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MODEL BUILDER

volume 11, number 118 $2.50 NOVEMBER 1981

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MORE WORLD CHAMPIONS AND TOURNAMENT OF CHAMPION WINNERS HAVE USED WEBRA ENGINES THAN ANY OTHER TYPE

Advanced mechanical design and production techniques combined with the latest in metallurgy provide the ultimate in performance at a reasonable price. Two series of engines are available, Blackhead and Speed. For years the proven Blackhead 40's and 60's have supplied dependable power for training and sport models while the Speed series has provided the power for more world championships and tournament of champion winners than any other engine.

WEBRA 91
SPEED, 4 cycle
No. 1040/T4

4 cycle glow engine with rotary drum intake and exhaust system. Excellent power with large props. Quiet running without need for a muffler. Perfect for scale models.

Glow plug not supplied.

WEBRA 61 FS
SPEED
No. 1024

World's most successful competition engine. Schnuerle ported, ball bearing, oversize crankshaft and revolutionary Dynamix carburetor supplied.

Glow plug not supplied.

WEBRA 61 FS
SPEED RACING
No. 1030

The newest addition available for the competition flyer and winner of the 1979 World Championship. Rear exhaust especially designed for tuned pipes installed inside of fuselage. For competitors who want the most readily available and powerful engine manufactured today.

Glow plug not supplied.

Send $1.00 for all information on Circus Hobbies Products.

Service and parts supplied from our facility in Sparks, Nevada. Technical assistance available from our regional managers who also use these fine engines themselves.

CIRCUS HOBBIES

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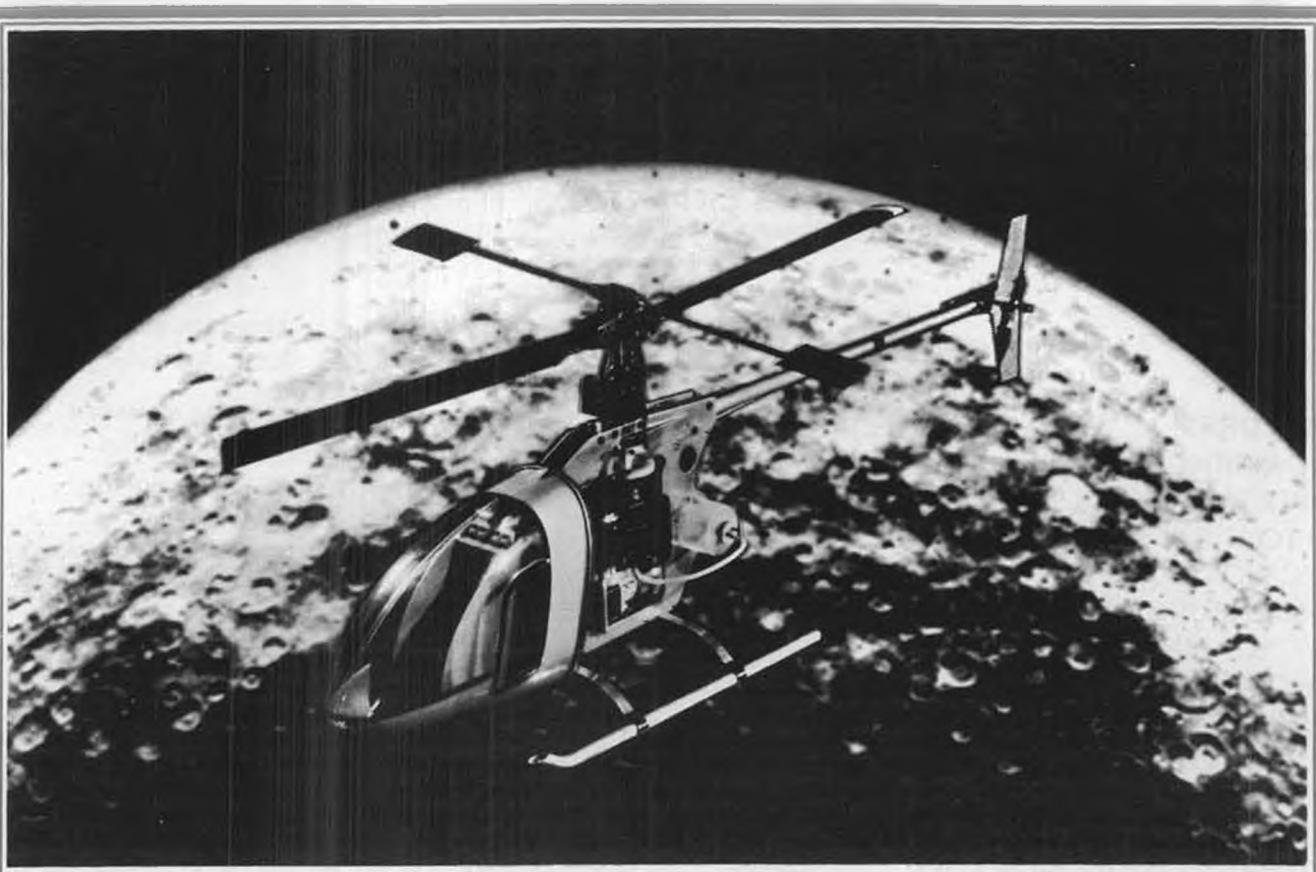

WE PUT THE THRILL BACK INTO R/C*

. . . been flying your Revolution I for five years. I know the quality of your products and have been delighted to recommend your machines to my flying friends. Thanks for another fine product that we can all afford!

RUSS RHUE, Age 46 - California

I was surprised at how easy it is to assemble!

PAUL MASTERS, Age 15 - Ohio

. . . wanted one for years. I am truly amazed by the stability of flight I get from my Mantis. Prior to buying my Mantis I had flown only gliders, yet within 3 days I was making coordinated turns, safe landings and nice long flights. I think the Mantis is truly a great helicopter kit!

GUY ROY, Age 17 - California

The Mantis has a major acceptance here in Rio, because of the high quality materials employed associated with an exceptional low price. That's Great!

ANTONIO CLAUDIO JAMEL, Age 19 - Brazil

I have long been desiring an R/C helicopter. At this cost, yours is a dream come true!!!

CECIL R. PARRISH, Age 33 - Illinois

Instructions are very clear. I'm glad to own a Mantis!

DAVID GUERRA, Age 16 - Texas

For a beginner in R/C Flying I feel you have come up with a real big winner - both construction and flying . . . keep up the good work.

STANLEY A. LEWIS, Age 27 - Florida

This kit is the most complete and comprehensive I have ever had. Assembly is a breeze with your fine instruction booklet and photographs.

WELDON I. HALTOM, Age 32 - Texas

I'm quite pleased with the way the kit was packed and packaged - it appears to be the best kit I've ever purchased.

THOMAS C. HENRY, Age 35 - Canada

It flys great, hovers very well. . .I love it very much. Can't wait until I get the new Super Mantis. I am sending you a picture of my new Mantis. I hope you like it. P.S. - Keep up the good work. Happy to fly the "American R/C Way".

FRANK R. CASPER, Age 28 - New Jersey

'OUTSTANDING!!! Exceeds all expectations, we use O/S Max .40 . . . plenty of power! (after) 4 years flying full size aircraft, fixed wing, this model put the thrill back into R/C. Look for more orders . . . my friends want one too! All claims of ruggedness gladly confirmed!

CARL P. DEAL Jr., Age 39 - Florida

This is the finest kit I have ever purchased. I have been a modeler for 50 years — I am a tool maker and I know quality. This is the best! You may use this recommendation for advertising.

H.H. MOORE, Age 62 - Texas

MANTIS

FIXED PITCH

Still $169 Price subject to change without notice.

American R/C Helicopters, Inc.

For Further Information Call or Write: **(714) 744-7533**

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MODEL BUILDER

NOVEMBER

1981

volume 11, number 118

621 West Nineteenth St., Box 335, Costa Mesa, CA 92627-0132 Phone: (714) 645-8830

CONTENTS

FEATURES

CONSTRUCTION

Cover: Larry Scott's Waco CTO Taperwing is hard to identify as a model, posed near a hangar at a small airport in Iowa farmland. The quarter-scale model is powered by a Kawasaki 3.15 engine, weighs 28 pounds, and the top wing span is 91 inches. Not just a "pretty face", it has placed high at numerous contests. See page 12. Photo by Jim Tiller.

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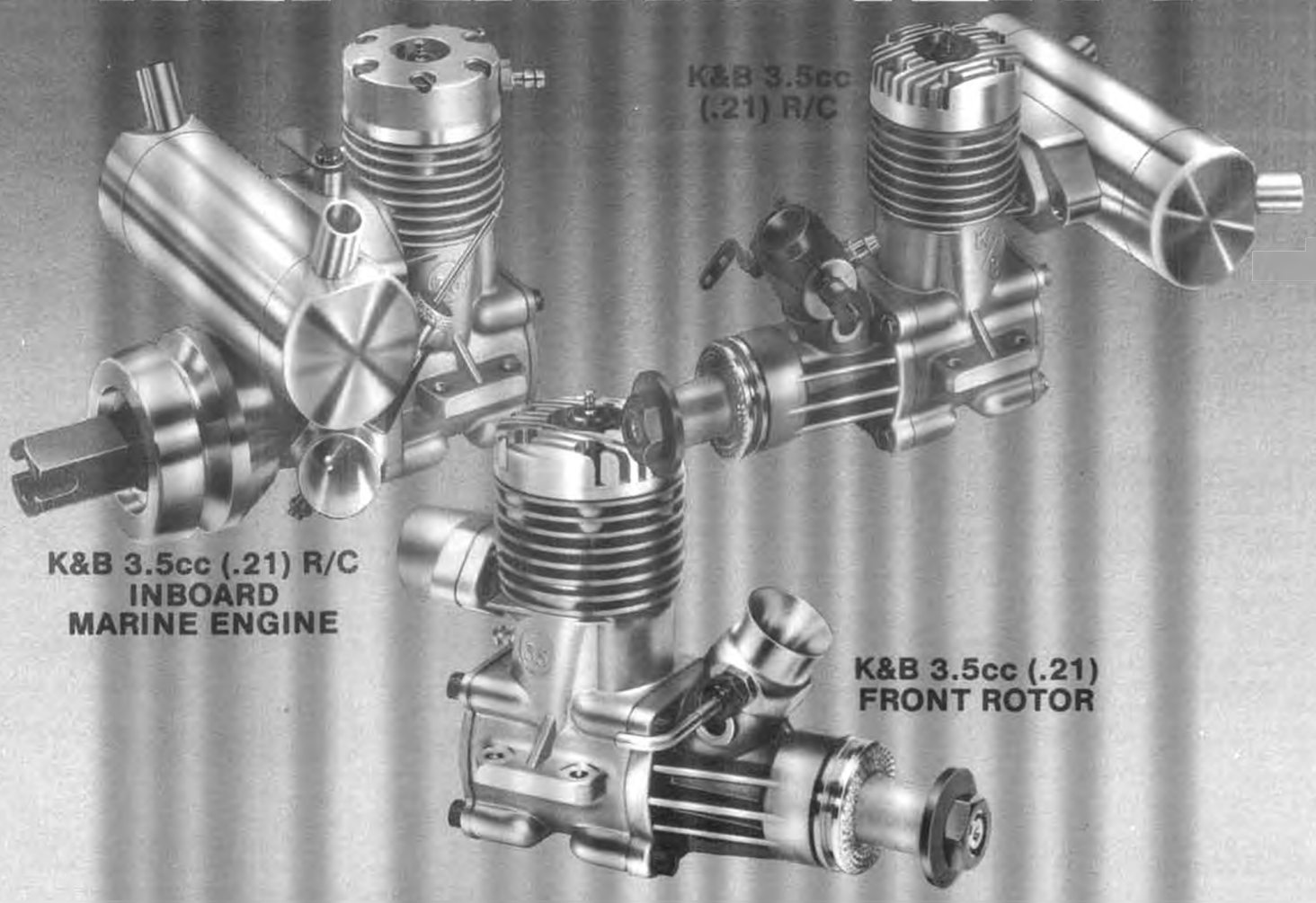
"REPEATABILITY"



K&B has long realized the value of repeatability! The new features in our latest K&B 3.5cc R/C car engine give every indication of its great success . . . it was the top qualifier at the R.O.A.R.* Nationals . . . so we are repeating these new features in the three K&B 3.5cc engines shown above. Which ever one you choose you will experience the same satisfaction that comes from "repeated" peak performance.

*Radio Operated Auto Racing

The new features are:

Con Rod – machined from high tensile strength aluminum stock. Bushed at both ends.

Heavier Wall Sleeve – harder and stronger – brass alloy minimizes distortion during machining as well as during running.

Honed Piston – honed after the grinding operation . . . resulting in a perfect round piston that automatically extends the life of the piston and sleeve fit.

Crankshaft – true running threads through a new machining process.

K&B's own Super Bearings – developed by our R&D – will withstand 30,000 R.P.M. plus without shedding ball retainers.

Mounting Lugs – webbed for extra strength.

On the ground, on the water and in the air K&B continues to be "The choice of Champions"

K&B MANUFACTURING

A DIVISION OF LEISURE DYNAMICS

12152 WOODRUFF AVENUE, DOWNEY, CALIFORNIA 90241

SIG HAS KITS FOR SPORT FLYING

HUMMER

There's more fun per ounce in this miniature tiger than in most any other model. Using just 2 channels of control you can fly up an aerobatic storm. Large wing area and light weight produces a low wing loading and that's the way to get superior performance from small models. Take off from any smooth surface, even close cropped grass.

DOUBLER II

Don't let the fact that the Doubler II fits 1/4 midget racing specifications lead you to a conclusion that this is a hot handful suitable only for expert pilots. All it takes to turn this sharp looking bird into a docile sport flier is the installation of a reasonably priced, non-racing, .15 sized engine. In this configuration it is aerobatic and responsive.

KIWI

We're all sport fliers at heart and this is a great model for Sunday sessions. Does well on wheels, floats, or skis. Big control surfaces for full aerobatic performance. You name it and the Kiwi can probably do it. And check that price against comparable models of other companies. A bargain without any shortcuts.

$20.95

Engine: .049 - .051
Wing Span: 34"
2 Channel Radio

KIT RC-50

Designed by - BILL FLEMING

HUMMER

Engine: .15
Wing Span: 36"
4 Channel Radio

Designed by - BRAD SHEPPARD

DOUBLER II

KIT RC-40

$38.50

KIT RC-42

$54.95

Engine: .35 - .45
Wing Span: 54"
4 Channel Radio

Designed by HANK POHLMANN

KIWI

GET INTO THE AIR FAST WITH A MOLDED FOAM WING DESIGN

The models below come with Sig's own high-density foam wing, formed in one piece, ready to fly. The wing is fuelproof and needs no covering, but can be painted if desired. Tails are sheet balsa and fuselages are built up on printed balsa sides in a quick and easy assembly technique. The result is a rugged little sportster that can take the hard knocks of Sunday flying. All include the following: Die-cut plywood parts, formed aluminum landing gear, aluminum motor mounts, nylon control horns, RC links, threaded control rods, molded hinges, hardware pack of screws, blind nuts, etc. and an illustrated building and flying instruction book. In addition, the Colt and Klipper have a nose gear, nylon nose gear bearing and nylon steering arm. A formed plastic cowl is supplied with the Klipper and Super Sport. Many RC clubs have used this series for special fun-fly events because of the convenient size and economical price.

KIT RC-36

$30.95

Engine: .09 - .15
Wing Span: 45"
2 - 3 Channel Radio

KLIPPER

Designed by - CLAUDE McCULLOUGH

Every designer has favorite outline shapes and some of the familiar lines of the Kadet and Komander are mixed together in this model. Steerable nose wheel.

Engine: .09 - .15
Wing Span: 45"
2 - 3 Channel Radio

KIT RC-43

$30.95

Designed by - JEFF FOLEY

COLT

This scale-like (sorta-Cessna) little gem is an ideal subject to paint in full size color schemes. Inspiration can be found at any airport or in aviation magazines.

Engine: .09 - .15
Wing Span: 45"
2 - 3 Channel Radio

KIT RC-37

$29.95

Designed by - MIKE GRETZ

SUPER SPORT

Clean and simple lines characterize this functional design. That approach makes it a snap to built and the wing loading can be kept to the lowest possible minimum.

KIT RC-45

$29.95

Engine: .09 - .15
Wing Span: 45"
2 - 3 Channel Radio

Designed by - MIKE GRETZ

SCAMP

Remember the lightplanes of Aviation's Golden Age - the Cub, Champ, Taylorcraft, etc. The Scamp is reminiscent of several of those classic lightplanes of the 1930's and 40's.

See your dealer first! To order direct, add $1 postage under $10, postage free over $10. No C.O.D.
Send $2.00 for latest catalog of kits, accessories and supplies by SIG and other major companies.

SIG MANUFACTURING CO., INC. . . . . MONTEZUMA, IOWA 50171

Long, Lean and Swift. . .

The U.S.S. Crockett for display or radio control

A scale model of the 164 ft. U.S. Navy Class 84 Motor Gun Boat that has a beam of only 24 ft. and can reach speeds of up to 50 knots.

Approximately 17 of these novel gun boats were built, basically during the 1960's. They generally served as short range, high speed patrol, support and reconnaissance vessels and were the first U.S. Navy vessels to be powered by a gas turbine converted from a jet fighter engine. Its power would accelerate these vessels from 0 - 40 knots in just about one minute!

This authentic Dumas scale model of the U.S.S. Crockett (Kit #1218) is 51" long and has a beam of 7½". Hull construction is of 1/8" balsa planking with decks, frames and superstructure of cleanly die cut plywood. In addition to being a beautiful display model, the Crockett can be built for radio control electric powered operation. Dumas has a deck hardware kit (#2105) and a running hardware kit for use with electric power (#2341) specially designed for this model (motors not included).

Remember, if you're into RC boating, Dumas has the electric motors, gear sets, proportional motor speed control for forward, neutral and reverse and sealed lead acid six volt 5AH batteries to make any model perform like the real thing!

Visit your local hobby dealer right now and see the Crockett and all the Dumas boats. If you wish, send $1.00 for a complete Dumas Boats catalog.

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"Yawn . . . reckon I ought to bring it on down, but I hate to wake everybody up". The rigors of slope soaring on the Hawaiian island of Maui can really get exhausting. " How about another sandwich, Dave?"

from Bill Northrop's workbench

SID AXELROD

This will be the only time we won't be getting a phone call from Sid Axelrod as a result of something we have published about him, his company (Top Flite), or the products his company markets in the hobby line. Whenever we have mentioned Top Flite or its products in **Model Builder** (and sometimes when we quite obviously neglected mentioning Top Flite products in **Model Builder**!), Sid has always called to thank . . . or chide us about the situation. The nicest thing about this has been that it meant he was always paying attention, and all of you know how much you appreciate someone who really listens when you're talking to them.

No . . . this time Sid won't be calling, as he succumbed on Friday, August 21, 1981, to a heart that could not keep up with his enthusiastic desire to enjoy an active life. But if there was anything nice about this, it had to be that after several years of enforced inactivity, he had one last good fling at the National Championships, in Texas, just two weeks prior, flying R/C sailplanes in competition. One ship was a 2-meter glider that is slated for kit production very soon. Right to the end he was working to develop a model design that would be well received as another Top Flite kit. And he was enjoying every minute of it!

Top Flite broke into the R/C field in 1960 with a kit for Ed Kazmirski's Nats and World Champs winning "Orion." In the face of tried and true high-wing cabin designs that dominated R/C in the years prior to multi-proportional, Sid had been developing the relatively small, highly aerobatic low wing Orion into a kit even before its fame became known, and it was an immediate success

SID AXELROD

and the best known model at flying fields all over the world. It was a daring gamble to kit such a radical aircraft (for the time), but did it ever pay off!

How do you follow an act like that? They called it the "Taurus," another Kazmirski design, and this was the haymaker right that followed the Orion left jab. Everyone who was *anyone* flew a "modified Taurus" (every modeler had to change the fin/rudder shape to their own satisfaction!).

Then, not satisfied with shaking up only the R/C troops, Sid brought us Monokote, the product that simply revolutionized the covering and finishing habits of modelers in practically all categories and in every corner of the world. Modeler's wives secretly, and remotely, fell in love with this gentle, quiet spoken man who virtually eliminated the strong (although exhilerating to us!) fumes of nitrate and butyrate dope from their homes . . . oh, maybe at the expense of a household iron that suddenly took to disappearing occasionally, only to return with strange, multi-colored streaks that transferred onto the best linens as she ironed them.

But . . . we seem to be talking about Sid's accomplishments rather than about him . . . However, that *is* to be talking about Sid Axelrod, for modeling and the pleasing effect he could have upon it was his whole life . . . well, not his *whole* life. Sid was a devoted family man, and much of the conversation in the long phone calls we were so proud to share with him concerned his grandchildren, and of course, whether any of them would become modelers!

We will miss those phone conversations with Sid, also seeing him and his precious wife and constant companion, Carrie, at the various trade functions that take place during the year . . . in fact, when this issue comes out, the telephone will haunt us. . .

CORRECTED CREDIT

We have received numerous compliments on the August cover, showing Mark Smith's "Mini Bird of Time" cruising in slope lift at Torrey Pines. However, instead of crediting Mark's father, Rod, for taking this photo, we should have named Paul Pankaski, who is now an instructor/dealer of "Quicksilver" ultralight aircraft in Florida.

FUN AND FRUSTRATION

Encouraged by our cross-country trip in May, that didn't seem to foul up the magazine works too much, we decided on another type of adventure. This time, the family took off for Hawaii immediately after finishing up the October issue. It was a first for the rest of the family, as we had been there a mere 36 years ago, courtesy of Uncle Sam. As Jartran doesn't rent any amphibious trucks, we decided to fly this time, rather than drive!

A little over a month prior to our departure, Al Tuttle, who had invited us to visit him and his wife, Julie, on the island of Maui, pointed out that there was terrific slope lift at a point west of Wailuku, where R/C gliders could be flown up and out of sight. We mistakenly commented that this might be a good place to tackle the existing World R/C Glider Altitude record, currently held by Ray Smith, at 4991 feet. Before you knew

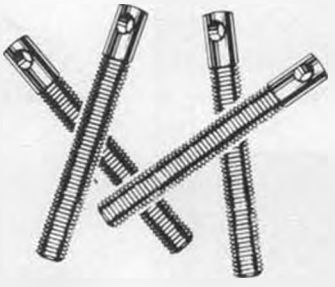
Continued on page 97

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 R/CMB does not constitute an endorsement of that product, nor any assurance as to its safety or performance by R/CMB.

• Mark's Models is now shipping the "Mini Bird of Time," featured as a construction article in the August issue of **Model Builder**. This 2 meter version of the FAI winner utilizes a die-cut wing rib that allows the builder to select either a 8 or 11 percent airfoil, depending on what type of performance is desired, when building the kit. Clear plans and photo-instructions assure ease of assembly. Suggested retail is $39.95. For your copy of Mark's Models catalog listing WWII scale models, R/C Sport/trainer airplanes, sailplanes, and accessories, send $1 to: Mark's Models, 1578 Osage St., San Marcos, CA 92069. Dealers and distributors please write for more information.

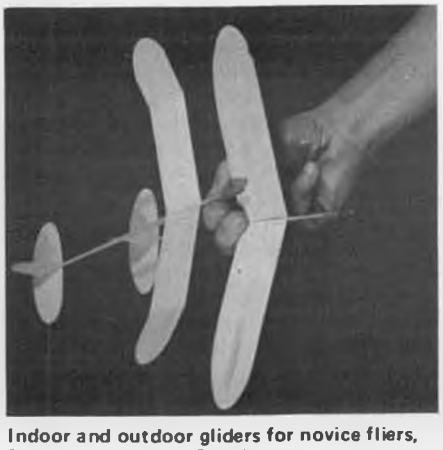
"Flapping Flyer", ornithopter kit by Indoor Model Supply.



DuBro "Rigging Coupler" for flying/landing wires, control cables, etc.

* * *

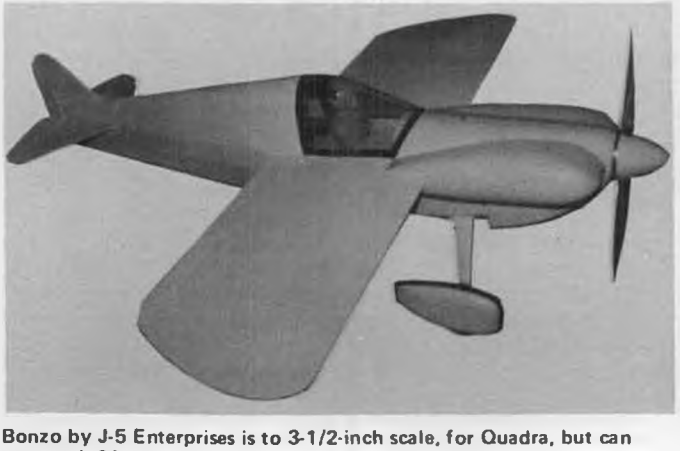
The Model #350, Multi-Purpose Work Center from Panavise has met with wide customer acceptance. Featuring the self-centering, extra wide opening head, Model #376, it will hold objects up to 9 inches in size for assembly, cleaning, painting, or repair, as well as tiny objects or parts. The extra wide opening head utilizes the Model #300 standard base that will tilt, turn, and rotate to any desired position. Tray base mount, Model #312, has six individual trays to hold small parts and tools right where you want them. Versatile and conve-



Indoor and outdoor gliders for novice fliers, from Indoor Model Supply.

Tatone choke for Tillotson and Walbro carburetors.

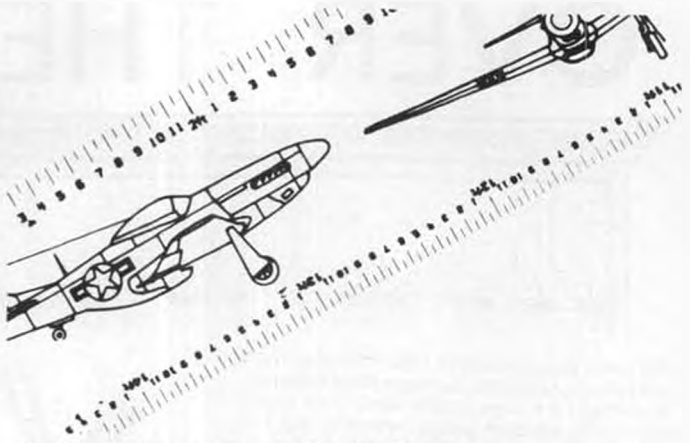
DuBro's quarter-scale pilot weighs 12 oz.



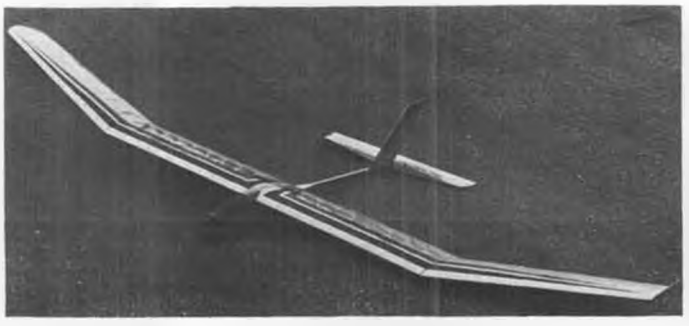
Bonzo by J-5 Enterprises is to 3-1/2-inch scale, for Quadra, but can use good .61.

Pro Line replacement and spare parts available from Ace R/C.

Complete kits for Pony-Blimp are now available from Peck-Polymers.



Scale ruler by Robart, with 1/8, 1/6, 1/5, and 1/4-scale markings.



Hawker Tempest M-5 from plans/parts package by Vito Tomeo Models.

Newest House of Balsa R/C sailplane is the 96-1/2 inch span HOB 2-S.

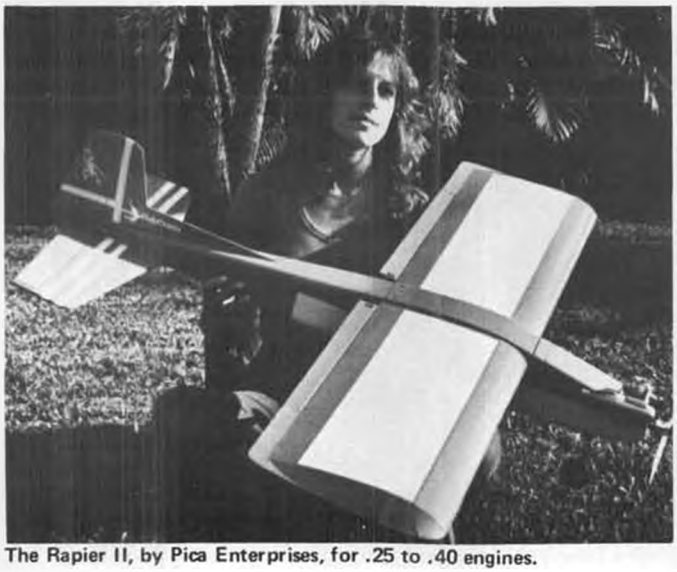
nient, the "Multi Purpose Work Center" will find a million and one uses on your work bench. For more information, see your local dealer, or if he cannot help, contact: Panavise Products, 2850 E. 29th St., Long Beach, CA 90806.

★ ★ ★

The J-5 Enterprises Bonzo is now available, being produced in 'almost' 1/3 scale, actually 3-1/2 inches to the foot! A high performance model, designed for Quadra power, it is definitely a beginner's airplane. With a wingspan of 54 inches and an overall length of 60 inches, it can be built lightly enough (10 to 13 pounds) for .60 power, however, it is engineered for Quadra power. The wing has a 1/2 x 1 inch basswood main spar with 1/4 inch, paper-covered foamboard wing skin material, while the fuselage and tail feathers are built up with basswood strips, 1/8 mahogany formers and fabric covering. The cowl, wheel pants, and fairings are vacuumed formed plastic and the landing gear is 1/4 inch spring steel. Most hardware, full size plans and instruction book are included and building time is said to be fairly quick. For all those interested in 2 cubic inch, chain saw powered pylon racing, contact Jim Kunkel, at J-5 Enterprises, Box 82, Belmont, Ontario, Canada, N0L 1B0, and for information on all of these boats, planes, and accessories, write to J-5 Enterprises at the above address, or to: J-5 Enterprises, P.O. Box 8, North St., MI 48049.

★ ★ ★

After three years of development, Peck-Polymers announces the availability of its famed 'Pony Blimp,' the hit of the IMS Show in Pasadena, CA, and the HIA Show in Atlanta, GA this past winter and spring (see August, R/C World). Capable of lifting 28 ounces, it's designed to fly indoors with two VL Hytork or Astro 02 electric motors. Complete control of turn, elevation, forward, reverse, and off, is provided by a 3 channel system. A 4 or 5 channel system



The Rapier II, by Pica Enterprises, for .25 to .40 engines.

Dynamic Models supplies 38-1/2-inch long fiberglass hull, accessories, and plans for this PT Boat.

Sprung tail wheel strut (less wheel) from Sullivan Products, Inc.

Dual Digital Charger, by Model Racing Products (MRP).

Bent wire to fit Robart molded scale landing gear, by Champ Model Products.

will provide control of water ballast and helium release, too. Contest balsa and ply parts, along with hardware, 'micro-switches', 18 and 26 gauge wire and Deans plugs are some of the quality materials included in this kit. The 11 foot, specially treated vinyl helium envelope with a unique slide system for removing the fins and gondola enable the blimp to be quickly deflated and packed in a box less than 1 x 2 x 2 feet! The standard kit, #PP-19A has "Pony Blimp" silk screened on its sides while kit #PP-19B has no lettering so that you may start your own advertising service! Either "Pony Blimp" sells for $249, or the helium envelope is available separately for the scratch builder for $129. See your local dealer now, or order direct from: Peck-Polymers, Box 2498 La Mesa, CA 92041. Californians add 6% tax.

★ ★ ★

Du-Bro Products has recently added a 'full bodied' 1/4 scale pilot to its line! This gentleman is extremely realistic and beautifully detailed out in a civilian flight suit, turtleneck sweater, and a seat pack parachute. The right arm and left hand may be positioned to suit the requirements of your particular cockpit. Some 'tailoring to fit' may be done with a heat gun to insure proper cockpit fit. Easily obtainable artist acrylic paints are recommended for a life-like Look. He is a lightweight, weighing only 12 ounces, and retails for only $15.95. Catalog #258.

Du-Bro has also brought back an old item, now called the 'Rigging Coupler.' Made of solid brass, they are perfect for flying wires, control cables, etc. With a length of 7/8 inch and a 2-56 thread, they will work with the Du-Bro Kwik-Links, Nylon Links, and Ball Links. Packaged four for $1.25, a welcome addition to the 1/4 scale hardware scene. Du-Bro Products, Inc., 480 Bonner Rd., Wauconda, IL 60084.

★ ★ ★

Sullivan Product's answer to the pretty rough business of landing and taxiing 1/4 scale models can be solved by the installation of its new, sprung tail wheel gear! Based on the design of its successful sprung, lever action main gear, a larger trail angle is incorporated to provide a smoother ride and good castor action for positive centering. Tough, lightweight alloy construction, and a bright plated spring to allow you to "tune" the ride to minimize the bumps are featured. Complete mounting and customizing instructions are included along with an allen key for the mounting screws and, four different sizes are available. Sullivan mentions that Cessna is now utilizing the same principle on its 12 inch to the foot aircraft . . . (wheel not included). See your dealer now for this new item. Sullivan Products, Inc., 535 Davisville Rd., Willow Grove, PA 19090; (215) 659-3900.

Mini Bird of Time, by Mark's Models.

★ ★ ★

Coverite's famous 'Black Baron' introduces 'Ironex', a new product especially designed to solve the age old problem of removing baked on adhesives from irons (Teflon coated, included), utilized for applying the various heat reactive, fabric or film, covering materials. Use of Coverite's new 'Ironex' will eliminate

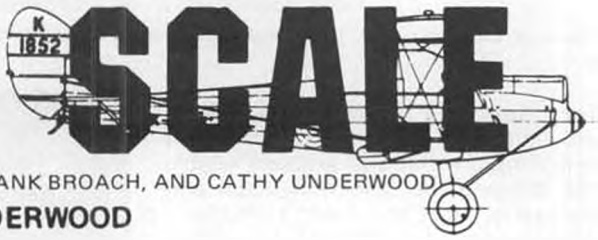
Continued on page 96

Multi-Purpose Work Center, by Panavise.

Zipper T-shirt from Hobby Hideaway.

Col. Art Johnson really cleaned up at the Nats this year, winning Sport and Giant Scale respectively, with his veteran P-82 "Twin Mustang" and big P-40 (featured in June '81 Model Builder). Well-deserved wins by a top scale modeler.

1 TO 1 SCALE



PHOTOS BY DAVE ABEL, FRANK BROACH, AND CATHY UNDERWOOD

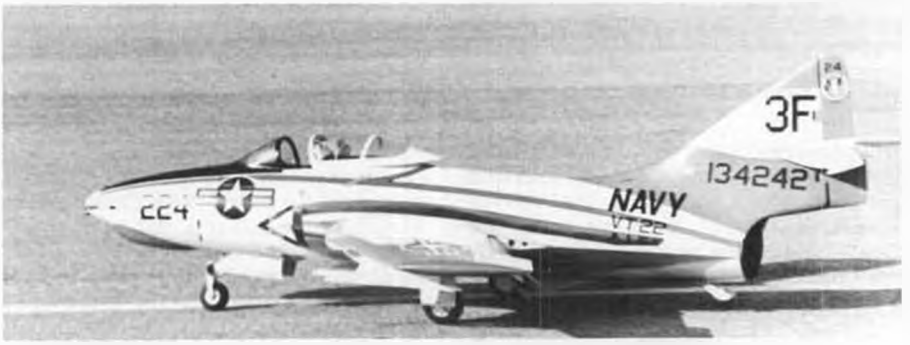
By BOB UNDERWOOD

• When the site was announced there were those who voiced concern about it. Some said it was too far, others too hot, some too windy, and some . . . The Seguin site provided an outstanding flying area with a 150 foot wide runway stretching forever that was super smooth and nothing that you could come close to hitting (not even landing lights!). Whether your bag be free flight, control line, or R/C, the site for scale flying was excellent. The Coliseum provided a great display area (air conditioned) and gathering point to swap tall tales about scale wars. Yes, it was hot, but then, recall Lake Charles and Lincoln and Wilmington and Riverside?

There was much concern when, less than a week before, it was discovered that the Category Manager could not attend and that other personnel would be unavailable. Therefore, the R/C Event Director added a few extra jobs, such as control line as well as R/C. Bill Pepin, the NASA newsletter editor, substituted at the last minute for free flight and the show was on. We were so pleased that the contestants were most complimentary concerning the running of the event. With the pilot's meeting for R/C on Friday night, we were able to get underway very shortly after the 1 p.m. time on Saturday. Had we been able to get the transmitters in from the guys quicker, there would have been no delay. The final flight was completed at *exactly* 2 p.m. on Sunday; everyone who wanted to fly the four rounds had the opportunity. Actually, we could have flown more rounds if we had used two sites, but those in attendance preferred to have the four flights and stay at one site. I must compliment Ron Hesselbrock who directed the lines, Frank Broach who selected the judges, and Suzi and Betty Stream on Saturday and my daughter Cathy on Sunday who did all the tabulation. We were able to provide each contestant a carbon copy calculator tape of his score just a few minutes after his flight. The awards were presented at the site after the final flight. All of this was made possible by the wonderful help and cooperation of the many helpers and the contestants.

Unlike some other years, the attrition rate of aircraft was much lower. This fact is, of course, little consolation to those four who lost aircraft, but it points up the quality of the flying as well as the suitability of the site. The wind, which had been right down the runway from Sunday until Saturday, was at 90 degrees on Saturday and blowing toward the crowd . . . hard! And what a crowd it was on Saturday. There were thousands, literally, lining the runway. They were a

Continued on page 87



Charlie Chambers won a spot on the FAI Sport Scale team with his Cougar, built from a Jet Hangar Hobbies kit.

John Pagan built two Bucker Jungmeisters for the Nats, one for Giant Scale, one for Sport Scale. Very enthusiastic competitor.

