (Yates Pylon/Rossi 40) 1948
3. Allan Mowat (Playboy/ASP 40) 1749
4. Joe McGuffin (Playboy/Rossi 40) 1637
5. Dick Showbridge (Rambler/ST G34) 1631

2cc Gas/O.T. Glider

(Both blown out, high winds)

FREE FLIGHT

F.A. Moth

1. Brian Beasley 134
2. Peter Werczyk 90
3. Max Starrick 81
4. Norm Bell 70
5. Allan Laycock 68

O.T. Rubber

1. Brian Beasley 454
2. Bill Gordon 326
3. Max Starrick 324
4. Bruce Abell 291
5. Bob Munn 277

Vintage Power

1. Craig Pearson 488
2. Dennis Parker 409
3. Alin Pearson 160

Vintage Glider

1. Craig Pearson 356
2. John Tidy 317
3. Alin Pearson 253

Old Timer Power

1. Alin Pearson (Kerswap/ED Comp) 400
2. Dennis Parker (Sailplane/O&R 60) 277
3. Brian Beasley (StratoStreak) Crash

Vintage Rubber

1. Bill Gorden 540 + 171
2. Max Starrick 540 +131
3. Brian Beasley 360

Rubber Scale

1. Max Starrick, Blackburn Skua
2. Alin Pearson, Moth Minor
3. Dennis Parker, Rearwin Speedster

The unrivaled retrieval team, Dennis Parker and Bruce Abell, after their 30-minute "Chambermaid" flight—most unusual for a 22-inch rubber speed model!

HASTE MAKES WASTE, BIG BIRDS STYLE

Last month, while visiting a local Big Bird fly-in, I spent more time trouble-shooting than flying, the result of not doing a complete spring checkup on my Big Bee. The battery packs had been cycled, the structure of the plane thoroughly inspected, and the engine's valves adjusted. Unfortunately, I ran out of time and was unable to run the engine at home prior to leaving.

Normally my Saito 270 springs to life with just a touch from the starter, so at the field, after five or six seconds of cranking, it was apparent that the engine was not going to start. My flying partner, Chuck Willcox, was helping me, and as I operated the throttle, Chuck noticed that the timing wheel on the CH spark ignition system was not moving with the throttle linkage. We found that the plastic timing wheel on the ignition system had swollen on its mount and would not rotate. A knife was used to scrape off material until the timing wheel again moved smoothly on its mount.

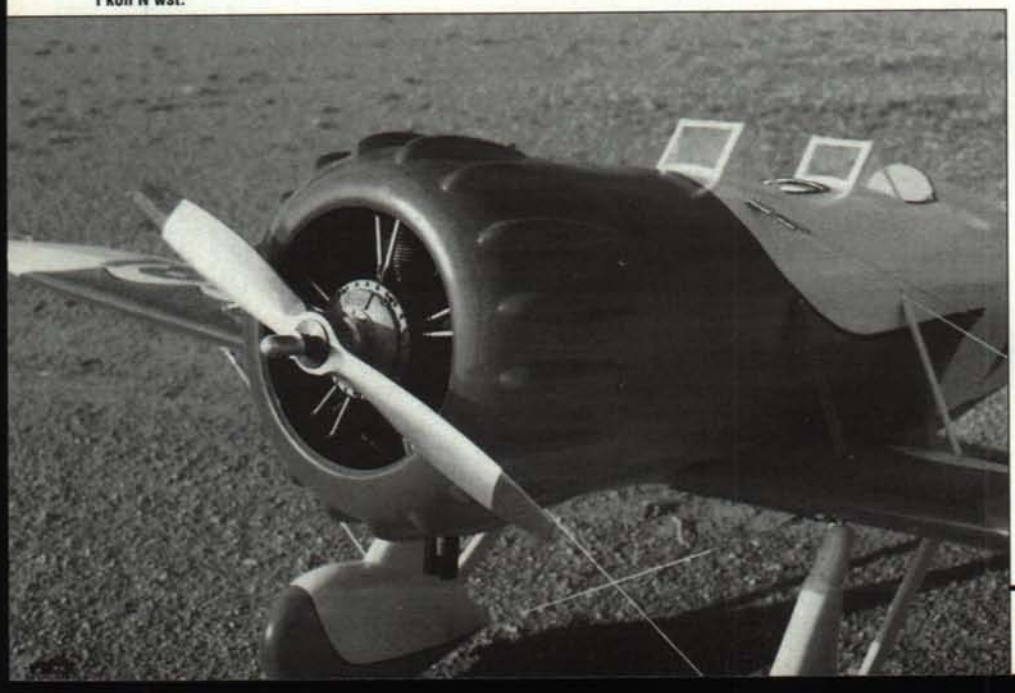
Another attempt was made to start the engine. I was operating the throttle and trying to focus my bifocals on the operating mechanism when Chuck said he thought the gap between the Hall Effect Generator and the timing magnet looked excessive. I remembered putting the HEG in with silicone rubber and decided it was probably secure.

We took a break and when we came back, I decided to have another look at the HEG. Chuck is seldom wrong, and he was right again. We quickly adjusted the HEG to .010-inch, a drop of CA glue secured it and on the next try, the engine sprang to life just as it usually does.

I despise doing maintenance at the flying field, because I'm there to fly and flying time is at a premium. Also, it often ties up a frequency that someone else could be using. Fortunately, despite the 65-plus planes at the Basin Big Bird Fly-In, mine was the only one on channel 30.

Ralph Graham enjoys flying his Sig Spacewalker. It has flaps and is powered by a Kawasaki 3.3 cu.in. engine with CH spark ignition.

Joe Forbes' Gee Bee Model Y Sportster looks great with a five-cylinder Saito radial under the cowl. Kit is available from I'kon N'wst.



SCALE MODEL RESEARCH

Attending fly-ins and meeting old and new friends is enjoyable. It is interesting to observe equipment variations from area to area. For instance, when I go to Canada to fly with the RCFCBC, most of the Big Birds will be Quadra powered. In the Seattle area, multi-cylinder four-strokes are popular, as are the big Sachs and Zenoah engines.

One plane that's popular no matter where you go is the Piper Cub. Cubs usually are the standard yellow with black trim, but there are a lot of variations, too—from the small Sure Flite all-foam type to Balsa USA's 1/3-scale giant.

Every conceivable type of powerplant is used and the venerable Cub will fly well on all of them. Whether overpowered or underpowered, it keeps chugging along, giving its owner hours of pleasant flying. The Cub may be as docile as a kitten or a real tiger, depending on the pilot's choice of powerplant.

Should you decide to build a Cub and

want a different color scheme, Scale Model Research is an excellent source of reference. Bob Banka has over 75 Cub photo packs; the wide range includes J-3s, L-4s, L-18s, and many more. He is very helpful in choosing a color scheme that will suit your tastes. For a catalog, send $4 to Scale Model Research, 2334 Ticonderoga Way, Costa Mesa, CA 92626.

I recently phoned Bob seeking a color scheme for my Cessna 180. The old bird was covered mostly with yellow Oracover, so I wanted a yellow scheme. Bob had one set of pictures of a Cessna 180 that was deep yellow with red trim and a black pinstripe. I asked if the scheme was tastefully done, because red and yellow can sometimes be awful. Bob gave his blessing to that particular scheme and, sure enough, it was just what I wanted.

Bob was also able to supply a three-view of the 180, which was in Australian Army camouflage. If I mess up the yellow paint job, the cammy one can be substituted.

WRAPPING MATERIALS

RC pilots never cease to amaze me. They will spend hours making a really nice model. No expense will be spared on the radio. Only the best engine will do. Only the best is good enough for this person's latest project.

That is, until it's time to wrap that expensive receiver in something to keep it from rattling around inside the plane. I have seen every imaginable type of material used, from nothing to rags. The same is true for battery packs. What's worse, modelers sometimes get angry when you tell them they need some better packing around these items!

Vibration from the powerplant is a real killer and can affect every part of our radio systems, from the wiring to the major components. Do yourself a favor and take the time and expense to pack your receiver and

continued on page 80

Jack Voegler did a fine job of building this Hurricane from a Roy Vallaincourt kit. It flies very well with a Zenoah G-38 for power.

Fred Pierce says his "Taurus Plus" is a good sport flier. It is kitted in Germany and imported into the U.S. by Hobby Lobby. The big ship weighs eleven pounds, has an 82-inch wingspan, and the flaps make landing a breeze. An O.S. 1.20 four-stroke provides the thrust.

Author's two favorite Sea Furys—#8, "Dreadnaught," belonged to Walt Hale and John Bollie. Unfortunately it crashed shortly before its full-scale counterpart arrived at Madera. Bob Heitkamp flew Red Dog Saloon to first place in the Bronze Trophy Heat.

ELECTRONICS CORNER

BY ELOY MAREZ

Ball Bearing Servo Conversion

HOW YOU CAN UPGRADE YOUR INEXPENSIVE PLASTIC BUSHED SERVOS TO THE MORE DURABLE BALL BEARING TYPE.

Ball bearing servos are generally considered superior in most respects to their less-expensive plastic bushed counterparts. When so equipped, a servo will have the ball bearing installed in the upper case, so that it supports the output shaft where it exits. This is the point at which whatever load is applied to the output wheel transfers to the junction of the shaft and upper case. Any excessive load can possibly cause binding at this critical point, and will in time cause some wear which will then allow the shaft to shift enough to cause some control problems, especially in high-performance airplanes. A related problem can occur with servos in which the internal feedback pot is mechanically coupled directly to the end of the output shaft.

It's time for a little review of servo theory, is it not? Now, don't go running off, it'll be quick and painless—I promise.

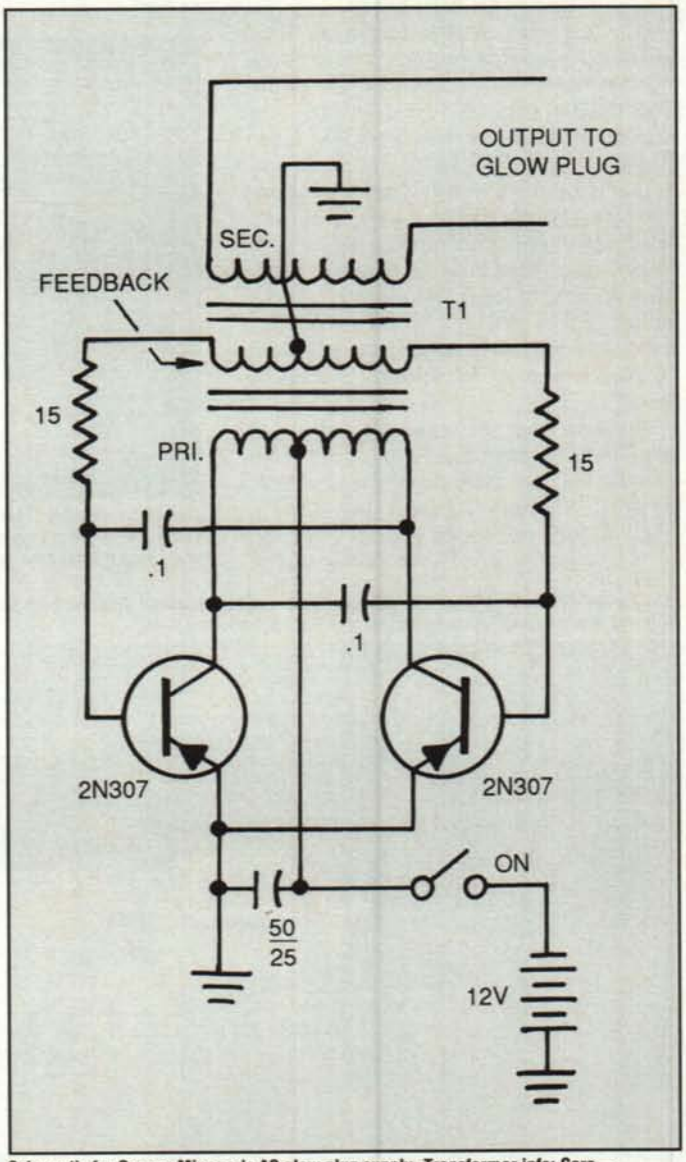
The position of the servo output, whatever is attached to the output shaft, is controlled by the length of a control pulse. This control pulse is generated by the transmitter, as directed by your command inputs. When, for example, you command elevator from neutral to full up, the length of the servo signal will change—length in this case being measured in time, milliseconds to be exact. The servo electronics sees a difference from the signal time in neutral, and generates an error signal which in turn switches current to the motor. Were things allowed to remain in this state, the motor would run continuously and the servo output shaft would turn round and round.

However, we want the motor to stop, at a point proportional to the stick movement. We do this by connecting a variable resistor, a potentiometer, to the gear train that the motor will cause to turn. This "pot," through its associated circuit, generates a varying signal that, at the proper point in its rotation, will exactly cancel the error signal and switch off the current to the motor.

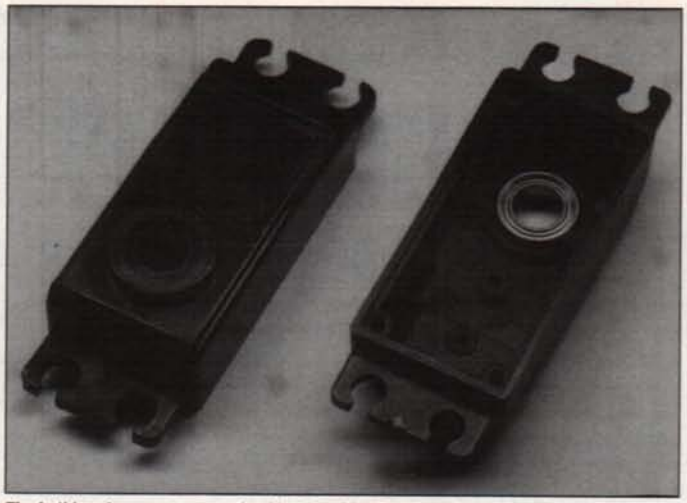
A pot is a circular resistive element, along which a metal wiper is rotated to vary its active portion. Should this metal wiper not make a solid, clean contact, the entire operation of the servo is disrupted; it might stop where it is, or it might run completely to one end of its rotation. Intermittent loss of wiper contact will normally result in small servo excursions, or glitches. In some servos, this wiper element is attached directly to the output shaft and will be affected by whatever the output shaft is doing. Thus, wobble of the shaft may cause wobble and lifting of the wiper; excessive loads on it might cause lifting of the wiper at its opposite end. None of these is desirable.

There is a better class of servo, lauded as "ball bearing" and "indirect pot drive." The ball bearing part has been explained; the latter means that though the pot is still connected to the servo output shaft, it is done through gearing or a flexible coupling which will not transmit stress or shaft wobble directly to the pot wiper.

Well, there is not much one can do about the direct servo



Schematic for George Minnear's AC glow plug supply. Transformer info: Core—Magnetics Inc. #50076-ID; Primary—110T C.T. #26; Feedback—16T C.T. #26; Secondary—9 T. #22.



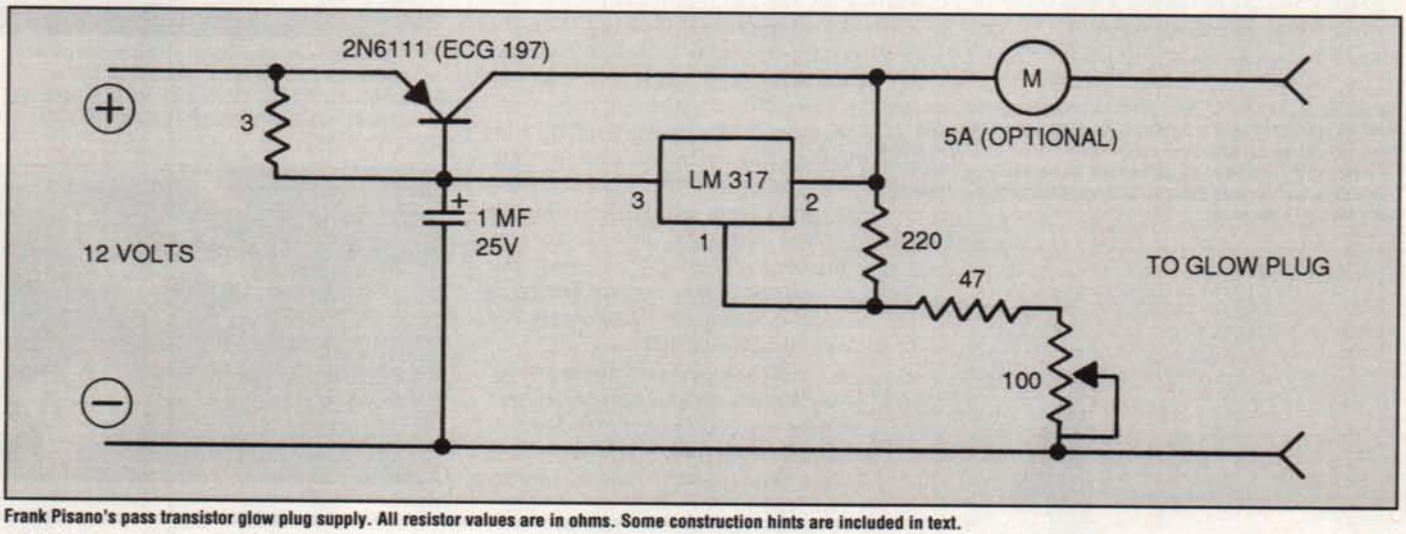
The ball bearing servo conversion kit offered by L&M Industries. See text for details.

drive in a servo, but there is some help in the ball bearing department, which will help in both instances. A quite reasonably priced ball bearing servo conversion is now available for a large number of Futaba's less-expensive servos which can benefit from this addition. These include all the "8" servos; the S28, S38, S48, S128, S138 and what is the standard servo currently furnished with all but the top-of-the-line systems, the S148. The supplier of this conversion is L&M Industries, P.O. Box 292396, Tampa, FL 33687-2396; (813) 985-5616.

Somewhat like some T-shirts, this is a "one size fits all" kind of product, as all of the servos listed share the same upper case. The conversion kit consists of a new upper case, differing only in that the area around the output shaft is large enough to encase a small ball bearing in which the shaft will be supported. Installation is a two-minute job, which requires only the loosening of the four case screws, removal of the old top, and replacement with the new. Regardless of the simplicity of the task, a very complete and well-detailed instruction sheet is included. It even includes a sketch and instructions in the event that during the conversion, the gears should come off or the gear shafts remain in the upper case as it is removed. There is no re-centering or any other adjustments necessary.

Price of the conversion kit for four servos is $39.95—as L&M states: "Less than the cost of one ball bearing servo."

My test conversion was made on some S148s. I don't have a method to accurately rate them before and after, except that the output shaft was definitely more stable and the sound changed, as if the motor was running faster. At $10 per servo, I definitely think this is a worthwhile conversion. I understand a similar conversion kit is planned for the Airtronics servos, I would imagine for the 94102, which is their standard servo. Check with L&M for availability—and to remind them that we're waiting!



Frank Pisano's pass transistor glow plug supply. All resistor values are in ohms. Some construction hints are included in text.

LIGHT YOUR GLOW PLUG

In reference to the March ('92) discussion of glow plugs and glow plug supplies, my mail brought some reminders that, as with skinning cats, there is more than one way to light your glow plug! The first interesting bit of info comes from George Minnear, who writes:

"In reading your column in the March 1992 issue of *Model Builder*, I see that you and others are interested in glow plug drivers or power supplies. I'm sending along a drawing of one such unit that I designed and built about 15 years ago (you can tell that by looking at the transistors that are used). It has worked very satisfactorily since then and has the advantage that it only draws about one amp when driving a glow plug, and no power is dissipated in dropping resistors. As you can see, this driver puts AC (alternating current) on the glow plug. This seems to make the plugs last longer, but I've never done any serious tests on that. Three of these units have been built in the last 15 years and there have been no failures of any kind during that period. All three are still in use by my friends.

"Since the original was built, I've made a few improvements. I've added an AC voltmeter to the output winding so that I'm sure the system is working. This voltmeter is a diode in series with a 560-ohm resistor and a 1-mA meter. I've also added a simple 4-ohm, 5-watt pot in series with the supply voltage so that the drive current is variable over a narrow range. Another nice thing about this circuit is that it stops oscillating if the output is shorted.

"Some of the glow plugs I've tested draw closer to three amps than the 1.5 amps that you mentioned in the article."

Glow plugs are also the subject of a letter from Frank Pisano (WB2CHU) of Staten Island, New York. Frank writes:

"I am enclosing a schematic of a power supply I developed that I have been using successfully. It has a wide range of 1-1/2 to 2 volts, which is adequate for most glow plugs. A PNP pass transistor will handle the amps with no problem. The pass transistor can be substituted with an NPN device by rearranging the collector-emitter connections. It is not expensive. Regulator devices that can handle 5 amps and up are available (but at a premium). This is

continued on page 81

UNIQUE FLYING WINGS & RUSSIAN SPY PLANES

What a wonderful surprise it was to hear from Rol Klingberg of Future Flight a few weeks ago. He called with an invitation to come test fly and evaluate his new sailplane design, the Klingberg Wing 100, or KW-100 for short. I say "wonderful" because I really enjoy flying tailless aircraft, and "surprise" because Rol lives almost 500 miles away in Sunnyvale, in the San Francisco Bay area. That's one heck of a long drive for me, so it was with great relief that I heard him say, "Pick a good flying site near you." Hey, no problem! My home club field in Riverside would be perfect!

Three weekends later on a Saturday, I found myself in a mid-morning rendezvous with Rol in the mess hall of a nice, downtown Riverside hotel. Quick coffee and rations were followed by a careful loading of the model and assorted RC gear (plus suitcases and coolers) into Rol's car.

We motored over to the nearby Inland Soaring Society's well-groomed flying field where we were greeted by about six or eight ISS fliers, cloudy skies with low ceilings, and surprisingly good low-level lift. It looked like a typical SoCal June-in-May weather pattern. Holding true to that pattern, by the time the gear was unloaded, the model photographed and assembled, the kit looked over, and the curious and inquiring ISS minds satisfied, the clouds had pretty much melted away into the normal L.A. Basin haze. We were ready for liftoff.

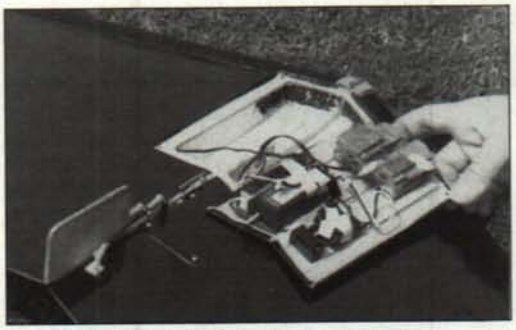
Then came surprise number two. Rol handed me the transmitter and invited me to perform the first winch launch of his new trade show and flight demo plane! "You're kidding. You mean this has never been launched before?" I asked in disbelief. "Yes, it has," replied Rol, "but only on a strong hi-start; the one put out by Northeast Sailplane Products. This wing is very stable on tow. Personally, I haven't used an electric winch in 15 years, so I would feel better if you launched it."

A few halfway intelligent questions later (you know ... the "usual" ones about servo-actuated CG shifts, trim tab settings, control sensitivity, towhook positions, towhook flexibility, control techniques on tow, flap settings, and the Klingberg Wing 100's launching characteristics in a quartering tailwind), the moment of truth had arrived. With Bob Andrews holding the model, I tensioned the winch line, checked for lulls in the gentle, quartering tail breeze, then gave the countdown to launch. The winch motor instantly gave the line top speed and the KW-100 was airborne in the wink of an eye. It quickly rotated into a shallow climb. There was absolutely no yaw, roll, or pitch instability observed as the ship immediately tracked straight up the line as if on rails. Guiding the KW-100 up the tow proved to be very easy.

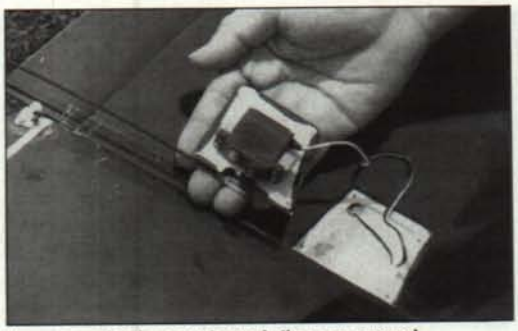
Even with the slight downwind vector taken into account, the final altitude of that first winch launch was disappointing. Subsequent launches became steeper, releasing at higher altitudes. Wind shifts helped. We also experimented with flap and elevator settings with good results. It was clear that this model would require some fine tuning and practice to get good launches. Comparatively speaking, the KW-100 probably gets 75% of the launch height of a conventional 100-inch competition sailplane.

After a few launches, we agreed that the towhook was flexing too much. The flex, combined with ever-increasing up stick on tow, caused occasional but uneventful pop-offs. Rol showed me a stock music wire hook from his sample kit that looked much stronger than the prototype hook we were using. Towhook flex shouldn't be a prob-

Rol Klingberg, proprietor, head salesman, chief engineer, and plant foreman of Future Flight is rightfully proud of his new Klingberg Wing 100. Computer optimized design breaks down into three pieces for travel. The "Autoyaw" tip rudders are free-pivoting, limited to toe-in only, and are very effective at keeping the wing from yawing away from its flight path.



Radio hatch removal also removes the movable ballast and most of the radio! Stick-on lead is stuck onto a large, four-cell receiver battery pack, which is stuck onto a sliding, servo-operated tray which allows CG shifts for high speed flight.



Elevon servo hatch removal reveals the servo screwed to the servo hatch. It's normally not necessary to remove the elevon servos, and they stay with the center (main) panel when the tip panels are removed.

Launch! First-ever electric winch launch for this particular Klingberg Wing 100, Bill Forrey on the sticks. He was impressed by the model's "on rails" stability during tow. Launch height, while only average compared to conventional (tailed) models, is good for a wing.

lem with production models.

Circling the KW-100 in lift is no different than a flat-winged conventional model—just don't overbank it. The side area of this model is very small, and there is very little dihedral. If you bank too steeply, it will get a tad upset and do a one-turn spiral to show its displeasure! The secret to good thermalling with the KW-100 is to use a little flap to slow down. The tendency of nearly all new wing fliers is to fly too fast and stir the sticks too much. Using flaps will help you stay ahead of the model and remain in solid control. It works. And the flaps do not cause any pitch change when deployed gradually.

The Klingberg Wing 100 kit is an obvious labor of love from a very detail-oriented engineer. This is as close to an ARF as any non-ARF kit can be. The foam cores are not only cleanly pre-cut (and supplied with their beds), but the cut-out areas for the radio gear, servo leads, nose weight, and spar caps are pre-routed for you. What's even more amazing is that the 1/16 balsa wing skins are one-piece units that require

Dr. Paul Clark's attractive power scale slope (PSS) ship, the M-17 Russian spy plane, ready for test flights.

no edge gluing or trimming. They are (get this) die-cut to shape! Simply punch 'em out, apply epoxy, insert the cores back into the beds, apply a flat board and a few dozen bricks to the top, and it's Miller Time!