George Rose again made the Precision Scale FAI Team with his P-6E. Looking good on this landing approach.

Paul Strona, Mid-Pacific Soaring Society, Oahu, Hawaii, rares back to hi-start his House of Balsa 2 x 2. Site is Kawainui Air Park, reserved by state for modelers.

Members of Mid-Pac "analyze" nicely modified Drifter II by Charles Ogata, 3rd from left. Lou Sdunek, far left, served as test pilot. Dick Everett (yep, that Dick Everett) stands between Marcelo Strona (far right) and club treasurer, Charlie Foo.

R/C WORLD

Text and Photos by JOHN ELLIOT

• Last month we mentioned the upsurge of interest across the big pond in R/C Schneider Trophy meetings. A general set of rules/guidelines has been established and we would like to reprint them here (with additional comments and thoughts by Larry and Granger Williams to follow in the future) as lifted from the August issue of RCM & E. We also hope to obtain a report on the September 12th and 13th contest, commemorating the 50th anniversary of Great Britain winning the Schneider Trophy outright.

The feeling of the rules is that this is to be a Stand-off Scale event (basically, our Sport Scale), with R.O.W. added.

1. ANY model will be allowed that had a connection with the Schneider Trophy Races between 1913-1931, whether it was a practice machine or an actual race entrant.

2. It will be a Stand-off Scale event judged to "Class II" Standard (our Sport Scale).

3. Maximum weight must not exceed the F.A.I. limit of 6kg (13 lbs).

4. Maximum engine size .61 (10cc).

5. Points will be allotted approximately 60% static, 40% flying (the judge will be looking for realism in the air).

6. The model must complete a 2-minute flotation and navigation test (based on full size practice).

7. Ten laps to be flown around a marked triangular course.

8. Fastest lap of event worth an extra 200 points (separate prize).

9. Each lap flown counts for 100 points

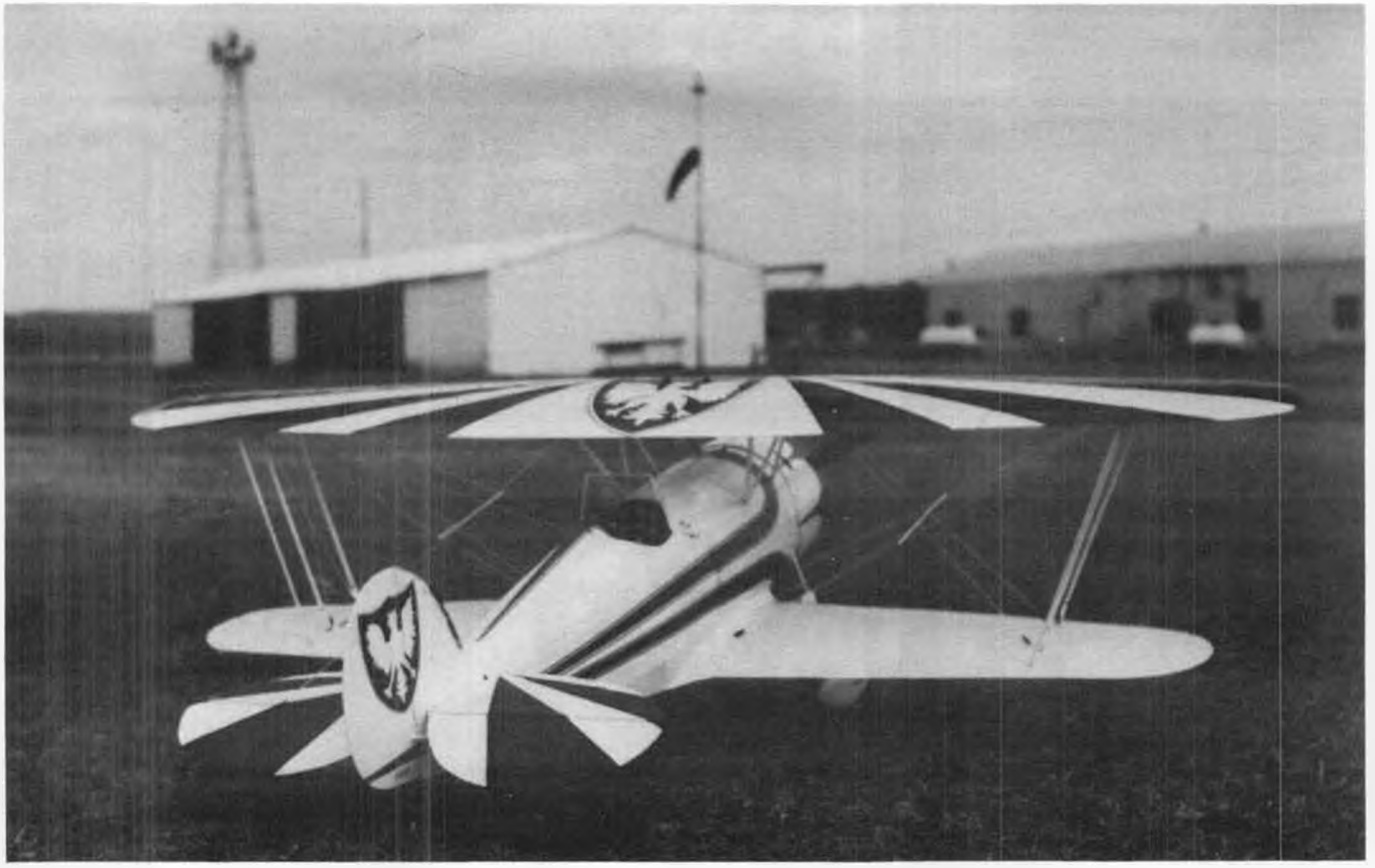
Continued on page 89

Public Relations officer Ed Danzinger stands by with spare xmitter while we fly club glider. Guess he figured 14 years of R/C sailplaning experience wasn't quite enough!

MB Editor's Sailaire with recording barograph (loaned by Walt Mooney) strapping taped to fuselage. Total weight still just 8 pounds. Gained over 3,000 feet on last attempt. See Workbench.

Original by Lou Sdunek, using aluminum tube boom. Couldn't sell it for $10 at swap night, won monthly club contest following weekend!

Al Tuttle at fabulous Puunene flying site on Maui, just a few miles from his home in Pukalani. Alo . .ha!



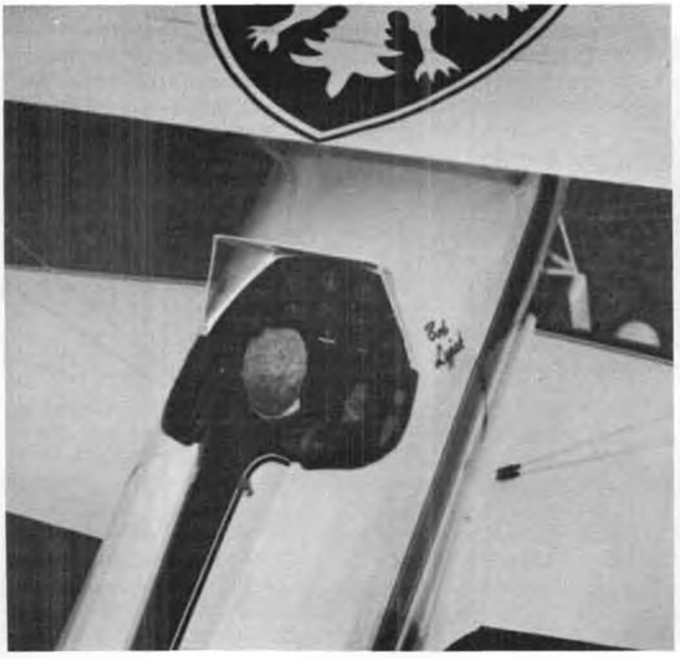
WACO CTO

Beautiful Quarter-Scale biplane from the Golden Age of aviation. The Waco Taperwing was, and still is, one of the most popular airplanes among aerobatic pilots. This one is modeled after Bob Lyjack's, seen in recent years at the famous Oshkosh, Wisconsin Fly-In.

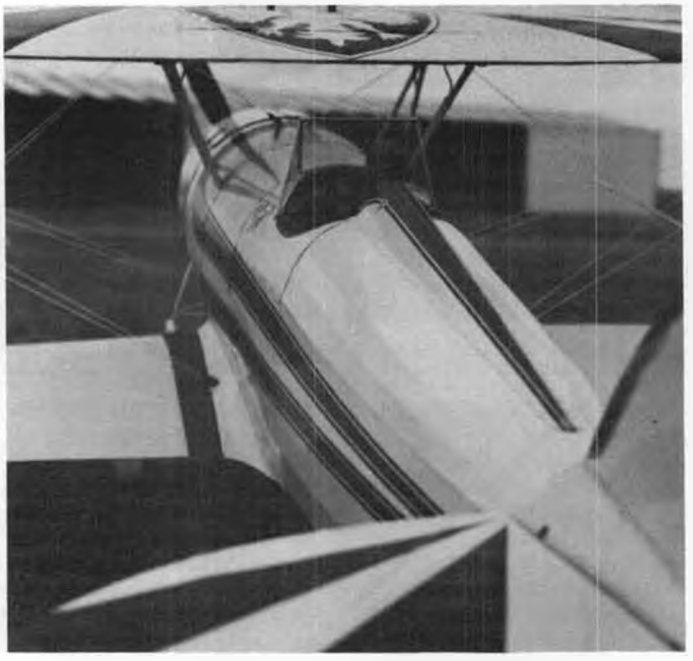
By LARRY SCOTT
Text by Bill Northrop

PHOTOS BY LARRY SCOTT & JIM TILLER

• When it came to submitting material for this construction project, Larry Scott was quick to point out that he is an Iowa farmer and model builder . . . not a writer. However, we could not pass up the opportunity to present this beautiful model, and as far as we're concerned, if



Flying and landing wires are primarilly decoration, as wings are one-piece and very rigid.



Stab trim slot is real . . . for screw-adjusted stab trim. Note realistic panel separations. The fine touches count.

you need detailed instructions for scratch building a model of this caliber, ya should'n oughtta try it! Actually, none of the construction is unusual, there's just lots of it, and as for bending that quarter-inch landing gear wire . . . farm the job out to Lou Ferrigno, the "Incredible Hulk"!

Larry's Waco CTO Taperwing was designed after aerobatic flier Bob Lyjack's Waco, which was featured in two consecutive issues of *M.A.N.* in 1975. Fine detailed Pete Westburg scale views of the ATO, which was the same airplane, but fitted with a Wright J5 "Whirlwind", 220 hp radial instead of a Wright J6, 250 hp, or larger, were featured in the August 1975 issue of **Model Builder.** Write to Pete at 834 Seventh St., No. 6, Santa Monica, CA 90403 for prints of his 1 inch = 1 ft. originals of these drawings.

The model is powered by a Kawasaki 3.15 engine, weighs around 28 pounds, and at quarter-scale, spans 91 inches. Larry got plenty of thrust from a Zinger 22x10 prop, and had equal results from a 22x8 Zinger and a 20x10 Dynathrust. A Higley smoke system has also been installed.

The radio in Larry's Waco is a Kraft Gold Spectrum 6, using KPS-15 servos throughout. After initial flight tests, however, Larry added another KPS-15 to the elevator control, when pull-outs proved to be a little slow using one! A KPS-20H would probably handle the load. Oh yes, one servo each for left and right ailerons.

The Waco is covered with Super Coverite and finished with Randolph aircraft dope. Larry has made female molds for the cowl and wheel pants, so these fiberglass parts will be available from him on a direct sale basis. Send your inquiries to him at Box 86, Kirkman, IA 51447. Prices may be included with the additional construction notes that will be supplied with the drawings. See last paragraph.

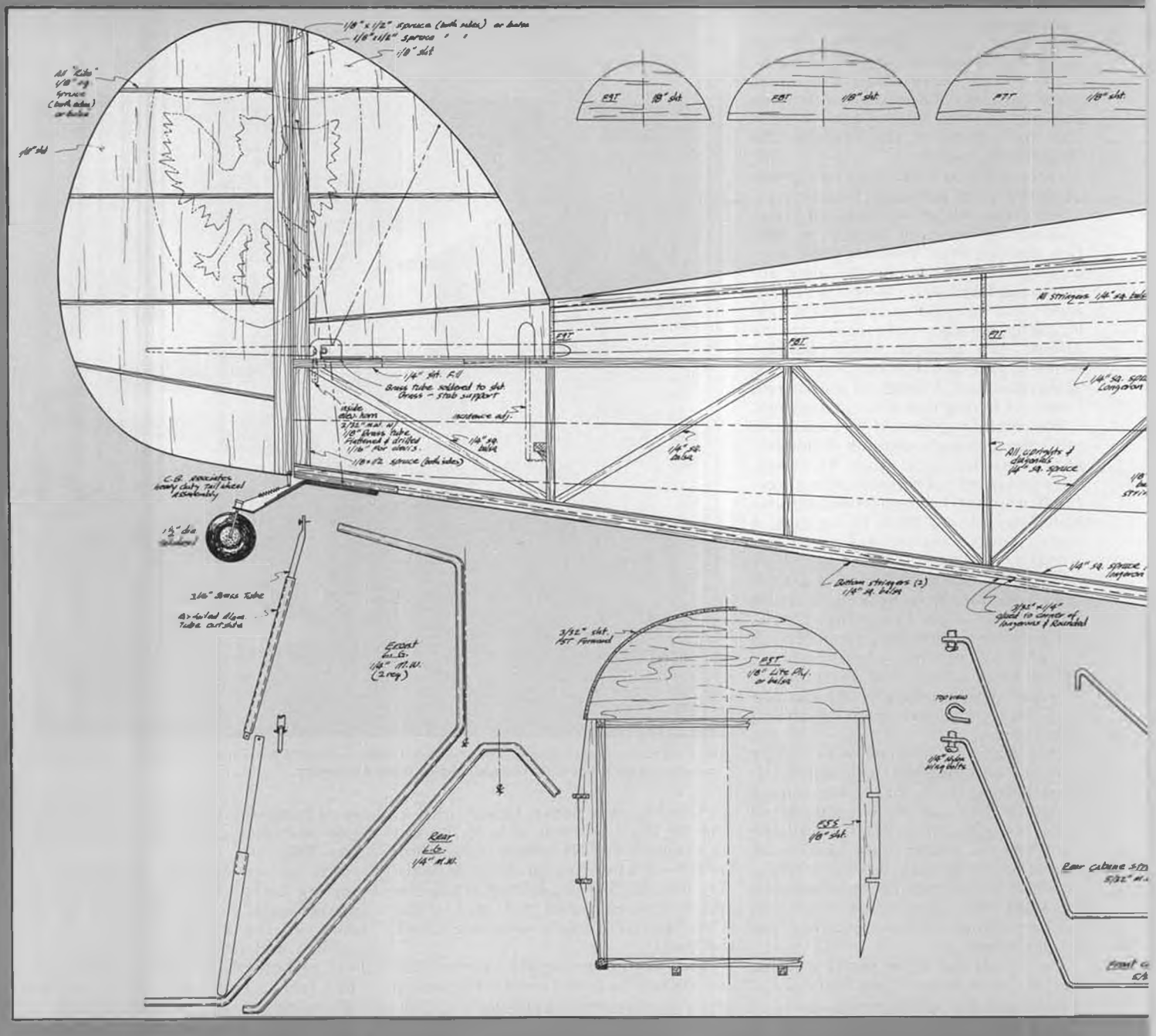
The model has done pretty well for itself in competition. It took First Place at a static display in Waterloo, Iowa in March of '81, and a "Best of Bipes" at Council Bluffs in April. When the flying season opened, Larry flew the Waco to First Place at Lincoln, Nebraska (Sport and Giant mixed) in May, and First again in Giant Scale at Kansas City in June. At the Sig IMAC contest in June, he was one point out of 244 behind 2nd and 3rd, which was a tie, in Giant. At the Milwaukee Pattern/Giant Scale meet in July, the Waco took First, and in August, at the Omahawks Pattern/Scale meet, it took Second.

Larry certainly knows how to put on a nice finish! Fiberglass cowl and wheel parts are available from him, direct. See text. Dummy engine from Air Design.

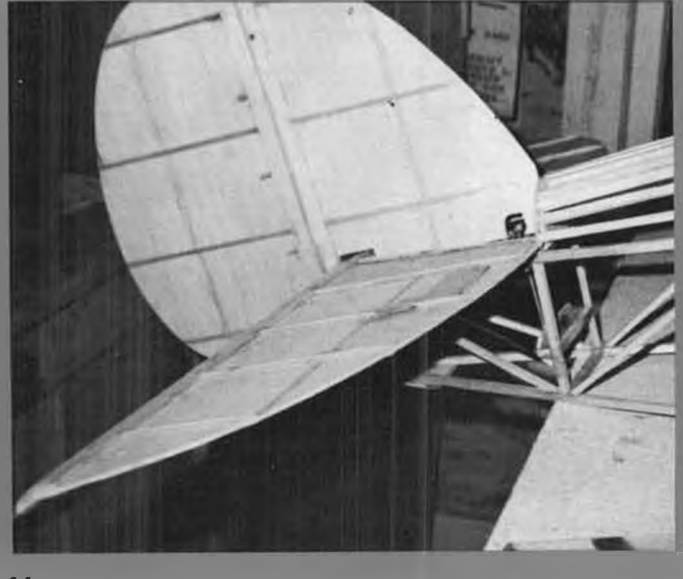
Larry is putting together some notes on the way he solved some of the special construction problems involved in completing the Waco, such as outer-plane strut connection, stabilizer trimming, wing attachment, aileron linkage, etc. These notes will be included with the three huge sheets of drawings prepared by Al Patterson, which will be available soon after publication of this issue (see page 100).

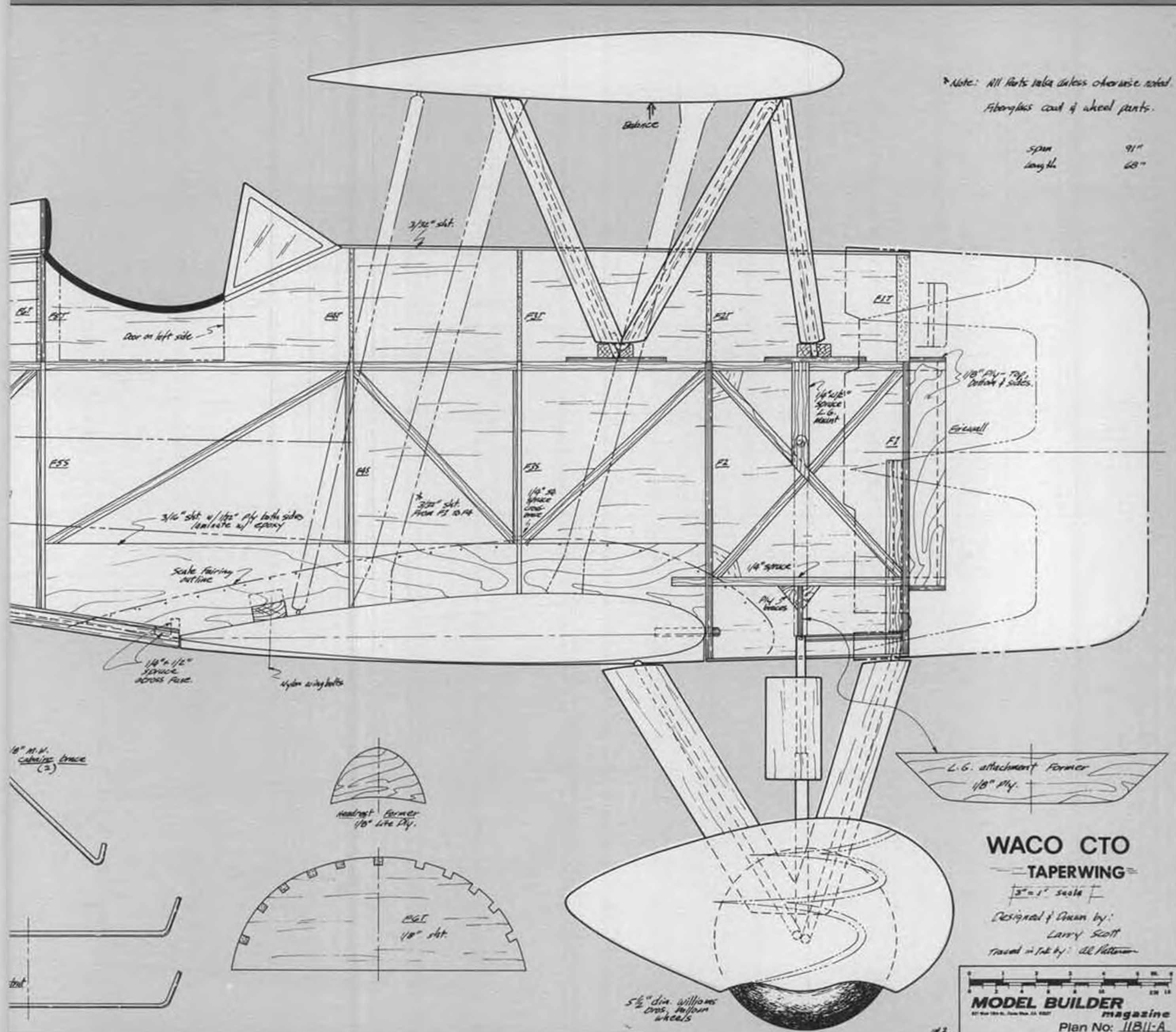
Not far downstream, we'll be presenting Larry's Krier Great Lakes in quarter scale . . . once he gets another one built! The one shown in this article was in a mid-air collision with a Byron Pitts, yet both planes were landed safely! The Great Lakes lost about 1/3 of the top right wing, and the Pitts lost the *entire* bottom right wing, however, both survived . . . a miracle. Larry sold this one, and is building another, with some further modifications in the construction. Watch for it in coming months. •

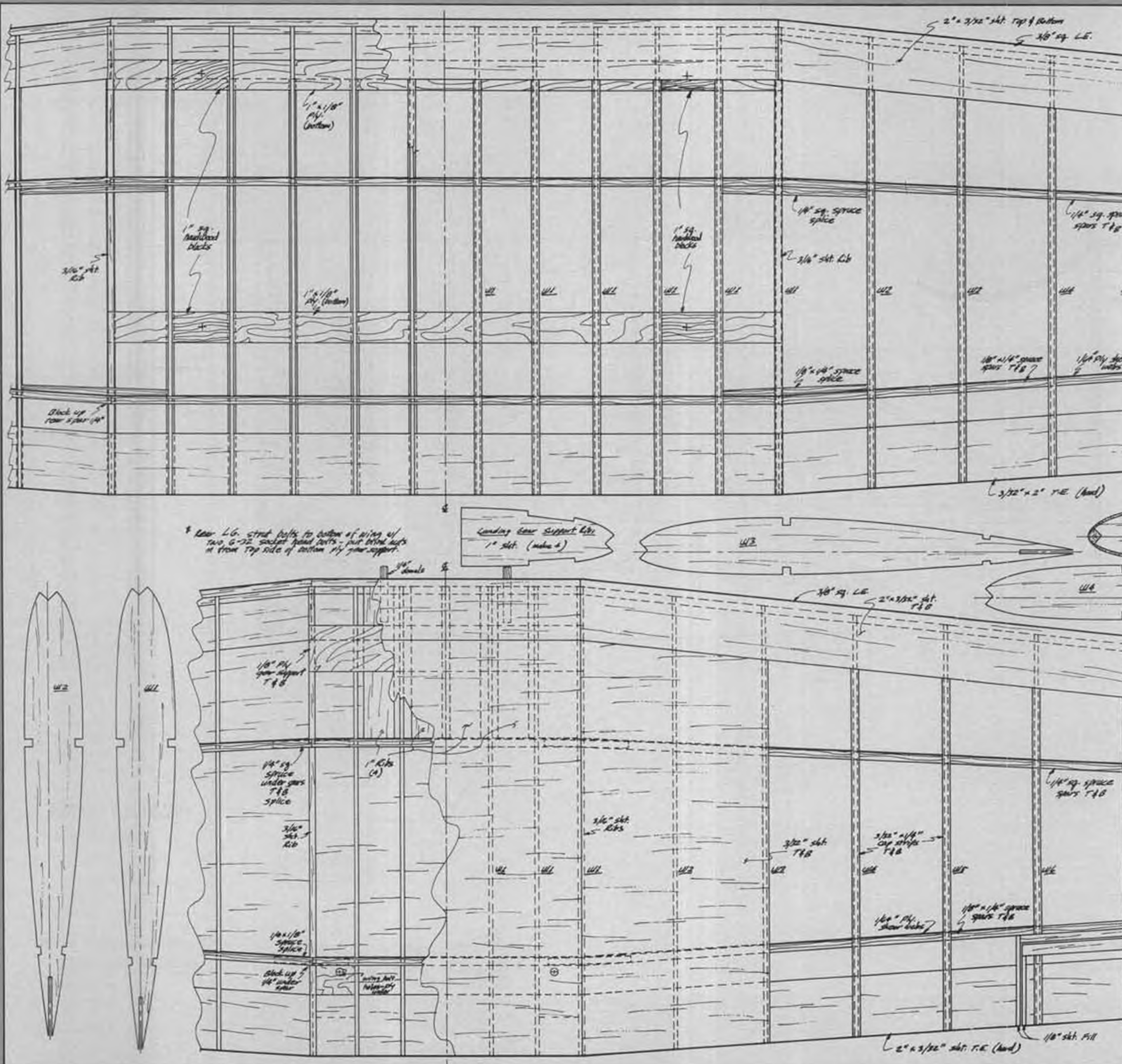
Larry's Waco and Krier Great Lakes look totally real as posed in front of hangars at local airport. The Great Lakes will be presented in a future issue. His next project is a mind-boggler. Stay tuned!

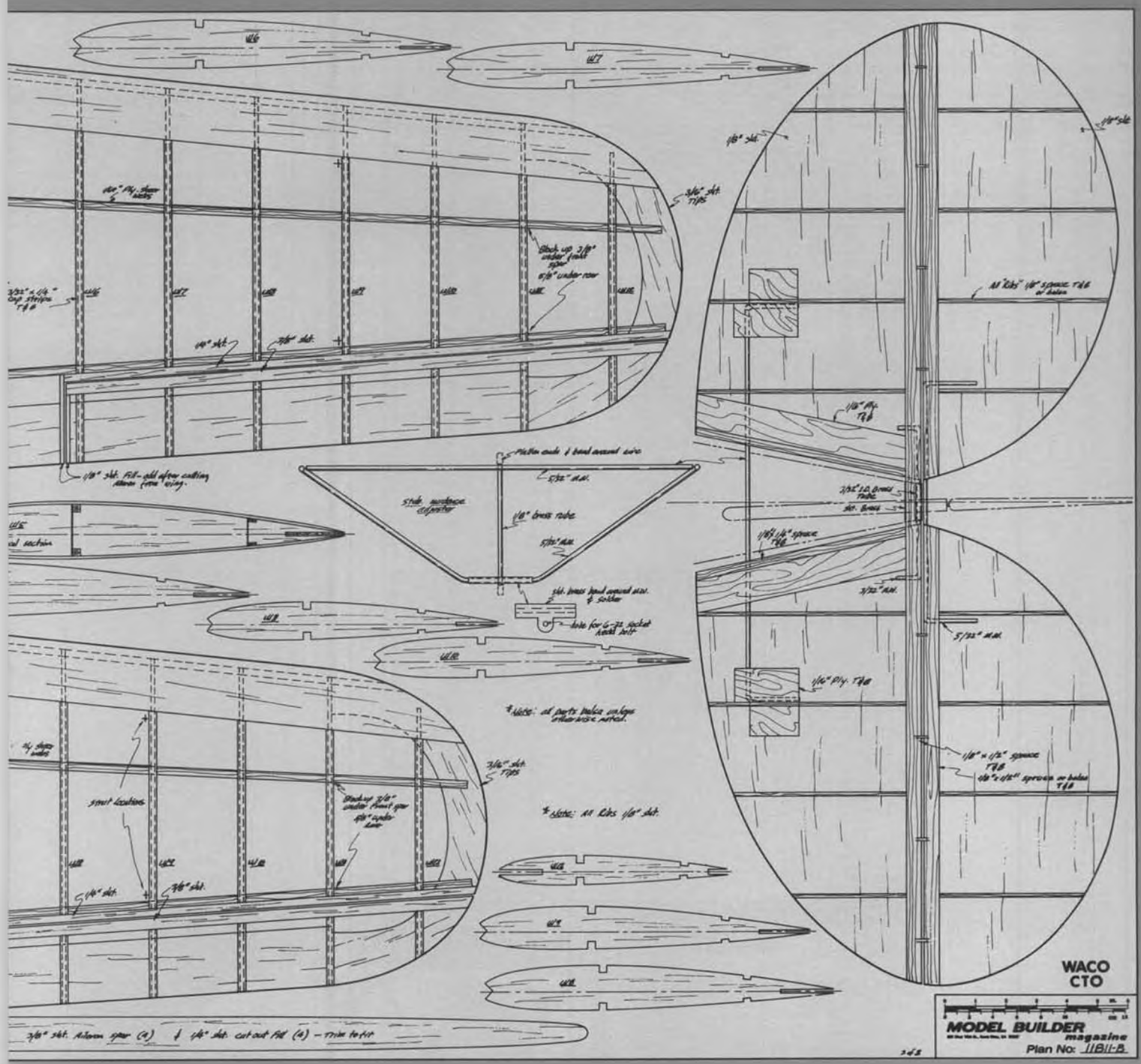


FULL SIZE PLANS AVAILABLE – SEE PAGE 100

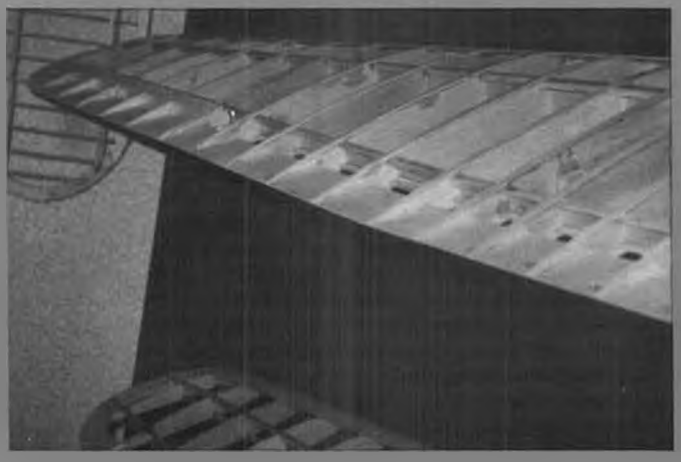


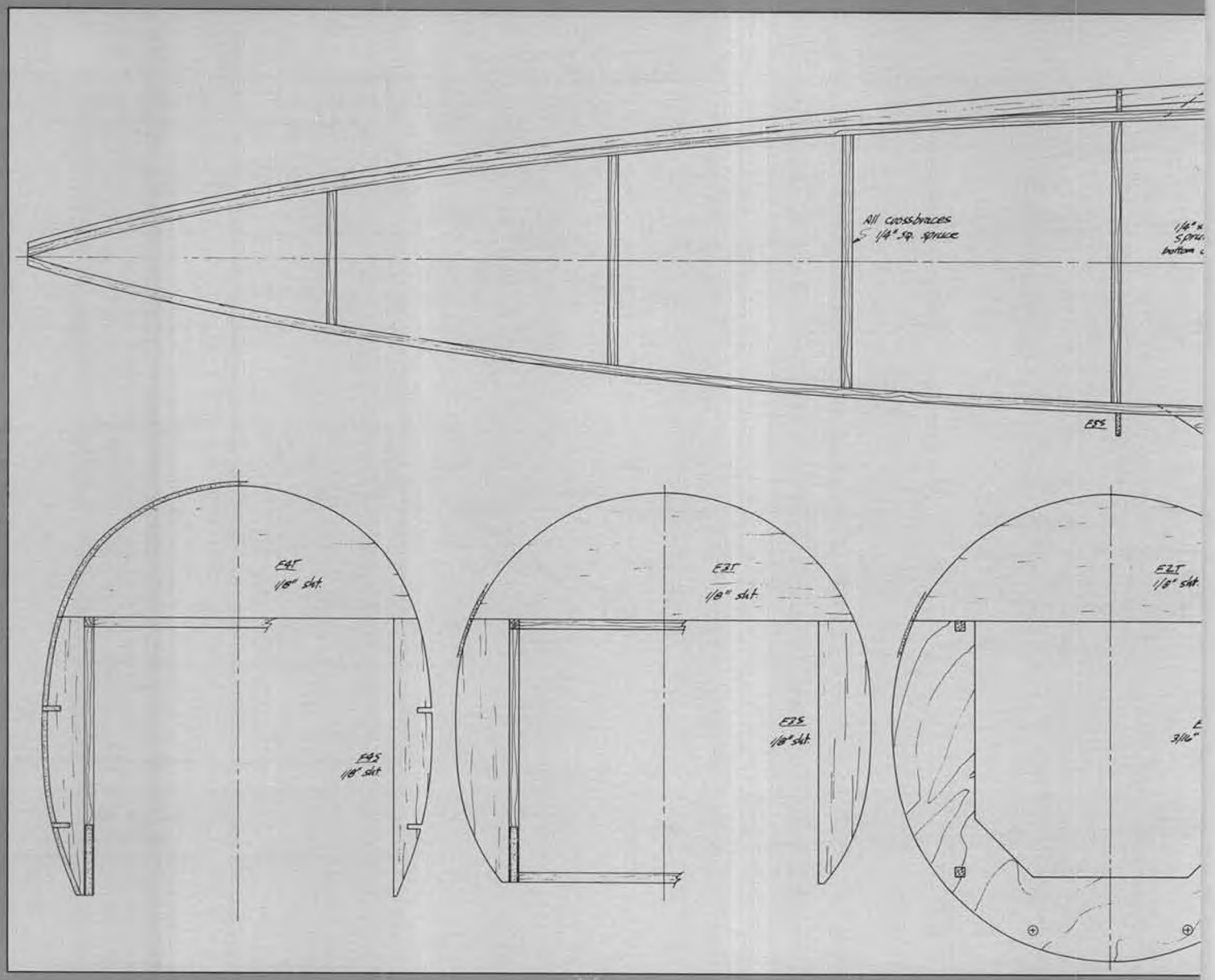

*Note: All Parts balsa unless otherwise noted.
Fiberglass cowl & wheel pants.
span 91"
length 68"
Balance
3/32" sht.
Door on left side
1/4" x 1/2" spruce across fuse.
Nylon wing bolts
Scale fairing outline
1/4" spruce
L.G. attachment Former
1/8" Ply.
Headrest former
1/8" Lite Ply.
1/8" sht.
5 1/2" dia. Williams Bros. balloon wheels
WACO CTO
TAPERWING
3" = 1' scale
Designed & Drawn by:
Larry Scott
MODEL BUILDER
magazine
Plan No: 11811-A

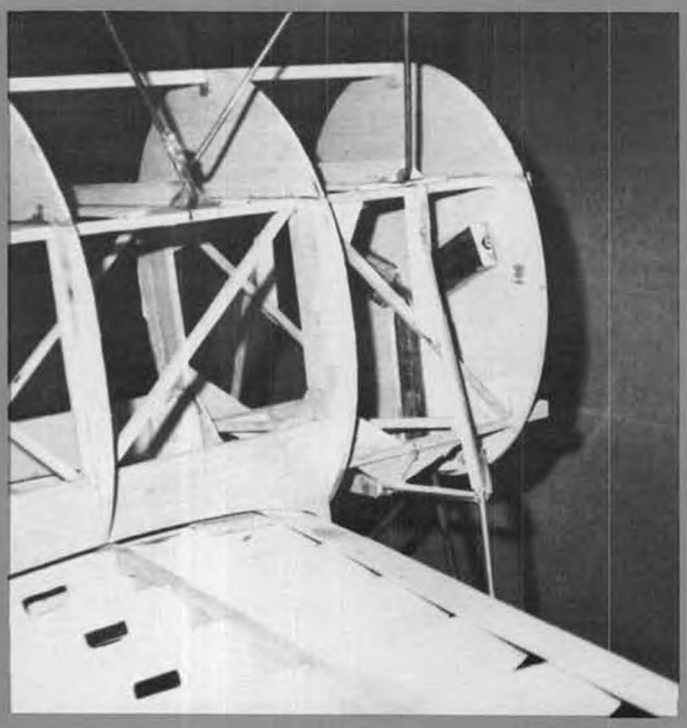

2" x 3/32" sht. Top & Bottom
3/8" sq. L.E.
1" sq. hardwood blocks
3/32" x 2" T.E. (hard)
Landing Gear Support Ribs
1" sht. (make 4)
W3
W4
W2
W1
3/8" sq. L.E.
1" Ribs (4)
2" x 3/32" sht. T.E. (hard)
1/8" sht. Fill

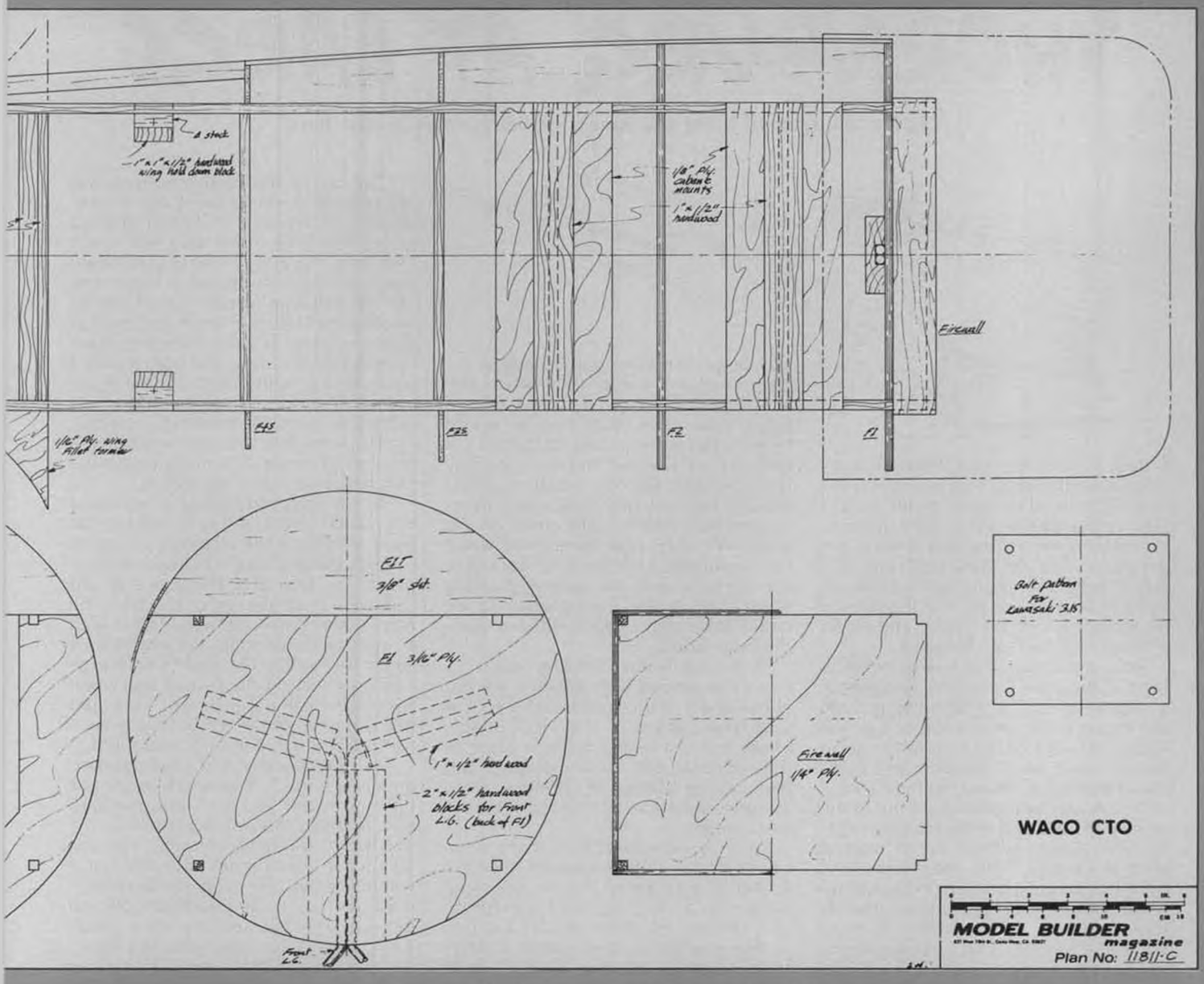


FULL SIZE PLANS AVAILABLE — SEE PAGE 100




All crossbraces
1/4" sq. spruce
E8S
E4T
1/8" sht.
E4S
1/8" sht.
E2T
1/8" sht.
E2S
1/8" sht.
E2T
1/8" sht.

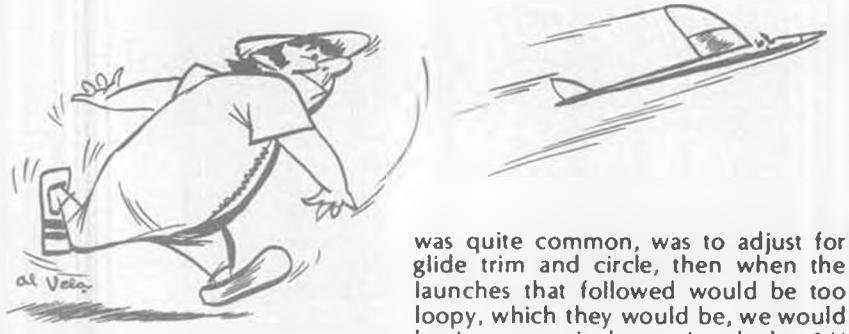




FULL SIZE PLANS AVAILABLE – SEE PAGE 100

THORNBURG AT LARGE

Another roundup of hints and kinks for handlaunch glider fliers.



• Back in the July issue, I sketched my first six weekends in a brand-new field: free flight handlaunched glider. Lots of folks responded to that column. It seems that HLG is something that anyone can get into . . . on the flying field, in a local school yard, even right out in the street in front of your house. The models are inexpensive, easy to build, and tricky enough to be a real challenge.

Among the responses was a fine letter from Californian Ed Slobod, designer of a long series of R/C gliders that include the Paragon, the Pierce Arrow, and the Ridge Rat. Ed's letter is so full of good tips on handlaunch building and flying that it has to be shared. So here's Ed:

". . . A year or so after I got out of the service in 1946 and settled in Los Angeles, Bob Dagan, whom I had worked with at Langley Field, moved out and into the garage apartment in back of us. My modeling at that time was primarily free flight gas, but Bob leaned more strongly to HLG and rubber so my modeling interests were broadened considerably by his presence.

"Though we built and flew together, our gliders were quite different. Bob, at that time, probably couldn't top 135 pounds soaking wet, but he had a whip for an arm. He also used a long run and a side-arm release. While his gliders went up steeply, they seemed to rotate about a 15 foot cylinder and make 1-1/2 to 2 revolutions.

"I used the overhand 'catcher's' throw and released pointing about 70° up and with a slight right bank. When done properly the launch path was a very shallow arc with a slight counter-clockwise rotation with the model pointing almost straight up at the apex of the launch when it had bled off just about all the launch energy. At this time it was supposed to do a magical rotation where the nose came around to the right and the tail came up, leaving the model in its normal glide attitude at the top of the launch. It even worked sometimes.

"What we really were doing was a 1/2 loop with a 1/2 roll on top, but the first part of the 1/2 loop was stretched out to be almost a straight line and the second part very small. Our technique, and it was quite common, was to adjust for glide trim and circle, then when the launches that followed would be too loopy, which they would be, we would begin progressively warping the last 1/4 inch of the stab down and removing clay from the nose. The down-stab was effective as a function of the velocity primarily, and had only a slight effect on the glide. We used quarter-grained wood for the wing and tail, but were careful to use wood where the quarter-graining diminished at the trailing edge so we could make slight bends without snapping the wood.

"We used Testors Sanding Sealer . . . two coats sanded with 360 then 400 just about down to the wood, then a coat of auto wax. Some of the HLG people chose not to use any finish because of the added weight, but for outdoor and high-ceiling gliders, the difference in altitude more than compensates for the extra weight.

"Just as we found that there is an optimum size glider for each person, we found that there is also an optimum weight for each glider. Joe Foster, probably the best HL glider builder and flier of that era, lost out, to me, at a major indoor contest because he built some super light models and could not get them high enough to do more than 1:06 on a day when I outdid myself and got a flight of 1:09. Normally 1:13 to 1:14 would be par for the course for Joe.

"Both Joe and I have three-views of HL gliders in Frank Zaic's 1953 Yearbook, pages 121 and 123. Just by coincidence, I noticed that the plans for the infamous 'Sleepwalker' are also on page 123. I'm not surprised that you could not get satisfactory flights with it. If nothing else, it's too big.

"The use of HLG dethermalizers was just coming in when I eased out of competitive HL flying. I could not throw a glider very well if the span was much over 16 inches and the use of a DT meant that I would have to use a larger and 'dirtier' machine, which I could not do effectively. Besides, it bothered me that contest strategy became more important than design, building, and launch skills. I suppose that is the reason that I much preferred indoor HL flying and why I drifted away from outdoor HL. I categorically deny that the appearance of a number of strong, talented young punk kids had anything to do with it . . .

"By the way, you might be interested in a pre-DT glider soaring technique that we used during the adjusting period to prevent thermal loss. After basic adjustments for trim and circle, we would remove a small amount of clay from the nose so that the model would glide with a series of gentle stalls. We would then adjust for launch. The slight CG change had no effect on the launch and when we got the roll-out just right we would put almost all of the removed clay back on and be ready for an official flight.

"As you suggested, the wing-stab incidence is critical. Too much incidence difference and you can't trim the loop out. A shade too much positive in the stab and it will never fly right. You can save it for warming up your arm but it will never perform properly. Because it is so easy to get the incidence off and because of wood sizes, we always built two gliders at the same time. We would get two wings out of a 4 x 36 inch sheet and two fuselages out of a 1/4 x 1 x 36 inch strip, if cut on a diagonal. Besides, even if both were OK, one would usually fly better.

"To really see the difference between the large, over-stable model made for flipping into thermals and the highly developed glider-builder-launcher combination, you should attend some high ceiling indoor contests. These guys can hit 90 foot ceilings and are good enough to do roll-outs a few feet below

Continued on page 81

Second place winner at World Champs, Sean Bannister, of London, England, ex-bicycle racer. Carries ballast in tubular wing spars.

International flavor of World Champs is enhanced by representative flags. Pretty good breeze blowing!

R/C SOARING

by Dr. LARRY FOGEL

PHOTOS BY THE AUTHOR

• By now, you've probably heard about the Third R/C Soaring World Championships held in Sacramento in mid-July . . . and was this a close contest! For those primarily concerned with who won what, the top teams were from Germany, the United States, South Africa, Italy, and Australia (with 91.4% of the top team's score). Top individual honors went to Dwight Holley of Bethel, Connecticut. He's spent 35 of his 47 years in aeromodeling, the last eight primarily devoted to R/C soaring. He won the Eastern Soaring League Championship three different years and holds LSF level V. The plane he designed with Fritz Bien of Boston, is called the Gobbler . . . if it flies poorly, the name is appropriate for this "turkey" . . . if it flies well, it "gobbles up the competition". Clearly, the second alternative has been realized.

The Gobbler spans 113-1/2 inches, the 13 to 1 aspect ratio wings taper from 10-3/8 inches to a 7 inch tip chord. These Eppler '205' wings cover 975 square inches. Empty, the wing loading is 11-1/2 ounces per square foot, but this plane can handle up to two pounds of ballast. The built-up wings and fuselage are fiberglassed, with spars and carbon fibers to provide great strength. The V-dihedral (three degrees per panel) allows for ease of flaperon control, the required mixing being performed in the transmitter. The aileron action is coupled to the rudder. The spoilers are separately actuated. Dwight believes that, to the extent possible, the sophisticated electronics should remain on the ground, thus reducing airborne weight and complexity. Sooner or later, this plane will be kitted.

Second place went to Sean Bannister of London, England with 99.3% of Holley's score. Now a civil engineer, he flew free flight 'til the age of 15, then turned his attention to bicycle racing. He won some 200 races and twice held the British national championship. Believe it or not, he's logged over 100,000 miles on person-powered wheels. He then turned to R/C and has won a few power events. Next, he discovered R/C gliders and designed a series of Algebras. In this championship he flew version 14.

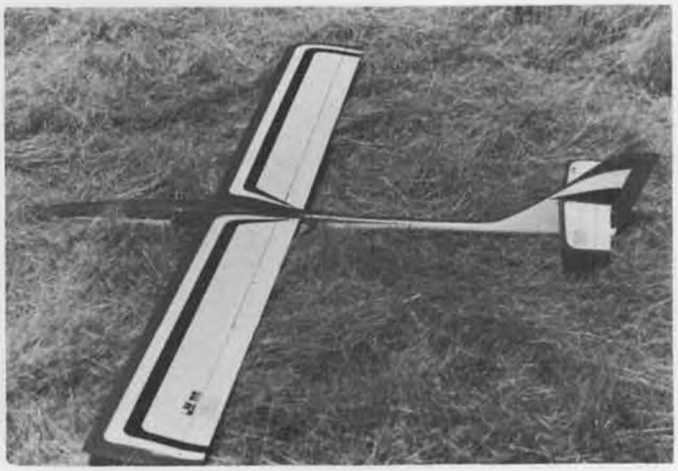
"Why 'Algebra'?" I asked.

"Why not? . . . I tried to be logical."

The built-up Algebra wings span 120 inches (46 ribs per wing panel with 1-1/4 inch separation between ribs). The average chord is 8 inches. The 3/32 inch top and 1/8 inch bottom balsa sheeting produce an Eppler 193 airfoil that transitions into an Eppler 201 at the tip. Swept wings allow attaching the wings to the pod in a pod-and-boom arrangement. "It's stable at high speed and provides lots of visual feedback." The fiberglass fuselage is 54 inches long. The all-up unloaded weight is 4-1/2 pounds, that is, it flies at about 11 ounces per square foot. (With full ballast it operates at 24 ounces per square foot, but Sean usually ballasts up to only 17 ounces per square foot.) "Flying heavier than that doesn't really seem to help performance."

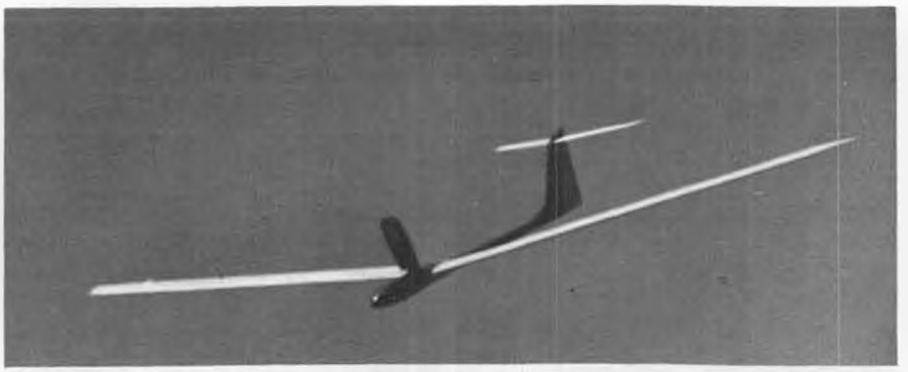
Note the unusual air-brake provided by opening the canopy about 80°. I was surprised to learn that the generated

When the Swiss lock onto a design . . . It's the Spartakus, and there were 12! Span is 3-1/2 meters. Split rudder speed brakes.



Whisper Speed by Romain Sfredda, of Luxembourg. Seems very typical of European FAI R/C glider design.

Ralph Learmont, Australia, with his Riccochet, featuring releasable tow hook, flaps, ailerons, rudder, and elevator. His own design, span is 2.7 meters.



No, the pilot didn't bail out, it's Sean Bannister's "Algebra" with canopy air-brake deployed. He placed 3rd at the first World Champs in 1977.

turbulence doesn't destabilize the tail. Incidentally, Sean is now also flying two-meter and 175 inch versions of the Algebra . . . also real beauties in the air.

I wish I could describe all the other planes, but instead let me mention a few particularly interesting ones. Ralph Learmont of Australia placed 10th with his Ricochette (with 94.7% of Holley's score). This clean ailerons/rudder/elevator/flap-controlled plane spans 2.7 meters and weighs 75 ounces. Ralph designed-in a switching arrangement so that he can fly either independent controls or coupled ailerons and rudder during flight. The wing section is a modified Eppler 205.

The Swiss team brought twelve identical aircraft, Spartakuses (or is it Spartakai?). This plane is somewhat larger, spanning 3.505 meters. The root chord tapers from 240mm to 230mm at the aileron to 150mm at the tip. The area of this 16.6 to 1 aspect wing is .739 square meters. The construction is unusual . . . blue foam spars.

Without ballast, it flies at 2830 grams. With ballast, the wing loading can range from 3.5 to 3.8 kilograms per square meter. The wing section is Eppler 205 while the stab is NACA 63-006A. The pilot operates the aileron (servos in the wing), rudder, flying stab, releasable towhook, and split rudder speed brakes. That's right, the rudder opens to form a 90° V providing drag right where it's needed. Designed by a committee of nine engineer/pilots, this plane proves that the old saw isn't always true. *(That a camel, is, in reality, a horse designed by a committee! je)* The Swiss team came well-equipped. They had their own portable weather station and a special tripod for holding the fuselage while the plane is being assembled.

The Canadian team (and Carl Blake of the American team) flew the FMF designed by Dave Wright. The 104 inch, 10 to 1 aspect ratio wings are constructed of foam and Kevlar, the wings and body being molded from hard tooling to yield an Eppler 193 airfoil. Ballast can be added in the center of the wing. The ballast box hatch opens to form a spoiler.

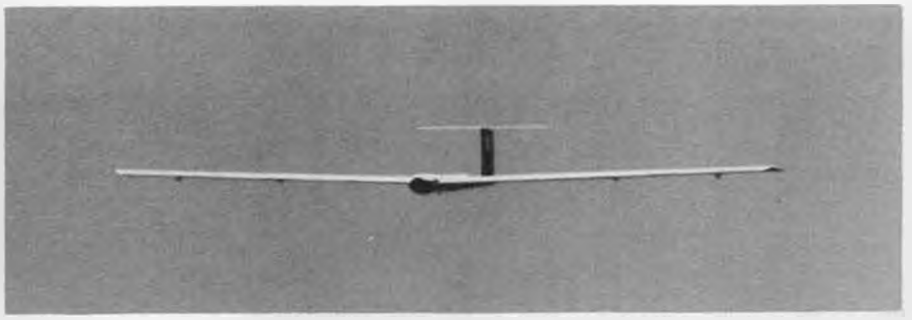
And the Canadians had something else up their sleeves . . . a 36 volt winch (using a standard 12 volt starter motor). They had perfected the zoom-launch technique and expected to gain super height at the beginning of each trial. Each launch was a sight for sore eyes. The plane is first held in a horizontal attitude. The foot switch actuates full rev of the winch. There is a loud swish, and the plane rapidly rotates to about 80°, then quickly climbs several hundred feet. But, instead of releasing the tow hook, the winch remains on full power while the pilot points the nose down further accelerating while descending about 100 feet. He then levels off, releases the tow hook, and pulls the stick back to zoom up several hundred additional feet before leveling out to the cruise attitude. It takes a lot longer to read this description than the actual launch. The only word for each such

Close-up of the canopy/air-brake mechanism in Bannister's Algebra. Neat idea, will no doubt be copied.

Swiss team member puts leverage to one of the 12 Spartakuses (Spartaki). Note fancy cradle support.

V-tail entry by 18-year old Rene Bock, of Luxembourg. Called Sperber (Sparrow Hawk). Also has aileron control.

Exotic portable Swiss weather station kept team members up to date.



The FMF, designed by David Wright, was used by all of the Canadians, as well as young Carl Blake, of the U.S.A. Composite foam and Kevlar construction.

launch is, "wow"!

And they were right. It did yield extra height . . . but at a cost. This maneuver places tremendous load on the plane, and even though this aircraft was well-constructed, I saw a number of separations during launch . . . a wing going in one direction while the remainder of the plane goes in another direction. In fact, each launch took its toll in terms of fatigue. By the end of the contest the Canadians had only one plane left, and they were launching it with much less than full enthusiasm. Other pilots tried the zoom launch with varying degrees of success. Clearly this maneuver requires precision, practice, and a tough plane.

★ ★ ★

Other news from around the world: Roger Stern of Salisbury, Zimbabwe (formerly Rhodesia) reports on their national championship (also flown according to the F3B/FAI event rules). The winner was Dave Malkin flying a Vega. His wife came in second flying a modified Aquila . . . Fellas, take note.

They also fly postal competitions in Africa using task A of the F3B rules (six minutes precision duration). You fly only on certain days established in advance; the single lowest score is dropped before comparing results, and the top three pilots in each club produce the team's score.

Sure, flying conditions vary from place to place, but it still makes for fun. Near Salisbury, they often have the advantage of many birds in the sky. "Sometimes we see one hundred or more storks on the ground at our flying site. Suddenly they go airborne and start circling. They're telling us that a thermal has just broken loose. Everybody gets into the air for a sure max. Generally, the birds respect our models, but sometimes a hawk or eagle takes exception to this strange bird invading his air space. Once my model was attacked by a large eagle. The encounter left claw marks on the fuselage and pulled one wing out about an inch on the wing wire, thus lifting that spoiler. This put the model into a flat spiral, and it came down with no further damage. The eagle, believing that he had seriously maimed the other 'bird' glided happily away."

It's hard to find a suitable slope site near Salisbury, so almost all of the soaring is on thermals. If you want a slope, you have to go 140 miles into the Inyanga Mountains, and then there are trees, rocks, and dense bush, to mention only a few of the obstacles.

Roger also takes an evolutionary approach to sailplane design. His first Pelikan was flown in a February 1977 FAI competition. "The solution to each problem gave birth to a new Pelikan. Pelikan 6 is now nearing its 200th flight." That's the attitude that brings out the best in man and beast. Roger, here's wishing you further success.

Wayne Thomas of Auckland, New Zealand, has two flying wings. His own design is of 73 inch span, covers 730 square inches, and operates at about 11-1/2 ounces per square foot (based on two thirds of the wing area being the

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Dave Malkin, 2nd from left, winner of Zimbabwe National Champs. His wife was second with modified Aquila, No. 59. His ship is a Vega.

Wayne Thomas, Auckland, New Zealand, with his flying wing, which uses Eppler 186 airfoil.

Raul Lomeli, with Monterey, and friends, use this small slope near Guadalajara, Mexico in hopes of finding thermals.

Our "Chopper Chatter" columnist stands beside the Robinson R-22 'copter he flies for Pacific Wing and Rotor.

CHOPPER CHATTER

By RAY HOSTETLER PHOTOS BY THE AUTHOR

• The lead photos this month shows 'yours truly' hard at work, but most of the time we'd be pressed to call that work. . .

In the issues past we commented somewhat on the similarities between the model and the full sized ship; this month we'll relate a little more material on that optic. If we were to close now with a conclusion it would be this: The experience gained from R/C helicopters is 125% applicable to the real thing, and we found this to be true from firsthand experience. Given intermediate skills at an R/C chopper, conversion to life size is remarkably smooth.

First off we must compare "reaction speeds" due to scale effect. Visualize a large bodied jumbo jet on approach to landing. Pretty slow and easy, right? Now drop to a light plane Cessna or what have you. A little faster than a jumbo jet but still slower than your usual sport R/C aircraft. Now, enter giant scale with a fairly aerobatic design such as our 25 lb. Bucker Jungmeister. The sport or pattern plane comes next, then full size helicopters are a shade faster, followed last by the model helicopter.

If we break down the different types of model helicopters, the quickest type would be a fully rigid system on a .40 sized ship. When we transition from a model helicopter to a full size 'copter (or an R/C plane to a Cessna 152 for that matter), the "speed factor" works in our favor. We have become accustomed to 'quick hover' work with the model, and in full scale, we have even more time to keep everything straight. This is why it is (or would be) easier for an R/C pilot to go full size vs. a full size pilot going R/C.

Rather than starting out at a hover, everyone gets used to the pedals and collective in forward flight or "out on the beach". As we cruise at 500 to 1000 feet along the Long Beach shoreline, we can acquire a feel for the controls and get adapted to using our feet for tail rotor control. This takes 15-20 minutes, after which the transition to hovering takes place. The initial reaction is to over control, which is normal as you try to stay ahead of the helicopter. After you actually are ahead of the motions and can anticipate reactions, control becomes smooth and co-ordinated. This same scenario happens with R/C helicopters in the early stages of learning, but for a longer period of time than the transition from R/C to full size. Given one to two hours in a full size ship, most R/C helicopter pilots would have little trouble hovering and performing normal take-offs, approaches, pedal turns, lifting off, and landing.

The take-offs and approaches are particularly easy to acquire since the same actions are taking place in the model. In other words, when we begin a descent from forward flight into a normal approach, collective is reduced and we give slight aft cyclic to start the deceleration. From the last of the normal approach to a hover, we *know* we must increase collective and give some forward cyclic so we don't settle in backwards. When we lift off to a hover we first get the machine light on the skids and stop any excessive motion so we don't lift off heading in an oddball direction, etc. etc. . .

The point we're trying to impress on you, is that while adapting to the contols is apparently seen as most important, it is the *actions* and *feel* of the model which is so easily assimilated into full size flying. Not only can we see what's going on, we can also feel that reactions in the seat of our pants!

One interesting difference between model and full size is pedal control, or rather the mixing of tail rotor with torque changes. With a Heli-Boy or Jet Ranger this mixing is automatically compensated for through a mechanical arrangement. Full size ships fly like a Heli-Baby, with all mixing directly controlled by the pedal. This is dismissed as "no factor" by full scale engineers. We'd more or less agree with this conclusion because pedal control is much more automatic when you are sitting inside looking out. We did hear of some Bell 212's with some stability augumentation systems on board, and these had some automatic tail rotor mixing arrangement. They cited the factor as less pilot workload, particularly during instrument flying conditions (IFR) when there are lots of other things to monitor in addition to trying to maintain a heading with pedals. Looking at cyclic, it is the most similar item for transition. Not only are all movements identical, but the control delay and "pendulum effect" of the helicopter swinging under the rotor disc is the same. It is almost funny when a student pilot is trying to catch on to cyclic. The over controlling develops into a swinging motion, most often in the fore-aft direction since its delay is longer than the right-left action. There we are, swinging back and forth, each corrective action making the situation worse because by the time the student gets his control input in, it's too late, and it only aggravates the situation. One of the earliest accomplishments for the student is to get himself out of this giant swing and back to a stabilized hover. Unfortunately for most model helicopter pilots, they do not have the luxury of someone stopping the swinging for them, and each shot at maintaining cyclic control results in the risk of a controlled crash.

In forward flight, the cyclic changes with airspeed due to dis-symmetry of lift, caused by the advancing blade developing more lift than the retreating blade. As airspeed increases more forward (and some right) cyclic is pushed in to reduce the lift of the advancing blade and increase the lift of the retreating blade. When pushed to extremes the retreating blade has such a great angle of attack that it stalls and quits flying, and we experience retreating blade stall. (The ship rolls left and the nose pitches up for a counter-clockwise rotating rotor system.)

Retreating blade stall is not so much of a problem in model helicopters because the rotor speed is fast enough that only slight cyclic pitch changes are induced and the retreating blade will never reach

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Pattern Flying

By DICK HANSON . . . Part 17: Reverse Cuban 8, Horizontal 8, and Vertical 8

• During the past summer we have worked with the larger type pattern design (825-840 square inch). Trimming on this size model requires some attention to detail which we didn't find obvious on our smaller models. We will pass on the following hints for your evaluation.

First, the large, long stabilizers can produce the following trim problems if they are not symmetrical and the throw on the elevators is not exactly equal:

1) The side with the highest drag (typically the most up trim) will cause the model to crab and appears to be a rudder problem.

2) Pitch in knife edge will differ. The model may pitch up one way, pitch down the other way, or simply vary in pitch.

3) The model will lose heading when up or down elevator is applied.

It is very easy to mistake the last example for improper wing balance. Of course, these problems are not restricted to the larger models. My point is that the greater the stab/elevator span, the greater the effectiveness of any errors, such as warp, hinge line error, etc. If I live to be 150, I'll never know all the answers to the various trim problems that keep popping up. If you have ever spent a summer trying to sort out a contrary new model, you know what I mean.

Another project we have been playing with is a semi-ugly scale type design utilizing the 825 square inch wing and the stab used on our pattern bird. The fuselage is a box about 6 x 6 inches, with a large bubble canopy and a fixed gear (spring aluminum). The pipe set-up goes through the fuselage along one side and the radio goes on the other side. The pipe is *not* isolated, but a few carefully placed cooling slots keep the temperature inside the model as low *or lower* than the typical sealed-in radio set up. The pipe is effectively sealed with a silicone sleeve and a 3/4 inch diameter aluminum tail pipe. Using the same engine and prop set up as used on our pattern bird, we get very interesting performance. The speed is extremely constant . . . up, down, whatever. The fixed gear and 3 inch wheels cause a little rudder couple problem but that's the only serious problem.

So much for the weird stuff.

The following three Figure-8 maneuvers are seldom used by most Masters class fliers, as they are K-2 factor types and are really deserving of a K-3 rating. Look at the sketches and notice the possible intersection errors (marked X). Intersections are very easy to note from a judges scoring viewpoint. (I'll take "Straight Inverted Flight" . . . yes sir!) Let's face it, there is room for improvement in the present scoring set up!

Upwind or downwind maneuver placement is up to you, but I prefer downwind for the Reverse Cuban 8, downwind for the Horizontal 8, and upwind for the Vertical 8. It just keeps things consistent with the other 8's.

REVERSE CUBAN 8

The whole ball game here is *hit the intersections.* The only way to learn this is to have a helper watch and record errors. It's impossible for me to pick up minor errors on intersections while I'm flying, but observers . . . even untrained ones, have no problem in spotting them by simply holding a pencil up as a reference point. I use my Tx antenna as a reference whenever possible. A common error is to make the maneuver too large and lose references. Fly in close enough to make a good impression and keep the airspeed up *if* there is much wind. The *apparent time,* as well as the actual maneuver size, can affect the judges opinion of the relative loop sizes. Our September '80 article covers the other particulars on the Cuban 8's.

HORIZONTAL EIGHT

Like the Cuban 8, this maneuver must be carefully observed to line up the intersections, altitudes and diameters. Unlike the Vertical 8, however, there is no downgrade noted for angled wing attitudes. I'm only guessing, but that's probably just an oversight. (Where is the rules committee?)

Your choice of flying this one upwind or downwind will require the appropriate throttle and elevator juggling to hold the loops round and centered. Although we usually fly this one downwind, we definitely would switch it to upwind in very windy conditions. Most people recognize this one as simply a standard Cuban 8 sans rolls. We like to think of it as a control line version of the Cuban 8.

If you decide to use this maneuver, make certain your observer/assistant really lines you up on the intersections.

VERTICAL 8

This is a "Rolling 8" without the roll like the Rolling 8, it is a low scoring maneuver for the skill required. The hard part of this one is keeping the wings apparently level throughout both loops. Orientation is very difficult if you are in close, so make certain you fly out as far as practically possible. This will allow you to get the best perspective.

Start with approximately 150 to 200 feet of altitude, and make a medium size (50 ft.) inside loop. You may like to reduce power on the backside of the loop to allow a constant apparent speed. The outside must be the same size and directly below the inside, so get your observer on the ball again to call out corrections. Try doing this sequence over and over just like the control line maneuvers. You might not have enough horsepower to do perfect consecutive Vertical Eights, but it's a good practice maneuver to learn to hold size and position.

There is no substitute for constructive practice, if you want to improve your flying skills. Sloppy practice will be counter-productive to both your mental attitude and your flying. We don't mean your flying should be work instead of pleasure. On the contrary . . . we are only trying to suggest ways of learning as rapidly as possible with the least frustration. That last line was a sneaky lead-in to one of the most frustrating things in pattern or any kind of flying . . . erratic engine performance.

It almost seems that there is no "best

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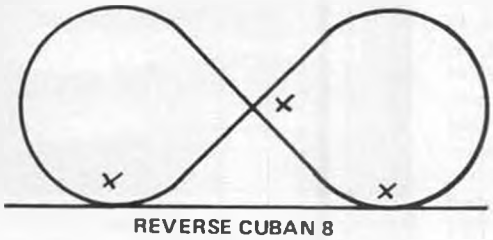
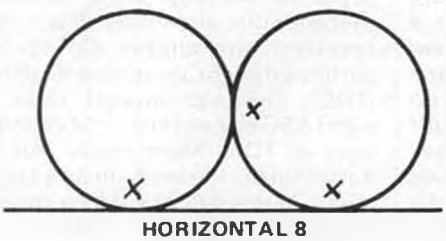
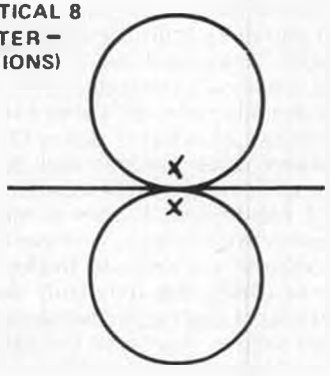


REVERSE CUBAN 8
(3 INTERSECTIONS)



HORIZONTAL 8
(3 INTERSECTIONS)

VERTICAL 8
(2 INTER–
SECTIONS)

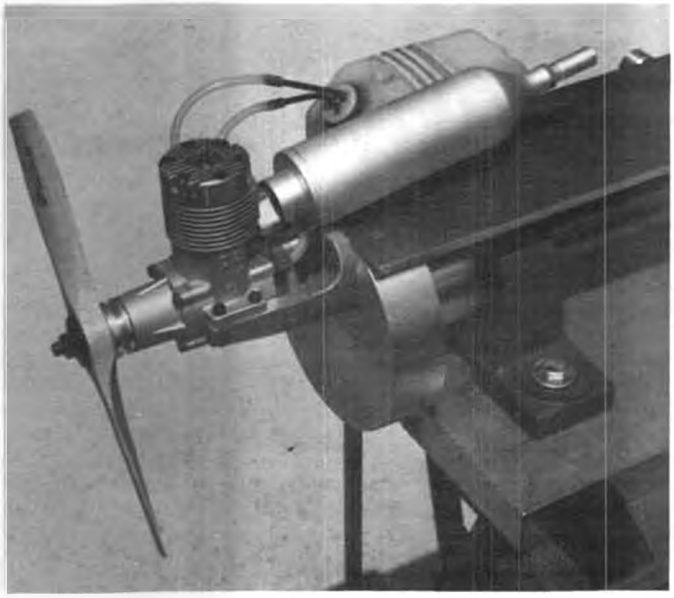


FUEL LINES

ENGINE TEST

O.S. MAX 40 VR-P

By JOE KLAUSE . . . First of a random series of engine tests. Each will be checked under like conditions on a dynamometer, the only scientific approach to an accurate analysis of power output.



O.S. 40 VR-P on the dynamometer Joe built for this and future "Fuel Line Engine Test" reviews.

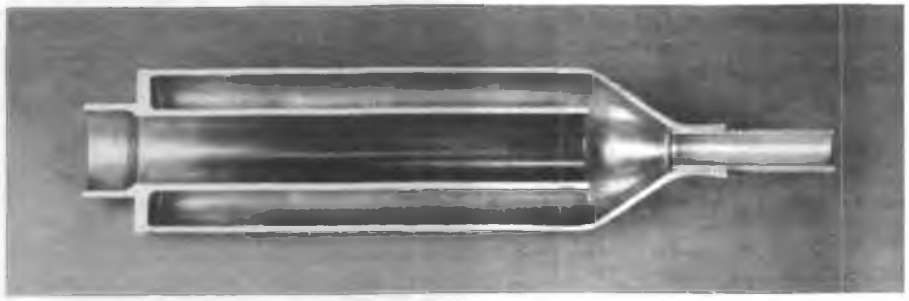
• Hi guys. You've all heard the expression, "Happiness is. . . ." For some, it may be, "Happiness is a new set of golf clubs." For others, it might be, "Happiness is a new surfboard." For most of us, it would be, "Happiness is a new car." All three of those sound good, but there's another one that has always perked up our interest. "Happiness is a new engine."

This has been true even with a brand new, established model. But it's especially so with a completely new engine. So, naturally enough, we were quite enthusiastic when YOE (Ye Olde Editor) handed over an all-new OS Max VR-P ABC, with a comment something to the effect, "See if you can start it."

We were not in the least bit dismayed. Rather, the thought occurred that a scientific approach to the challenge would be the best reply. That meant only one route: the dynamometer. About the time that tests were scheduled, somebody else muddied the water. Friend, Cliff Rausin, of Exportations distributors, allowed as how their "Magic Muffler" was a most logical adjunct to the project. It mean more "homework", but a friend is a friend.

Enough of the mundane background. This is about OS Max's entry into the Formula I market and an accessory that was designed to decrease decibels and increase power. Quite an ambitious undertaking.

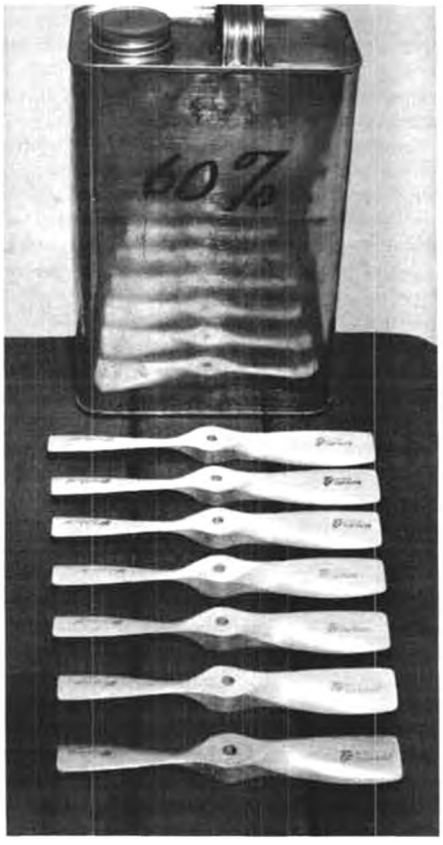
Take a look at the first photograph, and you'll see both the OS and "Magic Muffler" mounted on the dynamometer. Since we've introduced the subject of a dynamometer, let's offer a very brief summary of what it does. Ours is a reaction dynamometer that measures torque in ounce-inches under engine load conditions. If rpm is measured together with torque, we have all that's necessary to compute brake horsepower (BHP), the only truly definitive measure of engine performance. Really quite simple. If we use the same type glow plug and fuel, under the same atmospheric conditions for each test, then our only variable will be the engine load. In this case, we vary load by changing prop dimensions. The second photograph shows the props and fuel used in the tests. The glow plugs were Glo Bee R⁴ 4L's, and the atmospheric conditions are shown on the graph of engine performance.



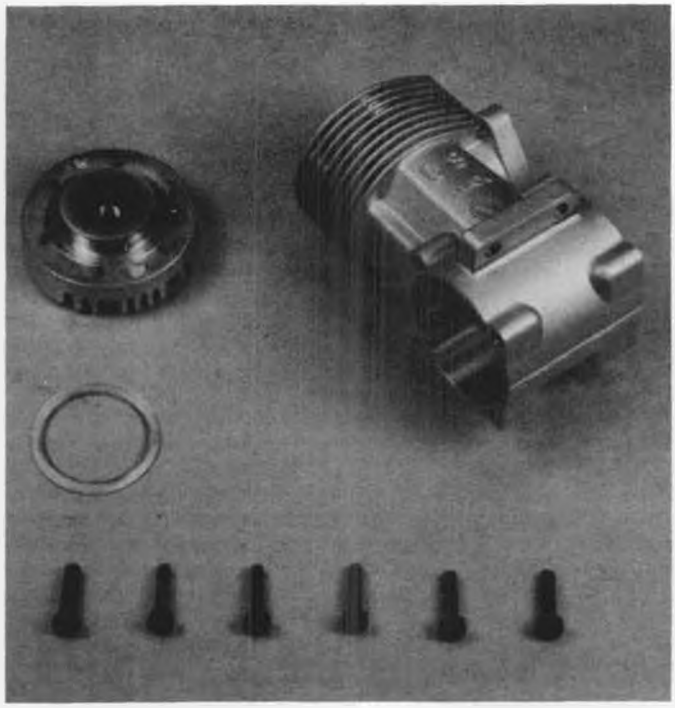
Condor Hobbies' "Magic Muffler" sliced lengthwise after running tests. Discoloration at end of inner tube indicates hottest area during engine operation.