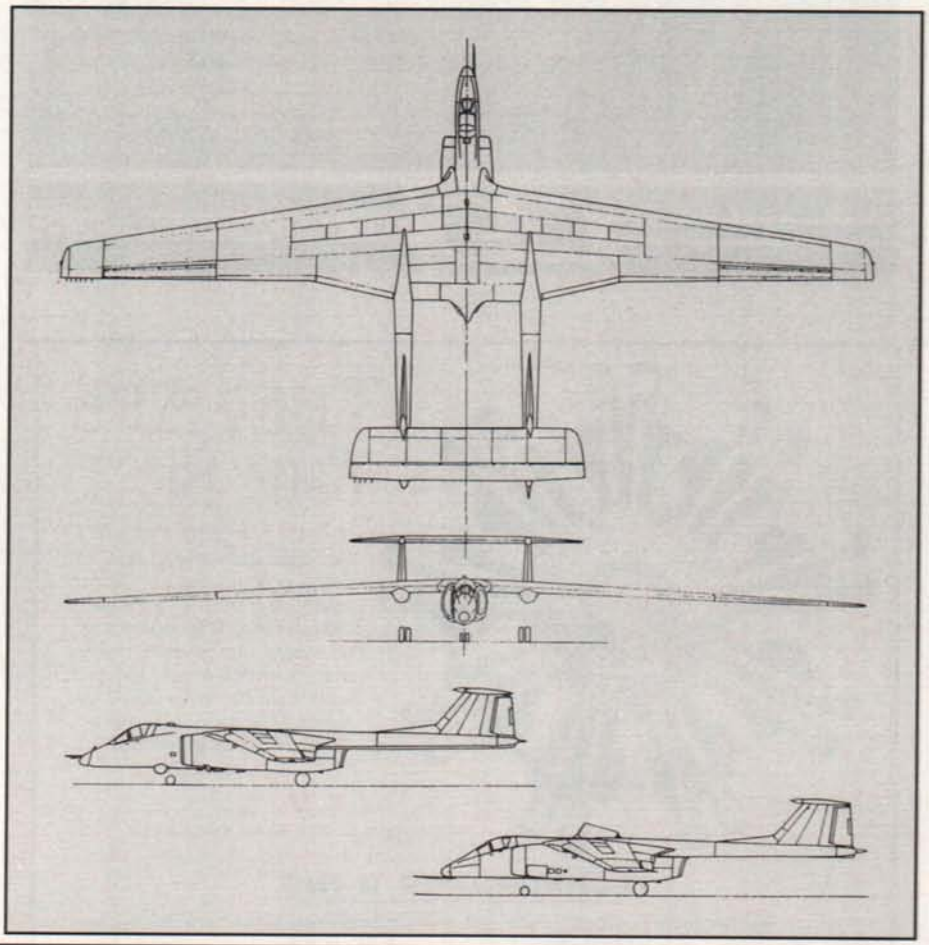
Hardware is included in the kit, and it is one of the most complete sets I've seen. About the only thing I can think of that's missing is the lead shot for the nose and the stick-on weights for the sliding CG tray.

The plans are generated by CAD computer, and the photo-illustrated instruction book leads you through every step, including control setup and flying.

As far as a Klingberg Wing 100 vs. conventional model comparison goes ... well, I would have to say it would be entirely possible to be a winner in thermal duration competition against conventional sailplanes, but it would take a pilot with good flying skills, good 20/20 eyesight, and lots of practice to rise above. The average pilot won't be good at it right away, of that I'm sure. If any wing was capable of winning against the conventionals, however, this one surely would be.

Where the Klingberg Wing 100 really shines is in the fun department. If you are

Three-view of the Russian M-17 spy plane, taken from an unidentified Japanese magazine. A terrific subject for a power scale sloper! More in text.



tired of building the same old thing, if you love attention at flying fields, if you love flying something different now and then, if you enjoy the rewards of mastering a short-coupled, agile model, then the KW-100 is for you. It's as unique as it can be!

Contact Future Flight at 1256 Prescott Avenue, Sunnyvale, CA 94089, or call or FAX at (408) 735-8260. Future Flight will be moving to its new location in Colorado soon, but don't worry, mail gets forwarded up to one year after a move. Look for new ads in upcoming issues for the new address.

RUSSIAN M-17 SPY PLANE OVERFLIES JAPAN (IN MINIATURE)!

I have to hand it to Dr. Paul Clark, of Osaka Bible Seminary, for finding one of the best-looking power scale slope subjects I have ever seen! The three-views came from a Japanese publication, which one I don't know, so proper credit will be delayed at best.

The model is a Russian M-17 spy plane, and it's a beauty! Twin tail booms, Siamese T-tails, multi-taper, multi-sweep wing panels, pod fuselage—a very unique and very clean machine! I am submitting the many-regenerations-old three-views with this manuscript for your enjoyment, and to entice others to scratch build one!

Before building the 60-inch RC slope soarer which you see in the photo, Paul built five different free flight model prototypes. Each one had a different dihedral plan. The first had the scale front view: simple anhedral of a couple of degrees, each side. This anhedral model flew fine, Paul says, "... as long as it had steam," after which it apparently went unstable. Other dihedral plans that were tried were simple "V" dihedral, gull wing dihedral/anhedral, polyhedral, and finally, flat center section with dihedral tip panels. The latter, according to Paul, "Would always climb. Without question was most lifting." This was the obvious final choice.

I have no details regarding construction of Paul's RC version of the M-17 other than that the primary material was balsa. All I know is that it has the Selig-Donovan 7032 airfoil in the main panels, the SD-6060 in the tip panels, and a 60-inch wingspan. I seem to remember Paul saying it handled very responsively and flew very quickly.

THERE'S NO PLACE... LIKE CLOUD BASE

Time to soar again. If you have a project or idea to share with Soaring readers, send it to *Model Builder*, C/O Bill Forrey, 3610 Amberwood Ct., Lake Elsinore, CA 92530, (714) 245-1702.

DRAT!! First it was my Zip Code, now it's my telephone area code that will be changing, to 909 after November 14, 1992. Please take note if you will, and I hope to hear from you. I prefer phone calls to time consuming letters. Call after 5:30 p.m. but before 9:30 p.m. weekdays, or almost any waking hour on weekends. ***MB***

BY ART STEINBERG

Das Ugly Stick Revisited

TWENTY-SIX YEARS AFTER ITS DEBUT, THIS FUN-TO-FLY DESIGN STILL IS!

Twenty-six years ago, the legendary Das Ugly Stick first appeared on the model scene. Phil Kraft designed the model to be quick to build, easy to fly, and inexpensive. This was in 1966, when RC was evolving into the hobby we know today. While many were still flying reeds, galloping ghost and rudder-only systems, more and more of us were switching to the new fully proportional radios. The great barrier was the hefty cost of this equipment. For example, a Kraft Systems KP-6 outfit was $489.95—pretty stiff when the cost of an open AMA membership was only $6!

In his history-making construction article, Kraft explained the concept of the Ugly Stick. He wanted to design a radio controlled aircraft which could be built in an absolute minimum of time. Its purpose was to be a flying test-bed for new proportional control developments and an all-around shop airplane which could be used as a loaner for visiting fliers, testing repaired equipment, and any use which required an airplane which could be considered expendable.

Later in his article, Phil added, "Its main virtue is as a trainer for the beginner in proportional control. Inevitably, unless the beginner is of remarkably unusual talent, he's going to have minor or major accidents in learning. Therefore, the Ugly Stick fits the requirements perfectly as a trainer. It is about as simple as possible to construct. It is rugged and very easy to fly."

Kraft certainly knew what he was talking about, because the Ugly Stick went on to become one of the most popular RC airplanes ever known. Just about everyone

Above: Ugly Sticks are so well-mannered, they are perfectly suited for close-in flying. Below: Great shot of the Ugly Stick. Photo courtesy Hobby Dynamics Distributors.

built and flew at least one during his flying career, and most of us owned a number of them at one time or another. In the looks department, the Ugly Stick certainly lived up to its name, but Phil Kraft declined the credit for thinking it up—it was named by some anonymous bystander who watched it fly for the first time.

I can remember having owned at least five Ugly Sticks, most in the traditional red color scheme with the usual World War I German crosses. Every once in awhile some heretic would turn up with a white or a yellow Stick, causing raised eyebrows all over the place.

For those who didn't want to scratch-build from Kraft's original plans, a dandy kit was marketed by a company called Jensen. Its kits were top quality, with some of the finest wood I've ever seen. Even today, the Jensen Ugly Stick kit is highly prized and sought after; while it hasn't quite reached the status of being collectible, modelers like them for their quality and ease of building.

If you want to build an Ugly Stick, there are many imitators around today. Ugly Stick variations are available as biplanes, shoulder-wing, mid-wing, and low-wing; in tricycle gear and in taildragger configurations. They've been built as slope soarers, as twin-engine models, for glow and gasoline, engines, and even electric power. They come in every size you can imagine, powered by everything from the Cox .010 to Quadras. The smallest Stick ever is the "Littlest Stick," marketed by Ace R/C, with a wingspan of only 19-1/2 inches. Recommended power is the Cox .010 or the Pee Wee .020. Though this model was intended for a single-channel radio, I have seen it fly well on a four-channel, full-bore Cannon micro system, nosewheel steering and all.

Many others have dressed up and disguised their Sticks to look sleek and streamlined, because no other RC model is so forgiving and lends itself so well to modification and restyling. I've even seen a few equipped with flaps, but why would anyone want flaps on an airplane that can already be slowed to a walk on final approach? Phil Kraft designed this plane to have its engine hanging out in the wind, allowing easy access right from the start, but modelers modified it to feature a cowled engine.

Every Stick I've ever seen flew faultlessly, and many a novice has mastered new skills by logging hundreds of flights on this celebrated model. Few airplanes can compete with the Stick when it comes to playing multiple roles in the sport of RC flying. It can serve as a basic or intermediate trainer or a full-blown aerobatic barnburner.

For those who don't want to scratch-build a Stick, there's a top-quality ARF available. The "Das Ugly Stick," produced by the Long Tai Shin Industrial Co. of Taiwan and distributed in the U.S. by Hobby Dynamics Distributors, a division of Horizon Hobby Distributors, is unique in that it's a state-of-the-art ARF—an embodiment of an antique RC airplane with all the modern improvements thrown in. The Ugly

The components as they come out of the box. Everything is nicely bagged and well protected.

Stick I received for evaluation was the .60 size; it comes in a smaller .40 edition also.

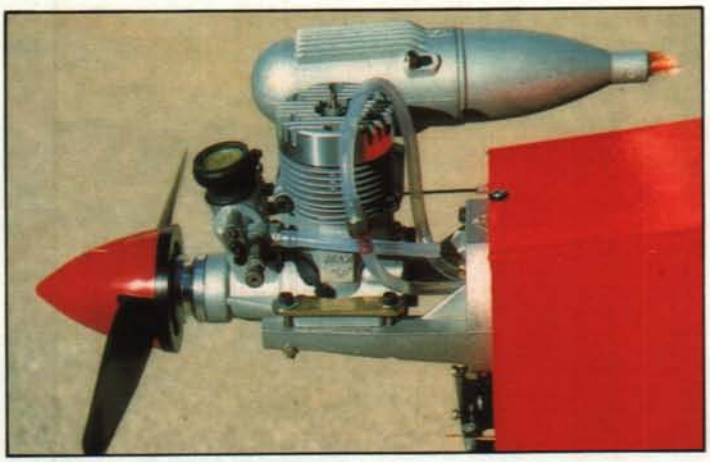
The sizeable carton contains a completely built and covered airplane, with each component safely protected in a clear plastic bag. The color scheme is traditional: flame red basic finish with black Maltese crosses on a white background.

I noticed that here and there the covering was sagging a bit, but the instructions said this was normal and to be expected. The recommendation was to tighten it up with a heat gun. But unlike Super MonoKote, which tightens up while the heat is being applied, the covering on the Stick softened under the heat and tightened up when the heat was removed! Actually, many of the import coverings react this way, so pay attention and use caution when applying heat.

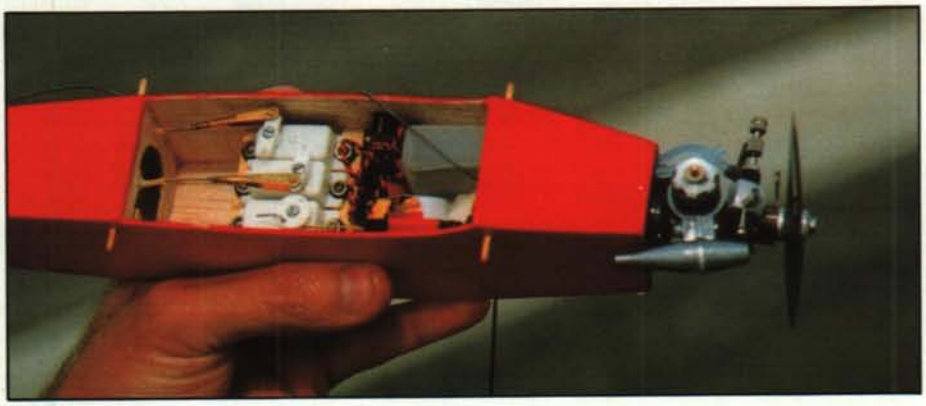
The entire model is balsa and plywood, except for plastic tips on the horizontal stab. Otherwise, all construction is exactly as though a skilled builder had assembled a conventional kit. The wing is of standard D-tube configuration, with an extensively sheeted center section. This was a departure from the original, which used no wing sheeting at all, and this modern version should be decidedly stronger. The fuselage and horizontal stab are fairly faithful outline reproductions of the original, but the new vertical stab is solid balsa sheet, while the original was built up.