At this point, it is most important that we add a few words about safety. As anyone can plainly see, the props shown in the first two photographs have obviously been altered. As most of you realize, that's a "No-no." The manufacturer's instructions, which come with every propeller, will explicitly tell you that. However, our modifications were strictly for experimental, test conditions. Extraordinary safety precautions were used during these scientific tests. We caution you not to modify propellers.

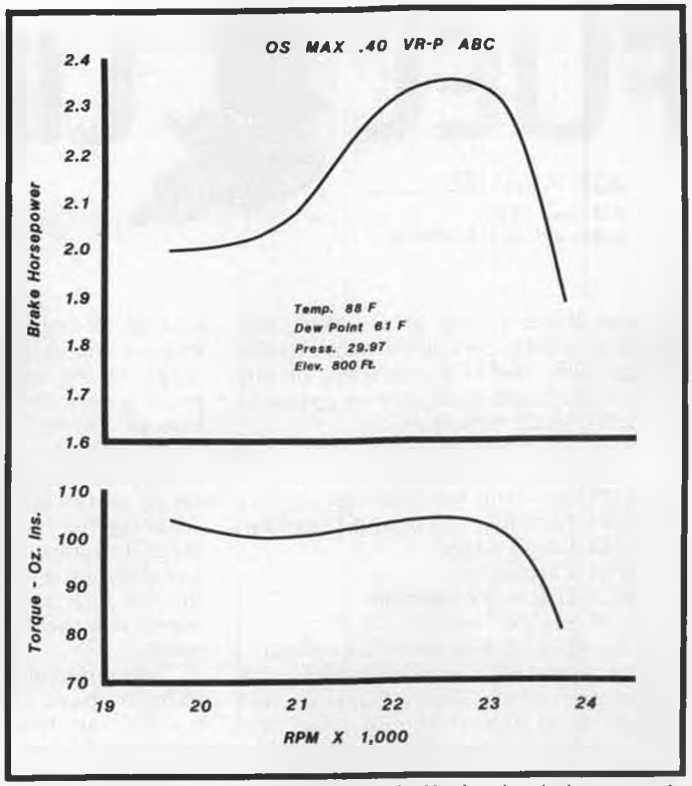
Our tests began with a thorough engine break-in. We first used 15 percent nitromethane fuel and a Top Flite Super M 9-6 prop. Next, we used 40 percent nitro, and finally 60 percent. As received, the engine did not seem particularly tight around top dead center (TDC). This was unusual, since most good ABC engines are just about squeek tight at TDC. More about this later. Refreshingly, the break-in only required about 20 minutes of running time. This period was "open face", no manifold or "Magic Muffler."



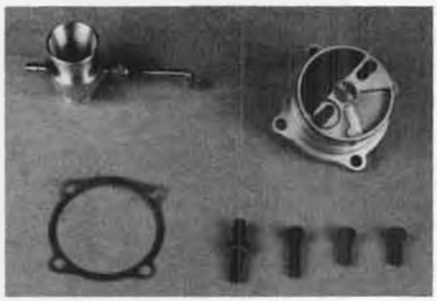
Standard fuel and props to be used in this and future engine tests. With all other things equal, loads are varied by changing propellers.



Crankcase, head, and gasket after hard engine running show minimal wear characteristics.



Next, we ran tests with 60% and various prop loadings. The results are shown on the performance graph. Following this, we worked with the "Magic Muffler." The instructions which came with it stated that nitro content should not exceed 40 percent, and that the static rpm range was 21,000 to 24,000. Naturally enough for a product test, we also had to try some 60 percent! While it was possible to operate the engine-muffler combination on 60 percent, there were some problems. Needle valve adjustments were very sensitive and heat generation was a problem. With 40 percent nitro, these problems decreased. With modest percentages of nitro, there were no problems. Seems there's an expression that's applicable here, "When all else fails, follow the instructions." Further, engine noise decreased significantly, and there was a noticeable increase in power. In general the power increases averaged .12 brake horsepower (BHP) through the useful rpm range of the muffler. The "Magic Muffler" seems well suited for use at sites where mufflers are required, but you don't want to suffer the power loss associated with most currently available mufflers. Here are a few tips on the use of the magic device.



Backplate, rotor, carb, gasket, and pressure tap.

1. Be absolutely sure that it is mounted securely to the engine.

2. After starting, set the needle slightly rich, and allow the engine and muffler to temperature stabilize.

3. Then, peak the engine, and back-off (enrichen) slightly prior to launch. For those who are curious about what's inside the muffler, at the end of the tests, we sliced it in half. The third photograph shows the innards. You'll notice that the end of the inner tube has some heat discoloration. Obviously, this is the hottest area during engine operation. So much for the muffler. Let's expand the comments and information about the OS Max.

We've mentioned the performance chart, and although it should speak for itself, we feel other remarks about this engine are most appropriate.

To begin, we ran the engine as received. During the tests we did not even vary head spacing. The .014 inch deck clearance was fine for 60 percent nitro fuel. It's a pleasure to say that there were no difficulties in starting, and it was quite easy to "needle" the carburetor. During open-face runs, even with 60 percent nitro, the needle was never too sensitive. Every run was very "clean" and steady. When peak power was set, it did not vary over 100 rpm . . . very smooth. That's really quite remarkable.

Let's add a few words about the fit of the sleeve and piston. Prior to running

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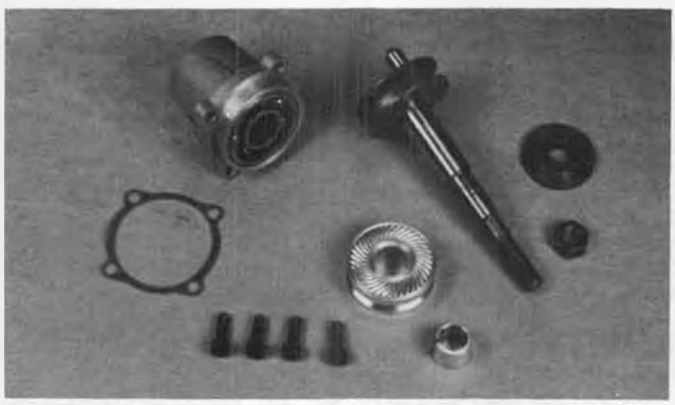
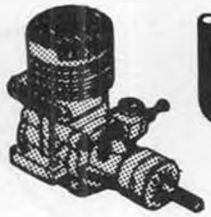


"Engine maintained excellent compression after more than an hour and a half of punishing runs. Further, it maintains nice compression even when hot." Based on standard racing prop tests, it is a highly competitive engine, out of the box.

FUEL LINES



JOE KLAUSE
P.O. Box 2699
Laguna Hills, CA 92653

PHOTOS BY AUTHOR

• How about a brief recap? Well, this series of articles on engine maintenance began with the February issue of this year. Here are the subjects we covered:

2/81 Series Introduction
3/81 Basic Engine Tools
4/81 Engine Disassembly
5/81 Servicing Ball Bearings
6/81 Parts Inspection and Cleaning
7/81 Piston Rings
8/81 Carburetors
9/81 Engine Reassembly
10/81 Engine Testing

On hindsight, last month's column, about testing your work, was the logical conclusion of the series. Guess we just forgot to say it. Nevertheless, now is the time to ask you guys for comments . . . good, bad, or indifferent. Let's hear it. Was it interesting, or was it a drag? How about you, John Young of Longview, Texas? After all, your letter triggered the series. . . Now is the time to make like Howard Cosell. *(Isn't one enough!? wcn)*

Actually, the mail bag hasn't been empty. Yes, there have been "Atta boys." But it's more constructive to tell you about where we could have done a better job. Dean Brown, of Placentia, California, told me that in his letter of July 10. Here it is,

"Dear Joe,

"A small correction to your August column where you write in the second paragraph, 'As the piston of a two cycle engine moves from the bottom to the top of the cylinder, the volume of the crankcase effectively increases. This rapid change in volume lowers the pressure in the crankcase compared to air pressure outside the engine. As a result. . . .'

"I appreciate this was meant to be a summary of the dynamics but it could be misleading if taken literally. Induction does not begin until the crankshaft has rotated a number of degrees past bottom center piston position. It starts around 35 degrees, depending on the engine manufacturer and intended usage of the engine, but always to a point where the piston is away from bottom center. And, induction continues until the crankshaft has rotated, perhaps, 40 degrees or more, past top center piston position. A fact that takes advantage of the relatively slow speed of the piston starting away from top center and the inertia of the incoming mixture for the final portion of the induction event; whether through a shaft or rotary valve.

"You might want to add a third probable, or basic, cause of carburetion trouble: air leaks into the crankcase because of loose front or rear cover or because of a carburetor so badly worn there is a big air leak around the throttle valve.

"Keep up the good work in your column. It's one of the more informative parts of the magazine."

Thank you, Dean. Your point is well taken. I should have been more explicit and carefully explained that induction on a rotary valve engine is precisely timed by either the crankshaft or rear valve. Hopefully though, we did explain the general concept.

While on the subject of intake timing, it might be of interest to some readers to know that there are significant differences between intake timings for various engines. Here are a few examples and comments:

1. Sport type engines will usually begin induction about 40 degrees after bottom dead center (ABDC). Induction closes some where around 40 degrees after top dead center (ATDC). The induction period is usually about 180 degrees or so.

2. Until recently, it was generally accepted that an induction closing of 60 or 61 degrees after top dead center was "about as far as you could go" on a high performance racing engine. Also, the so-called magic number for an induction period was 210 degrees. That meant that induction timing should begin about 30 degrees ABDC.

3. Contrary to the foregoing paragraph, the new Nelson N15G has an induction closing of 70 degrees ATDC! Further, on the latest version of the Rossi .15, closure is 75 degrees ATDC! Initial reports are in favor of the Nelson. However, there's a lot of running and flying to be done. Some months from now, we'll be able to make more sound judgments. Nevertheless, it is most apparent that high performance engines which operate over 25,000 rpm, do better with quite advanced intake closures.

4. How then, can one explain why the high performance Cox T.D. .049/.051 has an intake period of only about 180 degrees, 45 ABDC and 45 ATDC? Quite simply. . . These T.D.'s as we know them are capable of even greater performance. (Most T.D.'s do not operate over 25,000 rpm.) Also, the timing figures, particularly closing, are misleading. T.D.'s have sub-piston induction, which has the effect of increasing induction capacity. Note that we said 'capacity' and not duration. The name of the game is to maximize the induction of fuel/air mixture. Sub-piston induction is a "cheap" way to do this. It's not the most efficient, but it works, and it is expensive as far as production costs are concerned. To give this all a bit more credence, consider that very credible T.D. .049 U-Control speed planes will do 100 mph. That's with a fairly stock but well-fitted engine. Compare that to Al Stegens speed jobs that do about 125 mph . . . without a pipe! They were born stock, and they are highly modified. As a matter of fact, piped 1/2A engines have only managed, on a few occasions, to go a few mph better than Al's efforts. Obviously, Stegens has done his homework. Well done Al!

Now we'll make a departure from the usual format of this column. This is the first of our so-called product reviews. You might call it a FUEL LINES SPECIAL. In the future we hope to continue reviews such as these. For now, if you want to hear about the performance of the all-new OS Max .40 VR-P ABC and the magic muffler, turn to page 00. Take care guys. •

ENGINE TEST (Cont.)

the engine, we were concerned that it was too loose for an ABC, in comparison with other such engines. That certainly did not prove to be true. The engine has excellent compression after more than an hour and a half of punishing runs. Further, it maintains nice compression even when hot. This undoubtedly is due to the particular type of brass and aluminum that is used. But it may also be due to the plating of the sleeve. Note: the plating is not electrically deposited chrome. It appears to be nickel that was vacuum deposited on the sleeve, followed by some extraordinary honing. Regardless, the fact is that it works, and as you can see in photos 5 through 7, the engine wear was minimal despite some very hard running.

By now you may be saying, "That's all fine, and the performance graph looks nice, but will it beat so and so engine?" Good question. This thought occurred to us prior to the tests, so we called up Terry Prather, who has had a lot more than a modicum of success at Formula I racing. Terry suggested running some Rev-Up 8-3/4 x 6-1/2 and 8-3/4 x 7 props. If the rpms were 20,000 or better, it should be a very competitive engine. Well, we ran three different absolutely stock Rev-Up props. Here are the results:

8-3/4 x 7	19,700
8-3/4 x 6-3/4	20,700
8-3/4 x 6-1/2	21,000

Guys, you can draw your own conclusions. . .

In summary, we liked the engine, and the price tag of $134.95 seems reasonable. According to information from World Engines, these engines should be available about the time you read this

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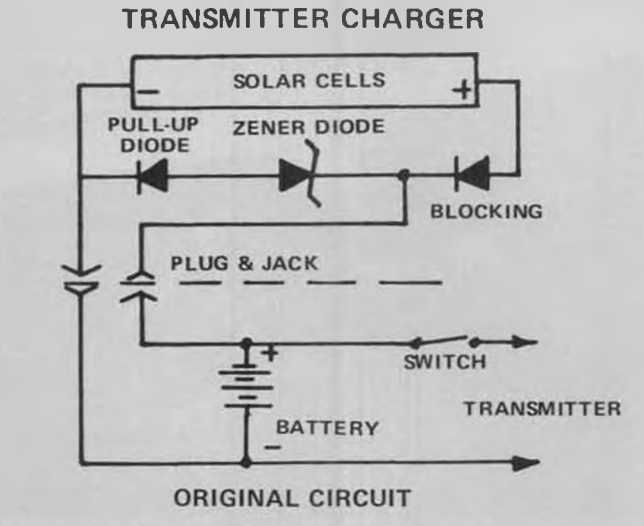
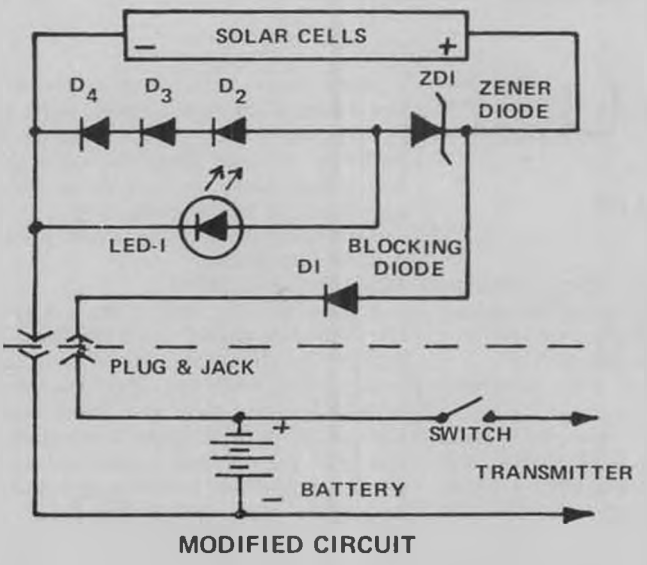
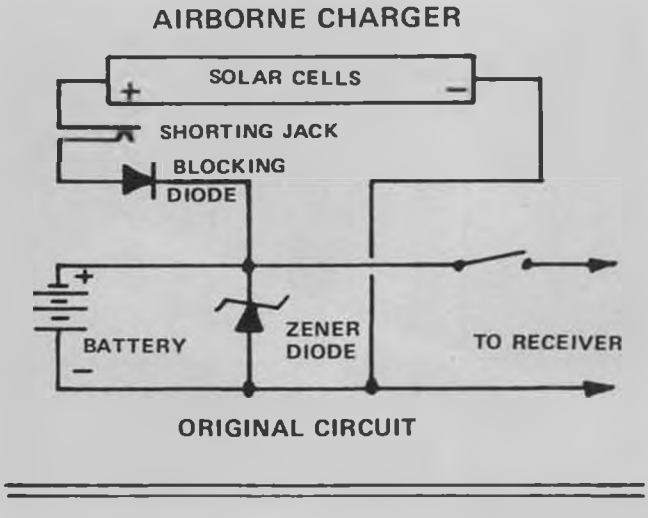
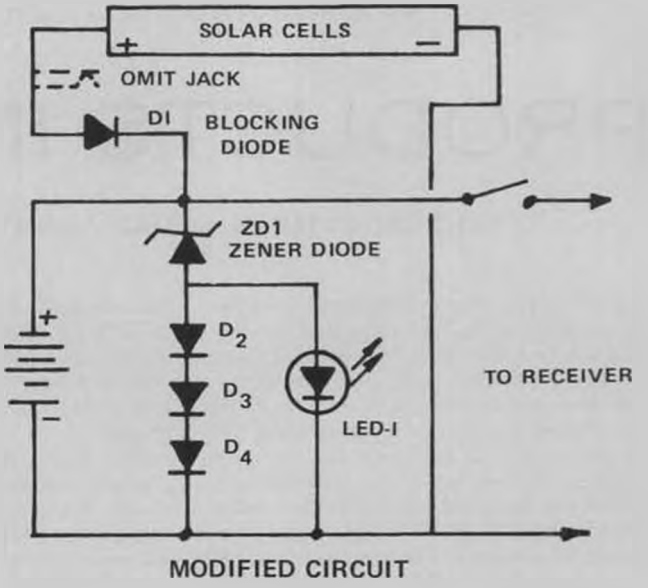




ZD1: 3.6-Volt, 5-Watt Zener Diode (1N5334, ECG5112)
D1 - D4: 1N4001 Silicon Diode
LED-1: 25 milliamp Light Emitting Diode





ZD1: 9.1-Volt, 5-Watt Zener Diode (1N5346 or ECG5124)
D1 - D4: 1N4001 Silicon Diode
LED-1: 25 milliamp Light Emitting Diode

the Electronics Corner

By ED KARNS . . . It's nice to know if your solar chargers (Sept. and Oct. '81 MB) are working. Here are simple modifications to the circuits to add light emitting diodes (LEDs)for constant checking.

In the last two issues, we have presented two very simple-to-build and not relatively expensive accessory items for your R/C system . . . solar cell chargers for your transmitter (Oct. '81) and airborne (Sept. '81) battery packs. As with any new electronic development, updating and improvements never stop.

Our mentioning the problem of not immediately knowing if the charger is functioning, and adding a note about inserting a shorting jack for an ampmeter in the circuit (page 92, September), turned Ed Karns onto even a better idea. At this point, we turn it over to Ed. wcn)

"Dear Bill:

"It makes a country boy proud to see his handy work in print and especially in your tenth anniversary issue. Your editorial comments at the end of the article we took as constructive criticism. Your suggestion of adding a shorting jack and an ampmeter was a good one, however, this adds additional hardware that has to be lugged up the slope, so we looked around and came up with a different solution.

"As described in the article (in September '81 **Model Builder**) the Solar Airborne Battery Charger has no provisions for a circuit checkout, or a 'go, no go' indicator. So we brewed up one that's quite simple, although a little esoteric.

"We changed two parts and added four. Remembering that there is a voltage drop across a silicon diode of about 0.7 volts and it takes about 1.5 volts to turn on an LED, it can be seen that when the battery is charged up to about 5.1 volts (3.6 volts for the Zener diode plus 1.5 volts for the LED) the LED begins to light up (faintly). As the voltage increases to a maximum of 5.6 volts, the LED gets brighter and brighter. At 5.6 volts the diodes in series with the Zener (D 2 through D 4) begin to pass all excess power to ground, holding the maximum voltage across the LED to no more than 2.1 to 2.2 volts.

"So . . . when the LED is dark you have

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The author, Mary Ann Devlin, and her pretty, pink and white Sig Kadet Mark II, named "This Little Piggy Went Flying". The whole thing started with her winning the Tower Hobbies R/C system at the January '81 IMS show in Pasadena, California.

PRODUCT$ IN U$E

SIG KADET MK. II, by MARY ANN DEVLIN

• I am brand new to the miniature aviation hobby of Radio Controlled Modeling. During the past five years, I have watched and listened to my husband, Ed, and our friends built and fly radio controlled models, but never took the opportunity to build or fly my own model. That is, until this past January when my husband and I went to **Model Builder's** Show (IMS) in Pasadena. I entered Ed's name in the free drawing that Tower Hobbies had for their System 4, 6 Channel Radio with the deal that if he won it I got it. He won it and I got it ...

When I told Bill Northrop the story about "the deal", he offered to provide me with the opportunity to build and fly the Sig kit known as the "Kadet Mark II".

The "Kadet Mark II" was designed by Claude McCullough, nationally known designer and builder of scale model aircraft and Product Engineer at Sig. Retailing for $49.95, the Kadet Mark II has a length of 44-1/4 inches, wingspan of 57-1/4 inches, wing area of 635 square inches, and a flying weight of approximately 5 pounds. The Kadet Mark II is intended to be flown as a 3 or 4 channel model.

The Kadet Mark II is a redesigned model of the Kadet Mark I Trainer. Some of the improvements are the new full-size plans and the 36 page building book with more than 150 step-by-step pictures and illustrations. This 36 page book has been especially prepared with the beginning modeler in mind. I found the numerous pictures and illustrations to be of the highest quality and very informative. From the materials to instruction, I found the Kadet Mark II to be excellent.

Some more of the improvements of the Kadet Mark II are; fewer parts and quicker assembly, more wing area, the addition of large ailerons, room for a larger fuel tank, built-in down thrust, easier access to the nose, and a sturdy dural aluminum main gear with greater ground clearance.

BUILDING THE WING

The wing of the Kadet Mark II uses a flat bottom airfoil. The flat bottom makes building the wing easy and straight for a beginner. The wing is built in two sections over the plans and is completed by adding the leading edge, top spar, leading and trailing edge top planking, and the sheeting of the inner and outer sections. The wing halves are joined together with Hot Stuff and front and rear dihedral braces. The wing tips on the Kadet Mark II are built-up. The last thing on constructing the wing is

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Everyone chipped in on the construction of the Kadet Mk. II. Ed Devlin applies Super-T Hot Stuff to the stab, and little Colleen cleans up balsa shavings from the floor. At far right, the fuselage, walls, and floor receive a spray coat of "Hot Pink".

The first airplane to ever fly on lines, with elevator, throttle, *rudder*, and *aileron* controls, on July 5, 1937. It was flown from the center, in modern control line fashion, by Oba St. Clair.

TRIBUTE TO Oba St. Clair

Inspiration and Research by DALE KIRN. Interviews and Text by CHARLES MACKEY . . . (Part 1) The purpose of this two-part article is to give long-overdue credit to the true inventer of control line flying. In no way is it intended to discredit the monumental one-man promotion of model aviation by Jim Walker.

• Introduction: Who is Oba St. Clair? Oba (pronounced Obie) designed the first control line/gas model airplane in 1937. We will tell you about this amazing man and how his thought process worked in developing his invention.

What about Jim Walker? I always thought he designed the first control line airplane! Jim Walker was a great man who did many things to promote control line flying. We will give more credit and appreciation to the memory of Jim Walker later in the article, but it was Oba St. Clair who proved in the United States District Court, Southern District of California, Central Division, that he first flew and publicly displayed his control line airplane in the court case, American Junior Aircraft Company vs. L.M. Cox Manufacturing Co., Inc. In this 2-part article, we will explain some of the search and discovery of evidence in the trial, the five times Oba St. Clair saw Jim Walker, the Oba St. Clair/Roy Cox connection, and an update on his inventions.

Oba is a person who is very easy to like. He was born in Richfield, Washington, April 5, 1912, but doesn't remember Richfield because he moved to Idaho Falls, Idaho at the age of two. His family moved to Dillon, Montana the following year. Oba has a good sense of humor and pauses to laugh as he tells of his move from Dillon to Orofino, Idaho, in a covered wagon. They covered 700 miles in only 30 days because the wagon was new, the horses were good, and the snow didn't come early that year. Oba was only five at the time and can remember vividly how he looked suspiciously at every tree when they passed through Bear Valley. Oba's biggest thrill of the covered wagon trip was the day they came to a nice, flat area in the terrain. Oba was walking with his older brother, who was eight years old, when his father teasingly put the horse team in a fast trot. When the covered wagon started to pull farther and farther ahead, Oba's older brother grabbed his hand to help him run faster. When they realized they could never run fast enough to catch up, the survival instincts overcame his brother and he released Oba's hand and went for the wagon by himself, leaving Oba all alone. Oba can still laugh as he recalls the terror that overwhelmed him when he thought he would be left alone in the wilderness. He thought he was a mile behind, but now says it couldn't have been more than 100 feet!

Oba now lives in Eugene, Oregon, next to his own control line flying field. Haven't we all had a dream of our own flying field? Oba built the field by clearing out 50 to 60 foot pine trees and leveling the ground. You can imagine the turbulence Oba must contend with on windy days as the wind moves over the top of the tall trees. The field is

Oba at the controls of his elaborate flying system, back in 1937. Large arms helped maintain continuous tension on lines, assuring good control.

Yamhill, Oregon. House in center with snow melting, is where Oba built his tether biplane and "Miss Shirley" in 1936 and 1937.

Berliner/Joyce flown on tether line . . . no control . . . in 1936. Wind sock countered line drag, keeping nose pointed straight ahead.

First flights had wind sock out on boom. This was later found unnecessary. Flight speed must have been quite low, and line tension very light. MB has plans for this Berliner/Hoyce.

Yes, the line tension was light! Note very slight bend in fishing pole, also, Oba's thumb is on reel to prevent line run-out.

fenced to keep the deer from tearing up his wood chip flying surface.

Oba worked in his father's sawmills in East Lewiston and Orofino, Idaho. He started at the age of ten as a timber fallers helper, progressed to driving a team of horses skidding logs, then to four-horse team and wagon moving logs to the mill. Oba is a self-educated man. He never reads fiction, but enjoys reading anything he can about engineering. He worked his way into the mill where he became head sawyer and millright. Oba designed several pieces of heavy-duty equipment that improved the output of the mill and made life much easier. When his father sold the mill, Oba worked for the new owner as a designer of small sawmills, and sawmill equipment. Oba could see that the timber would soon run out and he would have to move to a new location or find new work. He chose to become a watchmaker. He finished a one-year course in three months and in 1946, went to work for Skeies Jewelry in Eugene, Oregon, and worked there until he retired in 1976. Just as our country pulled together in a common bond of interest and direction in the early space flights, and more recently in the hostage crisis, so it was in 1927. When Charles Lindbergh touched down his Spirit of St. Louis in LeBourget Field outside Paris in May, 1927, the world was turned on to aviation and would never be the same again. Air travel increased 500%. Requests for pilot licenses increased by 300% the following year.

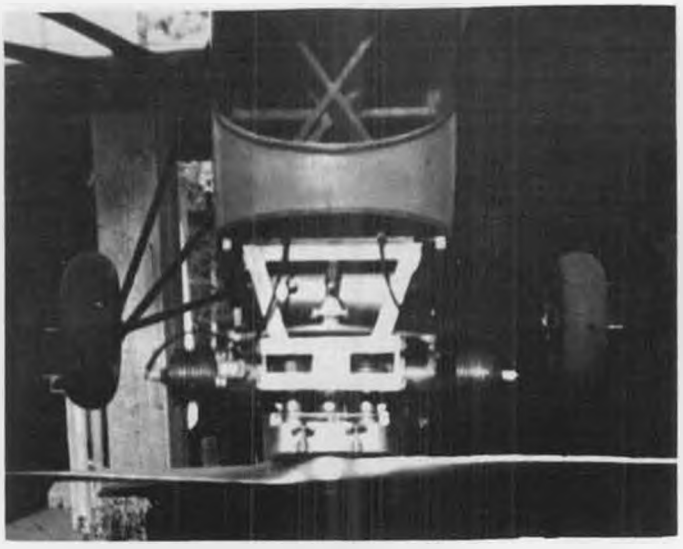
Oba St. Clair was caught up in the excitement of flight; his idol was Charles Lindbergh. To understand how Oba felt about his airplanes and still does, you should compare his feelings with Charles Lindbergh when he spoke of The Spirit of St. Louis as "like a living creature gliding along smoothly, happily, as though a successful flight meant as much to it as to me. We have made this flight across the ocean, not I or it."

Oba also feels that an airplane is a very personal object — not a thing. This feeling is the basis of Oba's invention of control line flying. It is the reason for his extreme safety consciousness and his thoroughness of thought. He still has every gas powered airplane he ever built, with the exception of his first biplane, which he gave away for the lack of space!

Oba's first airplane was his own design. It was rubber innertube powered. It had approximately a four foot wingspan. Construction was bailing wire, except for the spruce spars that were hand sawed. Oba didn't know about soldering, so all joints were crimped together. Covering was butcher wrapping paper. Oba was about 15 at the time and living in Idaho. It was winter and the airplane was equipped with skis. When Oba tells of the first flight, he says, "I got it cranked up, I was so surprised, I set it down, and that rascal took off, went up about 18 inches and settled back down. I was amazed and that really stirred me up!" That winter, Oba built 18 inch span rubber powered airplane from cardboard, for himself and all the neighbor children. He still recalls blowing the dry snow off the airplanes and the many enjoyable flights.

Iba's family moved to Yam Hill, Oregon in 1932 and he discovered that the hobby of model airplane building existed in the rest of the world. He bought his first strands of model airplane rubber in Greshan, Oregon. That was a thrill he recalls with a broad smile on his face. The performance of his model was improved by the new rubber and the development of a pendulum control of his own design.

Oba was 17, working in his father's mill, making 20 cents an hour. He had to travel 20 miles to the mill, so he bought a two cylinder motorcycle, a Harley-Davidson, with a sidecar. He could haul his tools in it and save a lot of gas money with which to buy more model airplane supplies. In the winter of 1933, he learned about soldering and built a



Twin engine was two Forster 99s coupled with auto oil pump gears.

Here's Oba today, with his metal bodied P-40. He has every model built over the years, except the old Berliner/Joyce.

replica of his motorcycle without the sidecar. Its power was a clock spring equipped with a governor. You could set it to run in a left or right hand circle or straight ahead. The model looks great today, super detail with working shocks on the front wheel and seat. The rubber tires were from ashtrays.

Oba says the motorcycle model was "the thing that started it all." He was demonstrating the motorcycle at the sawmill, when one of his father's employees asked him why he didn't build a large motorcycle with a gasoline engine. Oba had wished many times for a small gas motor for his airplanes, but didn't believe they existed. His friend told him they did indeed make such an engine, and he would bring him a magazine to prove it. He brought Oba two copies of *Modern Mechanics and Invention Magazine,* one dated August, 1935, costing 15¢. The magazine had an advertisement on page 91 showing a little Brown, Jr., 6-1/2 oz. engine. Oba says "that really turned me on.' (Oba still has the magazines.) The magazine also featured a construction article for the Berliner/Joyce Fighter (reprinted in February, 1977 issue of *Model Builder*

Control linkages on plane. Rudder and ailerons were used to keep tension on the lines when needed. He thought of everything!

Magazine). Oba started construction while saving for an engine. The depression was still keeping money tight. Oba made a trip to McMinnville and checked all the newsstands for magazines and found his first model magazine, a *Model Airplane News.* It was the first model magazine he had ever seen. It was a thrill he will never forget. The Brown, Jr. and Forster were advertised with 1/5 and 1/3 hp respectively. He decided he wanted a twin-engine motor due to his Harley experience. He planned to couple two engines together to make a twin. Bear in mind at this point, he had never seen more than a photograph of an engine. Oba chose the Forster Model A because it was advertised as more powerful. He knew he couldn't buy two engines to make a twin for a long time, so he would have to settle for a single cylinder temporarily. He saved $12 for the engine and $3 for the condenser. Delivery took six weeks, the factory sent Oba a postcard every few weeks telling him to be patient, that the engine was coming.

When Oba got his engine, no props

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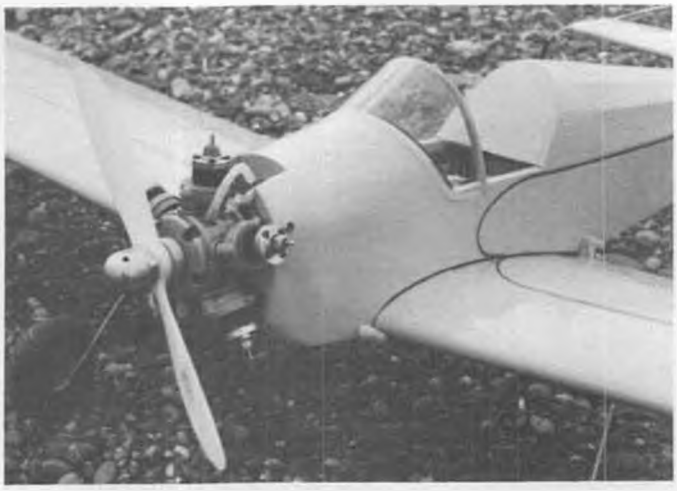
Oba's daughter, Shirley, with the model named in her honor. It was designed just after she was born, August 12, 1936.

"Miss Shirley" with wings folded, before twin engine was built. Smithsonian has indicated it wants model for the museum.

Pete Young's 1/2A P-51, built from a House of Balsa kit. No radio at the time of photo, but a nice building job.



Dave Unruh, Alaska, started with plans for a Super Brigadier, ended up with this fine flying G-Mark powered model.

Sport SCENE

By LARRY RENGER

• Part two, in the continuing saga of the intrepid Jim Jones in search of good razor blades. When last we saw our hero, he was caught in the morass of the corporate jungle at Gillette. Despite repeated cries for help, no one would even speak to him, by telephone or mail. *(Now if he was a 'commercial' athlete . . . wcn)* Nothing daunted, he turned his back on the suppliers in his native land who had rejected him, and began to search the wide world over to track down the elusive carbon steel blade.

As our avid readers may remember, in the good old days before "Platinum Plus" et al., there were razor blades which were awful for shaving, but terrific for modeling. They would rust, but they also were very, very hard, and stiff. They had the ability to hold a good edge while cutting balsa and tissue, and even more, they could be broken to get remarkably sharp points. They made your scalpel or #11 blade look like pre-school toys. Well, the blades they make nowadays are just as sharp, and work much better for shaving, but the metal is comparatively soft and the edge won't stand up.

So, after some months and some helpful leads from a few sources, Jim thinks he has found what is needed. By the time you are reading this column, he should have received his shipment of blades from overseas. He said that he had to order without seeing any samples; if they aren't right, he has a lifetime supply of blades to shave with. Anyway, he won't sell them unless they are like the good ones we used to get. If you are interested, send your SASE to Jim to get his catalog and prices on a variety of blades and tools (including a rubber stripper!).

Jim Jones
c/o ABS
36631 Ledgestone Dr.
Mt. Clemens, MI 48043

Continuing to deal with the feedback on my "What the World Needs, Mk II" list, I received another bit of info on small biplanes. Harry Stewart of Nevada City, California sent color snapshots of his 1/2A bipe. Specifications are:

Span: 28 inches top wing, 25 inches bottom wing
Chord: 5-1/4 inches
Length: 25-1/2 inches
Weight: 19 oz. with 225 mah batteries and 1/2 oz. of lead
Engine: Cox Tee Dee with sleeve throttle
Radio: Cannon Super Micro 4 ch (!)

Harry writes that the model has Hallco

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Display of SIRS Surgical instruments now being marketed in the hobby field. See text for more information.

Larry Laulom and his original "Foxbat" 1/2A unlimited Pylon racer. With Novak airborne, it weighs only 17 oz.

MATERIAL	ULTIMATE TENSILE STRENGTH IN PSI	COMPRESSIVE MAXIMUM PSI CRUSH STRENGTH	MODULUS OF ELASTICITY IN MILLION PSI	WEIGHT PER CUBIC FOOT
Ash	590	3510	1.13	34
Balsa	100	1700	.55	9
Bass	350	4730	1.46	23
Birch	620	5200	1.60	44
Pine	470	3510	1.12	32
Maple	500	5220	1.83	43
Spruce	345	6150	1.55	28
Aluminum	30000	10000	8.0	165
Aluminum Alloy 7075-T6	55000	13000	10.0	175
4130 Steel	95000	28000	30.0	489
Stainless Steel	250000	30000	28.0	489
E-Glass	500000	62000	10.5	162
S-2 Glass	665000	65700	12.6	156
S-Glass	665000	65700	12.6	156
Kevlar 49	525000	40000	19.0	86.4
Pan Carbon Fiber	400000	Over 40000	32.0	107
Pitch Carbon Fiber High Strength	300000	Over 40000	55.0	107

Model Builder's Classroom

COMPOSITE CONSTRUCTION AND ADVANCED MATERIALS

By JIM MOYNIHAN . . . (Part 1): Beginning of a series of articles on composite construction, and the description of modern, advanced materials and adhesives that can be used in the process of model building. Put on your thinking cap and pay attention!

• Ever since your editor asked us to write a series of articles on composite construction, we have wondered where to start. Probably the best way would be to define composite construction. For our purposes we would define it as the construction of an air frame utilizing an admixture, or a blend, or a compound of distinct parts or elements of various available materials to produce a resulting structure with the highest possible strength-to-weight ratio at acceptable cost. The idea of composite construction did not arise entirely from the current high cost of balsa! This obviously has a bearing on it but the real reason is to explore many new materials which have been available for some time to industry and only recently made available to the average model builder.

Actually, composite construction goes back to the Wright Brothers. The Wright Brothers flyer was made up of fabric, wood, steel, copper, aluminum, iron, glue, and rubber. So the idea of composite isn't new. What is new are the dramatic advances in raw materials.

We live in a world of advanced plastics, carbon fiber, kevlar, foam products, honeycomb products, advanced wood base products, and advanced adhesive systems, just to name a few. And we will be explaining them to you and stripping away the mystery and old wives tales we've heard about them. The existence of these new materials has made possible the flights of the Gossamer Albatross, the Condor, and the Solar Challenger. While proper utilization of the materials to make these flights possible was due to the superb engineering of Dr. Paul MacCready, he couldn't have done it either, without this material availability. We will give you a good idea of what can be done with the materials, their properties as well as the engineering and the practical know how to work with them. This article will not explore specific airplane construction but will rather stick to the material side of things until we fully understand what we really have to work with. We are going to steer clear of complex formulas (I hate that word formula, mathematical relationship of one thing to another is really a better way to say it. Formulas sound so pat.) Anyway, we want to stay as practical as possible. Like it or not, some presentation of numbers has to take place but we'll keep it as simple as possible. We are assuming that most of the readers are non-engineers. The articles will be geared as closely as possible to that assumption, and if you happen to be an engineer, forgive the simplification and

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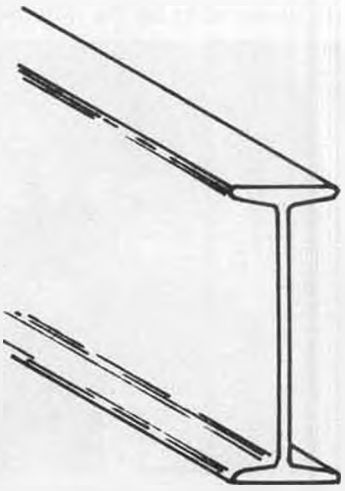


	STEEL A36	TITANIUM 6 A1-4V	ALUMINUM 7075T6	GRAPHITE/EPOXY COMPOSITE
Moment of Inertia IN4	12.51	12.51	12.51	12.51
Modulus of Elasticity 10^6PSI	27	17	10	26
Stiffness, E1 10^8 lb-in^2	3.38	2.13	1.25	3.25
Ultimate Tensile Stress KS1	80	160	83	140
Weight lb/ft	5.2	2.9	1.9	1.0

Dramatic illustration of the properties of an I-beam made of different materials. The graphite/epoxy composite beam has all the better properties of steel, with almost twice the tensile strength and at one-fifth the weight!

Ten finalists in the World Championships (l to r): Kondo, Burch, Carbonell, Ishihara, Bortolamasi, Culver, White, Tadiello, LeCat, and Bervoets. Countries represented are: Japan, U.S.A., Italy, Great Britain, France, and Holland. Futaba was primary sponsor of event.

The big winner, and World Champion Arturo Carbonell, U.S.A., with his very stock Delta car, powered by a Pico engine.

R/C CAR WORLD CHAMPS

By CHUCK HALLUM . . . Ex-*R/C AUTO NEWS* contributing editor returns to give us a run-down on the 1/8-scale gas powered race car champs. Next month, an analysis of some of the top cars.

• Indianapolis: The 3rd World Championship race for 1/8-scale gas R/C cars was held here on July 5, 1981. The Final was composed of a great variety of drivers and cars. The drivers were from the U.S., Italy, Japan, Britain, France, and Holland. The cars were Delta, S.G., Kyosho, P.B., Serpent and Associated. The drivers were Kondo (Japan - top qualifier), Ralphie Burch (U.S.), Arturo Carbonell (U.S.), Ishihara (Japan), Bortolamasi (Italy), Culver (Britain), White (Britain), Tadiello (Italy), LeCat (France) and Bervoets (Holland). These drivers made it to the Final through ten qualifying heats over a three-day period. Several of the top world drivers didn't make it to the final because of the competitiveness in the qualifying heats and/or luck. Sabattini, Ton, and Errington did not make it; Kishi didn't make it; nor did Jianas, Davis, Phelps, or Curtis Husting. The dominance of U.S. cars and drivers appears to have come to an end.

Rain the day and night before the Final, and rain forecast for raceday, caused the starting time to be moved up to 9 a.m. However, track conditions did not allow the Final to be started until after 12 noon. When the cars were flagged off at the start, White, of England, got a good start, with Carbonell of the U.S. second. Within a couple of laps, Carbonell, with his smooth driving on the damp track, passed White and started to pull away. White's driving was also good and he had a clear second, well ahead of the rest of the pack. Ralphie Burch was having steering problems, down several laps, and not able to show the style that got him the second qualifier spot.

Rain interrupted the race at 44 laps for Carbonell, 43 laps for White, and 42 laps for practically the rest of the field. Carbonell's excellent driving ability (part throttle and easing on the throttle) is what appeared to be the difference.

View of the World Championship track from the driver's stand is excellent.

Garage area under the tent. Also a very convenient refuge during the frequent rainy periods.

The Indy 500 club put lots of time and effort into the Championships. Tim Wilson on the mike, about to start a heat race.

Start of a heat race. Note pits for each car. Refueling had to be done in these "boxes".

Remember that at the 1980 Monaco World Cup race on a damp track, Carbonell was the fastest qualifier in the first round. After about one and a half hours, the track was dry enough to restart.

When the Final was restarted, in order, Carbonell immediately began to stretch out his lead. By lap 100 Carbonell had about a three-lap lead, when White dropped back. But the track conditions were really improving and most of the cars going much faster. In fact Kondo and Tadiello, in second and third, were running some faster laps than Carbonell. Carbonell was now having to work hard to pass, and on one pass he tagged a course marker . . . making two pit stops to fix the problem. Valuable time was lost, allowing the field to pull up a lap. By this time, Burch dropped out with receiver/steering servo problems and Bervoets and LeCat were way back because of problems.

Ralphie Burch, Texas, amazed everyone with his precise driving and racing sense. Associated car, new K&B car engine.

As the race progressed, Carbonell was able to pull up behind Tadiello, but had problems several times when he tried to pass Bortolamasi (Tadiello's teammate). Kondo dropped about three laps changing tires, but lost only one position. After Carbonell's last pit stop, he again got behind Tadiello, but played it conservative, and followed him for the last few laps. Carbonell crossed the finish line getting the checkered flag to win. So Arturo Carbonell, of the U.S., is the new World Champion, with Tadiello of Italy taking second, and Kondo of Japan in third.

The Track and Site

I arrived at Indianapolis Tuesday, in time to catch the last practice sessions for the World Championship race. The weather was hot and humid, about 89°F and 90% relative humidity. The track site, in Castleton Square, was quite impressive for the U.S., with bleachers, a large driver stand, and a huge tent (about 80 by 160 feet) for the garage-pit area and a little smaller one for displays, hobby items, and cold drinks. The track itself was well laid out but a little on the short side, mostly stop-and-go, and not much high speed. The back straight just barely let the engines wind up and was probably less than 100 ft. long. And the surface was a fresh cap of asphalt about a half-inch thick that was quite smooth. One might say it was a U.S. driver's track, with the smooth surface putting the suspension cars at a disadvantage and the stop-and-go being different for the Europeans.

Entries and Qualifying

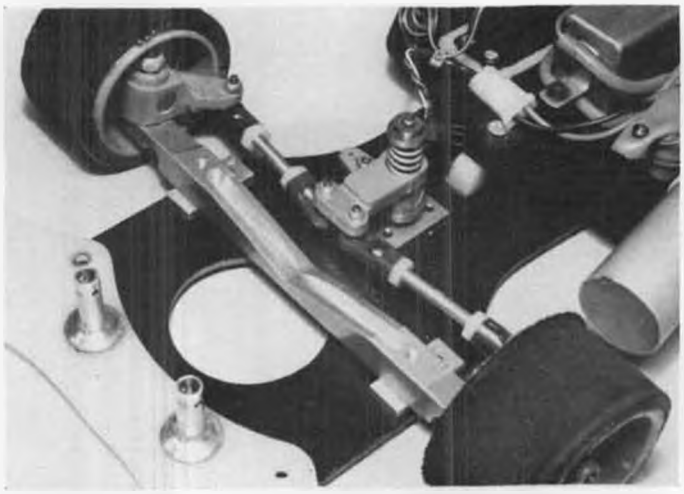
Wednesday, the first day of scheduled qualifying was wiped out by computer problems, then bad rain. After about the first dozen heats, it was discovered that the computer counting system was missing some laps (the computer was busy sometimes and did not accept lap inputs). It was difficult to determine exactly where the errors might be, and a backup lap counting system was not immediately availabe. So it was decided the day would be for practice. In a way, it wasn't bad, because the racers had practice starts and race-length heats with the drivers they would be racing. Then, late in the afternoon, the rains came, a real downpour, and wiped out the last couple of hours.

During this day of practice, where I got to see all the drivers and cars, it was very apparent that the USA has been very stagnant on car development. There were about four varieties of suspension cars from Europe (AMPS, P.B., Serpent, and Associated development) and then one impressive four-wheel drive from Japan, a Kyosho prototype. All of these cars looked good under various conditions, even though three were development modes. But more about all this technical stuff in the next article.

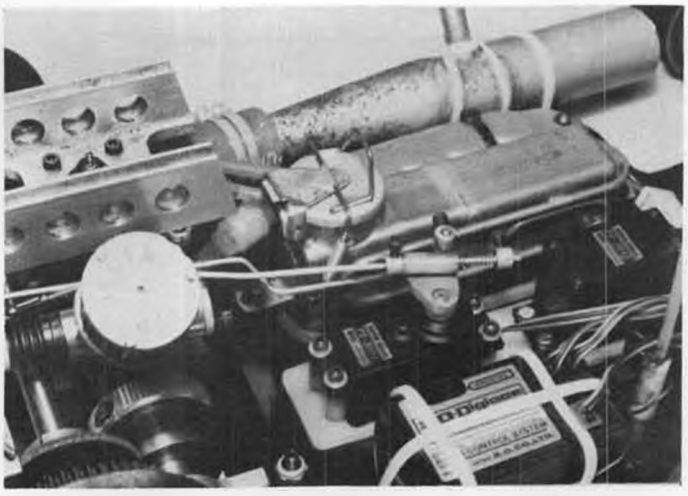
As far as drivers go, in this first round of semi-qualifying, the ones who impressed me the most were: Errington (G.B.), with speed plus smoothness; Kondo (Japan), was very smooth and quick; little Ralphie Burch (U.S.), with super quickness, good race sense, and neat passes; and Carbonell (U.S.A.) with smooth driving as usual and a good time . . . which was lost. The other U.S. drivers were suffering from all sorts of ill han-

Continued on page 66

Kondo (Japan) was top qualifier and quickest in practically every round. Prototype Kyosho car features 4-wheel drive.



Front crossbar has been milled, shaving off a few grams of weight. Note brads stuck in front right tire for balance.

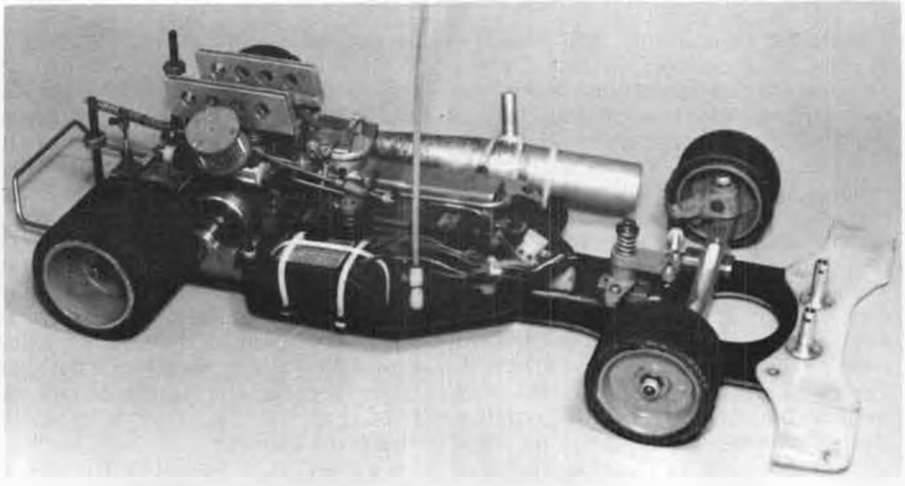


A busy installation! Note bullet-proof filler system with Gits filler, piano wire handle, extra springs to hold seal.

R/C AUTO NEWS

By DAN RUTHERFORD

PHOTOS BY AUTHOR



Overall view of car. KO (Kraft) radio system, servos not yet available in U.S., mounted on nylon strip which is bolted to 'glass radio tray.

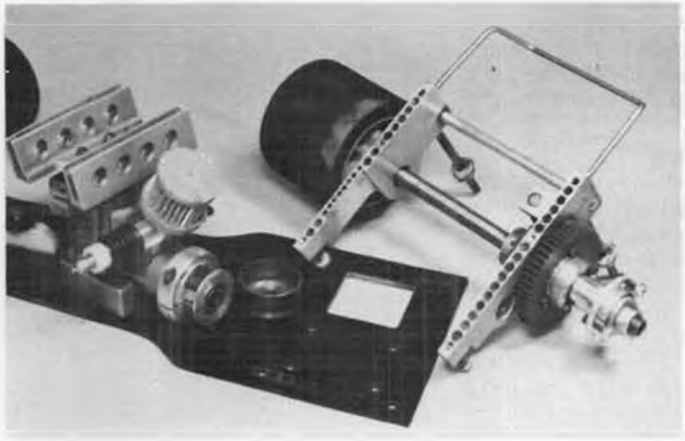
THE WORLD CHAMP'S RAC CAR. . .

I must confess that I was really looking forward to doing this particular column, as I had twisted a couple of arms and made the guys at Delta promise to send me Art Carbonell's race car, the same car used to win the World Championship race, recently held in Indianapolis. The reason for being anxious was that I wasn't sure Art would part with it, even for a month or so, especially as, at that time, the ROAR Nationals was coming up and it was obvious that I wouldn't be able to get the car back to him in time for that important race. But the Big Deal part of it was the chance to casually tear apart *the* World Champ car in the privacy and calm of my own shop. Nobody to bother me, all the time I needed to do it right and when it came to dig really seriously, like, in tearing the motor down, for instance, who was going to say that I should put the tools back and just look at the exterior of a very important piece?

What actually happened was a little disappointing, even though I was warned by Bill Campbell that it was a stock Delta Super J. You see, I still have a trace of oil on my hands, having just now torn the car completely apart, taking pictures at appropriate stages. And the car is so stock that there is precious little to write about.

Don't forget that the Dirty Racing

Continued on page 84



Lightening holes in hangers seem like much work for small gain (but he *did* win!). Stock Delta differential and 'glass pan.

Not too much difference between Arturo's winning Delta (foreground) and Dirty Racing Team Delta in back.

1. Pacific Ace 30 in a classic R.O.G. release by Ron Kiel. See text about Marin County P.A. brouhaha.

2. Winning compressed air design by Nick Sanford is called "Solenberger Special." SAM Champs. Johnson photo.

PLUG SPARKS

By JOHN POND

• In the June issue of **Model Builder**, we ran a few paragraphs on the Pacific Ace Event that SAM 27 (Marin County) has been promoting. Now the fun begins!

Received a letter from Tom Brennan, 588 Cedarberry Lane, San Rafael, CA 94903 of the Marin Aero Club, wherein he states:

"We read with great interest the story of the Pacific Ace 30 challenge within SAM 27. In fact we found it quite interesting that these people would trespass on our part of the aeromodelling world. We thought they were too old for free flight. Ha!

"Hence, our challenge to SAM 27 with their rules for the Pacific Ace 30 (R.O.G.) Event:

1) Must conform to outlines on CPM Products or Modelcraft plans.
2) Free Wheeling propeller only.
3) Reinforcement of structure okay.
4) Each aircraft must have I.D. number on both sides of fuselage and upper right wing tip.
5) Contest to be flown in three rounds. All flights over 30 seconds are official.
6) Cost is $1.00 to defend your (SAM 27) honor."

Photo No. 1 is a shot of President Ron Kiel launching his Pacific Ace 30 in preparation for this challenge meet. Matter

5. Nice looking Shereshaw Nimbus seen at 1938 Nationals. Anyone know the builder? Classic photo by Bruce Lester.

3. Dick Williamson placed with this Ed Schlosser design called the "Sensatherm", a Best-by-Test product. Johnson photo.

4. Pretty red, white, and blue Hayseed, from Aug '80 Model Builder plans. Builder Harold Thomas, at Taft. Johnson photo.

6. Bruce Norman, the "Texas Terror", with his highly successful OS 60 4-cycle powered Dallaire Sportster.

8. Most popular design in Texas, Shereshaw's Cumulus. This one by James Buice.

9. May *NOFFA* meet. Joe Scuro (right) was flying this twin pusher long before most Junior fliers were born!

7. Winner, Jack Swain, in the Winner's Circle with neat club pennant. SAM 29.

of fact challenges have been flying back and forth so quickly one wonders who challenged who.

In a bit of satire in the personage of Pierre Flabon (Tom Brennan), the following FAI rules have been advanced on behalf of the Marin Aero Club (Paris Division).

1) Absolutely no on-board R/C gear allowed.

2) Foam construction and plastic covering is prohibited.

3) No electric starters permitted.

4) All modelers must retrieve their own aircraft. SAM 27 fliers may use motorcycles (rubber powered only) for retrieving purposes.

5) SAM 27 fliers may use motor noise devices when necessary for the well being of the flier. (Note: These devices must be attached to the propshaft as no rude noises made by one's lips will be allowed.)

6) SAM 27 fliers may hold R/C transmitters in their hands only after the prop is free wheeling and the switch is in the off position.

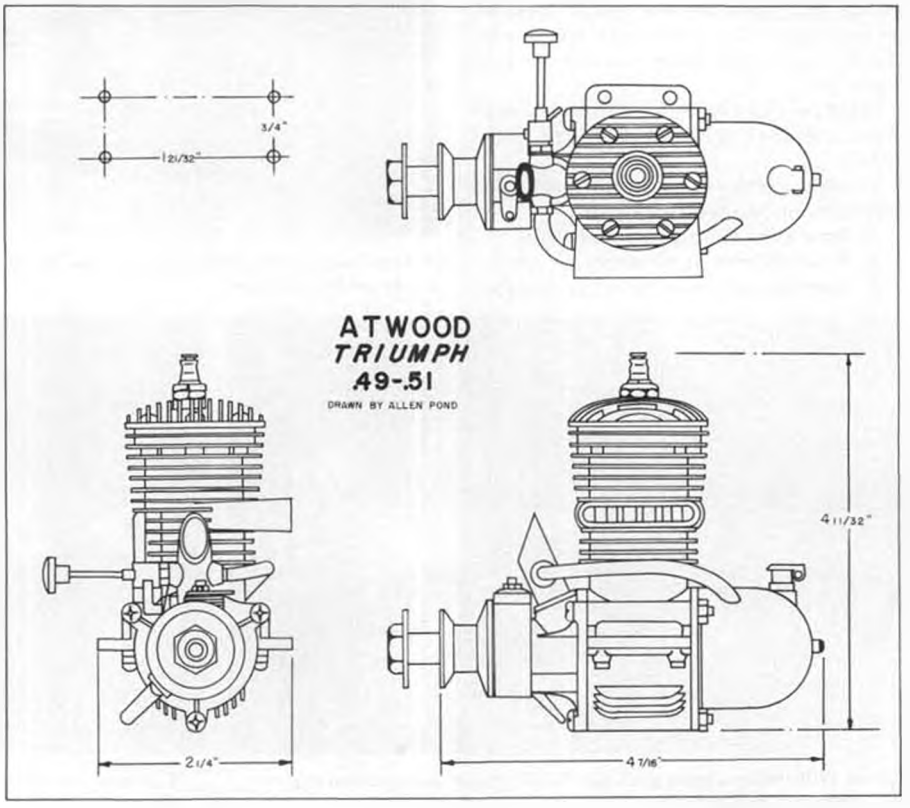
7) Rubber lube must be transferred to the motor by hand. No electric pumps are allowed.

To which, Ed Solenberger has issued a communique to all SAM 27 members stating this is a situation that threatens to destroy the SAM 27 image as Old Timer modelers if immediate action is not taken. Such libelous remarks regarding the usage by SAM 27 members of rubber motors is intolerable. We must get off our backs and get those Pacific Aces going.

The foregoing is all quite hilarious and this columnist can detect the fine hand of that old time kidder, Hal Makinson, a now retired funeral director! Between Hal and Tom Brennan, rubber flying has enjoyed a tremendous renaissance in Marin County. The last meet drew 49 fliers and 61 aircraft! Tom has further stated if this meet goes over big enough, SAM 21 will be the recipient of a challenge not to mention the other Bay Area clubs such as the S.F. Vultures and Oakland Cloudusters. To all of this, this columnist sez, "Ain't it great . . . Amen!"

Getting back to some of the photos that were left over from the 15th Annual SAM Champs, Photo No. 2 shows Nick Sanford, 5320 Santa Teresa, Santa Rosa, CA 95405 with his very successful compressed air model. Nick modestly attributes most of the design to Ed Solenberger but Nick can't fool us. He was building C.A. models back in 1933! Needless to mention he won the compressed air event by a large margin.

Photo No. 3 depicts Dick Williamson of Klamath Falls, Oregon with a Best-by-Test "Sensatherm" rubber model. The B-B-T line of models, produced in 1940, and designed by Ed Schlosser, were quite successful. Among the designs were such names as Altimeter, Enduro, Air Flow, and Stratometer. Hopefully, others will take notice of this line and try them. Sure beats looking at Kordas and



11. Scaling up a Lanzo by 10% permits using a .60. George Stephens powers his with a Saito .60.

10. Eastern hot shots (l to r); Stu Murray (Gas Bird), Esio Grassi (MG-2) and Tom Acciavati (Playboy).

Flying Clouds all the time!

SAM 41 from San Diego was well represented at the SAM Champs as attested to by Photo No. 4 showing Harold Thomas with a Hayseed B, a design featured in **Model Builder** (August 1980). We were going to draw the Class C version of this model, but unfortunately it was lost last year. We are still awaiting recovery of the model.

Photo No. 5 is another Bruce Lester gem taken by Bruce in 1938. The Shereshaw design pictured is the ten foot straight wing version of the Cavalier called the "Nimbus". Hopefully, one of you old eagle-eyed old timers out there will recognize who built this model. Let's hear from you. Should be a good story.

Engine of the Month

Of all the engines produced by that fantastic engine genius, William E. (Bill) Atwood, the Atwood Triumph probably stands out as an engineering "triumph" in die casting. Developed over a long series of engines, the Triumph represented the best to be had in die casting; crankcase casing, cylinder head, gas tank and forward section containing intake, crankshaft bearing, and timer housing.

The Triumph engines, in this case the "49" and "51", were first advertised in Model Airplane News, October issue of 1947. Coinciding this announcement was the advertisement from Micro-Bill Inc., extolling the virtues of the new Arden glow plug; an omen presaging the obsolescence of ignition engines. Matter of fact, the advertisement offered a choice of the 49 or 51 ignition engines at $20.00 or the same duo on glow for $18.00 less glow plug.

Actually the engine was created to compete in Class C (max .50 cu.in. displacement) and Class D (.51 cu.in.). This idea was to be employed again and again by Atwood and other manufacturers, notably K&B Mfg. Co.

However, Atwood ran into tough luck with this engine as it did not prove out in the controline circles and worse yet, the free flight events were reorganized to accommodate the new 1/2A engines. This meant Bill had two engines in Class C (.301 to .65 cu.in. displacement).

Actually, the engine was quite good and featured several gimmicks to attract the prospective buyer's attention. The so-called Atwood "Repak" induction claimed to produce increased performance based on the new style air accumulation chamber. Of course, the Atwood "Justex" timer was the thing that was to simplify trouble shooting the gap of those pesky points. The idea was simple, loosen lock screw, rotate the hardened timer bearing to the adjustment required. Then tighten the lock screw. Actually, this was a variation on the old Orwick timer adjustment.

Another Atwood feature, not normally seen in other engines, was the aluminum alloy split crankcase. This lower section was screwed to the upper just inside of the mounting lugs. This allowed for quick inspection of the lower end of the engine.

On the technical end of things, the Atwood 49 and 51 engines both had the same stroke, .790, with different bores, .890 in. and .900 in. respectively. Weight was the same for both, 8-1/2 ounces. The compression ratio also same: 7-1/2 to 1.

This rotary valve type engine featured a solid alloy steel crankshaft, centerless ground and hardened. Crankpins were produced the same way. The connecting rod was bushed on each end and supplied with oil holes. The two-ring type piston was actually a permanent mold, 195 steel alloy, heat treated, and fitted to an alloy steel cylinder with full 180 degree

12. They all give in sooner or later! Hugo Lung, ex-So Cal flier, with his R/C Scientific Mercury.

13. South African O.T. spark plug Jack Abbot, with his restored Ohlsson 60 powered R/C Sailplane.

14. Another South African, Harry Allan, with his Shereshaw "Cloud Cruiser", an ever popular design.

17. Ernie Johnson can make any rubber job fly like a champ. This is exquisitely built Whitman Falcon.

porting. The engine was provided with mounting lugs to allow beam or radial type mounting.

Flying Models magazine ran some strobatac tests and found the best rpm was 15,000 using a 9 dia. 8 pitch Tornado prop. The testing team indicated the motor actually ran better than this as the measuring limit of the strobe was 15,000 rpm.

For the free flighters, a 12 in. dia. x 6 inch pitch Hi-Thrust propeller would turn 13,800 rpm using standard Red Devil glow plug fuel. A not too shabby performance!

Despite the advanced design and performance of the Triumph motors, their death knell was sounded when they were rule changed to have to compete with .60 engines. This was true of other engines such as the Madewell 49, Rocket 46, OK 49, and others that were designed to the top limit of the then Class C division.

Thirty Years Ago, I Was . . .

Rodney S. Taylor of 17443 Haynes St., Van Nuys, CA 91406 writes to say the information I gave him on the Hassad Blue Streak really brought back the memories. Let's listen to what he has to say:

"In 1947, I was a 13 year old model builder living in Provo, Utah. I built gas models for 1-1/2 years having moderate success with an Ohlsson 23 Playboy Jr. and an Arden .09 powered Baby Playboy. About this time I also picked the art of flying controline using a successful sport model of my design.

15. Harold Lanser's enlarged Stanzel Tiger Shark with R/C is an outstanding job. Flies as beautifully as it looks.

"Now Provo was a college town (15,000 pop.) and the real mecca was Salt Lake City, 45 miles to the south. This is where the big regional meets were held. Every year over the Labor Day weekend, Jack Douglas, of Douglas Model Shop, would sponsor the two day 'Douglas Trophy Contest' featuring free flight and controline on successive days.

"This was one meet I had to attend, so 'conned' my parents into letting me go to Salt Lake City to see grandmother where I could stay overnight and attend the meet.

"Arriving in Salt Lake City by electric interurban rail (trolley), I found I had made no provisions to get out to the field 15 miles westward. Nothing to do but to get over to Douglas Model Shop and see if I could catch a ride there.

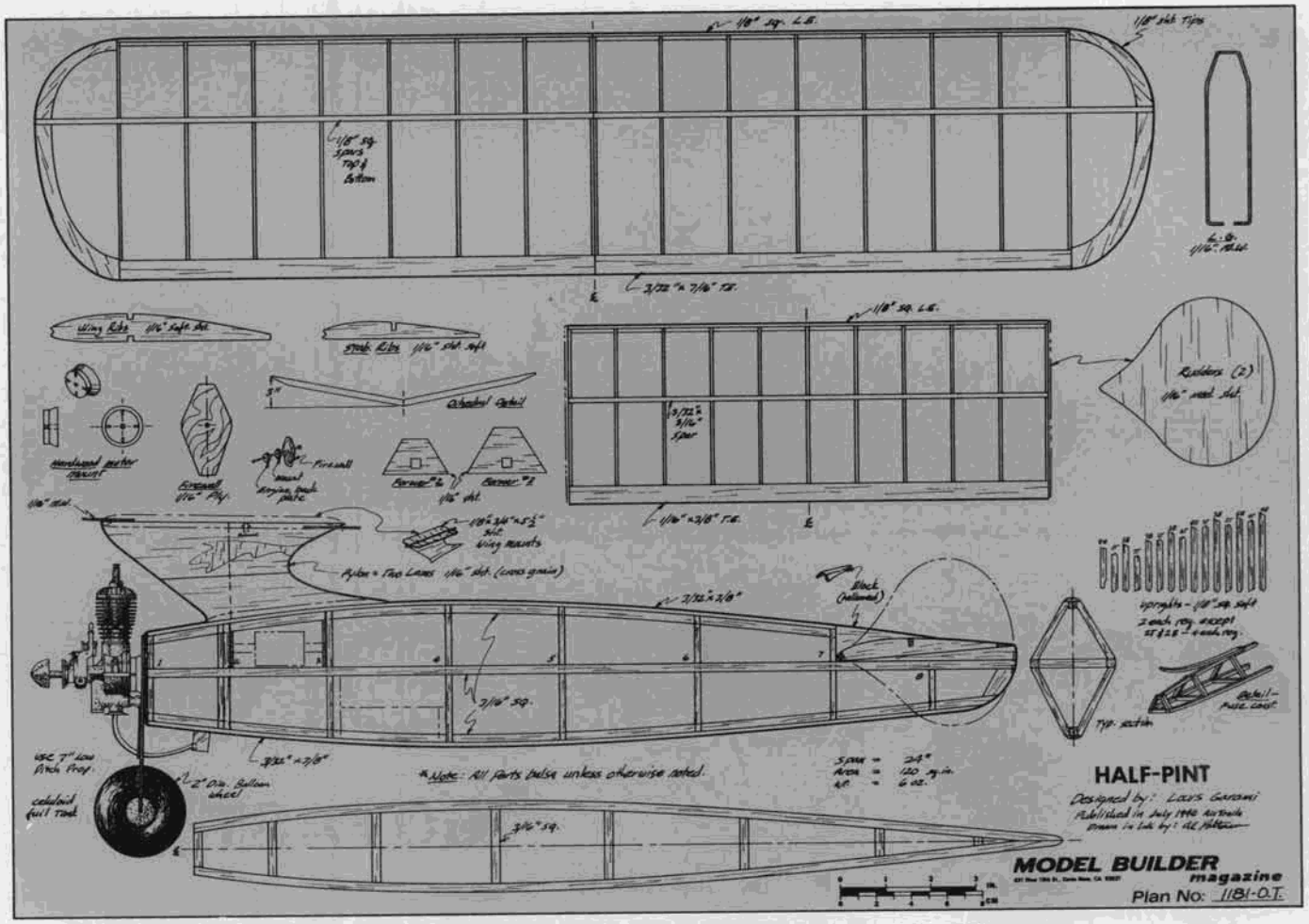
"Sure enough, up drives a California licensed black 1941 Ford coupe (you know the type . . . sweeping rear deck, the one you lowered and put on those tear drop shaped fender skirts). Seeing the large trailer they were pulling, it was quite obvious here were a couple of modelers looking for directions. Of course, I could go along!

"Well, it didn't take long to find out these fellows were Bill Lake and Ted Tyce from Chula Vista, CA on their way home from the Nationals and all the regional meets they could take in.

Continued on page 74

16. Lee Norcross produced this neat looking Flying Aces Stick Gas model. Seen at Taft.

18. Foxy George Perryman, with Nats work team; Carl Hatrak, Recorder and Bill Bowen, Chief Timer.

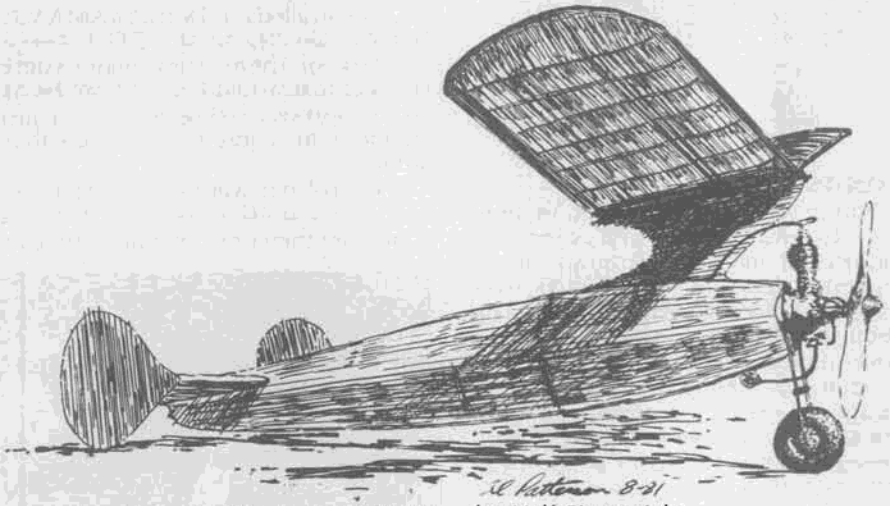


FULL SIZE PLANS AVAILABLE – SEE PAGE 100

Half-Pint

OLD TIMER Model of the Month

Designed by: Louis Garami
Drawn by: Al Patterson
Text by: Bill Northrop



• Yes, there were small gas models back in 1940, just as in any other era of the hobby. But our feature model this month was . . . is small in *any* era. With a span of only 24-3/4 inches, and 120 sq. in. area, the "Half-Pint" is smaller than today's popular .020 Replicas. . . Hmmm, can you *enlarge* a design for .020 Replica?

As hot as it would be with a screamin' .020, can you imagine hanging an .09 on this little jewel? Well, of course an Atom wasn't as "Mighty" (isn't that clever?) as a modern .09, but it was still a lot of engine for this small model.

Half-Pint appeared in the July 1940 issue of *Air Trails*, the same issue in which John Sprague, alias Bill Winter, presented "Old Square Sides", our Old Timer featured in the last issue. Half-Pint was designed by Louis Garami, whose name should be familiar to pre-WW-II modelers. Garami was one of the few truly innovative designers of all modeling time. Unfortunately he died way too early in life, and we'll never know what he might have created in later years with the many new modeling materials that have come along since his death. He is best known by today's modelers for the Strato-Streak, a pylon free flight design that is still competitive, and which undoubtedly had some of its beginnings in Half-Pint.

Garami's hints on flying small models were summed up in the last paragraph of the Half-Pint article.

". . .the first step to success is the right incidence. Remember, a small model requires more incidence difference (we call it decalage) than a big one. For a real good glide get your center of gravity back to forty percent of the chord from the trailing edge and reduce the incidence slightly. Make sure the rudder is set straight at the first trials, and if the model flies straight or circles too sharply, counteract with the rudder bit by bit. Stop to think before giving any adjustment because hasty warping of this and that will not lead to a happy landing!"•

A bunch of pylon racing Warbirds and their pilots. Aircraft had to fly well in standard Sport Scale maneuvers to qualify for racing.

PYLON

GO FAST AND Turn Left!

By JIM GAGER

CONTESTS:

You may have noticed that, in addition to this column not appearing monthly, it has also cut down on the contest coverage. Going through back issues and reading what had been 'writ' about local contests, I've come to the conclusion that it isn't always interesting to everyone unless it was a major or unusual contest. Therefore, you'll see less contest coverage than usual, unless I personally attend a major contest or you take it upon yourselves to send me some reports of said major or unusual events. Which brings us to the opening item of this month!

Venture Hobbies Warbird Sport Scale Pylon Races.

Don Phillips, owner of Venture Hobbies in Wheeling, Illinois, wanted to create some enthusiasm in pylon racing and also promote sport scale flying. What, you ask, could be more natural than combining World War II aircraft and pylon racing just like the big guys did after the war? Certainly, this isn't a new idea, as the guys down around St. Louis, Missouri, have been promoting a similar racing event.

Don corralled our District 6 AMA V.P. Horace Cain into being a C.D. Between the two of them, they made some changes that would keep it from being an out-and-out racing contest, or just another scale contest. Here's how they did it. . .

The airplanes were scale judged per normal stand-off scale procedures; a contestant then flew two rounds of scale flight, doing the mandatory take-off, slow fly-by, three optional maneuvers, landing approach, and landing; then three rounds of pylon racing were held. These various categories allowed the opportunity for many class winners, i.e.; best static aircraft, best scale flights, and fast pylon time. Then, by compiling the static scale score, flight score, and accumulated pylon heat points, you wind up with an overall winner from first

Kneeling (l to r): Jim and Allen Gager, Dave Schatz, Ed Bywalec. Standing (l to r): Chuck Smith, sponsor Don Phillips, Gary Achepol, Fred Rogers, Dino Goegan, Horace Cain, Larry Laureto, Bob Loehner, and Loot.

Gary Achepohl (B-25), Hal Parenti (Me 109) and Horace Cain (P-51) prepare for a heat. Now that's gotta be neat!

Dist. 6 V.P. Horace Caine CDed Warbird event and also flew in competition.

through however many entrants there were.

Race day started out absolutely horrible. As I loaded my car, I wondered if the hard rain and winds gusting in the 30-40 mph range might cause them to cancel the contest . . . Driving around Chicago's fine Forest Preserve district looking for the flying site (of course I left the directions at home), I began to think things were improving as the rain stopped and the high winds dried the ground rather rapidly. Arriving late (12:05) with a noon entry deadline — I had my first run-in with Horace Cain, C.D. Now, the stories you've heard about Horace being hardnosed and inflexible just aren't true, as he bent the rules enough to accept my entry even though it was late. Must be the teary eyes got to him. Or, maybe the fact that I couldn't get back up after I threw myself at his feet! *(Or maybe he knows what it's like to be a last-minute write-in! wcn)* At this point, everyone else's aircraft had been static judged and they were already finishing up the last round of scale flight.

Talk about PRESSURE. The little heart was racing; have to rush to get the airplane cleaned up and into the static judging circle; where the hell are my 3-views? At home with the street directions! Luckily, someone else modeled the same aircraft and was kind enough to allow me to borrow his scale proof! *(That's a true friend! je)*

Then, out to the flight line, still windy with very strong gusts, haven't flown any pattern or scale maneuvers *intentionally* for some time, only one other flyer finishing up his flight and all the contestants and spectators just waiting to see how the hot-shot magazine writer crumbles. Pressure . . . Pressure. . .

Well, I showed them! I went right out and blew the flight completely! After the nerves calmed down, the second flight went a little better. I even scored 9 out of 10 possible points for my scale, pylon lap demonstration. Having arrived late, I can't relate what the other contestants' flights were like, but my static score and high flight score (low score was thrown out) put me in 2nd place going into the pylon races. At this point in the contest, I ran into Horace Cain's renowned inflexibility and hard nosedness. Just kidding, but, the way they scored the pylon races was to award 25 points for completing the heat and 5 points for everyone you beat in that heat. Therefore, if you flew a 3-plane heat and won, you'd get 35 points; 25 for completing the heat and 5 points for each of the two guys you beat. The problem arose when, by luck of the draw, you only had one other plane in your heat. The most points you could accumulate was 30. As close as the combined static and flight scores were, it looked as if 5 points might be the difference between the various placings.