Another minor difference is that the scal-

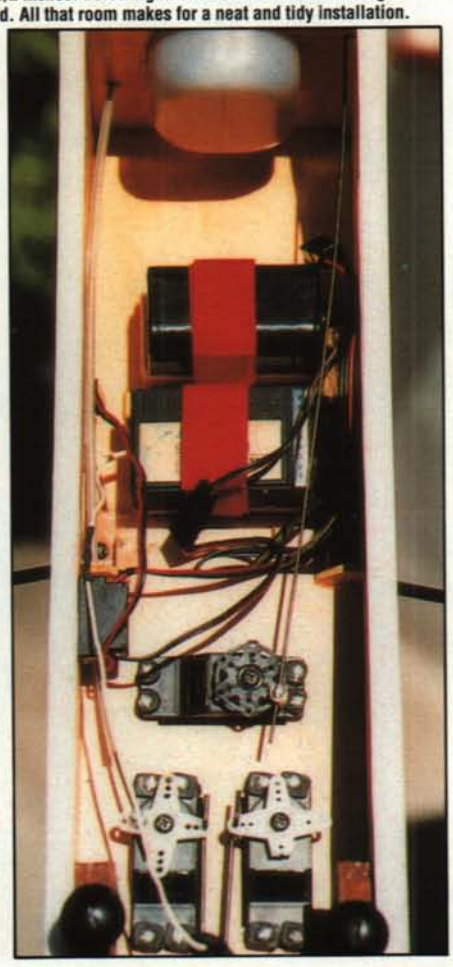
Virtually any Ugly Stick can be made to fly at a snail's pace, and the Long Tai Shin version from Hobby Dynamics Distributors is no exception.



Left: All true Ugly Sticks have their engines hanging out in the wind, allowing for the best possible cooling and easy maintenance. O.S. .61 SF ABC has probably three times the power of the Veco .45 used in Phil Kraft's original ship. Note the clamp-type universal engine mount—no drilling required. Below: Closeup view of the Littlest Stick discloses a Cannon radio setup with G-Mark .03 engine. This three-channel model flies like an enraged hornet!



Below left: Just to show that Ugly Sticks come in all sizes, Mike Thompson, a commercial pilot from Irvine, California, shows his "Littlest Stick," kitted by Ace R/C. Wingspan is 19-1/2 inches. Below right: The oversized Stick fuselage interior makes the radio components appear to be miniaturized. All that room makes for a neat and tidy installation.



loped edges on the ailerons and elevator are omitted for the sake of simplicity. How well I remember the time-consuming process of covering those scallops in the old days!

The last, but more important difference is in the main landing gear. The Kraft version was made of formed sheet aluminum, while the Horizon Hobby Distributors Das Ugly Stick substitutes a wire torsion bar main gear. Those purists who prefer the sheet aluminum gear will have no trouble bolting one to the well-reinforced belly of the fuselage.

The wing is supplied in two sections that require mating, but that is about all the real building necessary. In joining the wing halves, I considered the way we like to fly an Ugly Stick. These planes are so responsive and easy to fly that we tend to use brutish engines running at full throttle throughout each maneuver. Ugly Sticks are matter-of-factly subjected to many Gs and are mercilessly wrung out flight after flight. Mindful of this, after joining the wings with slow-cure epoxy I peeled away a one-inch strip of covering from the entire wing joint, then applied an inch-wide strip of fiberglass cloth to the joint with a liberal application of CA glue. This joint was then covered with the red vinyl tape supplied, and I now have every confidence that there is no possibility of an in-flight wing joint failure.

My only other modification was to substitute a wing bolt hold-down system for the traditional rubber band arrangement. The kit comes with a pair of sturdy dowels and ready-punched holes in the fuselage to receive the dowels. But I just couldn't face dealing with messy rubber bands, so I installed a pair of maple wing hold-down blocks, securely held in place with slow-setting epoxy and reinforcing screws through the fuselage sides. A dowel was epoxied into the wing leading edge and a hole drilled in the plywood fuselage former to receive the dowel. This means of securing the wing to the fuselage should prove to be utterly reliable.

Wherever I looked, some outstanding feature about the kit jumped out. The beautiful metal motor mount was already in place, set up for upright mounting of the engine, although if side or inverted mounting is desired the mount can easily be rotated to any position. However, since the engine mount is already drilled for the nose gear and is oriented for upright engine mounting, the holes must be re-drilled if the mount is rotated. This mount is ingeniously designed to fit most engines and requires no drilling. My engine, a new O.S. .61 SF ABC, slipped right in and mounted in only three minutes.

All furnished hardware such as the spinner, wheels, landing gear, collets, threaded rods, clevises, control horns, and aileron fittings were of excellent quality ... except the one-piece "live" hinges. These were made of plastic that was scored down the middle for bending. I folded a few of the hinges and worked them back and forth to make them more flexible, but was alarmed to see a couple of them split in two. I

substituted some commercial hinges.

After hinging the ailerons, elevator and rudder, the pushrods were assembled from the dowels and threaded rods supplied in the kit. The dowels came already grooved and drilled. After bending, cutting and attaching the rods to the dowels, I wrapped them heavily with thread and applied CA glue. Then, to dress up the joints, I covered them with the heat-shrink tubing supplied in the kit.

The 12-ounce fuel tank is a first-class item and fits perfectly into the firewall and #2 fuselage former support holes. Assembly of the tank is quick, as it uses a screw-on cap rather than a rubber plug with an expanding screw. It comes with aluminum tubing to be used for the fuel pickup and vent, and the tubing has rounded edges to prevent cutting the fuel line.

All that remained was to drop the plywood servo tray into place and glue it securely. Using my Airtronics radio, the servos fit the pre-cut holes perfectly, and the whole radio installation took about an hour. The hook-and-loop fastener strap and sponge rubber pad system was used to attach the receiver and battery to the fuselage floor.

Almost before I knew it, before me sat my sixth Ugly Stick. Now to find out if it flew like an Ugly Stick should!

Test flight day was a typically balmy Southern California morning, with virtually no breeze to disturb the calm air. Needless to say, the Stick performed like a champ! It did all of those maneuvers we used to do, hurtling by at full bore, then spinning itself silly, followed by vertical climbs and anything you felt like doing.

And when the fuel level is low and it's time to land, putting a Stick on the ground is the simplest thing in the world. All I did was slow down to a walk by holding some up elevator and used the throttle to control the descent. She settled down to the ground almost like a helicopter, never even suggesting the possibility of a tip stall. Several times, when the breeze became stiff, I brought my Stick straight down in a vertical descent.

One characteristic I found was one that I have observed in other versions of the Ugly Stick: a tendency to exhibit control surface flutter at extremely high speeds. (We really have no business pushing a non-streamlined airframe along at such breakneck velocities, so the real cause of this flutter is overpowering the airplane.) In any event, this is one tough model and should survive an occasional episode of flutter, but the wise pilot will refrain from flying the model too fast. As an added safety precaution, securely pin all hinges.

This ARF has to rank among the most fun-to-fly models I've ever had. Regretfully, the Ugly Stick is no longer so common at local flying fields. It is strange that many modern RC pilots reach competency without ever having flown a Stick. Perhaps this story will rekindle interest in this reliable old performer, one that's to RC flying what the Piper Cub is to civil aviation. **MB**

The Old College Try

BEST-MADE PLANS ARE PUT TO THE (FLIGHT) TEST AS COLLEGIANS SEEK HONORS IN AERO DESIGN '92

BY AL TUTTLE

"Eagle III" was flown by one of the four Embry-Riddle Aeronautical University teams. Best lift was 15 lbs., 7 oz. Note how they minimized the aft fuselage's planform area—by leaving the top and bottom uncovered!

A view of the flight line early Sunday morning. Site is the DeLand Radio Control Club's field in DeLand, Florida. Pilots meeting in progress at right.

Left: The best of the two Ryerson team entries was able to lift just over 13 lbs. This school holds the current record of something over 23 lbs., set at last year's competition. Below left: First place overall went to the University of British Columbia team, flying in their first Aero Design competition. Their fairly conventional looking machine lifted a staggering 18 lbs. Below: Robert Frink and Scott Thompson with the Ohio State entry, just prior to their disastrous first flight attempt. The model suffered quite a bit of damage, but the team managed to get it back together and flying well enough to lift almost 15 lbs., good enough for 4th place.

The 7th Annual Society of Automotive and Space Engineers (SAE) International Radio Controlled Cargo Aircraft Competition was held in DeLand, Florida, this past May. This contest, held in a different part of the country each year, gives students of engineering disciplines an opportunity to apply the knowledge learned in the classroom to a practical problem. It's designed to stimulate interest in both aircraft and design and the SAE.

Contestants design and scratch-build an original radio controlled aircraft based on a 0.61 cubic inch glow ignition engine, with a maximum planform area limited to 1200 square inches. The competition tests each team's ability to predict the performance of their design, as well as determine which entry

"Challenger" lifted 10 lbs., 8 oz. for the team from the University of Kansas.

Highly tapered wing tips and clear acrylic wheels characterize the 87-inch span, T-tail entry from the University of Waterloo, Ontario, Canada.

The University of Cincinnati's entry lifted 10 lbs., 8 oz., appears to have a fairly thick wing skinned with carbon fiber. Note the canard foreplane just behind the firewall.

The two teams from Cedarville College entered identical ships based on this 12-foot, high aspect ratio design. Best lift was 14 lbs. plus. Like most others, this entry uses a tubular aft fuselage for minimal planform area (see text for rules).

will carry the most weight aloft from a 200-foot takeoff strip.

Only fixed-wing, heavier-than-air aircraft are allowed to compete. All flying surfaces (e.g. flaps) are positioned for maximum area; planform area includes fuselage, horizontal stabilizer and all flying surfaces positioned for maximum area projected vertically downward on a flat surface. Planform area also includes the engine extension from the fuselage (excluding prop), landing gear struts, and any slot overlap. Vertically overlapping surfaces are considered as separate when calculating planform area. Area for each surface, as in the case of a biplane, is included in the calculation.

Point penalties are given to entries that vary from pre-submitted plans or for planes exceeding the 1200 square inch maximum. The 0.61 cubic inch engine has to be stock; tuned pipes or power augmenting devices are not allowed. K&B .61 glow engines have been used since the first competition and are specified in order to compare results from previous years. Tank size, receiver battery pack capacity, and spinner or rounded spinner nuts are dictated.

There are two parts to the competition: Design and Flight. Thirty days prior to the flight competition, each team must submit detailed plans for the aircraft to be flown. Plans must be full-size and fully detailed with all views, dimensions, planform area and the required bill of materials with stock sizes noted. Along with the plans, a detailed report explaining the methodology and results of the design calculations performed to estimate the maximum payload of the aircraft is required.

A panel of SAE engineers evaluates the plans and aircraft specs. Prior to the flight competition, each team is allowed ten minutes to give an oral presentation to "sell" their design to the panel.

During flight competition, each plane must carry a minimum weight of eight pounds on the first day. Test flights for trimming purposes without the qualifying weights may be allowed, but do not count as official flights. Weight is added in 1/4-pound increments.

Time allotted for each round depends on the number of teams competing. Five minutes is allowed to start the engine and take off. The plane must be airborne within 200 feet, make a 360-degree turn and land back on the 200-foot runway. Penalties are assessed if the plane does not get off in 200 feet.

On landing, the plane must touch down on that 200-foot section. The aircraft must take off and land without losing any parts to receive any points for the attempt.

Fuel for the competition is supplied by the contest directors and is the only fuel used for the competition. Fuel for this year's event was Byron10% Premium Sport Blend.

Sixty-one teams from 50 schools entered this year's competition. Practice flying was on Friday, with the oral presentations held Friday evening. Competition began Saturday morning. Weather was absolutely perfect—bright blue sky and no wind. It wasn't long before the runway temperature got up into the high 80s to low 90s. Humidity was typical for Florida—high.

Field altitude I guessed to be about 400 feet above sea level. With these conditions, the teams quickly found that just getting the required eight pounds off the ground was going to be tough, to say nothing of getting their predicted weights aloft!

But try they did. Many attempts ended with bent or broken aircraft. However, there was a huge tent set up with tables and electric power so the teams could prepare and repair their aircraft. This area reminded me of the facilities that were available at the AMA Nats when they were sponsored by the U.S. Navy many years ago—we used to stay up all night rebuilding models. The tent area was bustling with feverish activity both Saturday and Sunday!

These planes are devilishly difficult fly, especially when you get them weighted down. Eighty-six flights were made or attempted on Saturday, 63 on Sunday. At 1 p.m. on Sunday, flying was stopped and the top 15 teams were picked for a fly-off, starting in reverse order, 15th place flying first. Each team got one attempt, that being counted when the helper released the plane.

Sunday's temperature, humidity and lack of wind were the same as the day before. The team wizzos had their computers out, trying

A nice touch was the work tent area, complete with tables and electrical power, where the teams could work on their models. A busy place!

This basic, straightforward design from the Milwaukee School of Engineering lifted just over 13 lbs. Note the full-span flaperons.

to figure the weight they could get in the air under these conditions, using the data they had generated in the lab and wind tunnel.

This competition really proved that there is a vast difference between laboratory predictions and the real world. Many remarked, "I don't understand it, we lift X number of pounds regularly at home, yet we can't get half that weight off the ground here!"

All of the engines performed well in spite of the high heat and humidity. Those teams that had the engines propped right had the best results. The overall winner was the team from the University of British Columbia, Canada, with a predicted lift weight of 19-1/2 pounds and an actual lift of 18 pounds.

Special awards presented:

University of Central Florida (Carbon Copy team)—Best drawings, third in written report and third in oral presentation.

Concordia—Best written report and third in drawings.

University of Central Florida (Pegasus team)—Best oral presentation.

Ohio State University—Second in drawings, second in written report and second in oral presentation.

University of British Columbia—Most weight lifted: 18 pounds.

Wichita State (Team 2)—Second heaviest weight lifted: 16 pounds.

University of Southern California—Third heaviest weight lifted: 15 lbs., 12 oz.

The 300 team members did a remarkable job and are a credit to the schools they represent. If they keep their enthusiasm, curiosity, inventiveness and good humor, then this next generation of engineers and scientists should make great contributions in their chosen fields.

This competition would not have been possible without the help of the DeLand Golden Hawks club members and wives who manned the flight line and cook shack. These same few people show up at every event and are to be commended.

Host school for Aero Design '93 is Wichita State. If you are in Kansas next spring, plan to attend. You won't be disappointed! ***MB***

PARTICIPATING SCHOOLS

SCHOOL	PREDICTED WEIGHT IN LBS.-OZ.	LIFTED
1. University of British Columbia	19-8	18-0
2. University of Southern California	20-0	15-12
3. University of Calif.--Davis (Aerobrick)	16-0	12-0
Other entrants:		
Ohio State University	27-0	14-14
University of Central Florida (Pegasus)	24-0	10-2
Ecole Polytechnique de Montreal	15-0	0
University of Calif.--Santa Barbara	20-3	8-12
Milwaukee School of Engineering	20-0	13-2
State University of New York--Stonybrook	20-0	0
University of Michigan	24-0	10-1
Lawrence Technical University	17-6	11-5
University of Missouri—Rolla	15-12	0
Embry-Riddle Aeronautical U. (Freshman Team)	20-0	0
University of Central Florida (Carbon Copy)	22-0	10-12
Michigan Technical University	16-8	0
Embry-Riddle Aeronautical U. (Albatross)	24-0	0
Wichita State—Team 2	24-0	16-0
University of Akron--Team 2	22-4	0
University of Akron--Team 1	23-0	0
California State--Fresno	21-15	10-12
University of Iowa	15-8	0
Georgia Institute of Technology	15-0	0
Iowa State	30-0	9-2
Cedarville College (Gold Team)	25-0	9-7
Cedarville College (Blue Team)	23-0	14-1
Cornell #1	16-0	12-3
Cornell #2	16-0	8-1
University of California--Davis (Guppy)	16-0	9-0
Embry-Riddle Aeronautical U. (Eagle IIB)	23-12	0
Embry-Riddle Aeronautical U. (Eagle III)	25-0	15-7
Florida Institute of Technology	23-0	8-10
McGill University--Montreal (FL2)	21-8	12-8
Ecole de Technology--Montreal U. of Quebec	14-11	0
University of Cincinnati	22-0	10-8
Embry-Riddle Aeronautical U. (#4 Dragster)	16-0	0
Drexel	22-0	0
Wichita State--Team 1	24-0	0
Stevens Institute of Technology	22-0	0
Ryerson Team 1	26-0	11-0
Ryerson Team 2	24-0	13-1
Rutgers State of New Jersey	15-0	0
University of Tennessee	18-1	10-1
Princeton University	23-0	0
Queens—Team 2	33-14	0
Widner University	15-8	18-2
University of Wisconsin--Milwaukee	19-8	0
University of Waterloo—Ontario	14-8	0
University of Calgary	22-0	0
Western Michigan University	20-0	9-0
Parks College	25-0	0
University of Kansas	16-0	10-8
Warsaw U. of Technology--Poland (HG-2 Meleager)	21-6	10-8
Warsaw U. of Technology--Poland (W-Duck)	30-0	0
McGill University (CG-EXP)	18-8	13-3
Clarkson University	18-8	8-8
Concordia	24-0	0
Queens--Team 1	31-0	0
College of Aeronautics	20-0	0
University of Michigan—Team 2	28-0	0
Florida Institute of Technology--Team 2	8-8	0
Memphis State University	N/A	12-5

FREE FLIGHT

BY BOB STALICK

Are Tuned Pipes Speeding the Demise of F1C?

During the past several months, a number of rules changes have occurred that will affect many free flighters. These changes have been promulgated by the CIAM, the International FAI rules committee. One of these changes is that you will be able to use tuned pipes on your 1993 F1C models. (Ostensibly, this rule was passed under the guise of muffling the sound of the engines.) Some of you may see this development as a plus for the sport, but look at the current crop of U.S. F1C fliers. Compare this number to 10 or 20 years ago. Smaller, isn't it?

Currently, F1C is attracting fewer competitors to the FAI contest scene. What will be the effect of tuned pipes? Will it increase the number of participants? In my opinion, just the opposite will occur. Fewer folks will get involved in this event, because it will demand an even higher level of commitment and technical expertise—stronger airframes to accommodate the increased power, more structural enhancements, etc.

The good news in this development is that it will accelerate the not-too-distant day when F1C will become extinct and will be replaced by F1J. On the topic of F1J, the CIAM didn't fiddle with the current rules and has kept them intact for another season. That means you don't need a high-zoot (and high-cost) engine to be competitive in this event. It does not mean that you can expect to enter with just any model and not be prepared to fly competitively, but the event is not out of reach of any decent flier with a hot Tee Dee and a Maverick kit.

Maybe the CIAM will begin to view F1C as an experimental event, with the highest level of technological development being the object. If such is the case, then popularity of the event is obviously secondary, and F1J can become the world championship event that it undoubtedly deserves. The probable and unfortunate outcome of the increase in popularity of F1J is that it, too, may suffer the same fate as F1C. Let's hope not.

In any case, the U.S. CIAM contingent voted against the allowance of tuned pipes in F1C. Their honesty and ability to foresee the direction this event will head with the new and unfortunate change is commendable.

The Swiss Heibi CO_2 motor, 0.08cc displacement. An excellent example of Swiss craftsmanship!

Terry Thorkildsen in action at a recent contest in Fresno, California. Hard work paid off with his winning the overall Sweepstakes. Photo by Ray Sahlberg.

JUNE MYSTERY MODEL

Ten entries were received correctly identifying John Tatone's distinctive "Birdie" *1/2A* ship, taken from the *1957-58 Zaic Yearbook*. Of those, Jerry Zierdt, a frequent Mystery Model contributor from Colbert, Washington, was chosen at random to receive the complimentary one-year *MB* subscription.

• Kermit Walker, of Lodi, California, recalls watching Tatone fly the model at several NCFFC contests in the late '50s, and describes it as "a beautiful model built and finished to John's usual incredible standard of fit and finish!"

• Donn Linton, of Winston-Salem, North Carolina, says the Birdie is pretty large for a 1/2A job (54-inch span, over 300 square inches of wing), and speculates that it might be about the right size for a modern F1J model.

SEPTEMBER THREE-VIEW: CLIMAX A

BY MAL McLEAN

As noted in the last issue of *Model Builder*, the NFFS Nostalgia committee has approved a number of new designs for Nostalgia competition. One is the Climax A by Mal McLean. This little ship, with a wing area of 216 square inches, qualifies for Ignition Nostalgia. According to Mal, it was initially flown with a Bantam .19. He ac-

Peter Sahlberg, son of photographer Ray Sahlberg, seen here with an .020 Replica Playboy at Fresno.

knowledges that it was overpowered with this engine and would have flown just fine with an Atom .09.

Mal notes that climb was everything in those days, so it was common to cram large engines into small airframes. Glide, then, was not a major consideration.

Mal offers a full set of plans for the Climax A; $10 will cover complete costs for the plans postpaid. Write to Mal at 195 Mason Ct., East Northport, NY 11731. He also notes that he has produced an enlarged version of the Climax for Glow Nostalgia. This is a 706 square inch version for O.S. Max .35 power. Nice-looking ship and a cabin design, too.

UPDATES

•The Flattop Nostalgia

In April, I published a three-view of the Flattop, a small 1/2A design. A short time ago, I received a letter from Donald Hockaday with some tips on how to build and fly this model to best advantage. Don offers the following:

In 1988, I built my first Nostalgia model, a Hewitt Record Holder (now known as the Flattop). Since then I have built and lost that one and two more, as well as an 80% version for .020 Pee Wee 30 competition. All of the 1/2As used Black Widow engines and Cox 6x3 props. The number one model used an eyedropper tank and weighed 5.5 ounces. Numbers two and three used a precious Tatone timer and a Tomy, respectively, and weighed in at about 6 to 6.5 ounces. Number three was scaled up about 5% so that the body was 36 inches long and the span was 40 inches. I couldn't tell any performance difference. All have a fabulous glide. With a Black Widow engine, the CG moves forward to 1.5 inches behind the trailing edge. The stab must be built light. Don't ever use an eyedropper tank if you want any kind of precise engine run control.

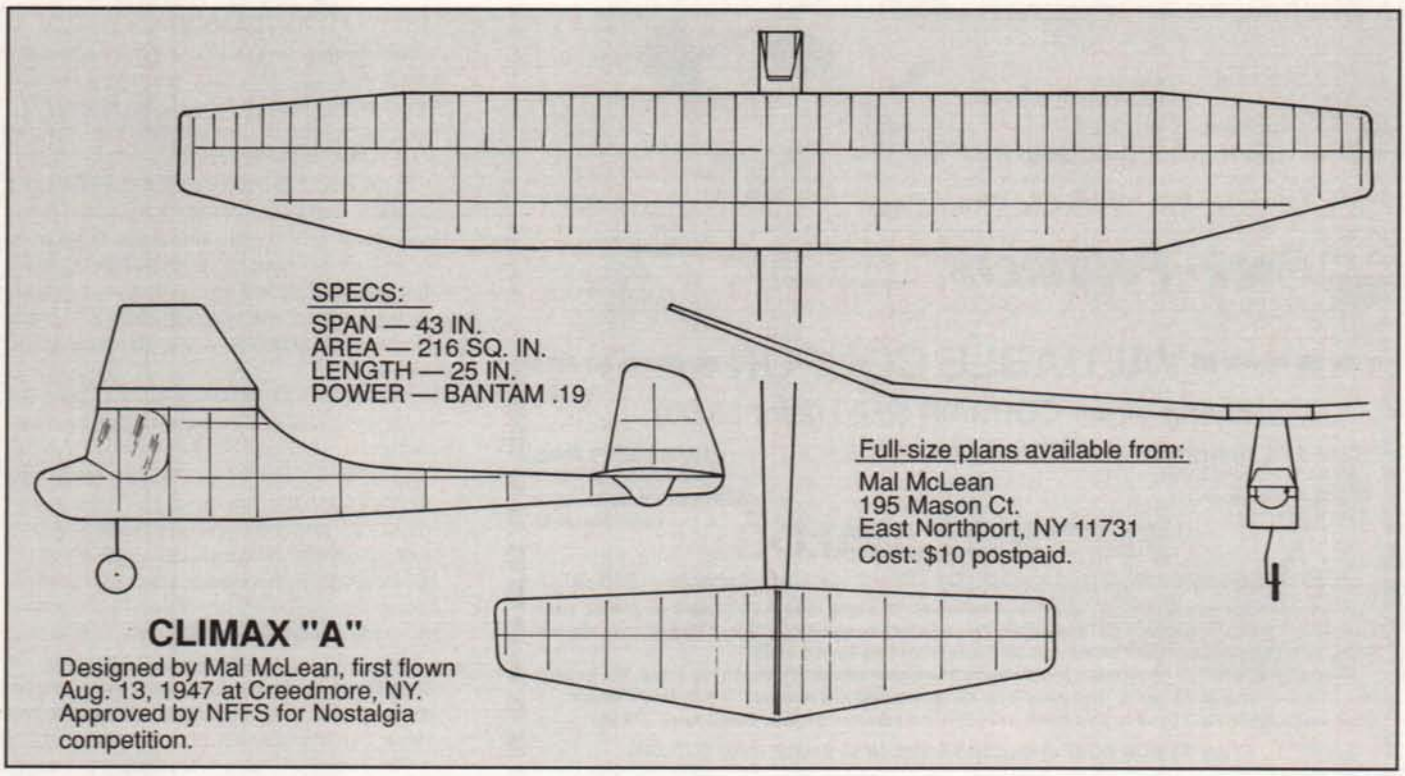
This logo, designed by Roger Simpson, is featured on the U.S. Junior FAI Team T-shirts now available. Your purchase will help support the team—see text.

Some Construction Notes:

1. Use two strips of carbon fiber tow CA'd across the rudder to prevent warps.

2. Use four 1/16-inch square longerons on the fuselage with carbon tow top and bottom. The body is too weak without it.

3. Pylon should be built with 1/32-inch sheet, grain lengthwise. I use 1/16x1/4-inch leading and trailing edges on the pylon. Run the pylon to the bottom of the fuselage.



4. Wing section is an NACA 6409. It is slightly thinner than the section shown on the three-view.

5. Add false ribs so the covering does not droop between the ribs (this is legal according to Nostalgia rules).

6. Instead of the 1/16x1/4 main spar, I use two 1/16x3/16 top and bottom spars with 1/32x1/4 shear webs a la the Pilfered Pearl.

7. Use three degrees down thrust and no side thrust.

8. Use 1/32-inch sheet doublers on the front three inches of the fuselage to prevent crushing the nose.

Thanks, Don, for these tips. If you are thinking about building the Flattop, check out the April issue of *Model Builder* for the three-view and then pencil in the changes that Don suggests. It sounds as though this ship has some real promise for current Nostalgia competition.

•Bill Lynch's Hurry Up II F1J

Bill Lynch reports that the Hurry Up three-view featured in the June *Model Builder* instigated quite a number of requests for full-size plans and further information. Updates for Hurry Up II are now available from Bill. He also encourages anyone who has an interest in this highly successful design to contact him by phone or letter. He would like to talk to you, to make sure the model comes out as well for you as it does for him. If you decide to call him, the best time is 7:30 to 8:30 p.m. PDT, at (916) 823-1037. Write to Bill at 11137 Creekhaven Ct., Auburn, CA 95603. By the way, the update package can be yours for $3, but you will need a set of the Hurry Up 1 plans ($12) to make sense of the updates.

•Heibi CO_2 Motor

Thomas Ogden says that Werner Heise, manufacturer of the Heibi motor, is producing motors of extremely high quality, worthy of the best meaning of Swiss workmanship. The Heibi has a .08cc displacement and is a modification of a successful Swiss race car motor. It uses a Modela tank and fill unit. No information was supplied on how to order a Heibi for your own use, but I suggest you contact Thomas Ogden if you are interested in more information. Enclose an SASE and send it to 27 Cortland St., Norwich, NY 13815.

Thomas notes that the CIAM will be adopting a new CO_2-powered free flight event, F1K. Competition should begin in 1993. Maybe it's time to start taking CO_2 seriously.