After much discussion, the dispute was resolved in Horace's favor (tears and begging don't always work), yet he acknowledged the fact that the pylon scoring system needed some thought and revision for the next contest.

The pylon races were very exciting in themselves. Of the 13 entries, only myself and Chuck Smith are involved in racing, and Hal Parenti had gotten away from the racing scene these past years. Near as I can tell, that left the other entries with this race being their baptism of fire. Keep in mind now, the entries in this event were as diverse as a Beech Staggerwing, B-25, P-51, Spitfire, and a Me 109. The actual races provided some excitement as the gusty winds had picked up, if they had changed at all; the classic scene of "Build all the time at the expense of practice flying time" made itself known, and of course, Lady Luck intervened. At the end of the day and seven demolished Warbirds, the final results were:

High Point, Static Scale	Chuck Smith
High Point Scale Flight	Dave Schotz
Low Time, Pylon	Jim Gager
1st—Combined Scorer	Dave Schotz
2nd—Combined Scorer	Ed Bywalec
3rd—Combined Scorer	Jim Gager

Many, many nice prizes were given out to the contestants, including a Dremel band sander unit, Top-Flite scale kits, Jemco scale kits, Hobby Shack scale kits, electric starters, etc. Every flyer and worker received some sort of prize. My

Continued on page 86

Identifying Warbirds to No. 1 pylon. Easy in this heat, but how about 3 House of Balsa "Candy Man" P-51s!

Nice spot for photographer, as most aircraft tended to torque left at this moment!

Neil Whitman's flying boat on ice! January 80 in Connecticut. All 'glass fuselage, neat tip floats. Gear plugs in. Neil's letterhead logo at left.

ELECTRIC POWER

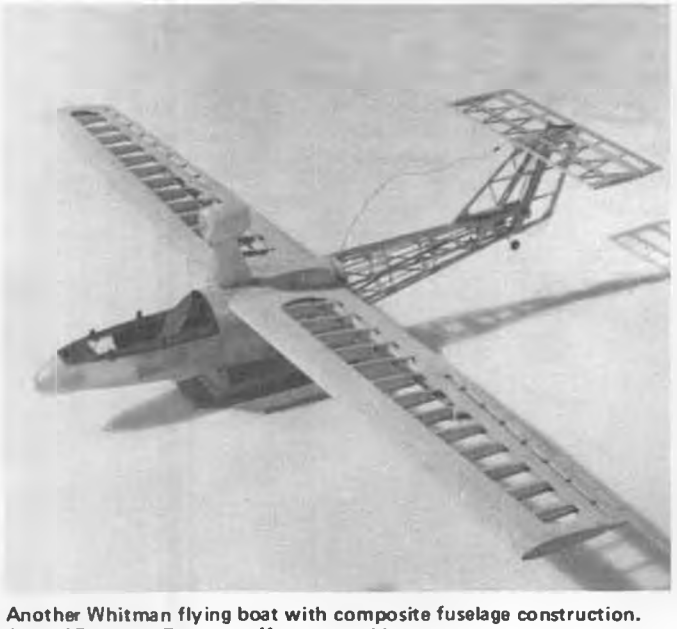
By MITCH POLING

• The September issue of **Model Builder** has a good write up on the Brimfield hydro meet in Massachusetts. If you look carefully at the photo on the lower left on page 35 in that issue, you can see Nelson Whitman's unique electric seaplanes. As far as I know, Nelson has the only electric flying boats in this country, other than an .020 size one I built (somewhat marginal in ROW). Nelson's planes have fiberglass fuselages made by him; I have one, and I can testify to his impressive workmanship. Now all I have to do is finish it! Nelson's description of his plane is quite complete, so I'll run it in his own words.

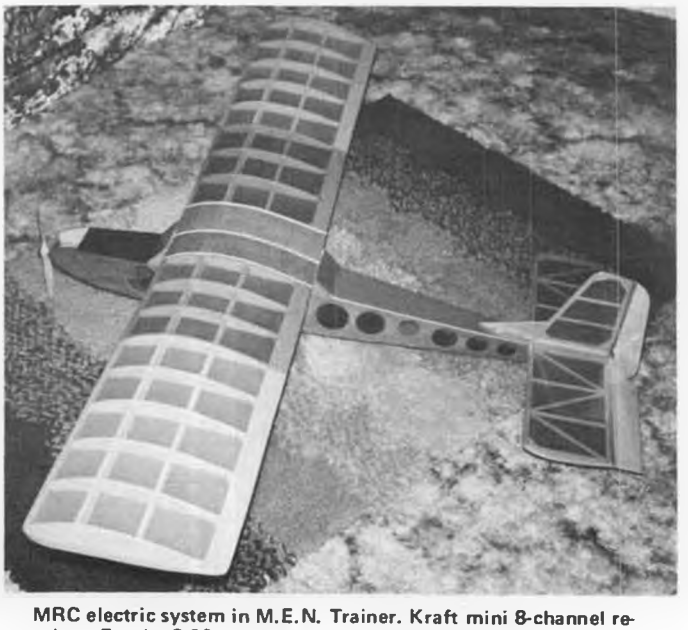
"This is the second generation of this aircraft. It differs from the first by the use of the NACA 23012 wing instead of a Clark Y, by use of a built up hull aft of the step, and by relocation of the batteries and flight gear. As a matter of fact, I think that I prefer the batteries under the canopy (with a vent on the canopy rather than on the pod stem) and the flight gear on a tray under the pod support. It turns out that there is a negligible difference in weight between the built up hull and the all glass one, and the latter is much easier to build. The craft flies beautifully. It will ROW in about 50 feet. Equipped with wheels, it will ROPavement, but not grass. I fly it off grass using a surgical tubing assist, with or without wheels. Easier on the nerves than a hand launch. Flies well as a pusher as shown, but is a little quieter as a tractor. Ailerons are useful on takeoff, but turns need a bit of rudder. Might not if the aileron differential is modified. Roll rate is s l o w. All-up weight with the Astro 15, KPS-14 II servos, micro switch throttle control, and a voltage regulator for receiver supply is between 70 and 71 oz. I do not intend to go into the business of supplying hulls; if anyone is interested, I'll make a few at cost.

"It is my normal practice to paint the fuselages with K&B epoxy primer. This step invariably shows blemishes which I had not seen before the painting. I have found that Pettit's "Stuff" fills the holes well and adheres to the primer. Sometimes two coats of primer are needed, but most is sanded off before applying the final finish. The primer sands beautifully with #400 wet-or-dry paper used wet. One coat of color sprayed on seems to be enough. I guess a better finish might be obtained with two or more coats, but I don't want the additional weight.

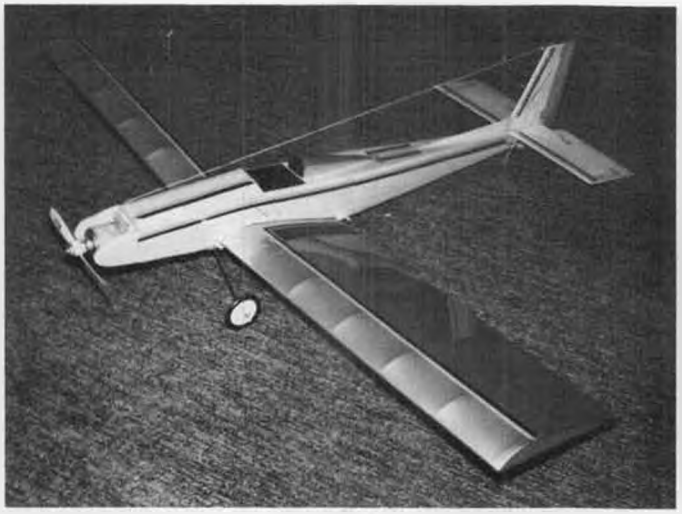
"As time goes on, I tend to sling more equipment from the hatch rims rather than from stringers glued to the hull sides and bottom. In the hull with the Kraft radio (see the photo) the Astro 15 battery is slung from the lips of the forward hatch. All equipment is mounted high off the bottom to keep it out of the water. I do not "bag" the gear; it is easier to dry. Although the air inlets are scuppered, there are times when water does enter the hull. I now put the air exit duct in the rudder post and use it



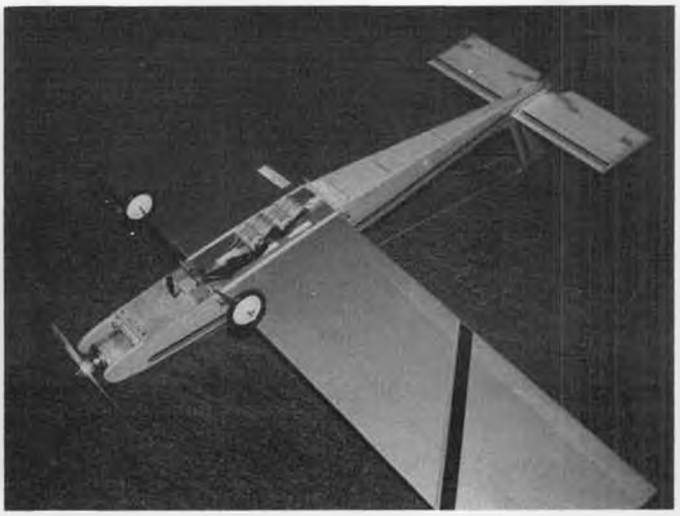
Another Whitman flying boat with composite fuselage construction. Astro 15 power. Funny stuff on ground is snow.



MRC electric system in M.E.N. Trainer. Kraft mini 8-channel receiver, Futaba S 20 servos.



Astro 020 in scaled down Pronto. Kraft 18 servos. Weighs 12-1/4 oz. with 475 mah motor battery.



Underside of Pronto. Battery pack is rubber banded on outside of wing. Sanyo cells.

to drain out whatever leakage I get. In the installations shown in the photos you can see the power supply for the radio, and the cam operated micro switches for speed control. In the Futaba installation, the resistor is mounted ahead of the throttle servo and cannot be seen. In the Kraft installation the resistor is between the throttle servo and the power supply. The resistor is 15 ohms, 25 watts with two sliders, giving me idle, low cruise, high cruise, and max. The idle is advantageous for taxiing on the water."

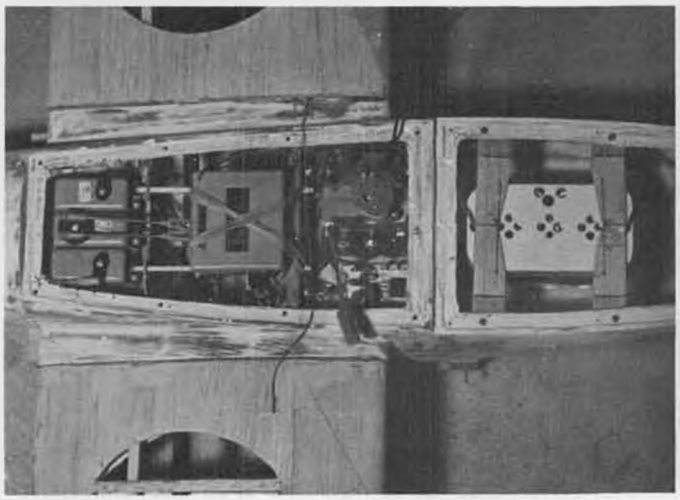
Thanks, Nelson, for the information. Nelson has a very sophisticated approach, the photos are impressive! I really like the wing tip plates that also serve as floats, and the very clean plug in landing gear. I fly an Astro 15 float plane without ailerons, and the fact that Nelson can roll his plane is enough to inspire me to try it; all I can manage is very wide barrel rolls with rudder and elevator. Last, but not least, Nelson has a very neat logo for his letters, with a drawing of the electric seaplane and the motto "Fly Electric — Fly Hydro", hopefully the printer can reproduce this for the column.

(Nelson is an old flying buddy of **MB's** *Editor. We gave him his first R/C flying lessons in Delaware, circa 1960. wcn)*

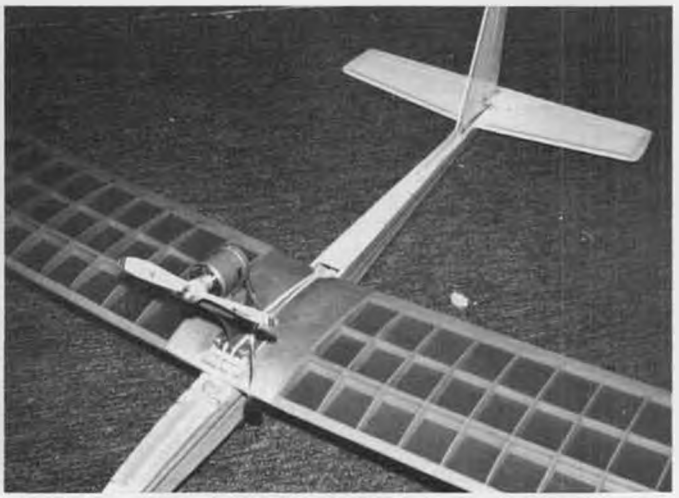
I do get quite a few photos from readers, both in color and black and white. I am happy to get these, and if you do send some in, the chances are good that they will turn up in the column. The only problem I have is that sometimes there may be a delay in getting these into the column because of reports on products, shows, test results, and so on. This is sort of an apology for those who have sent in photos, the ones in this column are about a year old! But, better late than never, so here are some photos of Jack Dobbins' planes that he sent in. Jack likes to build (he lives in Illinois and sells ready-built models), as is obvious from the variety of planes. He also doesn't hesitate to scale a good design to another size to suit his requirements; a good idea! I have found from my own experience that a good model in one size will be a good model in just about any other size. The Gentle Lady by Carl Goldberg already has an excellent reputation as an 05 electric, and Jack has scaled it down to an 020 size. He says the flying characteristics are fantastic, great climb and glide. The photo shows how nice it looks, good workmanship. Jack also does it right on the radio equipment, he keeps it light. The mini servos and battery packs are a boon to small electrics. The mini Gentle Lady uses a micro-mini Cannon receiver, a 70 mah receiver pack (from the 9 volt GC9 battery), and Kraft 18 servos for rudder and elevator. I am using the micro-mini receiver, and I really like it and recommend it. It weighs about .6 ounces, and has excellent sensitivity and range. I have flown it indoors many times, both in Pasadena and in the Kingdome, and all the indoor steel structure doesn't bother it a bit, never a glitch. The GC9 battery, by the way, is really a bargain, at $6 to $8 in the hardware, electronic, and photo shops. It has six 70 mah cells in it, and they can be either fast charged (five minutes for a full charge) or slow charged overnight. They are good for two flights, then can be quick charged at the field in five minutes. I have been using them a lot, and they have given me excellent service, no problems at all. I do the fast charge at 1 ampere for about 3.5 minutes (batteries completely discharged), or .7 amperes for five minutes (discharged pack).

Oh yes, back to the 'mini' Gentle Lady. It weighs 13.75 ounces, with an area of 275 square inches. That is just right; my 020 glider, I'm ashamed to admit, hardly

Continued on page 78

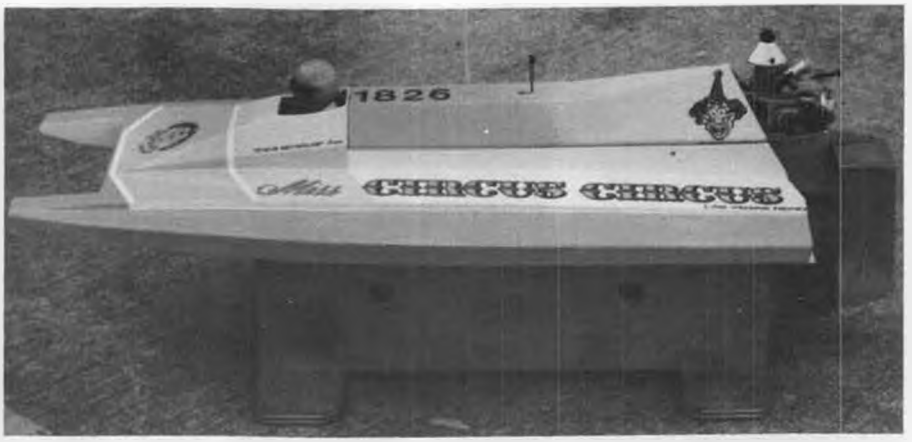


A busy scene inside Neil Whitman's flying boat. Cam operated switches for off, low, medium, and high power.



Astro 020 powered Gentle Lady. Weighs 13-3/4 oz. with Cannon Micro-Mini receiver, Kraft 18 servos, 500 mah motor pack.

Bill Brazzle's Hughey Tunnel pours it on.



Brazzle's Hughey Tunnel on stand. Note protective bread pan over outboard drive.

R/C POWER BOATS

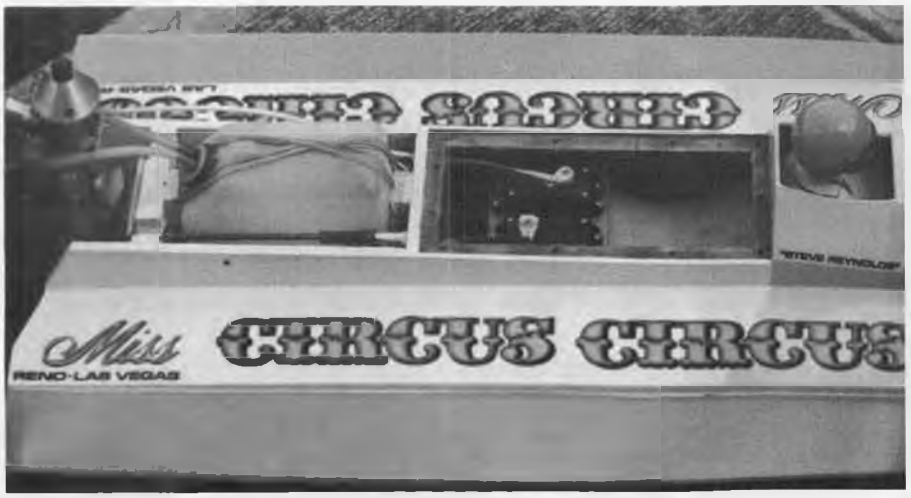
By JERRY DUNLAP

PRODUCT$ IN U$E — The Hughey Tunnel

Although the Hughey Tunnel has been available now for a couple of years, I believe it is still a viable subject for a products review. Since the introduction of the K&B .21 Outboard back in the fall of 1976, there have been a number of tunnel boats offered to model boaters interested in this type of model boating. Since 1976, I've probably built and reviewed more of these boats than anyone I know. So I guess that qualifies me as some type of authority on the subject of model tunnels. As one who has had more than just a passing interest in the development of model tunnels and model tunnel competition, I feel the following statement is valid. To date, no model tunnel I've seen has proven to be superior to any other tunnel design.

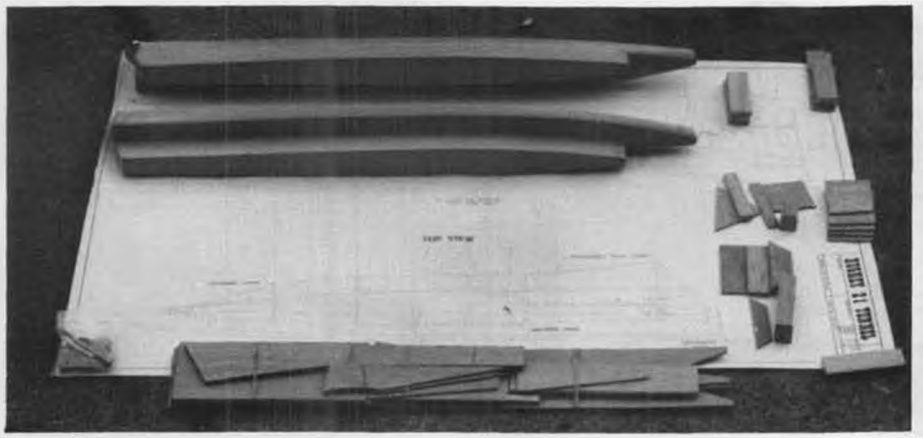
That being the case, what's the best boat to choose for the individual interested in this form of model boating? The answer is, there isn't a 'best' boat. There are lots of good boats available and choice will depend on a number of considerations that must be mulled over by the potential model tunnel builder. Although cost is probably among the lesser important things when selection is being considered, I think it interesting to note that good running tunnels can be purchased as wooden kits for around $35 or in epoxy fiberglass for $130. Wait a minute . . . when you consider nearly a $100 difference in price, maybe cost is important. Another thing to consider is the amount of time and skills needed to get the boat ready to run. That $35 wooden kit requires some time to put together and basic skills in following directions and simple model building. I've seen some pretty sadly built wooden kits. On the other hand, that more expensive epoxy glass boat is ready to run less installation of radio, engine, and fuel tank. Appearance is a rather important item for many modelers. This is really a personal thing and I suppose the adage, "Beauty is in the eye of the beholder," applies here. Readers have sent me photos of various tunnels that are very nice appearing because they took extra pains in building, painting, and detailing the boats.

But what about performance, Jerry? Do you mean to tell me that there isn't a difference in performance between all these different types of tunnels available? Well, there are differences in performance. However, the performance differences are not because of design. I believe I can make this statement since I've seen almost all of the popular tunnels run at one time or another during the last five years. And during that time, I don't feel one particular design has proven itself to be superior by reasons of design alone. The good running tunnels do so because they are properly trimmed, have the correct prop, and the owners know how to drive the boats in various water

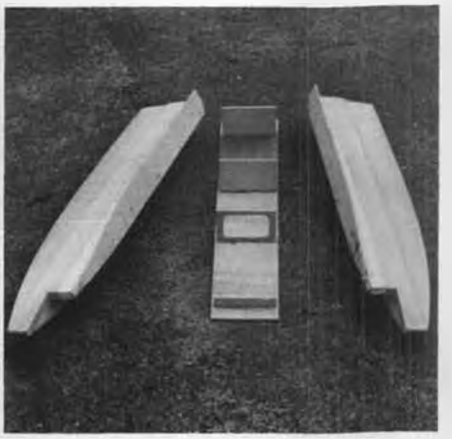


Engine, fuel tank, and radio installation in Bill Brazzles Hughey Tunnel. Proper rigging is vital to successful operation.

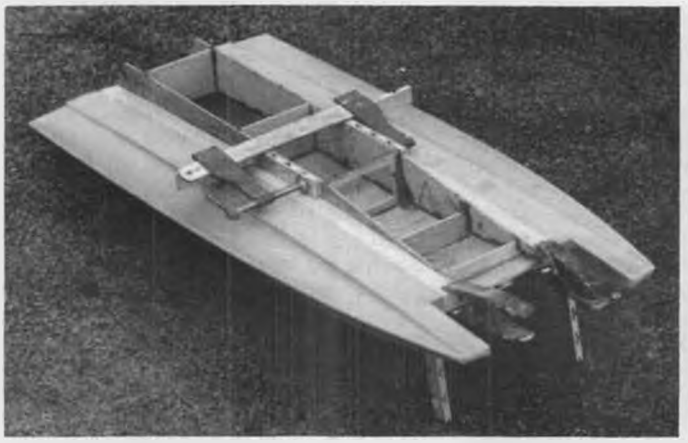
Bill Brazzle, owner of Bill's Hobbytown in Tacoma, Washington, with his Hughey Tunnel in Circus Circus trimmings.



All parts for the Hughey Tunnel spread out on the full size plans. Sponsons are made of foam, while all other parts are plywood.



Sponsons and center section ready for joining. Simple construction helps accuracy.



Sponsons joined to wooden center section. Clamps hold parts until epoxy sets.

Plywood cowling can be held together with masking tape and pins while epoxy cures.

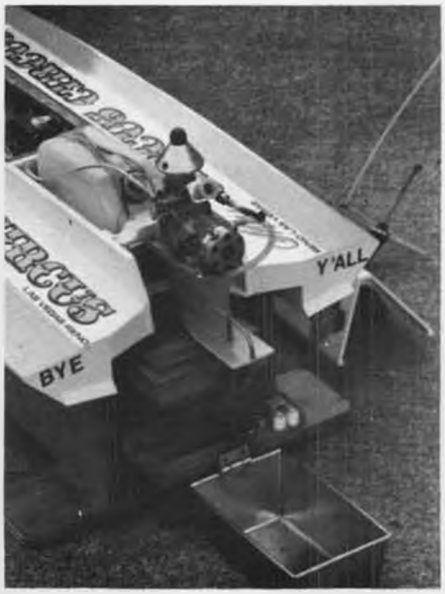
conditions.

The Hughey Tunnel, available from Hughey Boats, P.O. Box 68328, Indianapolis, IN 46268 might be considered a semi-assembled model. The kit features very hard foam sponsons that are affixed to a wooden center section. Checking with my local hobby shop, I found the retail price for the boat to be $90. This puts it in about the middle of the price range for boats of this type. Because the boat is partially assembled, building time and skill needed are somewhat lessened. However, I don't want to leave the impression that skill isn't an important part of building this model. The actual building of the Hughey Tunnel is rather simplistic and easy to accomplish. The area that is most often neglected is the one I consider most important! This is rigging the boat. By rigging, I mean installation of the radio equipment, fuel tank, and motor installation. This is what really makes the difference as far as I'm concerned.

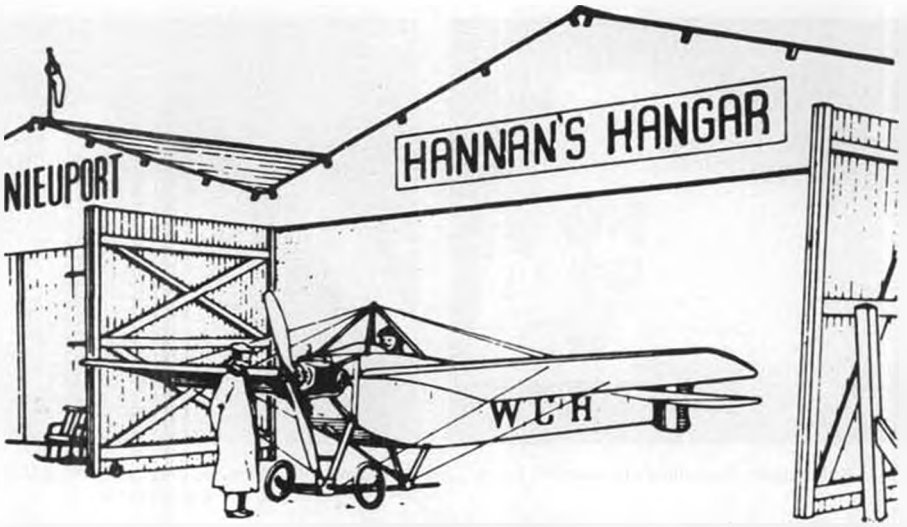
Ed Hughey, one of the best known names in model boating for many years, has provided a well thought out kit. The wooden pieces are cut to exact requirements to help insure proper alignment during the building process. The directions and full size plan are most adequate to assist in building the boat. An epoxy glue like Hobby Poxy Formula II works very well for gluing the wooden parts to the foam sponsons and for gluing all the wooden parts. I took a number of photos during the building of the Hughey Tunnel and feel they show how the boat goes together. As can been seen in the photos, there isn't much need for many items to complete the assembling of this boat. I would recommend that all wooden pieces be given a protective coating of epoxy glue on the interior sides. This will assist in sealing the plywood and prevent moisture from being absorbed in the plywood.

A couple of comments about painting the Hughey Tunnel might be in order at this time. Preparing the wooden parts for painting will require the application of some type of primer to fill the grain in the plywood. I brushed on a coat of K&B Super Poxy Primer over the wooden parts. After allowing this to dry, I sanded the primer thoroughly and applied another coat by brush and sanded again. The plywood provided does have a rather deep grain and this process provided a smooth surface when completed. Since epoxy glue was used, I didn't use a sanding resin as the sanding resin will not cure over any areas where there is epoxy. Any cracks in the wooden pieces can be filled with material like body putty. The fiberglass body putty from Hobby Poxy works very well as a filler. Care needs to be taken when doing any sanding near the foam sponson parts. These parts have a thin skin that can easily be sanded through. To prepare the foam for painting, clean it thoroughly with the thinner of whatever type of paint you are planning to use. I used K&B Super Poxy paints to finish the Hughey Tunnel. The entire boat was painted first with primer, then sanded. The base color coat was then applied. After this had dried, the boat

Continued on page 72



Stern view of Brazzle's boat with bed . . . er, bread pan swung away. Note message to the competition!



"When the weight of the paperwork equals the weight of the plane, the plane will fly."

F. Van Hauwaert, organizer of "Flamalle International" indoor contest of Belgium, holding Renard 31 Peanut. Frugoli photo.

• Our quote this month, by the late Donald Douglas, is via the June 1981 *Popular Rotorcraft Flying* magazine.

SOLAR SUCCESS

Congratulations are once again in order to the Paul MacCready team, who continued their winning ways by achieving the goal of a France-to-England flight with a sunpowered aircraft. As in the case of previous MacCready projects such as the Gossamer Condor, Gossamer Albatross and Gossamer Penguin, model builders played vital roles.

The 47-foot span Solar Challenger features some 16,000 solar cells feeding an electric propulsion system engineered by Bob Boucher of Astro Flight, Inc.

After a month's delay awaiting suitable weather, the Challenger, piloted by Stephen Ptacek, took to the air assisted by a friendly thermal and eventually reached an altitude of 11,000 feet, during its 180 mile, five-hour flight. As usual, efficiency on the ground did not match that in the air, and the landing was delayed about 30 minutes while customs and immigration personnel prepared themselves for the "imposing task" of receiving a U.S. citizen pilot.

MEDIA PRIORITIES

It is an interesting commentary upon local television stations to note the scant coverage given the Solar Challenger epic flight. We watched four different news programs before we were even able to determine the pilot's name! (We had anticipated it to be Janice Brown.) By startling contrast, the *non-action* of U.S. baseball teams was repeatedly examined in utmost detail!

A UNIVERSAL PROBLEM

Searching for scale model documentation seems to be a world-wide pastime. French writer Georges Chaulet put it this way: "We modelers have a malediction, which is always to be interested in strange and obscure models for which pictures are very difficult to obtain! And we do ask questions such as, "What was the shape of the ailerons of the Smith XW 2685," or, "What kind of motor was used on the Mk 793 Jones biplane built around 1924 by the Papoos." Or, "regarding the PZX 15M-009 fighter used by Attila, what was the number of holes made by the enemies' bullets in the tailplane?" And of course there are no papers available about these rare phenomena."

AERO POST CARDS

Picture post cards offer a decorative way to correspond, and can save considerable time as compared to a letter. It is surprising how much information may be included . . . if you write small enough! Gerald Myers, of Redway, California, sent us a collection of post cards with special appeal to aero enthusiasts. Published in booklet form (each card to be removed for use) by Post Card Books, of Southfield, MA 01259, the pictures featured are vintage aircraft, most of which are not identified. This in itself offers a challenge to aviation history buffs. A few we readily recognized were the Vance Breese "ALOHA" monoplane, one of Lincoln's Beachey's pushers, a Ford Trimotor, an AVRO triplane, one of Gustave Whitehead's much-maligned flying machines, and a Wright biplane. An 1894 canard hang-glider was a complete mystery to us, as were some of the other craft.

THE LANGUAGE BARRIER

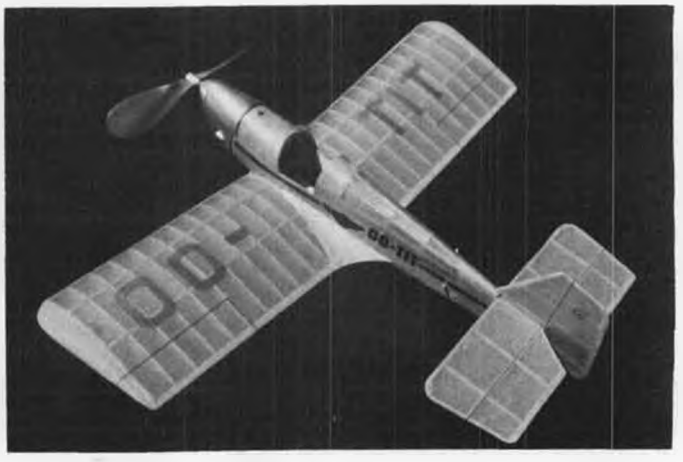
According to the *Paris Air Show Daily*, aircraft translations can present difficulties. The example they chose was the push-pull Super Skymaster, which was listed as a "Cessna Pooch Pool".

THE WAY IT IS

Model builders have long been plagued with militant trees and unsupervised dogs, but boomerang enthusiast Ken Simpson, of Cedarburg, Wis-

Continued on page 71

Sopwith Baby (Blackburn) by David Deadman, of England. Power is Brown CO_2 twin. Floats are 1/64 balsa over expanded polystrene.



Neat little Tipsy Junior Peanut by Wal Kavanagh, Sydney, Australia. See text.

Dick Stubblefield hides George Cleveland. TWA engine builder Glen Dye doesn't argue the point.

Russell and Ron Hester prepare or repair model during match. Circle marshall Tom Zon sorta looks on.

Control line

By "DIRTY DAN" RUTHERFORD

PHOTOS BY CHARLIE JOHNSON

• Please excuse anything about this column that seems to be in the least bit logical. You see, I am actually starting work on it in plenty of time to meet **MB's** deadline. Time enough to think about things to fill this stack of blank pages with. Time to go back and do a rethink on passages that would otherwise be let go. Time to get serious and solve all the problems of the CL World.

And time to decide that it really isn't worth it after all, that your time would be better spent running a die down the threads on the end of a crankshaft than it would in reading whatever it is I am about to write. Maybe that is why I usually leave doing this column until the very last moment, on a monthly basis reducing **MB** staffer's fingernails to leavings on the floor. *(Thanks a bunch! je)*

Craig Cervo holds burned out model while Bob Beardon shows how he put out fire with Windex bottle.

GLOW FUEL AT $140 PER GALLON

This will take a bit of development but can you see what might happen if fuel sold for $140 a gallon? No? Told you it would take a bit of developing. Do be patient.

It all started a couple of weeks ago while taking a run through the classified ads in the *Seattle Times*. Just for the halibut, I was pricing old cars, the ones with those good ol' monster motors, clunky (but stout) 4-speeds, posi-rear ends and such. And there was a lot of other interesting cars for sale, things like Chevy Nova's that are relatively light, easy to work on and, thanks to somebody at GM, will accept an amazing variety of motors with hardly any work at all. These cars with the big motors are for sale because the owner either thinks he can't afford the gas, really can't afford the gas, just wants something new, or has finally been brainwashed into buying an efficient small car, to never again feel the rush from being shoved in the back by a big, whomping V-8. The small, older cars are being sold just because they are older and apparently need to be replaced.

Then it struck me, that now, today, is the perfect time to be a kid in high school with a few extra bucks, looking for a car and wanting this car to be an honest-to-gosh, get-the-women-and-the-kids-off-the-streets (dare I say it) HOT ROD!! Sure, go out and find a ratty old Olds or Buick or Chevy or Ford; might even sink to a Pontiac or MoPar product. Just be sure it has a Big Breather for a motor, one that runs at least OK. Then shop around for that small car of yesterday, early Chevy Nova's being my personal pick. Save the Big Breather and any drive train parts that might work. Discard the rest. Also discard whatever wimpy motor came in the small car (for a price). Reassemble.

The end result would no doubt be fast, might not handle just super, but that's beside the point, because nobody really cares, at least the high school kid doesn't. Fast is good enough.

consin, says he has a different problem: "Its strange but you can throw a boomerang once without seeing a person for blocks around. By the time you pick it up there always seems to be someone standing in back of you. They surely seem able to draw a crowd in a hurry."

TALENT IS WHERE YOU FIND IT

Were you aware that Frank Zaic,

Continued on page 79

Let's see . . . AMA rules say no holding. Pat Wilcox gives George Cleveland a demo during Buckeye Final.

The Complete Line

K-LINE SERIES KP-2K

Complete 2-channel R/C system, featuring dual neutral positions on left stick, precise trim controls, 2 fast-response low current-drain servos, 3 μV sensitivity receiver, 72-75 MHz – ideal for model airplanes, cars and boats.

K-LINE SERIES KP-3KW

Complete 3-channel R/C system, featuring exclusive "trigger" throttle/brake control, adjustable steering throw and limit controls, servo reversing, plug-in transmitter and receiver frequency modules, 2 rugged fast-response servos, NiCad conversion kit available, 27 MHz – ideal for model cars.

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Complete 4-channel R/C system, with full rechargeable NiCad battery packs and AC charger, precise ratchet-type trim controls, 4 fast-response servos, 3 μV sensitivity receiver, 72-75 MHz – ideal for beginner and experienced flyers.

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Complete 5-channel R/C system, featuring new double-tuned receiver, precise trim controls, 4 fast-response long-life servos, gear retract switch, new durable direct-coupled control sticks, full NiCad battery packs and AC charger, 72-75 MHz.

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# of R/C Systems

GOLD SPECTRUM KP-6C
New high-styled programmable 6-channel R/C system, with dual rate elevator and aileron switches, shielded double-tuned 3 μV receiver, 4 long-life servos, externally accessible 5-channel servo reversing, rechargeable NiCad battery packs, plug-in RF module, 72-75 MHz AM and 53 MHz AM & FM.

DELUXE SERIES KP-7C & -7CS
World standard competition model 7-channel R/C system, featuring built-in roll button, adjustable dual rate elevator and aileron controls, adjustable length open-gimbal sticks, plug-in RF modules, shielded double-tuned highly selective 3 μV receiver, trainer system, 3-function dual RF output and voltage meter, high-reliability rechargeable NiCad battery packs, dual rate charger, choice of 4 high-performance servos, available on 27, 35, 40, 53, 72 & 75 MHz, including FM. **Single Stick Model KP-7CS also Available.**

...Now featured, along with a full array of modeler-designed accessories and components, at your neighborhood Kraft Dealer.