SEPTEMBER MYSTERY MODEL

As regular readers of this column know, I usually try to feature Mystery Models that are post-WWII, so that a greater number of readers will have a chance of recognizing them. Such is the case this month, except not by very much. This little rubber-powered model debuted in 1946, and the first sentence in the construction article begins, "Here's that new postwar job that you've been waiting for!" The ship features a rounded bulkhead-and-stringer fuselage and has a 30-inch wingspan. It was presented by a prolific designer of the period. Thanks to Warren Delane for his suggestion of this ship and his contribution of the original magazine article.

Now, here is what you, dear reader, get to do. If you know the name of the model, write it on a postcard or in a letter and send it to the best model magazine on the newsstands today (psst! It's *Model Builder*, you fool!). After an appropriate amount of time, they will drop your card or letter into a hat and draw out the winning entry. If it's yours, you get a free subscription to *MB*. If you already subscribe, they'll add a year to your present subscription.

FRANKLY SPEAKING, A NEW BOOK

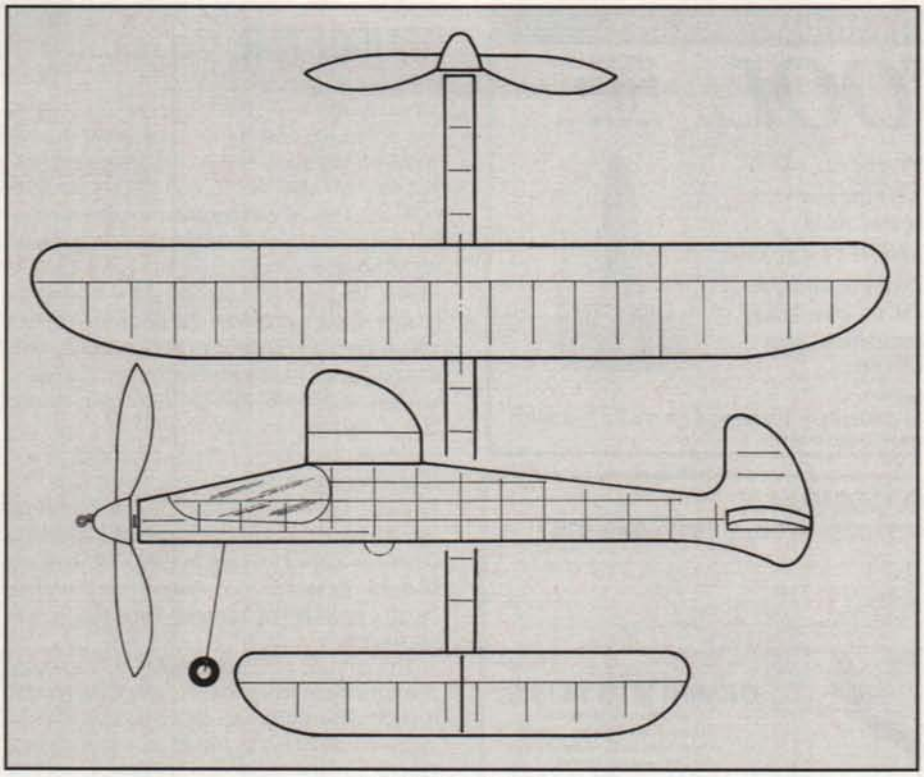
BY FRANK ZAIC

Bill Bogart, who's known the legendary Frank Zaic for 35 years, reviewed Frank's latest book, *Frankly Speaking*, in the May issue of *Scatter*, the newsletter of the Southern California Aero Team.

Frank Zaic has been identified with model aviation, particularly free flight model aviation, going on 60 years. He is the developer of the Zaic Yearbooks, properly titled *Model Aeronautical Year Books* with the appropriate year added. He typed the text and drew all the illustrations in a way to reduce the cost.

"Receipts from his book in 1937 paid for his trip to Europe as a Wakefield team member and manager," Bill Bogart notes. "We all have used his books for model design tips and hints and various features. Open any of his books and you will generally see two well-presented drawings per page. If you do not have any of his books, you are missing a great piece of the history of the development of model airplane design over the years. Copies can be obtained from the AMA or from Frank directly. Get the whole set. By knowing the past, you can appreciate the present state of design.

"This book, *Frankly Speaking*, is probably



MYSTERY MODEL

his last book. And it is not about model airplanes. It is Frank Zaic talking frankly about Frank Zaic. The book contains a collection of quotations he has generated over the years, as well as short stories of various incidents in his life. "

Whenever he came up with a phrase he wanted to remember, he wrote it down and kept these quotations throughout his life. For example: "Climb the mountain now so you can say you did it when you cannot." And, "There is always enough to do to keep me from working."

"Interspersed with the quotations are short stories. There is one that includes a beautiful picture of his cat, Jasca, who kept him company at his shop in New York. There is an incredible tale about a fellow he met on a bus ride from Buffalo to New York, and met again much later in life. Look for the story entitled, 'Living with History.' He tells another tale about being able to listen to music in Italy during WWII without the earphones being plugged in.

"I have known Frank since meeting him at the Willow Grove Nats in 1957," Bill adds. "He hasn't changed his smile or his friendliness and desire to help those in need. I have been fortunate in receiving his annual letter discussing many activities, including his bout with a pesky squirrel stealing from his bird feeder and the ingenious methods he used to try and thwart that squirrel. This book ties all the ends together and leaves the reader with a sense of just plain feeling good all over. I heartily recommend the book."

Frankly Speaking is available from Frank at Model Aero Publications, Box 136, Northridge, CA 91328. Cost is $6.95 plus $1.00 postage.

JUNIOR FREE FLIGHT TEAM

Gail Gewain recommends free flighters support the U.S. Junior Free Flight Team, and provides the following information:

"The Junior Free Flight Team will be going to Czechoslovakia in August to represent the USA. The team is composed of eight members. Jody Miller from Orlando, Florida; Jeff Fedor from Arlington, Texas, and Scott Robbins from Los Gatos, California make up the F1A team. On the F1B team are David Fee from Oceanside, California; Mark Richmond from Carmel, Indiana; and Rod Loerger of Fulton, Maryland. On the F1C team are James Troutman from Marion, Texas; and Erick Schmoekel of Seguin, Texas. The team manager is Matt Gewain."

T-Shirts are now on sale with the intent to raise money for the Junior Team program. The logo on the shirts was drawn by Roger Simpson. T-shirts can be purchased by sending $15 in check or money order (no credit cards or CODs) to: Gail Gewain, c/o Composite Structures Technology, P.O. Box 4615, Lancaster, CA 93539. All proceeds will go to the Junior Team Fund.

THE END

The summer activity will soon be ending. For us in the Northwest, the free flight weather is just entering its best time of the year, and most of our big contests are coming up. Hope that you have a number of good meets coming up. If so, take that camera and snap a few pix for Free Flight. Send 'em to Bob Stalick, 5066 NW Picadilly Circle, Albany, OR 98321. And catch a thermal for me. ***MB***

HELICOPTER continued from page 23

same as on the SX, but the decals, of course, are different. The main rotor head comes with the hard red O-rings. It is difficult to see, but the hub also incorporates slight positive coning. The advantage of having positive coning is that the O-rings are compressed equally top and bottom during flight. On the other Concepts, the top side of the O-rings is compressed more than the bottom side because the blade lift causes each blade to ride at a positive 1 to 2 degrees in hover. An equal compression makes the O-rings behave more like a linear spring.

Remember, the O-rings are there to act like a spring to restrain the blade flapping motion. *They are not there to add damping to the rotor head!* On the Concept 60 and the other Concept 30s, I always add a thin piece of nylon tiewrap or aluminum strip underneath each O-ring to make the blades cone up slightly.

The entry-level Concept 30 DX has heavy aluminum control paddles, hence the model is extremely stable, so much so that almost anyone can learn to hover in a few flights. The SE had the same size paddles as the DX but were molded from plastic, hence they are lighter and make the model very aerobatic. Even so, the SE is very easy to fly. I have taught three people to fly on the SE, and all were able to hover at eye level after only about one gallon of fuel. On the SX, the plastic paddles were made even larger and thinner to further enhance aerobatics. However, the drawback was that the model became pitch sensitive in high speed forward flight (pitch sensitive means the model tends to zoom up and down).

On the new 30 SR, the paddles are back to the original, proven SE size. With the SE size paddles on the SR, the helicopter can easily roll inverted from a hover. There is plenty of control authority; you can even do snap rolls in forward flight—just give full left tail rotor, full back cyclic, full left cyclic and zero collective pitch all at the same time.

The Concept 30 SR costs about $150 more than the DX. I recommend that beginners start on the inexpensive DX before moving on to the 60s. The SR is just as easy to learn

on, but I suggest buying a set of DX paddles for your SR, or a set of 3mm inside diameter 30-size metal flybar weights (don't get the 60-size flybar weights, they have a 4mm inside diameter).

The instruction manuals for all of the Concepts are illustrated and easy to follow. With the 30 SR there is also an excellent supplement instruction on flying. After four years of refinement, the Concept manuals are excellent.

The 30 SR, as well as the DX, now comes with a new material for the molded side frames, servo tray, and landing struts. They are made of glass-filled nylon and are much stiffer than before. This is especially noticeable on the landing gear struts; the older Concept 30 struts used to deform slightly after prolonged sitting.

The main shaft/swashplate/mixer assembly is factory finished for both of the Concept 30s and the 60. For people who love mechanical things, it is a work of art. The swashplate does not travel up and down like on the X-Cell or Schluter helicopters. The Concept's swashplate is used for fore/aft and left/right cyclic controls only. Collective pitch is controlled by sliding the Bell-Hiller mixer up and down. (Kalt model helicopters also use this arrangement.) The Concept's swashplate sits on a plastic tube; Kyosho calls it a "pitch rod guide." The plastic tube spins inside a large ball bearing. The tube is secured from moving by an aluminum collar and four set screws, located right below the bearing. (Be careful, if the set screws are overtightened, the collar can fracture! We have had this happen.)

A useful hint here is that you can adjust these four set screws to make the swashplate wobble-free. If you have a Concept 30 or 60, spin the main rotor by hand; you will probably see the swashplate wobble slightly. If it doesn't, you are lucky. On the Concept 60 it is quite noticeable. You can eliminate most of the wobble by loosening all four set screws and carefully retightening them unevenly. You need to tighten them more on the side that the swashplate wobbles out. If you do this carefully, the wobble will be reduced and there will be less wear on the ball links and swashplate.

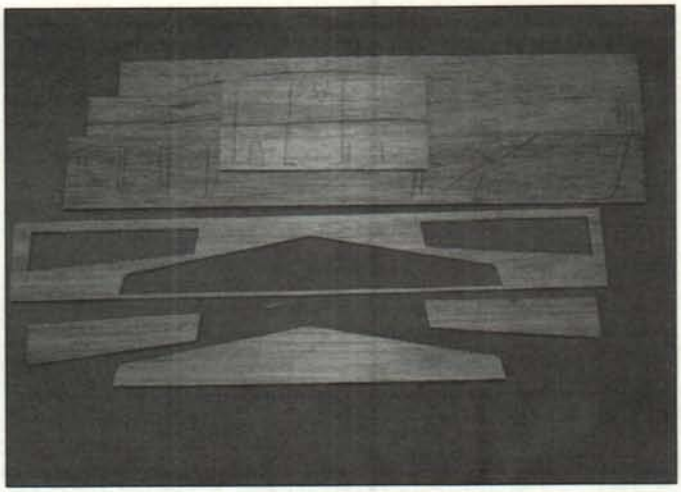
The Concept 30 SR and Concept 60 both come with metal balls on the swashplate and mixer. Only the less expensive DX still uses plastic balls on the swashplate. However, on all of the Concepts, the swashplate itself is still molded from plastic. On my 60 there is minute slop between the rotating and the non-rotating portions of the swashplate. This causes about one degree of slop at the Hiller paddle, which is not bad. The Concept 60 swashplate does not ride on the 10mm main rotor shaft; instead, it rides on a plastic tube that sits over the shaft. Swashplates from other 60-size helicopters will not fit on the Concept.

Most of the play in the Concept 60's controls is due to the ball links being too loose on the metal balls, as well as play in the servo gears. The Kyosho plastic ball links could be tighter on the metal balls. I have replaced some of the looser ones with Rocket City ball links.

The Concept 60 kit does not include ball bearings for the control bellcranks. However, in flight I really couldn't tell that there was any play in the system because the controls are loaded by the aerodynamic forces. Curious to see what the difference would be, I replaced the bushings with Kyosho's ball bearing control set (part #KYOE7532), which comes with seven bearings. You also need bearing set KYOE7560 for the roll cyclic and tail rotor. With the bearings, play at the bellcrank pivot is eliminated, however, it is difficult to notice any major change in flight characteristics.

TO BE CONTINUED IN OCTOBER ISSUE. **MB**

The Astro-Blaster kit, which lists at $74.95, contains virtually everything but adhesives and covering. Motor mounting tube is supplied, but the disposable D-11P motors themselves have to be purchased separately.



The 'Blaster represents Estes' first entry into the RC model aircraft market, and they have put much effort into producing a first-class product. Kit features excellent die-cutting throughout.

ASTRO-BLASTER *cont. from page 25*

ference between a sound wing and one doomed to failure at high speed!

You'll probably want to add some alignment tabs on the canopy/radio hatch to keep it straight on the fuselage. Also, some internal bracing of the hatch may be necessary for it to retain its proper shape once it is cut away from the fuselage.

I made two minor additions which are probably unnecessary but which helped give me peace of mind. First, I glued in a 1/16-inch plywood bulkhead that extends about halfway down from the top of the fuselage and which the motor mount butts up against. My reasoning was that this is the area that absorbs the motor thrust, and I didn't want to take a chance on the motor mount coming loose under the load from the larger E motor I plan to try sometime in the future. In addition, 1/8-inch triangular stock was added to the top and bottom of the wing tip/fin joints. This was more to keep the fins from being accidentally knocked off while handling the model, than to keep them from coming adrift during flight.

In order to keep the aileron and elevator servo arms from hitting each other, a 1/8-inch lite-ply servo mount was made that allowed the servos to be staggered fore and aft somewhat. The servos I used were Futaba's smallest, S-133s, along with their FP-R114H receiver and a 110 mAH battery pack. Space is limited and small, light RC gear must be utilized.

The model was finished with MonoKote on all surfaces except the wing. EconoKote was used here due to the lower heat required. High heat can distort the foam wing cores since the 1/32-inch balsa skins don't provide much insulation from the iron or heat gun.

Due to the Astro-Blaster's unusual configuration, I took extra care to make sure all flight surfaces were in alignment and that the model was within the specified CG limits with either a spent motor casing installed or with a loaded one. I moved the receiver battery fore and aft until the model balanced at the forward limit with a spent casing and at the aft limit with a loaded one—about a 1/4-inch range.

I also balanced the model laterally as, with the nyrod and antenna running through it, the left wing panel came out heavier than the right. Balance was achieved by hollowing out the right wing tip and adding a small amount of lead before the fins were epoxied on.

Flying weight with the D-11P motor came to 14-1/2 ounces, yielding a very light wing loading of 8-1/2 ounces per square foot on the combined wing area of 245 square inches. Overall wing span turned out to be 35 inches—about an inch shorter than specified.

In addition to the kit, Estes' standard Porta Pad II launch pad and Electron Beam

launch controller were supplied for this article. With one minor modification, this system worked perfectly with the Astro-Blaster. With the launch rod inclined at the recommended 20 degrees from vertical, you will find that the model wants to roll over and hang upside down when on the rod. A simple solution is to stick two 1/8x36-inch wire rods into the ground to hold the model upright as it goes up the launch rod.

So, what's the Astro-Blaster like to fly? Well, appropriately enough, I found it to be a blast! After a couple of hand-launched test glides to check out the trim settings, we made the first rocket launch. With a resounding "whoosh" the model left the launcher, pitched forward slightly, and went up, well, like a rocket! After motor burnout, the model coasted up to about 200 feet and, with just a bit of up trim, sustained an excellent flat glide until touchdown.

For subsequent flights, I positioned the launch rod closer to vertical, which gave a noticeably higher peak altitude. Control response is typical of most canards—positive roll at all speeds and soft elevator at gliding speeds. The model will not stall or spin; full up elevator produces only a gentle mush. The only control I found sensitive was down elevator, and this can be eliminated somewhat by positioning the servo arm forward of the neutral position, giving less down elevator and softer response around neutral while still yielding the full amount of up needed for the landing flair.

As long as speed is maintained, aerobatics are no problem and if one is *very* gentle on the sticks, small control inputs can be made during the motor burn.

It is advertised on the box label that the Astro-Blaster also makes an excellent slope soarer and I would have to agree, as it glides so well. While it's not a floater, it is certainly capable of thermalling under the proper conditions. About the only consideration as to how or where you fly the model is the lack of protection for the bottom. Landing on anything except soft grass will quickly grind away the launch lugs and covering. Wire skids should be added to the fuselage and bottoms of the fins if you don't have access to a grass field.

Although the construction manual says that a low-impulse E motor can be used for flights of up to 1000 feet altitude, currently there are none being produced that are compatible with the needs and characteristics of the Astro-Blaster. Estes had hoped to hit the market with such a motor at the same time the model was released, but things didn't quite work out as planned. When they become available in the future I'll try to give a flight analysis in a later issue.

Even with the "little" D motor, though, the model is a real kick in the rear to fly. I do hope that the E motors become available soon. As most of you are aware, the thirst for power is self-perpetuating and right now (to quote a line from a popular aviation movie), "I feel the need, the need for speed!" **MB**

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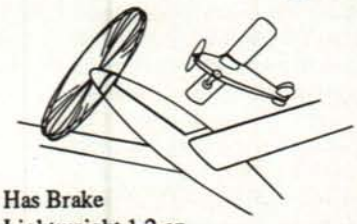

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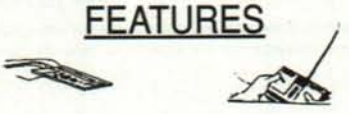

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BIG BIRDS *continued from page 55*

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Sig, DuBro and Goldberg all supply foam rubber that is just the right density to wrap battery packs and receivers. These foam rubber sheets are from 1/4- to 1-inch thick, and 7x11 inches in size.

How much is enough foam rubber? To quote rock star David Bowie, "Too much is never enough!" Seriously, there are few areas where such a line would apply, but it borders on the truth when applying the foam rubber around your radio and battery packs.

I personally try to have a minimum of 1/2-inch of good-quality foam rubber around my equipment before I fill in with the cheap stuff. A few sheets of foam rubber is a small investment to protect your favorite Big Bird.

Phil Silvera, owner of Phil's Hobby Hut Ltd., near Surrey, B.C., takes time to pose with his Big Bee, powered with a Quadra 42.

Bob Morgan lost his landing gear, but not his sense of humor. Bob has been flying models for more than forty years. His Big Bee weighs 19 pounds and is powered by a Quadra 50.

A YEAR OF BIG BIRDS

Time flies when you're having fun. My bride, Eileen, just reminded me that July marked my first complete year as your "Big Bird" columnist. It has been a busy year and a rewarding one, too.

Whenever readers ask questions, it is necessary to do the research to give a good answer. I often learn something or make a new friend when answering correspondence. Many thanks for the stamped, self-addressed envelopes. It makes it faster and less expensive to give you a prompt reply. Thank you, Big Bird lovers, for your encouragement. I strive to make every column better than the last.

Jerry Boudreau from Armstrong, B.C., Canada, was kind enough to send an article out of a 1991 *Best Buys* magazine featuring a C-119. I had commented on seeing some pictures of one in Oregon. It was much bigger than the one in the article Jerry sent. It is nice to know that there are a lot of fellows unafraid to tackle such a big job. I would love to hear about your special big project.

Paul Stanley wrote from Keaau, Hawaii, seeking information on the Hyperbipe that appeared in the April 1992 issue. Builder Bruce Gale informs me that his plane is an early I'kon N'wst kit.

I called Emil Neely, owner of I'kon N'wst, and he said that the Hyperbipe kit is no longer in production. The next step in the search led to Bob Holman and his plan service. Bob has a 56-inch version of the plane that can be blown up to any size desired. Of course, this is going to cost a few bucks, but it works well if you just have to have a particular set of plans.

BOOK OF THE MONTH

If you have read any good aviation books lately, please let me know. I cannot read them all and our Book of the Month has proven to be a popular item in the column. This month's favorite is *Fly For Your Life* by Larry Forrester. It is a Bantam war book and tells the story of England's greatest Ace, R.S. Tuck. I never tire of reading about the exploits of great airmen. ***MB***

ELECTRONICS continued from page 57

the least expensive way to go, as I show in my schematic."

One of these two schematics has got to fill our needs—and thanks to both of these fine gentlemen for sharing their circuits with us. Let's take a look at them one at a time.

George's circuit uses a special transformer, which has to be hand-wound around a ferrite core. The process might sound intimidating, but isn't, being quite common for this type of transistor power supply. The core maker is: Magnetics, Div. of Spang & Co., P.O. Box 391, Butler, PA 16003; (412) 282-8282. They should be able to furnish you with the name of the supplier closest to you, and probably also have transformer winding instructions. At this point, the subject is probably not of enough interest to cover here.

The rest of the components are common and readily available. For the 2N307, most any 5-amp or more germanium PNP transistor should work—heat sinks are definitely called for. The NTE and ECG recommended replacements are No. 104.

Both mods described are worth making. The meter used is the common method of measuring AC—first rectifying it with the diode and using a DC milliameter as an indicator. An LED could be used for this purpose, considerably cheaper though not as visible.

Frank's circuit works on a completely different principle. The transistor is actually working as a sort of resistor, and as such can be expected to get quite hot. In this case too, a heat sink is in order, though the fact that the operating time is short lessens that requirement considerably. Both devices are available in the common TO-3 and TO-220 cases, so a single heat sink with appropriate insulation could be used to mount both devices.

NEGATIVE PULSE SERVOS

On another subject, Frank writes:

"In the July/August '90 column, someone asked if they could use older servos with a newer rig. You suggested using a 4069 Hex Inverter (IC). My question is the opposite; I would like to use some of my newer Airtronics servos with my ProLine equipment to replace some of the tired ProLine servos. This seems like a good solution using an interface between the receiver and the Airtronics servos.

"I ask if this can be done because I do not not have any schematics of either device, knowing only as you mentioned in your column that ProLine are negative pulse servos. I hope it is possible to do this as it will prevent retiring a good old rig."

Yes, to everything! The 4069 is actually a six (Hex) section inverting amplifier; that is, whatever signal is fed in comes out in the opposite polarity. Used as described previously, as late as in the previous column, we use a second section to re-invert the signal to its original polarity. To use it as Frank intends, only one section need be used, with its output going directly to the servo. In this application, one IC can handle six servos, with only one set of battery connections necessary. Receiver signals can be applied at pins 1, 3, 5, 7, 9, 11, and 13, with outputs to the servo at 2, 4, 6, 8, 10, and 12.

Keep that old ProLine flying, Frank, but don't forget that as good as it was in its day, it is woefully lacking in the narrow-band requirements so necessary at any but the most sparsely populated flying fields.

SOLAR POWER

Though one needs to consider its practicality in a given application and not be carried away by its newness and "high tech," solar power is here. One supplier to the RC hobby claims that after a day's flying, your NiCds, which you still need to carry, are still fully charged. I fail to see that being worth hundreds of dollars, neither can I see any disadvantage to my batteries becoming discharged within their limitations.

Though not primarily intended for the RC hobby, a Kentucky company advertises its solar powered battery charger to "Let the sun's natural rays charge your battery 24 hours a day!" Should sell well in Alaska and points north !

Eloy Marez, 2626 W. Northwood, Santa Ana, CA 92704. ***MB***

Our vote for the most unusual electric went to Frank Wetherill's "Quasimodo" seven-cell entry. Foam core wings and wheels, carbon fiber reinforced spars, homemade folding prop and gearbox, wire wing bracing, and pull-pull control cables were just a few of its many unusual features.

Dick Pantzar and his Airtronics Eclipse finished well out of the money, but for any amount of money, the Eclipse is one deluxe kit that performs nicely!

ASTRO CHAMPS *cont. from page 41*

ous, however. A quick call to John Pond's Plan Service or *Model Builder* Plans Service will give you a broad selection. Now all you have to do is pick one that would be suitable for electric RC and scale it to the appropriate size!

First place Seven-Cell O.T. winner, Jim Skinner, used parts of a Leisure Playboy kit as well as some scratch-built parts to construct a pylon version of the Playboy Sr. The theoretical advantages of the pylon version vs. the Playboy Cabin are less drag and greater lift through a smaller fuselage cross-section and more lifting surface. Regardless of whether the advantages are really there or not, Playboys always do well in O.T. competitions, both gas and electric.

UNLIMITED SAILPLANE

First place winner in this class was Jerry Bridgeman and his original design Snipe Electric Mark XI (SE-XI for short). Here is a model with a wingspan of 64 inches and a wing area of 475 square inches. Moreover, it weighs 87 ounces, more than *double* what a typical seven-cell model weighs. The question arises, how could a model with a 26-ounce wing loading win a duration contest? The answer lies in the Astro 60 backed up by 27 900 mAH cells!

To quote Jerry Bridgeman regarding the 20-second climbout task, "To clear traffic during the mass launch and to keep from getting too high to see the plane, I fly flat for about three seconds, then pull up into my climb." By the time SE-XI rotates to vertical it is *really* hauling! It literally gets small so quickly that Jerry pulls up past vertical into an inverted, climbing, Z-pattern with a one- or two-second pushover to horizontal at the top before "motors off" is called!

After all the oohs and aahs subside, one can see the down side of such a high wing loading and a super low camber, modified Selig 7003 airfoil. Sink rate is a tad high! Yes, you do cover miles of ground in the blink of an eye, but it takes one strong thermal to sustain altitude. Keep in mind, however, that this is a full-blown, world-class F3E ship which gets points for every lap completed in a four-minute time frame on a 150-meter course. Speed is essential.

UNLIMITED OLD TIMER

First place winner in big gun Old Timers was Gary Westland and his Playboy Sr. Gary uses 17 800 mAH cells to power an Astro FAI 25 motor and turn a Sonic-Tronics 13x7 folding prop. An Airtronics radio provides the control, while a combination of Oracover and MonoKote provide the good looks.

PRIZES, PRIZES!

Bob Boucher of Astro Flight really deserves a round of applause for his generosity. At the conclusion of the contest on Sunday afternoon, he produced about a thousand dollars worth of motors, chargers, motor controllers, high-flex wire, connectors, and other valuables. These goodies were to be awarded via raffle to all contestants. Bob Sliff

Model Builder's vote for the most unusual Old Timer went to Bob Taylor's Carl Goldberg "Sailplane." Lots and lots of parts go into the structure on this bird! Built from a Hobby Horn kit.

Bob Sliff of Midway Model Co. holds his Gnome 3M electric (aka Electra-Gnome 3M). Biggest model of the meet, it placed a close second to the Bridgeman skyrocket. It's powered by an Astro 60 on 24 cells.

of Midway Models also donated some kits.

Full credit for a well-run contest goes to hard-working John Lupperger and his able assistants who ran the headquarters table. John's fair but no-nonsense approach to running the meet in an orderly, efficient manner earned him the utmost respect from everyone present, even if they were only spectating.

Electric power continues to come on strong these days. In spite of the Los Angeles area "civil disorders" which were going on at the time of the Astro Champs, a healthy turnout was witnessed. True, not one out-of-state entry showed up to compete (which is far from normal), but the locals knew better than to believe the hysterical, sensational, ratings-hungry TV media and stay home!