Photo courtesy of West Coast Hobbies, San Diego, CA

A Subsidiary of Carlisle Corporation Since 1972

KRAFT

Souper P-30 is latest kit from Campbell's Custom Kits (Box 5996, Lake Worth, FL 33461) displayed by Tara Campbell. Soup-er, get it?

John Lenderman prepares for first test flight on new P-30.

FREE FLIGHT

by TOM HUTCHINSON

PHOTOS BY AUTHOR

Tom Hutchinson's new address
20518 S.W. Leeds Ct.
Aloha, OR 97005

• The mail this month brought the following letter from John Drew, McLeansboro, Illinois:

"In your June 1980 issue you pinpointed some of the main problems of Junior free flighters. However, I differ with you that space is the main problem. In my opinion, the plans and kits are too difficult to build. Yes, I am a Junior. However, the kit manufacturers expect us to cut under-cambered ribs that are on hard balsa and to cut formers on the same material. I am very lucky that I have an excellent site only 50 yards from where I sit."

I agree with John that he is lucky in having a site close by . . . this is probably not the case for most Juniors. I also agree that most kits (especially the scale ones) are too difficult for Juniors to build. (Some manufacturers are still putting out the same kits that frustrated me when I started out!) Even some of the so-called "beginners" kits have vague, misleading, or incomprehensible instructions calling for a vocabulary the average 10 to 13 year old doesn't have.

However, the problem of printed parts on too-hard sheets of balsa can be solved. Just take the printed parts to the nearest Xerox machine and make a copy of them. Then go to the hobby shop and buy a sheet of softer wood. Lightly spray the wood with a contact cement (3M Spra-mount is good), or apply rubber cement to the back of the paper, then stick the pattern to the wood. Presto, an instant kit on better quality wood, and you still have the printed sheets as a master if you want to make another kit. The paper pattern will also help keep the wood from splitting on cross-grain cuts, and should peel off easily later.

F/F Editor Tom Hutchinson shows off his new 1/2A Spacer for Nostalgia event.

THERMISTORS, ANYONE?

I also received a letter from Rich Rohrke (Atwater, California), who's been looking for a Fenwal thermistor to replace the one in his thermal detector which was blown over and wrecked. He says that Radio Shack (his last source) claims that its supplier no longer manufactures thermistors. A check of a half-dozen other electrical suppliers had no luck either.

Can anybody out there help him? If this is true, maybe the FAI won't have to ban electronic thermal detectors . . . they'll become extinct. Send any news or info on the subject to me, and I'll pass it on to Rich.

NEW ROSSI .15

A couple of sources have reported that the long-awaited new (1978-79-80-81 version) of the standard FAI Power engine is now available. Price has gone up a bit . . . $200 apiece will get you one. It's an all-new design, which will not fit the old mounts, and a bit heavier to boot. Only parts that are interchangeable with older models are the piston and wrist pin.

As far as performance goes, Doc Anderson says it is the best-performing stock-in-the-box engine he's ever run. On the other hand, Fred Morgan says that his sample has no more rpm than the older versions. I'm reporting these opinions as hearsay, since there's no way

Walt Johnson launches his Strato Streak at Harts Lake Prairie.

I'm going to cough up that much money for one at this time (of course, that's what I said when they sold for $45 . . . and the variations between individual samples were about the same then, too). Actually, the new Nelson .15 would be a better investment, since you could always sell it to a collector . . .

THIS MONTH's 3-VIEW
Big Brother (Cheap Thrills) R/C
by Tom Hutchinson

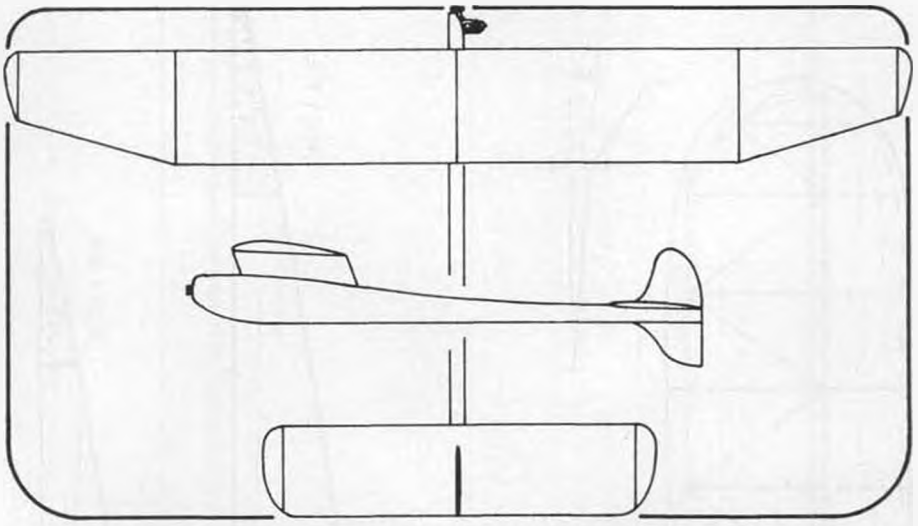
The best gas model I ever designed was, in my opinion, the *Flying Burrito Brother*. Performance was outstanding — in early morning air at Lake Elsinore, it easily did about 7-1/2 minutes off a 13 second VTO. At some contests, I was able to put in 3 maxes and a 6 flight in the first hour, before the air started to thin out. It held the Class A record about three times in one year, as I recall.

I'm sure some of this performance came from the hot ST .19 Al Vela supplied me, but the basic design layout seemed good enough that I tried scaling it up to Class C size. Since I was limited in model box size, and anxious to build another hot-climbing gassie, I kept the size down to 660 square inches. I figured this would let me use any good .29 or .35 and still be competitive, but in the corner of my mind I was thinking it might be able to handle a .40.

When Bob Isaacson wiped out his faithful Starduster 900 (in 1972), he became interested in trying out the design. The original plan was to use a rear-rotor K&B .29 he had, and keep the weight down to 25 or 26 ounces. We were a little generous in fuselage structure, since final weight came out about 30 ounces, but I took some pictures of Bob's ship for a possible construction article. I thought I'd write the article after the first few test flights, before I'd feel confident in letting others build one.

Well, it took about eight years for those test flights to occur, since Bob got involved with making the Nordic team in that time. And, I managed to lose the negatives during one of my moves. Bob's knee injury sidelined his glider flying for awhile, so he put a K&B .40 (old style) in the nose and went for broke with *Big Brother* this spring. He reported back to me that performance is just fine, thank you, about 8-1/2 minutes off a 12 second hand launch! He's won a few contests at Taft with it, so I can't see any reason to keep the design under wraps any more. It's a good one!

A new generation of engines has come since this ship was designed, which makes it more versatile than before. A hot 3.5cc Schneurle would be nice on the front end, if you'd like. Or, one of the early K&B .40's would make for a torrid climb, as Bob found out. You could even stick something like a Fox Combat Special on it. If economy is important to you, any one of the .29 or .35 engines lying around your workshop should do the trick, also. I'd be interested in hearing from anyone out there who scales this up and tries it . . .



NOVEMBER MYSTERY MODEL

DARNED GOOD AIRFOIL
Gottingen 180 (MVAH 26)

This airfoil looks like it might make a good FAI Power section. It has a little bit of undercamber, but the maximum camber of 5% is not too high to cause high-speed trim problems. It has sufficient thickness for a stiff structure, almost 9%. Wind tunnel tests in 1917, on a chord of about 5 inches, at a speed of 20 mph show it to have a reasonably high lift coefficient and lift/drag ratio. And that's about all I'm going to say about it, except that it passes the "Eppler test" for upper surface drop-off, as well as the "Hutchinson eyeball" test of looking right for its purpose!

MYSTERY MODEL

This month's mystery model is the second by this designer that I've featured. This one qualifies as a true nostalgia model, whereas the first design didn't. Identification features would be the unique low pylon and rudders on top and bottom. Veteran San Valeers members should recognize this as the new design that Les Sindelar faithfully flew at Sepulveda Basin every weekend morning (though I'll bet few remember the name). If YOU are able to recognize this golden oldie, send in your guess to the **Model Builder** office (621 W. 19th, Costa Mesa, CA 92627) to see if you've won a free subscription.

LUCK AND HOW TO LIVE WITH IT
by Paul Lagan

In addition to being a very versatile competition modeler (he's represented New Zealand in both R/C Pattern and Free Flight World Championships), Paul writes some very nice essays on the art of free flight. Here are his latest thoughts, reprinted from the *BatSheet*, via the Australian *Flypaper* newsletter:

"An essential element of free flight success is LUCK!

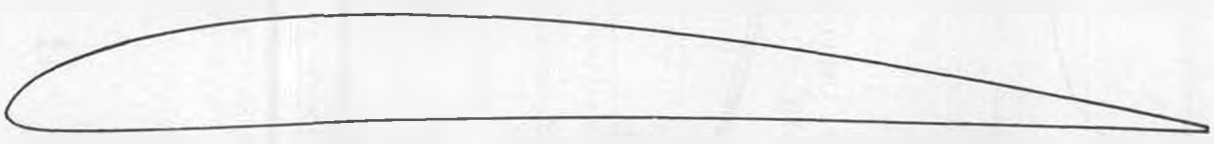
". . .If you don't have it, you don't win.

". . .If you do have it, you can do amazing things with a very ordinary model.

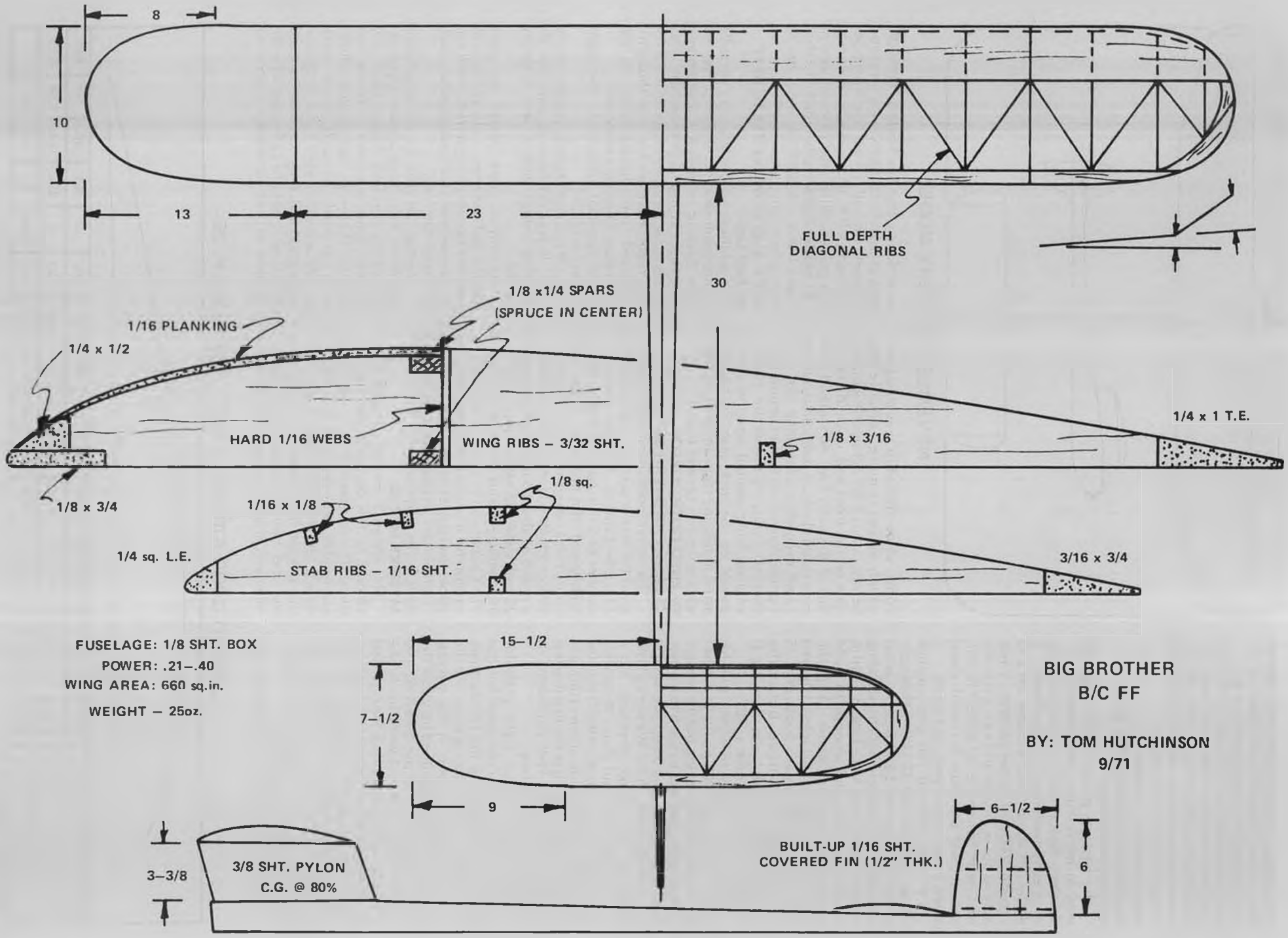
"As with all sports though, the good and the bad luck tend to average out and over a reasonably long period, you'll win as many contests with good luck as you'll lose with bad luck.

"Having said that, let me emphasize that many fliers have a poor appreciation of the part luck plays in their own success. Some are quick to blame bad luck for their own (avoidable) failures and, curiously enough, these same people are often very quick to ignore some good luck they may have had and gloss over it; yet, they are quick to write off some of their competitor's successes

DARNED GOOD AIRFOIL — GOTT. 180 (M.V.A.H. 26)



STATION	0	1.25	2.5	5	7.5	10	15	20	30	40	50	60	70	80	90	95	100
UPPER	1.3	3.28	4.2	5.6	6.65	7.37	8.45	9.05	9.65	9.3	8.43	7.33	6	4.38	2.5	1.58	0.25
LOWER	1.3	0.3	0.14	0	0.05	0.15	0.37	0.6	0.98	1.15	1.15	1.1	0.93	0.7	0.42	0.3	0



FUSELAGE: 1/8 SHT. BOX
POWER: .21–.40
WING AREA: 660 sq.in.
WEIGHT – 25oz.

BIG BROTHER
B/C FF

BY: TOM HUTCHINSON
9/71

Paul Lagan treats us to another of his essays on the art of free flight this month. Photo by Will Nakashima.

Gene Bartel provides sturdy launch platform for one of his fleet of Witch Hawks.

as 'lucky'. To a degree, a very good flier who is well prepared can suffer a little bad luck in an event and still succeed. The chances of success depend on the size, skills, and luck of the opposition. At a World Championships, for example, one certainly needs to have that little man on one's shoulder to have any chance of winning. So many really good fliers at the World Champs have placed low in the lists through some unlucky occurrence and so often the World Champion is the one who had Dame Fortune smile on him that day.

"Bad luck that isn't bad luck needs to be recognized and accepted. For example, there is usually no excuse for DT failure. On very rare occasions, a DT timer actually fails for the first time ever on a crucial thermal flight and the model is lost. Yet, more often than not, the flier will have had a warning of that failure with some intermittent operation and decides to 'risk it'. (It's been my experience that most so-called DT failures are more often the result of poor rigging of the lines, etc., based on those cases where the model didn't DT but was recovered. th) *Subsequently, it is not bad luck if the flier can't continue the contest, it is bad management not to be prepared with a trimmed, reserve model.*

"When Lady Luck (Dame Fortune's Mum) deals a genuinely nasty blow early in the contest and causes a poor score, it is no use at all to curse your luck and fret over it. Have a swear, then resolve to try even harder on subsequent flights. Sometimes a run of events continues for quite a period and on such occasions it pays to stop and think if it is luck, or preparation, or approach, that is to blame; then, press on, working the 'Percentage Game' that sooner or later things will even out. In these times it pays to be physically fit and not overtired (a factor at Nats and other long Champs). At one New Zealand Nats I had a disastrous first two days. Everything went wrong: models DT'd across rocks, flew into streams, glided into fences, watches stopped on 'certain' maxes, and, I twisted my ankle. No fun at all. An early night and then on the third day, all came right in a rush. Everything went perfectly, all decisions were good and I won 4 events in a row. Some said I was lucky . . . I smiled and remembered two days.

"Every dog has his day in Free Flight. This is why so many persevere with the sport. To gain the most from FF, you must be well prepared, expect the worst and plan for it and let success come. Sometimes it comes (luckily) very soon. Accept that with good grace and resolve to improve even though you won last time, because you'll need improvement to ride out that inevitable 'bad' day."

THE HUMBLE GUSSET

One of the most overlooked ways of increasing the strength/weight ratio of your models is through the proper use of 'gussets'. Used in the right spots, gussets will permit the rest of the structure to be built lighter without loss of strength, or will increase the strength of heavily loaded points with minimum weight penalty.

One place where you can use gussets very effectively is at the rib/trailing edge joint. I used to slot the ribs into the trailing edge, but could never get the slots uniform enough to match a set of stack-cut ribs. So I eliminated the slots, used the stack of ribs to assure proper spacing between leading and trailing edges, and used a gusset at each rib. The extra length of glue joint is much greater than with a slot, and weight can be saved by using a smaller trailing edge. A side benefit is that the thin rear section of an A/2 rib, for example, will not be distorted by the covering as it shrinks, since the gusset gives you an effectively thicker rib at the trailing edge.

You can also use gussets for reinforcing tip dihedral breaks, and eliminate the use of spar doublers of plywood. I put gussets at the rib/leading edge junction on both sides of the dihedral ribs, as well as a thicker than usual gusset at the trailing edge. The spar/rib junctions are also reinforced with small balsa gussets to keep the spars from separating from the ribs in a hard landing. With these gussets, a butt glue joint can be used to join tips to center panels, and any damage that occurs will usually involve a simple repair, rather than rebuilding the entire tip.

Gussets are really easy to mass-produce, once you get the hang of making them. The important trick is to make sure the grain of the wood is on the hypotenuse (the side opposite the square corner of the right triangle). I usually start out by cutting a strip of balsa of the proper thickness (usually 1/16 or 1/8, depending on the size of structure and where the gussets are to be used) and width (3/8 or 1/2 inches; figure that the length of the sides that contact the structure are going to be about 1-1/2 times the width of the strip used). Then, I usually use a miter box or the 45 degree angle of a combination square as a guide

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A beautiful antique on display at Oshkosh, 1981, this 1928 Cessna A.W. Model Builder plans service includes a jumbo rubber scale model (48" span) of this one, by Jim Adams. No. 4742.

FREE FLIGHT SCALE

By FERNANDO RAMOS

• As a change of pace, I have a saga about another trip to Oshkosh in my Charger biplane. After making the flight a couple of years ago, I thought that the urge to fly that far that slowly wouldn't hit so soon. Jack McCracken, my navigator and I decided if we were to make the trip, something should be done about my leaky engine. Most of the seals had to be replaced; this meant disassembly. If we had to go through that much trouble, we might as well overhaul it. As it turned out, I have another engine, which Jack and I completely overhauled and installed in the Charger. I could tell you a story about that incident... Nothing worthwhile ever occurs simply!

With a fresh engine overhaul and a complete annual of the plane, the wheels were set in motion, and all plans for Oshkosh '81 were made. Since we had gone east the first time by way of the southwest, we wanted to try the northern route as a change, weather permitting. As it turned out, the nations weather indicated that this would be the best route.

The airport where I keep my airplane, sets in a little valley, which means it is usually foggy early in the morning. Jack came up with the idea of leaving the afternoon before our scheduled departure. This way we could leave the area, and be some place where clear skies are common in the early light. We departed Corona at 1:00 p.m. Tuesday afternoon enroute to Las Vegas. When we arrived there after only two hours and ten minutes (a good tail wind), it was a mere 107 degrees. We refueld and got out of there as quickly as possible and headed for Cedar City, Utah. As we taxied toward the fuel pumps, I caught a glimpse of the replica 'Miss Los Angeles.' It turned out that this was also Bill Turner's first stop on the way to Oshkosh. We got a ride into town and checked into a motel followed by a great steak dinner. While at dinner, who should walk in, but a good friend and his wife, also enroute to Mecca. They decided to fly along with us the rest of the trip, so we discussed our proposed route. Bill's airplane is much too swift to fly with us, so he went on alone.

In the morning we left at dawn, and enjoyed a beautiful sunrise and scenery. Our destination for this day was Cheyenne, Wyoming by way of Provo and Rock Springs. Over Laramie, I was able to get the Charger up to 11,500' in the very cool air. Actually, it was downright cold. At Cheyenne, they have lovely line girls directing you on the ground... not a bad idea if you're not distracted too much.

We checked into a motel and leisurely spent the rest of the afternoon and evening there. The weather so far was

Very clean Waco 10 in red, black, and silver.

This Hornet Moth was brought all the way from Burradoo, Australia.

A blue and silver Swallow.

Close-up of Cessna A.W. tail section. Note space at bottom of fin, gap between fuselage and wing.

A Timm, in World War II Navy training colors.

outstanding, if you didn't mind a little heat. From Cheyenne, we decided to go north toward Rapid City and take in Mt. Rushmore on a scenic fly-by. This is beautiful country particularly when you see it by air. The rest of the flight through South Dakota was uneventful, but Southern Minnesota was something else. Both ceiling and visibility dropped to the point we had to set down on a strip in LaVerne. While waiting for the weather to do something, we met someone who was originally from Northern Minnesota. He said that this part of the country had nine months of winter, and three months of poor sledding! I guess that says it all. . .

Beautiful Pitcairn Mailwing.

We left there about an hour later staying directly over the Interstate (I won't mention at what altitude!) until we reached the town of Fairmont. We got a ride from the airport into town in the back of a pickup truck . . . the price was right! We spent the night in Fairmont where we all enjoyed outstanding food. In fact, this was quite commonplace to eat very well without the usual expense typically found in California.

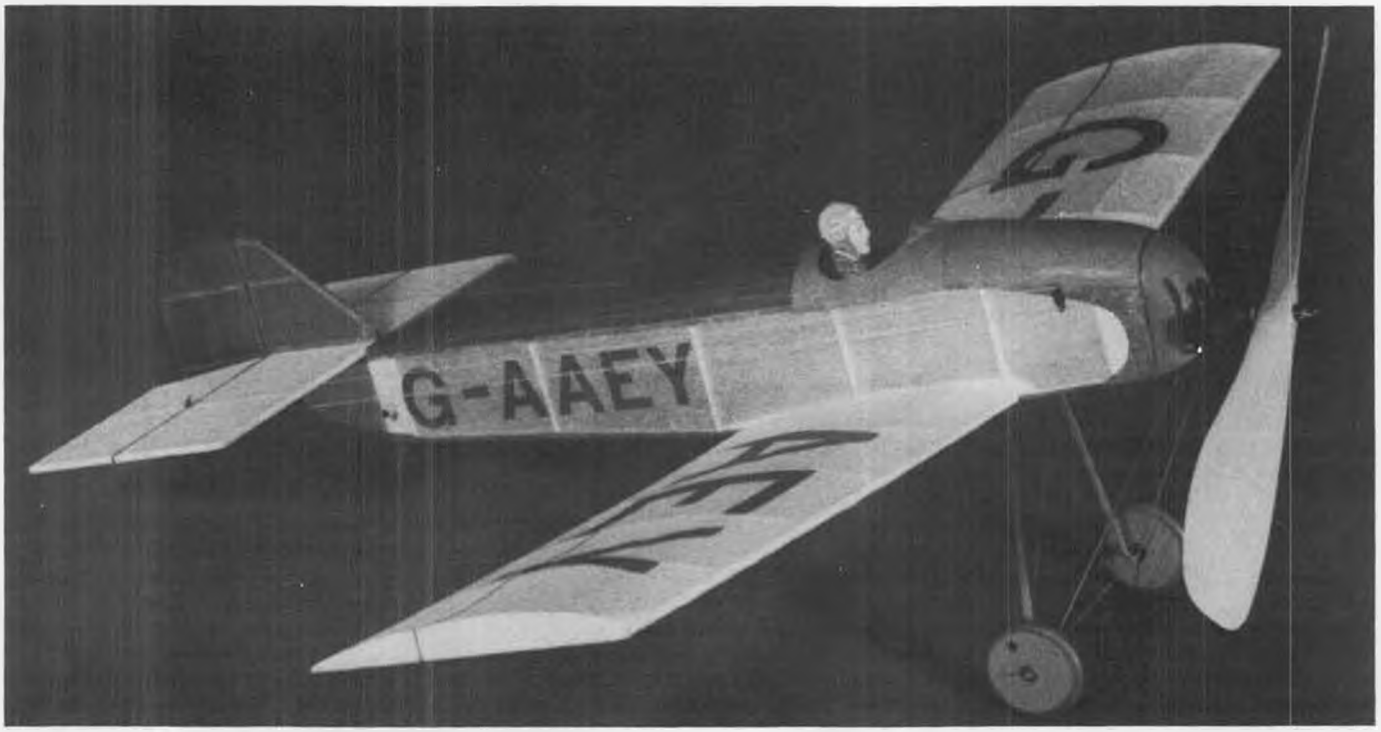
Bucker Jungmann, with Spartan and Fairchild 22 in background.

At this point we were not far from Oshkosh. We had planned one more gas stop about 45 minutes from there just in case we would have to fly circles until it became our turn to get into line. This last stop was at a picturesque airport in a town called Portage. As we were preparing to leave, I noticed a familiar looking Tailwind. Sure enough, it belonged to a friend of mine who had flown up from Brown Field near San Diego.

We finally arrived at the entry point just in time to hear the controller say, "if you are not over Ripon, do not go there yet. Instead, do a 360° until further instructions." We were fortunate, be-

Continued on page 82

No wonder scale modelers have a rough time with accurate markings! Look at the variations on these two Stinson L-5's. Maybe restorers should have done as much research as most serious modelers.



PHOTOS BY THE AUTHOR

GADFLY - 1979 Grand Peanut

By SHERMAN GILLESPIE . . . The "GRAND PEANUT" (Overall winner) and best in the Golden Age category of the last (1979) Model Builder Parcel Post Proxy Peanut annual contest series.

• The Gadfly is one of those obscure, light aircraft that has always appealed to the sport flier, both the pilot of full scale airplanes and the model builder. It would make a fascinating project for the homebuilder if the plans were available today!

Built in England in 1929 by A.P. Glenny and Lt. Col. G.L.P. Henderson, and designed by Capt. K.N. Pearson, it had a wingspan of 25'-10", was 7'-10" in length, and had an empty weight of 455 lbs. with a disposable load of 295 lbs. Fitted with a 40 hp A.B.C. Scorpion engine, it was quite a performer with a listed top speed of 91 mph, a cruising speed of 72, ;and a landing speed of 45. An advertisement for the little machine in the August 15, 1929 issue of *Flight* magazine stated that it held "the World's Height Record for Single Seater Light Aeroplanes, 4th category (under 200 kilos) at 3021 metres."

The decision to build the model for the 1979 Model Builder Proxy Peanut Contest was based on several years of very successful flying of an 18-inch semi-scale version and the clear knowledge that it was not a commonly seen aircraft. The decision turned out to be a happy one, for the Gadfly earned top static and flight points in the Golden Age category and was named "Grand Peanut."

In the capable hands of proxy fliers Ken Hannan and Jim Lueken, the Gadfly turned in an average flight time of 42.5 seconds. Only seven Peanuts out of the 68 to qualify in all categories posted higher times.

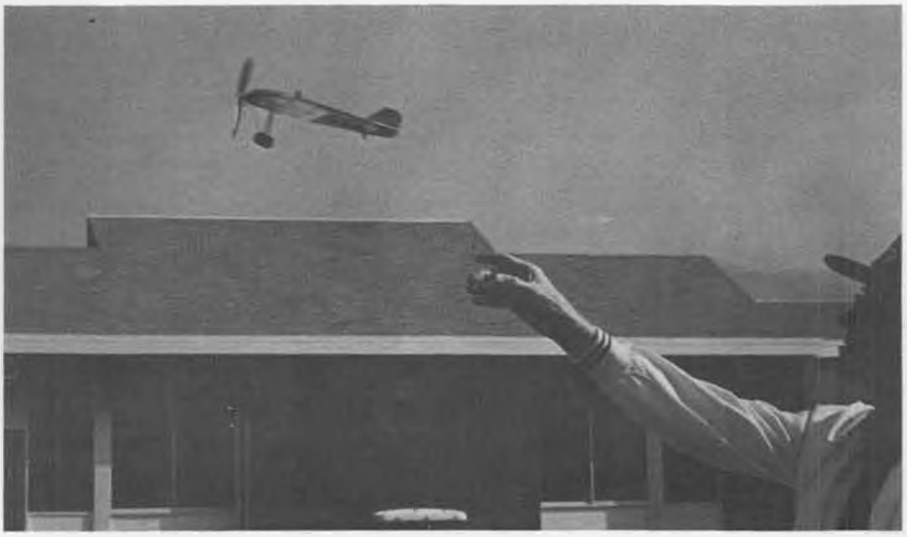
CONSTRUCTION

Construction is rather conventional, as the saying goes, and certainly poses no problems for the experienced builder. For modelers who have not built ships for indoor flying, the old advice "think light" works very well. The finished model weighed 7.5 grams, which is probably a good weight to shoot for. Study the plans and the photos, read through the article, gather the necessary materials, and enjoy some pleasant building!

Close-up of the Scorpion engine detailing on Sherman's Gadfly.

The Gadfly disassembles for shoe-box transportation. Wing is friction fit into fuselage.

Gad! It does fly!



Designer Sherman Gillespie launches the Gadfly for a little back yard exercising.

FUSELAGE

The fuselage sides are built in standard fashion over the plans. If building one side on top of the other for accuracy, use plastic wrap or wax paper between the first dry side and the second to avoid separation difficulties. Square structure is vital with the Gadfly if the wing mounting is to be true. Patience here will help to avoid alignment problems later.

When setting the finished fuselage sides up over the top view, block them up square with the building board and fit the cross pieces carefully. This will be very important through the cockpit section.

All formers are cut from 1/32 sheet balsa and are not notched. The 1/32 basswood stringers are butt-glued against formers number Two and Five, and rest on top of the others. A small spot of glue will hold them in place. Balsa stringers may be used if desired, but basswood can be sanded very thin and still be quite strong.

The cowling between the nose block and the cockpit is shaped from soft balsa and hollowed as indicated. It is perhaps best to do the finish sanding after the nose-block engine section is fitted to assure a smooth contour.

Before gluing on the bond paper cockpit cowling during the covering of the fuselage, an instrument panel should be cemented in place, if one is desired. Instruments possibly included tachometer, oil pressure, oil temperature, fuel, airspeed, altimeter, and of course, magneto switches. Also, a bond paper cockpit "floor" can be fitted. When glued under the top fuselage longerons and painted grey (Floquil #RR132), the floor has a nice finished look and allows the easy positioning of a "pilot"!

LANDING GEAR

Before making the landing gear, the builder should decide whether the model is to fly in competition under AMA or club rules requiring R.O.G. launching. Scale length landing gear should be about 3/4 inch shorter than shown; a shorter landing gear would require a much smaller propeller.

The landing gear called for on the plans is formed from .020 wire. The main gear is sandwiched between 1/32 sheet balsa and glued in position. The front brace is bent to match the main legs with the ends bent up at the necessary angle for about 1/8 inch to be spot glued, wrapped with silk thread, and glued again.

The top part of the brace element will be held in place by the .015 wire hook, which is formed in a right angle bend and pushed into the nose block. This allows the engine section to be removed for winding and also lets the gear bend back in a hard landing. The axle is cut from .020 wire and laid across the vees of the landing gear legs. When glued in place with Testor's model cement, the gear endures quite well.

Wheels are made from cross-grained laminations of 1/20 sheet balsa. Cut the tail skid from 1/20 sheet and glue to a 1/32 sheet cross piece set between the lower longerons.

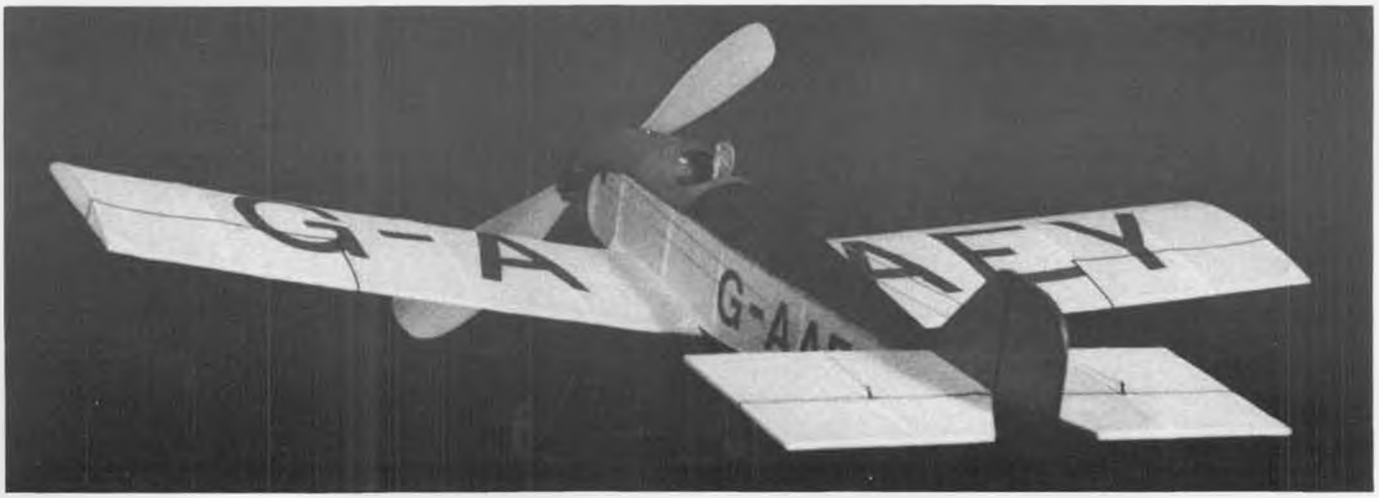
TAIL SURFACES

The stabilizer is made from light 1/20 square balsa. Although the full-scale Gadfly had a thick section, the flat stab on the model does not detract and is probably less of an adjustment problem than a true scale airfoil section would be.

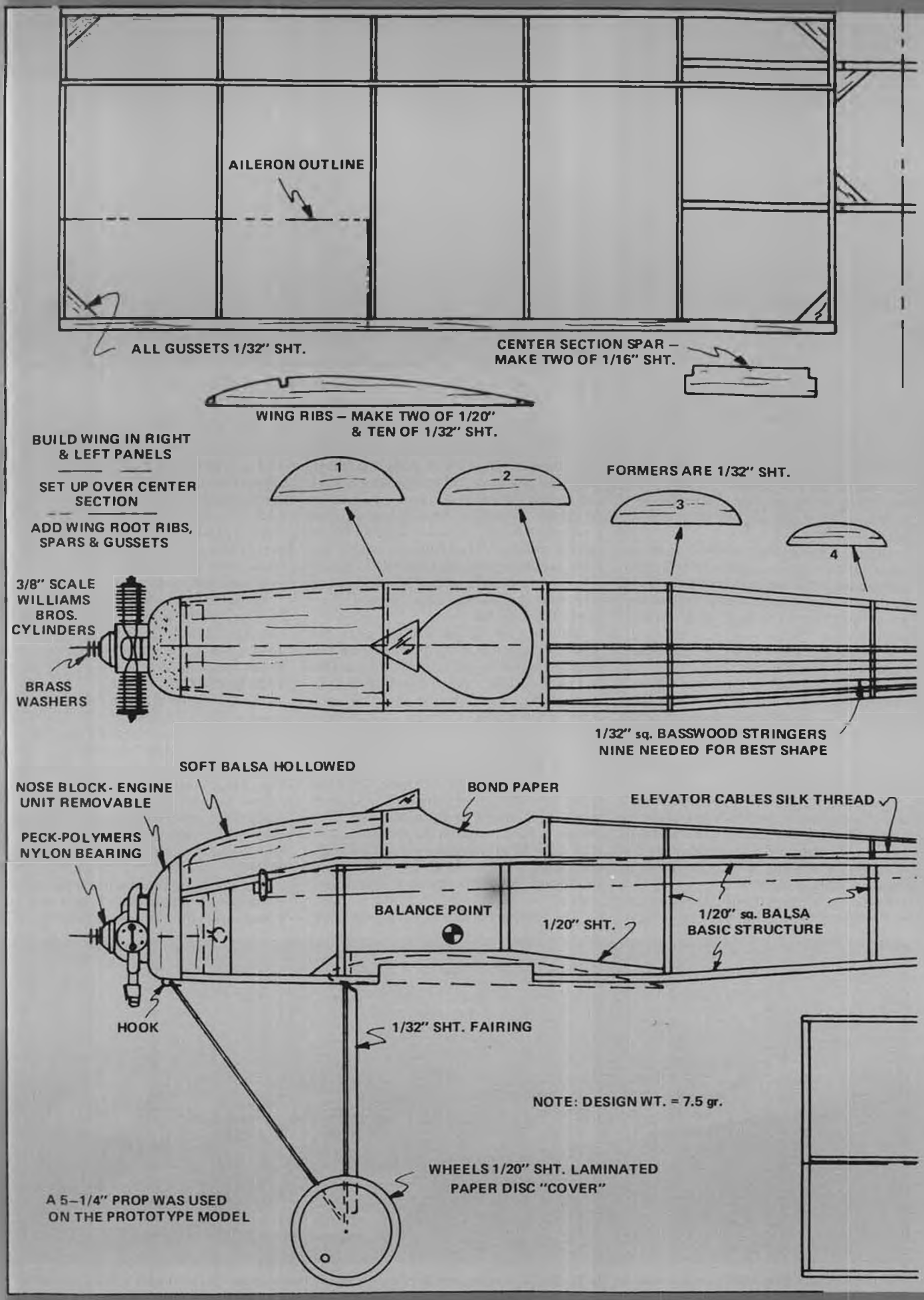
The curved rudder outline is made from 1/32 square basswood soaked in water and bent around a form made from balsa or cardboard.