Electrics are here to stay. With many flying fields being jeopardized over noise violations, it's nice to be able to fly in a neighborhood vacant lot just a few yards from a residential area and have no one realize you are even there! Field permits are easier to obtain because there are no flammable fuels, no noise, no crowds, no environmental impact. In Europe, electrics are the rule, glow power is the exception! Could this be the future for American metropolitan flying?

As a modeler, it's nice to be able to buy and fly electric motors as powerful, efficient, and affordable as the ones available today. Many more really impressive model projects are possible with the new generation motors, batteries and speed controllers that only a few years ago did not even exist. Give electrics a try, soon! **MB**

CONTROL LINE *continued from page 29*

edge I'd acquired over the past year. So that's where the 314 comes in . When I see how this plane flies, I'll send you more information and pictures with all the details."

Anyone else with information about electric CL flying is welcome to join in this exchange of information!

• • •

Here's another chance for modelers to lend a hand to one of their own: Thomas L. Byers of Riverview, Florida, writes that he has been searching for fellow CL fliers in the Tampa area. Fred's been a CL flier for 30 years, but has been inactive since moving to Florida; now he'd like to get started again. Anyone in the Florida area who can get Tom connected with your local activity should write to him at 12500 McMullen Loop, Riverview, FL 33569. How about also contacting *MB* at the address listed at the end of this column, and we'll spread the word about Florida activity? From correspondence over the past few years, I know there is some!

NEWSLETTER OF THE MONTH

The newsletter of the month feature this time will mention a pair of excellent publications from Vancouver, British Columbia, Canada. Vancouver has two active clubs with control line modelers involved.

The Vancouver Gas Model Club, which has existed since 1935, caters to both CL and free flight model aviators. The newsletter is the *Hot Head,* edited by Dave Finnie.

Vol. 42, Issue No. 1, the January-March edition, featured a variety of information, including Northwest contest schedule information, local meeting notices, reports from club officers and bits and pieces on members' activities in CL and FF events over the winter. There also were flyers on upcoming contests in the region and a list of VGMC club records for CL, indoor and outdoor FF. There also was an article on carrier plane engine alignment by the Northwest's carrier guru, Orin Humphries.

The VGMC can be contacted at 2929 E. 22nd Ave., Vancouver, B.C., Canada, V5M 2Y3.

Formed a couple of years ago when the VGMC split into two clubs, the Pacific Aeromodelers Club is one of the newer organizations in the region. However, it puts out one of the best CL modeling newsletters around, edited by veteran CL flier Frank Boden.

Airwaves is always filled with photos, ads and articles. The February-March issue contained a report from president Lyn Murray, a list of technical tips and dope finishing instructions by Windy Urtnowski (courtesy of *The Pits),* a report on one modeler's winter building, contest flyers and schedule, a report on Dan Rutherford's adventures in Russia, a list of Washington State hobby shops, contest results and other items.

To contact the Pacific Aeromodelers and receive *Airwaves,* write: Frank Boden, 4791 Shepherd St., Burnaby, B.C., Canada.

Airwaves Editor Frank Boden also reports that several of the Vancouver fast combat fliers are now using automatic flyaway shutoffs of varying designs, including one now being manufactured by Rob Martin of Forward Models. This device, based on the first Norm McFadden fuel dump design that was demonstrated in 1991, apparently is the first commercially manufactured AMA fast combat shutoff. The shutoff costs $19.95 plus $3.50 U.S. for shipping and handling. Write to Forward Models, 1183 Lockley Road, Victoria, B.C., Canada, V9A 4S7.

What seemed impossible only a couple of years ago—stopping fast combat flyaways—now can be done in several ways with the use of shutoffs. There are at least five designs now available, including one that can be purchased and at least one other expected to hit the market soon. The designs include the McFadden fuel dump, the Boden air dam, the Thompson alligator clip, the Mel Lyne ball-check valve, and two other designs under development by McFadden for eventual manufacture by Will Nakemura. Another safety problem solved!

We're looking for CL modeling photos, club news, contest information, technical tips and questions, or anything else of general CL interest. Write John Thompson, 1145 Birch Ave., Cottage Grove, OR 97424. ***MB***

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MODEL PUBLICATIONS! Hannan's "Stick & Tissue," $9.95; "Peanut Power," $15.95; New! "Aeroplans, Volume 4," $10; Zaic's "Frankly Speaking," $6.95; Warner's "Hey Kid!, Volume 3," $9.95. Add $2.75 postage, one or two books, $3.25 for three. Or send $1 (refundable with order) for our complete catalog. Hannan's Runway, Box 210, Magalia, CA 95954.

MODEL/AVIATION magazine collection for sale, hundreds of issues! Send long SASE for list. Tony Avak, 114 Atalanta St., Lexington Park, MD 20653.

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RUBBER FREE FLIGHT source directory. Designed for newcomers. Thirty pages, lists retailers and manufacturers of kits, supplies, plans and "how-to" books. Plus; "how-to" article and 16" Bostonian construction plan for "Robin Red Sox." Fifty pictured designs and sources. Tips on saving construction time and more. Send $3.95 (postpaid) to: Ray Hayes, 69598 Brookhill, Romeo, MI 48065.

CONTROL LINE STUNT kits, plans, engines and other items for competition or sport. Send $3.00 for 32-page catalog. Tom Dixon, P.O. Box 671166, Marietta, GA 30066.

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HANNAN'S *continued from page 49*

cluding the "Micro-4," "Micro-Jet" and "Mini-6." For their complete catalog, send $1 to HiLine, P.O. Box 11558, Goldsboro, NC 27532.

Having settled upon your choice in powerplants, how about the plans and supplies for the models? Ken Sykora, of Oldtimer Model Supply, has the answers in his latest catalog. Featuring a stirring cover illustration by Otto Kuhni, the fun-to-read booklet lists hundreds of construction plans, balsa and Hinoki wood, tissue and condenser paper, wheels, propeller blanks, and nearly everything else that might be required for building free flight models. Sprinkled throughout are delightful sketches and quotations, such as this gem: "Life makes men of boys. Modeling gets them safely back again!"

Indoor News is returning: This international newsletter of indoor modeling, formerly edited by Jorgen Korsgaard, of Denmark, is now being published by Thedo Andre, Meijhorst 35-43, NL-6537JD, Nijmegen, The Netherlands. A subscription for three 16-page issues per year is $20, postpaid, by airmail. Featured are plans, techniques and competition information from world-wide sources.

Simple Simon Stooge may be just the thing to enable your rubber-powered model to be wound without a helper. All the required materials are readily available from a hardware store, and only simple tools are required for fabrication. Plans are only $2 postpaid, from: Edward Schlosser, P.O. Box 412, Ridgefield, NJ 07657.

SIGN-OFF

This month's parting message is by courtesy of Ed Whitten: "Simplicity of design is the natural result of profound thought." ***MB***

ADVERTISER INDEX

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MODEL DESIGN

cont. from page 47

quested; but you also can allow for such things as undercutting of foam cores from hot wire melting by requesting that a "negative" skin thickness be added to the template patterns to compensate.

Cygnet has, in this modeler, one happy customer. I recommend their airfoil plotting program to those of you who have IBMs or their clones, and who design your own models or modify existing designs. Note that this program provides no engineering data to help you choose an airfoil for a given purpose. Sometimes, however, modelers like to study the plots of several airfoils and make a qualitative choice by visual inspection. For that, and for producing selected airfoils, the program is perfect.

There is at least one more airfoil-plotting program available. Chuck Anderson of Box 305, Tullahoma, TN 37388; (615) 455-5788, offers one. I have seen some airfoils plotted by Chuck's program and they looked fine, but I am only qualified to discuss the Cygnet program in any detail.

SEATTLE MUSEUM OF FLIGHT (BOEING) RESEARCH LIBRARY

I'm a retired Boeing engineer and a charter member of the very fine Museum of Flight, located at the southwest corner of Boeing Field, just south of Seattle and adjacent to several of the Boeing plants. The museum has a huge glass-walled display hall with a great many airplanes, including some big ones such as a Boeing 80A trimotor, a DC-3, and an A-12 Blackbird. The really big ones, such as the four-engine bombers, are on display outside.

Needless to say, the museum tends to be somewhat Boeing-oriented and has a lot of Boeing members, but it was established by a separate foundation and has airplanes of all makes. If you can spare a few hours to tour the Museum of Flight when you are in Seattle, you won't regret it.

But there's more. Scale modelers, attention! I just chatted by phone with Anne Rutledge, the Archives Research Librarian for the Museum of Flight. She tells me the archives are available to non-members for in-person research, by appointment only, Monday through Friday; telephone (206) 764-5705. Anne said that they also sometimes answer questions by mail. Address the Research Library, Museum of Flight, 9404 E. Marginal Way S., Seattle, WA 98108-4097.

This library is by far the best source of materials on Boeing airplanes, clear back to the first one—the 1916 B&W floatplane—but they have a modest amount of information on some non-Boeing airplanes as well. If you want a lot of help, don't tell Anne I sent you.

PERPETUAL MOTION

A short item titled "New Energy Source" in the September 1991 issue of *Sport Aviation*, describes a new means of providing energy for airplane engines which is "being developed" by an Ohio firm. According to the magazine's source, "The company has obtained a long list of patents covering every aspect of a system that involves a new way of accomplishing electrolysis of water...producing hydrogen rapidly enough to continuously operate an internal combustion engine. The electrical power needed to break down the water into hydrogen and oxygen is said to be supplied by the engine's normal electrical system. The device that induces on-demand electrolysis is about the size of an aircraft spark plug and, indeed, screws into a normal spark plug hole to perform its dual function of producing hydrogen and igniting it in the combustion chamber."

Glory be! The article goes on to note that if this is all true, it is of course the answer to the world's energy problems. To their credit, they express doubt.

Most of my engineering consulting business clients are fellow inventors, and I have been taken severely to task by several of them, over the years, because I insisted that their particular perpetual motion machine inventions could not work.

"Perpetual motion" literally means moving forever, but that isn't what the term commonly means. The earth will move around the sun for a very long time, but it doesn't generate any energy in doing so. "Perpetual motion machine" inventors are trying to get usable energy for free.

If you remember some physics or have studied engineering, you know that "perpetual motion" is impossible because it violates the natural law that energy can neither be created nor destroyed. Energy can be converted to other forms of energy. Energy can also be converted into mass or vice versa in atomic reactions. That is what Einstein's $E=MC^2$ equation is all about.

So, the general laws of nature assure us that perpetual motion machines can't work, but I am still interested to study each new one that comes along, to see in detail *why* it won't work. Details are more challenging than generalities. In some clever PM machine ideas it is difficult to identify which step or steps in the proposed operation are false.

In the system supposedly being developed to run airplanes on hydrogen generated by the same system, the fallacy is obvious. To decompose water into hydrogen and oxy-

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gen requires more energy than one can recover by burning the resulting hydrogen in a heat engine. Nothing is 100% efficient, so losses will keep all such machines from running. But even if they were perfectly efficient, and were started with a starter, they would immediately stop if we tried to take any energy from them, since they cannot generate energy from nothing. There is no free lunch.

We may be fueling our airplanes with hydrogen someday, but the hydrogen won't be free. Actually, the closest thing to free hydrogen and oxygen that I have heard of results from a new system for decomposing water into its elements, directly by the energy of the sun. It may be possible that such a system could someday be more efficient than solar cells for flying solar-powered airplanes. It would need to be a closed system so that water from the engine exhaust was returned to the solar hydrogen/oxygen generator to be recycled.

NON-HEAT ENGINES

Internal combustion engines, steam engines and turbines, and gas turbines are all thermodynamic or heat engines. To use the energy in fuels, we first burn it and convert its chemical energy into heat, then we use this heat energy to power an engine to develop mechanical energy, to drive a propeller, generate electricity, or for any other purpose.

Unfortunately, the laws of thermodynamics dictate that the real and theoretical efficiencies of our heat engines are disappointingly low. The higher the combustion temperature and the lower the exhaust temperature, the higher the theoretical engine efficiency can be, but practical limitations keep the maximum efficiency of the best actual engines down around 30%. In these days of rapidly diminishing fuel supplies, that is unfortunate.

But there is hope from a new, yet old concept: new for man-made machines, but old for man himself and all other animals. The muscles in my arms and fingers are delivering mechanical energy to this keyboard, and I eat chemical calories that are the source of that energy, but we are not heat engines!

Think about that. Yes, we are warm, but our temperature is roughly constant, whether we are doing any work or not. Our food undergoes oxidation, but it "burns" at body temperature. There is no high combustion temperature and no identifiable lower exhaust temperature. It is meaningless to try to apply the "Carnot cycle" efficiency formula to animal "engines," because Carnot applies only to thermodynamic systems, and animal muscle works on a different and little-understood principle. We convert chemical energy directly into mechanical energy without converting it into heat as an intermediate step!

This interesting fact occurred to me in July of 1982, and I immediately started to research the idea. There has been little written, or work done, on the subject, but what I did find supported my thesis. Animal muscles are not heat engines. The *Encyclopaedia Britannica* confirms this, and goes on to say that muscles reach as much as 25% efficiency. Of more importance, there do not appear to be any laws of physics that would limit the efficiencies of man-made non-heat engines. Carnot's law does not apply. When we avoid the heat part of chemical energy conversion to mechanical power, we avoid the severe thermodynamic losses defined by Carnot.

I teamed up with Dr. Peter Stewart, a bio-engineering professor at Brown University, and corresponded with Dr. David Jones of the University of Newcastle upon Tyne, England, on the subject. We all agreed that the goal of man-made non-heat engines was possible, but we were unable to come up with any breakthroughs. Direct chemical-to-mechanical conversion has been done by several investigators in Israel and elsewhere, using unusual fuels, but the engines were heavy and the power output was small.

As this concept is not going to power your model airplanes tomorrow or next year, it may be of little interest to most of you, but it may be of extreme interest to this rapidly depleting world in 25 or 50 years.

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

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