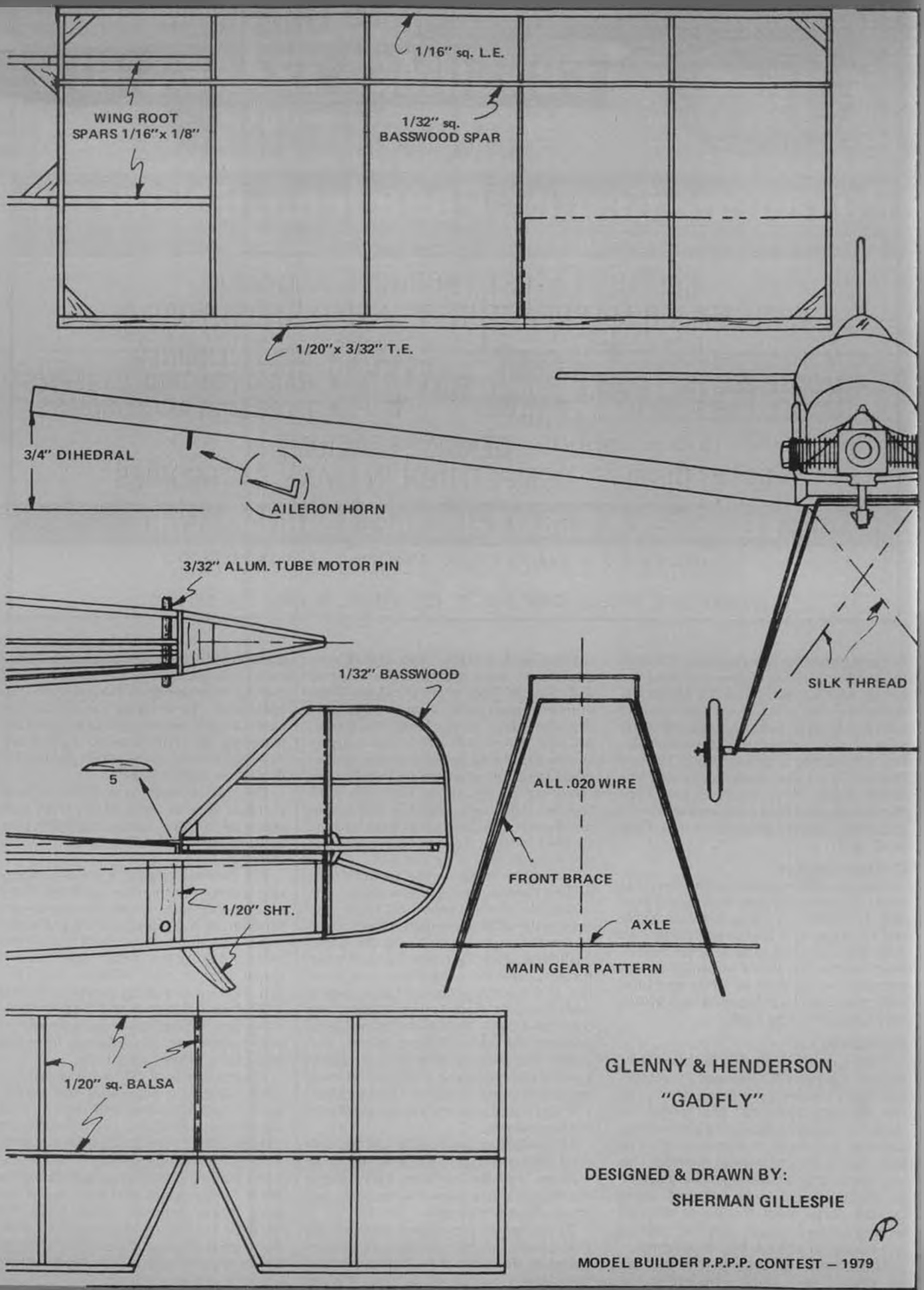
WING

The wing, being of square plan form, is simple to make. Build right and left panels and when dry, prop them up over



Sherman flew an 18 inch not-so-scale version of the Gadfly for several years before building the Peanut model, so he already knew it would fly well.


AILERON OUTLINE
ALL GUSSETS 1/32" SHT.
CENTER SECTION SPAR – MAKE TWO OF 1/16" SHT.
WING RIBS – MAKE TWO OF 1/20" & TEN OF 1/32" SHT.
BUILD WING IN RIGHT & LEFT PANELS
SET UP OVER CENTER SECTION
ADD WING ROOT RIBS, SPARS & GUSSETS
FORMERS ARE 1/32" SHT.
1
2
3
4
3/8" SCALE WILLIAMS BROS. CYLINDERS
BRASS WASHERS
1/32" sq. BASSWOOD STRINGERS NINE NEEDED FOR BEST SHAPE
SOFT BALSA HOLLOWED
NOSE BLOCK- ENGINE UNIT REMOVABLE
BOND PAPER
ELEVATOR CABLES SILK THREAD
PECK-POLYMERS NYLON BEARING
BALANCE POINT
1/20" SHT.
1/20" sq. BALSA BASIC STRUCTURE
HOOK
1/32" SHT. FAIRING
NOTE: DESIGN WT. = 7.5 gr.
WHEELS 1/20" SHT. LAMINATED PAPER DISC "COVER"
A 5–1/4" PROP WAS USED ON THE PROTOTYPE MODEL


1/16" sq. L.E.
WING ROOT SPARS 1/16"x 1/8"
1/32" sq. BASSWOOD SPAR
1/20"x 3/32" T.E.
3/4" DIHEDRAL
AILERON HORN
3/32" ALUM. TUBE MOTOR PIN
1/32" BASSWOOD
SILK THREAD
5
ALL .020 WIRE
FRONT BRACE
1/20" SHT.
AXLE
MAIN GEAR PATTERN
1/20" sq. BALSA
GLENNY & HENDERSON
"GADFLY"
DESIGNED & DRAWN BY:
SHERMAN GILLESPIE
MODEL BUILDER P.P.P.P. CONTEST – 1979

the plan with the tips raised to 3/4 inch to give the indicated dihedral. Add the center section spars and the gussets to complete the wing structure. Double gluing of joints here is advisable. The wing on the real aircraft was removable, being mounted with four bolts. Using a friction fit on the model simulates this rather nicely. Also, it allows easy incidence adjustment during testing, as well as giving pop-off protection in a "bad landing"!

COLOR SCHEME

Thanks to Bill Hannan and his overseas contacts, it is now pretty well established that G-AAEY was silver with probably red fuselage trim and a red rudder. All lettering was black. The original model, built before the above information was known, was finished in white and blue with matching blue letters which gave a very sharp finished look.

COVERING

One problem with a lightweight indoor model is how to get an acceptably tight covering job without warping the delicate surfaces. The model, as shown in the accompanying photos, was covered with light Japanese tissue using the clear dope and thinner method. This requires the clear doping of all structure to which tissue is to be adhered. Some builders may elect the water-thinned white glue technique . . . either method is a matter of choice and experience.

The tissue to be used on the wing can be doped to a small wooden frame, shrunk with a light coat of rubbing alcohol or water mist and then doped with Sig Lite Coat or clear nitrate dope thinned about 50%. When completely dry, the tissue is cut from the frame, pinned down flat on a wax paper-covered building board and the cut out tissue registration letters are fixed on the covering by brushing through with thinner. Although available photos do not show it, the Gadfly may have had the G-AAEY letters on the bottom surface of the wing as well as on the top.

Cover the wing on the bottom first, pulling the tissue as tight as possible. The underside of the center section is covered with red tissue to match the bottom of the fuselage. Brush along the panel outlines to stick the tissue. To do the top surface, place the wing down, one panel flat, and pin the prepared tissue over it with the pins close to the leading and trailing edges. Pull the tissue tight, position the identification letters, and adjust the pins to eliminate wrinkles. Use thinner along the end ribs and leading and trailing edges to fix the tissue. The top surface of the center section is left uncovered.

The stabilizer and rudder can be covered with pre-doped tissue in the same manner. Lay the surfaces flat, pin the tissue, pull across, tight and smooth, and brush thinner through.

By using the pre-doped method the side panels for the fuselage can be prepared in the same way. The identification letters can be made from Pickett transfer letters. The letters shown are 1/2 inch - 48 pt. Helvetica Medium and match the lettering on the full scale ship quite well. The lettering can also be cut from tissue if desired and fixed as on the wing panels. The lettered panels are then positioned on the fuselage side and doped on with thinner.

The turtle deck was covered and alcohol shrunk very easily with one piece of colored tissue. Add the pre-painted cockpit cowling last.

ENGINE

The dummy engine is a most important element in the finished look of the model and also serves the necessary function of putting a little weight in the nose. Cut the engine block from light balsa and drill it for a small Peck-Polymer thrust button. Use Williams Brothers' 3/8 inch universal cylinders and add 1/32 sheet balsa discs as cylinder heads. Valve gear for each cylinder is simulated with balsa dowel sanded from 1/16 strip and cut to proper length.

Glue a piece of .015 wire across the valve covers to represent the rocker arms. The carburetor and intake pipes are shaped from balsa as are the slightly curved exhaust stacks. Cut the magneto from balsa and glue on top of the block. Paint the completed engine with Engine Black Floquil paint and then install the grey thread ignition wires. Glue the finished engine to the nose block after the nose is painted. Remember that the entire engine-nose block unit is removable for motor winding!

BYRON ORIGINALS

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V-35B Bonanza
Retail value - $162.44
Factory direct - $138.08
(plus $8 shipping)

F-33A
Retail value - $174.95
Factory direct - $148.71
(plus $8 shipping)

Kit includes scale wingtip nav/strobe detailing.

A-36
Retail value - $181.20
Factory direct - $154.02
(plus $8 shipping)

T-34B
Retail value - $186.20
Factory direct - $158.27
(plus $8 shipping)

Scale effects include molded louvered inspection panel, landing light and grill plus scale nose gear strut, wheel doors, cowel flaps, engine exhaust & removable cowel.

T-34C
Retail value - $198.00
Factory direct - $168.30
(plus $8 shipping)

Other super scale features include vacuumed-formed skin detailing for stabs and control surfaces.

Optional Interior
Retail value-$29.50
Factory direct-$25.08
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An optional instrument panel and cabin interior are also available for the V-35B, F-33A and A-36.

Prices subject to change without notice.

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⅓ Scale Pitts Special
Suggested Retail Value
$292.80

Factory Direct Price
$248.88
(Plus $12.50 shipping)

Pitts
Wing Span - 68"
Wing Area - 1400 sq. in.
Length - 62"
Power Quadra engine or .60 Byro-

Kit highlights of our new Beechcraft Series

•Scale detailed fiberglass fuselage •injection molded foam wings, stabs and control surfaces •wheels •landing gear •Robart scale nose strut •spinner •scale, vacuum-formed detail for all control surfaces •decals •antenna & beacon •one-piece, vacuum-formed window insert •hinges •pushrods •cowel flaps •wingtip nav/strobe detail •plus all necessary hardware and die-cut materials to complete model.

Model	Wing Span	Wing Area (sq in)	SPECIFICATIONS Ready-to-fly wt.	Channels No. req.	Power (No Prop) Reducer required	Length
V-35B	66"	700	8-9	4-6	stand. 60s	53"
F-33A	66"	700	8-9	4-6	stand. 60s	53"
A-36	66"	700	8-9	4-6	stand. 60s	54¾"
T-34B	66"	700	8-9	4-6	stand. 60s	53"
T-34C	66"	700	8-9	4-6	stand. 60s	57"

MiG-15
Wing Span - 57"
Length - 55"
Wing Area - 600 sq. in.
Flying Wt. - 8-9 lbs.
Power - Byro-Jet Ducted Fan & .60 Engine.

MiG-15
Suggested Retail Value
$170.68

Factory Direct Price
$145.08
(Plus $8.00 shipping)

FINAL ASSEMBLY AND DETAILING

It is easier to add the black tissue rudder and elevator separations strips before gluing the surfaces in place. The stabilizer is set at zero degrees incidence. The ailerons are also represented by black tissue strips on top and bottom wing surfaces. The rudder can be spot glued for testing and if the flight pattern is as desired, fixed permanently later.

Other needed details are the grey silk elevator cables and the card stock elevator and aileron horns. The aileron horns are located on the under side of the wing at the aileron mid-point as indicated on the plans. Paint all control fittings black. Add the small plastic windscreen to finish off the cockpit area.

Paint the wheels with grey Floquil and add paper discs painted with red Floquil #RR20. Brass, 1/8 diameter washers are added last as bearings. Paint the tail skid the same matching red. The landing gear legs are painted red also. Grey silk thread is used for the landing gear wires. The nose cowling and the cockpit cowling are painted red to match the tissue used.

To keep the model as light as possible, a simple silhouette pilot was added to meet the contest requirements. The Paul Plecan scale pilot series available from Peck-Polymers are very effective when colored. A 7/16 size was used and is shown in the photos.

DOCUMENTATION

For serious Peanut competition, documentation will be important. A small three-view drawing and description appeared in "Aero Digest," January, 1930. Two good pictures can be found in *Jane's All The World's Aircraft, 1929.* Another usable photo is in *Experimental Light Aircraft and Midget Racers* by Underwood and Caler, 1958, Aero Publishers.

The 1929 Jane's also has excellent front and back photos of the ABC Scorpion engine.

FLYING

After establishing the stabilizer incidence at zero degrees and setting the dihedral as shown in the plans, the Gadfly performed quite consistently. No ballast was needed at all. For some sweet reason (luck probably) all that was necessary was about 1/16 wing incidence to trim out. The model was adjusted to fly in right circles with a "faint" bit of right thrust and a "tweak" of right rudder. This produced such a truly realistic take off and right turn pattern that the ship was boxed up and sent off to **Model Builders** without any further testing.

Prop and rubber combinations, of course, are always the final determinant of performance. The prop used was a 6-inch Paulownia cut down to 5-1/4 and sanded to a very thin section. Power was two strands of .078 Pirelli 15 inches long and was a bit on the powerful side.

With only 600 turns, ROG flights averaging 23 seconds were possible and it was obvious that depending on ceiling height much higher times were possible. The hand launched, official 42.5 second average for the contest is a good indicator of the little ship's potential.

Subsequent testing with two strands of stripped .076 Sig rubber 15 inches long, using 1400 turns has turned in many ROG flights over 40 seconds with the best so far a beautiful 48 seconds. Not too shabby under a 22 foot ceiling!

Trimming for a left circle with the torque is the most often recommended pattern for low-ceiling flying and might give flights of over a minute.

All in all, the Gadfly can be a most rewarding Peanut project, whether built for local fun or the next 24 hour international bash at West Baden! •

Auto Champs *Continued from page 37*

dling car problems.

Well, on the 2nd of July we finally got around to qualifying. It did not make much difference to me, but the racers really were relieved to get started. The old standby counting system was used: punch a counter and record time for the official count. This only gives data to the nearest second, but the reliability of the info is good and it can be checked.

The previous day of additional practice was very evident in the way some of the cars handled on this first day of qualifying. Gary Kyes now looked very good, and so did Phelps, both Hustings, and Rich Lee. The G.B. drivers were also looking good, with the Italians struggling a little. The Japanese were doing the same as they did at the last world champs

. . . just motoring around looking like the track was old hat . . . and going quicker than anybody.

So after the first round, the top five were: Kondo, (Japan); Kyes (U.S.A.); Mizushima (Japan); Bortolamasi (Italy); and Culver (G.B.). Kondo was running a Kyosho car with aluminum chassis and solid rear axle (Mizushima also). The Japanese cars still look five years behind but they whiz right along. Both Kyes and Culver were running PB independent suspension cars. With rather soft springs, these cars look funny . . . their tails swaying around as they go . . . but then they look like their handling is rather predictable, so they go fast. Bortolamasi was running a solid rear axle SG car and swishing around smoothly.

Round 2 brought few surprises, as some of the better known drivers started getting good times. Kondo and Kyes both went faster, to say 1 and 2. Ishihara looked good running a Delta car, pulling into position 3. And little Ralphie Burch gave many competitors a driving lesson, pulling up to 4th with his Associated car. White and Culver (of G.B.) were next in their P.B. cars. Smeltzer, Davis and Phelps (all U.S.) were close behind.

Several heats became the ones to watch: Kondo-Carbonell-Kishi, Jianas-Phelps-C. Husting-Errington, and Burch-Davis-Ishihara. It seems too bad that some of the heats have so many of the good drivers from one country in them. In the heat with Jianas, Phelps, and C. Husting, they all wanted to win and many times took one another out. It would be bad enough when you tangle with someone from another country, but when it is a teammate, the tempers flair. The foreign teams seem to know better who the number one guy is, and there is not as much of a problem.

In Round 3, Kondo and Burch both improved to a 36-lap, 601 second time. WOW, everybody just seems to keep going faster. Ishihara and Jianas both got their acts together for the 3rd and 4th places. The one who continued to stay up top also was Bortolamasi of Italy. Culver and White for G.B. were now really moving along too. Curtis Husting moved into 8th and Sabattini at 10th.

FINAL STANDINGS (TOP TEN)
3rd WORLD R/C CAR CHAMPIONSHIPS

NAME	FINAL POSITION /LAPS	LAST QUAL. BEST OF (4)	QUAL. ROUND 6	5	4	3	2	1
CATBONELL, U.S.	1/200	3*	3	7	23	17	20	9
TADIELLO, Italy	2/198	8	7			19	9	
KONDO, Japan	3/196	1*	1	5	3	1	1	1
ISHIHARA, Japan	4/194	4*	4	9	8	3	3	
CULVER, Great Britain	5/191	6*	6	1	1	7	6	6
BORTOLAMASI, Italy	6/187	5*	5	6	9	6	11	5
WHITE, Great Britain	7/187	7	21	15	18	9	5	3
LECAT, France	8/178	9	34		22	14		
BERVOETS, Holland	9/169	10	44					20
BURCH, U.S.	10/95	2*	2	2	3	1	4	16

*Sit out, no last qual.

Round 4 saw the top spot change to Culver from G.B. on the last heat. Culver was the first to break into the 37-lap qualifying time in 10 minutes plus. Kishi of Japan was able to get a good start and a clean run for 36 laps right at 10 minutes (600 sec) for the 2nd spot, and Errington of G.B. a 36 at 601 sec to tie with Kondo and Burch. By now it was pretty obvious who the quick drivers were. Many racers were moving over for these top bananas, making it a little easier for them to get good times. Guys a little further down were still having to "battle" their way through. Jianas went from fourth down to eleventh with all the quick times being turned in, and went down 4 places when one heat was run.

Round 5: Ralphie Burch streaked to a 37 lap in 615 to show everybody how consistent he could be, and showed throughout his good racing 'sense' and unbelievable passes. It is hard to believe a little kid can have so much racing 'smarts'. Errington got a 36/601 time to nail down 4th qualifying spot, and he looked 'smooth' too. And Bortolamasi continued improving to 36/601, to tie for 4th along with Kondo, who has been looking a little worse because of bad starts and pressing a little too hard (also he was not getting the right tire combos). Carbonell moved from 34th to 7th with a 36/606. Art looked quick the whole time, but he also has had bad first lap positions and lots of bumping and banging during the racing. Phelps too had been having racing problems in his heat with Jianas, C. Husting, and Errington (all trying for the top spot) but managed a 36/608 for 8th spot.

In Round 6: There was a lot of shuffling around because the traction was becoming so super. The straight-axle cars were looking better and better . . . many of the suspension cars were looking worse and worse (with many tipping over in the turns because of improper adjustments and tire selection) and differentials unloading and engines whining in the tight corners. Kondo and Carbonell put on quite a show in this last round . . . never being more than about two seconds apart. Carbonell was in front for the first half, pitted early, and came out behind Kondo. Kondo's fuel stop was quick and he came out about four feet in front of Art. The separation

distance varied from about 2 to 50 feet as the cars passed back-markers and had little problems. But Carbonell was never able to catch Kondo and was about 20 feet back at the flag. Both got 37 laps, with 604 sec. for Kondo and 607 sec. for Carbonell.

Young Ralph Burch did it again in Round 6, showing precise driving and unbelievable passes to record a 37/606 sec. time. Both Ishihara and Bortolamasi also improved their times into the 37 lap, low 600 sec. range. Tadiello of Italy must have found the right combination, because he had made numerous 35-lap qualifiers, but managed a high time 37 on this last round. Jianas, Phelps, and Davis all improved their times, but only to the low 600 sec, 36-lap range.

So the top 6 qualifiers were: (1) Kondo, (2) Burch, (3) Carbonell, (4) Ishihara, (5) Bortolamasi and (6) White; and were sit-outs until the Sunday Final. The next 40 racers had to go at it on Saturday, July 4, 1981 for another 6 heats (rain permitting).

As expected, the 40 'cut' drivers were really 'battling' for those remaining four spots in the main event. At first there was fighting for position in the turns and lots of bumping. Some of the races looked like crash and burn. Of course times suffered, because one bad hold up would not allow you to make 37 laps. After a couple of rounds, things settled down a little as the quick drivers established themselves and then the other racers would give them a little room.

The rains came after 4-1/2 rounds (of 6 planned) of the final 'cut' qualifying. The top drivers were: White (37/604), Tadiello (37/607), LeCat (37/611), Bervoets (37/611) who moved up to the Sunday Final. (Mizoshima 37/612, Jianas 37/613, and Davis 37/616 were next.) Booth had made 37/612 in his 5th round race, which was thrown out. So the four move-up spots went to Europeans and Jianas and Davis were out for the first time in W.C. racing, as was Phelps.

The Final lineup (drivers shown in table) would include 1 Kyosho, 1 Associated, 2 Deltas, 2 SGs, 3 PBs and 1 Serpent in the final; quite a variation of cars and the end of the US dominance of the World Championship top seeds. It should be noted here that Bervoets had switched from a suspension car to a flat plate chassis car for the final 'cut' qualifying, with race official approval, the feeling being that drivers were being qualified, not cars. This is a little different than the usual interpretation, as Peter ran someone elses car . . . and his argument was that other racers (U.S.) were changing chassis plates.

The Final Event

The *World Championship Final* was delayed by rains for quite some time. Heavy rains had occurred the night before and the track was extremely wet. Since rain had been forecast for Sunday, the race was scheduled to start at 9 a.m., conditions permitting. The sky looked threatening, but there was a slight breeze and the track was gradually drying. At about 11:30, the track was continuing to get better and the cars brought to the pits for some practice laps. Ugh . . . the cars spun out everywhere, it seemed. After a few laps, the cars did look better but there were a couple of places where the track was really wet. I was surprised when Burch and Carbonell looked to be about the best getting around the track. The suspension cars seemed to spin out easily and the light Italian cars did the same thing.

The track was deemed not suitable for a start and we waited some more. Finally, about 12:30, the track was judged to be satisfactory for racing, and seemed to be improving rapidly. The sky was still overcast with rain clouds. With everybody chafing at the bit to get started, Joe

Werner (race director) had each of the cars go around the track so he could announce who they were, etc., etc. Then it was back to the pre-grid line to refuel and wait for the start.

When the buzzer sounded and the flag rose, it was a mad dash for the first corner. White of GB got through the cleanest and onto the back straight first. Carbonell was in second, then Tadiello (I think), and Burch. After a very few laps, Carbonell passed White and started increasing his lead little by little. And White was pulling away from those behind him. Ralph Burch was having problems already. Burch's car seemed to understeer some but then oversteer . . . possibly the damp track yet. Peter Bervoets was into the pits with some sort of a problem (just as in Geneva in a semi-main).

Art continued to just motor away from everybody. Only on maybe one lap out of ten would he bobble on the switch backs before the back straight, which was the low spot and still damp. Burch continued to have problems. So whenever Carbonell would get close, Ralphie would pull over and let him by. In fact, most of the drivers who were not doing well would let Art by. A far cry from what it would have been like if they were competitive and going well. When he got behind White some time around the first pit stop, even White moved over, saving his car for when the traction might get better and keeping his good second place lead over the rest of the cars.

Art's pit stops, which looked like they were at 20-lap intervals, seemed to be going smooth. Bervoets was going reasonably well now, but had been in the pits for about 8-10 laps. Burch was still having some kind of a steering problem, but the rest of the drivers were really having a good race among themselves, except White, who had a strong second place.

First there were a couple of rain drops, then a few more. After a couple of more laps, the rain started pretty good. The RED flag was brought out and the car times recorded as they crossed the finish line. Some unlucky drivers had almost a lap to complete and were spinning out everywhere, taking maybe 40 seconds to finish a lap that would normally take 15 seconds. White was ready to come out of the pit when the red flag came out and race officials held him up. Officials awarded White one lap when the British team complained.

At this point, the lap count was Carbonell 44, White 43, Bervoets way down, Burch way down, and it seemed like everybody else had 42 laps. The cars were impounded and everybody went under the tent to wait out the rain. And it was quite a wait too, because a light rain continued for some time.

After about an hour-and-a-half things started looking better and the track was drying. In the meantime everybody was buying out the tent hobby shop bargains . . . except me, I was trying to get pics of all the cute girls. A request for a straight axle car of a non-finalist was made; to test the condition of the track. Mike Kimery volunteered his car and out he went. The first lap looked bad as Mike was punching the throttle purposely. But the second lap looked much better and when he eased up a little even the low part of the track looked pretty good. All but one driver said GO. So preparations were made to restart the race. The cars would be started in the order of the position they held when the rain delayed the race.

All the engines were started and the cars carried to the pre-grid. When the buzzer sounded, the flagman then waved off Carbonell, then in about one or two seconds White, and every second or so, the next car. All cars were off before Art came around and the race was on again. Once again Carbonell started lapping cars.

When Carbonell came across for the 101st lap, the race was official. Art now had a two lap lead, but the traction was coming up and the other cars were starting to go quick too. Most cars that were down several laps were still moving over for Art. Shortly after one pit stop, Art tagged the back of one car and then the wall. His body got cocked and he had to come into the pits to get it fixed. Ken Campbell snapped the body down and sent the car out again. But the body was still not down right and Art came in again. Ken did it right this time, but valuable time was being lost. No fuel was taken on at either one of these quickie stops; I guess it really would not have done any good because at twenty-lap intervals all that would have happened is an extra pit stop . . . unless something else happened.

By this time the track had really dried out pretty good and the traction was becoming fantastic again. Several of the other cars were now really beginning to put in some quick times. Kondo and Tadiello, of Japan and Italy, were turning in times quicker than Carbonell. But Burch's steering problems seemed to be worse than ever and he was pulling over to let practically everybody by. Shortly after the mid-point of the race, Ralphie

Burch dropped out because he was obviously not in the race and just getting in the way of the other drivers.

White had some problems, dropping him back several positions. But the problems that Carbonnel had allowed Tadiello and Kondo to be only two laps back (almost 32 sec.). LeCat, of France, was now experiencing engine problems with the engine dying on several occasions. Even though LeCat's car ran well when it was on the track his lap count was dropping back to keep Bervoets company.

With more cars running fast, Carbonell was having more problems passing. Several cars down numerous laps would move over for Art but when he was following Tadiello and overtaking Bortolamasi, Art had trouble. Bortolamasi let Tadiello by, but really raced and left no room for Carbonell. When Bortolamasi took the corner going onto the back straight a little wide and off line entering, Art punched it and went inside only to hit the inside barrier and get stuck. A couple more of these and he might lose his lead. A few laps later Art was behind Bortolamasi again, but luckily Bortolamasi got on the throttle too fast, oversteering to the side and had to back off, letting Carbonell by.

You could hear some of the cars beginning to scrape bottom as they went around the corners. An hour race is pretty long for both tires and batteries. Kondo had to stop and change tires, probably costing him a sure second place. The tire change was quick and only cost him about three laps. But Tadiello now had a firm second place. One of the Italian cars, Bortolamasi I think, was dragging bottom and losing a little traction and control.

The last 20 or 25 laps, most of us were worried about whether Art could stay out of trouble. He came in for the last pit stop, which was a quick, clean one by Ken Campbell. We did not need to worry, because Art's driving was smooth and conservative the last twenty laps. Art got behind Tadiello, the second place car which was down two laps, and cooled it for the last few laps. On the last lap all the photographers crowded under the drivers' stand and shot pictures galore when Carbonell got the checkered flag.

Everybody on the drivers' stand congratulated Arturo Carbonell and quite a few people went up and also congratulated and took pictures of him. Within about 15 or 20 minutes, Art had his car cleaned up and was out on the track for a few more pictures. I can guarantee you that if this race had been in Europe, Carbonell would not have been down off the drivers' stand for at least a half hour, with all the spectators crowding in the pit area. The U.S. really takes racing more lightly than Europeans. Over there, the spectators really get into the mood.

So, with the World Championship over, what do I think? Well the U.S. has been sitting back on its (our) butts, based on how good we *WERE*. Almost all of the RC car technology improvements are coming from overseas . . . both ways, East and West. I was surprised at how well the independent suspension cars performed in this, their first World Championship and first full year. The four-wheel drive car from Japan was impressive, a Kyosho prototype, and might have placed higher with a more competitive driver. Even the flat plate chassis cars from Italy and Japan seemed superior in many ways to our cars. My next article will be on the Cars of the 3rd World Championship.

Even though there were numerous little things that went wrong . . . and also several rain delays and wipe-outs, I feel the race was quite a success. The biggest error of the race organizers was that plans were based on everything working properly right out of the box. But then I think this was the biggest and most preparation that has gone into an R/C car race here in the U.S. Look at the picture of the track, barriers (probably one of the first really safety legal circuits), grandstands, pit and concession tents, etc. The Indy 500 club and Joe Werner in particular should be commended — as well as the Ralph Spencers, Leckron, the Muellers, Hagen, Smith, Yell, the Moodys (Roberta, Roy and Diane), as well as Big Tim Wilson and Mike Reedy. Hopefully all these people can provide

some guidance to the next group who takes it upon themselves to put on a World Championship race here in the U.S.

Tune in next month to learn all about the Cars of the 3rd World Championships. •

Hannan . . . . . *Continued from page 50*

possibly the world's best-known model builder, once sang in the New York Metropolitan Opera House? It's true, and perhaps one day we shall provide the rest of the details. But then, perhaps not. . .

PEANUT GRAN PRIX PERPETUATED

The 1981 West Baden, Indiana 24 hour Peanut Gran Prix was quite successfully conducted, according to reports from Dave Linstrum, Charles Sotich, and Dr. John Martin. Doubtless complete results will appear elsewhere, but we would like to pass along a few observations regarding the meet's ambiance.

Crucial to the favorite outcome of such an ambitious event is a suitable site, and this requirement was marvelously fulfilled by the Northwood Institute and their most efficient staff, under the direction of Paul Stroud. The atrium flying site, constructed back in 1902, incorporates a 200 foot diameter dome almost 100 feet high! Around its periphery are accommodations for guests as well as facilities for well-prepared low-cost meals. Thus, dedicated modelers can fly, sleep, and eat without ever leaving the building, rounding out an almost perfect set of circumstances for marathon indoor model flying. Auxiliary entertainment this year included the remarkable Indoor World Championships film produced by Dick and Nikki Hardcastle.

The Peanut Gran Prix attracted nearly 80 models from five countries which were Australia, Germany, Switzerland, the United Kingdom and the United States. Categories included Pioneer, Golden Age, Warplanes, Modern, and Weirdo. As has been traditional in Peanut contests, variety was outstanding. At the risk of slighting the many, we singled out a few of the more unusual examples: Nieuport triplane (John Martin), Twin Mustang (Lloyd Wood), Loening Kitten (Don Kilgore), Fokker F-7A (Alfred Genther), Caudron Lightplane (Mike Arak), Pacific Racer (Bob Clemens) and a Solar Challenger by Millard Wells.

Walt Mooney's long lost Found, which failed to appear last year, managed some 39 second flights this time, ably proxy-flown. Certainly the dedication of all the proxy flyers makes such a truly international contest possible, and with the continuing difficulties and costliness of travel, proxy meets may well be the wave of the future competition.

Mike Arak organized a series of mass-launched events at intervals during the contest, with as many as 20 craft airborne simultaneously! Bobby Skrjanc operated a Peanut repair depot and was kept busy restoring crashed models. And Charles Sotich conducted a brand-new "Peanut Speed" competition, involving two laps after an r.o.g. start around balloons spaced 20 feet apart. We'll try to present more about this innovative idea in a future column.

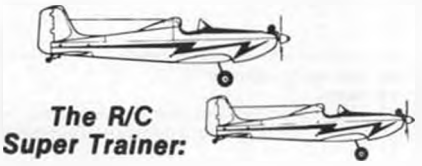
The "Grand Peanut" award went to Tiny Sutter's Heinkel HE 100, which also won the Warplanes category. Top single flight duration was posted by Jim Miller's Piper Vagabond with a time of 114.3 seconds, while top static score was achieved by Dave Kiefer's colorful Pitts Special. England's Butch Hadland took time out to post an over-two-minute flight with his CO2 powered Lacey. Bruce Kennewell's Timm was apparently the longest-travelled model, having been sent from Australia. A touching note to the proceedings was the proxy-flying of the late and popular Ted Gonzoch's Lacey Peanut. He will be remembered.

Another Gran Prix is planned for 1982, so don't procrastinate . . . start building for it now!

THE MODEL BUILDING BUG

We receive quite a few letters from modelers who are returning to the fold after many years away from the hobby, but few so charming as this one from Wal Kavanagh of Sydney, Australia "Wedding bells, moving away from the old flying field and friends, children, all took their toll on modeling which went into a sad decline.

"Fortunately, once bitten by the bug, no-one ever fully recovers. My



blood was still diluted by an odd mixture of ether, methanol, and rubber lube. Having tired of (other activities) I one day emerged from the garage clutching a 20-year-old TAIFUN HURRICANE 1.5 cc diesel. Once cleaned and fueled, it ran as well as ever. If you don't tell an engine how old it is, it will run as well as if its last run was yesterday instead of 20 years ago. Which is more than I can say for some people.

"My renewed interest caused me to buy some magazines which had some funny models called PEANUTS. Too small! Never fly! However my curiosity was aroused so I wandered into the nearest model shop and bought a Peck-Polymer clipped-wing Cub and a Druine Turbulent. Came the first shock of handling 1/16 squares! Trembling fingers and squinting eyes had me reaching for the tweezers, always knew they were good for something!

"I suppose the first big benefit of building Peanuts is that they reteach building skills. I had been building a LARGE (in comparison) Albatros DVa for a Super Tigre .46, and when I went and had another look at it (after building the 2 Peanuts) I decided I couldn't bear to look at the sloppily-built tailplane, so destroyed it and built a much better one. Score one for Peanuts.

"Filled with enthusiasm, I dug out old control-line plans of a TIPSY JUNIOR . . . it was no time at all before I had it reduced to 13 inch span." (One of our photos this month shows the delightful results.) Wal makes his markings on a thin self-adhesive film employed in photo-typsetting. Special colored pens made for the purpose are suitable for drawing emblems on the clear film, which is then trimmed out and applied to the model. Presumably similar products may be available in other parts of the world.

We conclude Wal's comments with the following: "Every modeller should be made to build at least one Peanut per year. I'm sure the standard of modelling would improve drastically." He also says that there are no such things as warps, but merely "God's adjustments".

THE LAST STRAW?

Now that the breakfast cereal manufacturers seem to have abandoned any interest in model aircraft, we had about given up seeing any more cardboard flyers on product boxes. But no, Virginia, there still are such things! On the *SCOOPY'S* plastic soda straw container is imprinted a colorful 7-inch span glider, called the *STRAW-PLANE*, with one of the products forming the fuselage. Curiously, the glider features neither vertical tail nor dihedral. . .

SILLY SIGN OFF

Perhaps Ed Lockhart, of The Fiat Farm, has the best answer for solving any model's instability: "Cover it with *righting* paper!" (ouch, j.e.) •

Boats . . . . . *Continued from page 49*

was masked of with tape and the trim color applied.

The area provided for the radio system is very generous. The builder will find little problem in arranging the servos, receiver and battery pack in this radio compartment. Earlier in this review, I mentioned rigging the boat and its importance. When the kit manufacturer does all the difficult hull construction for the builder, he's done about as much as he can do. The builder has the rigging responsibility and all too often doesn't adequately carry out this task. I think good rigging is as much a function of taking the time to do it correctly as is any degree of skill required. When one has spent this amount of time and money, don't squander it by messing up at this stage.

One area where I definitely have to give Ed Hughey credit is in keeping up to speed on developments or performance hints that can prove successful in his boats. Since this boat has been introduced, there have been some refinements made in the area of sponson running pads. A self-addressed, stamped envelope sent to Hughey Boats will provide the builder with sketches of these running pads. Being an active model boat racer himself, Ed Hughey realizes the importance of continued development in the area of performance aids.

My experiences and observations of the Hughey Tunnel have provided me with some definite opinions about this

boat. As far as a kit type boat, it's just about the easiest one to build. That, of course, being the result of the foam sponsons. The Hughey Tunnel is the most durable boat of any I've seen when it comes to taking the rigors of competition. It is extremely strong. About the worst thing I've ever seen happen to the boat is having the front pickle fork bow snap off. And this was repaired with five minute epoxy before the start of the next heat. The boat is among the very best when the water conditions become rough. It is a very good boat in windy weather, too.

I do have one complaint about the boat in the area of looks. The cowling just doesn't have the scale appearance that I like in a model tunnel. I personally prefer a different type of cowling that reflects more of what is used on full size tunnel boats.

However, that is the only negative comment I have about the Hughey Tunnel and there are certainly a lot more positives that far outweigh that concern. I can heartily recommend this boat to anyone considering involvement in model tunnels. It has won numerous races and at least one IMPBA Outboard Championships. The boat has many merits that make it a fine choice as a contender in the .21 outboard tunnel class.

MORE PRODUCT$ IN U$E

Prather Products, 1660 Ravenna Ave., Wilmington, CA 90744 has introduced some new products that should prove interesting to many model powerboaters. Prather Products now has a complete line of tuned pipes for .21, .45, and .65 size engines. I have personally tested both the .21 and .45 size pipes and found them to be very good items. Both of these tuned pipes worked as well as the pipes that I had been using. I cannot claim that they worked better, but they didn't make the boat run slower than it was running. To go along with their pipes, Prather Products is introducing a muffler that mounts to the end of the pipe. This muffler has proven to cut down the noise level of engines using tuned pipes without reducing power. It will adapt to most other pipes besides the Prather Pipes. I managed to misplace the price list for the pipes, but as I recall the .21 pipe was around $25, the .45 was around $34, and the .65 was something like $44. The muffler was $14.95. Having personally tried these products, I don't hesitate in recommending them for use.

Prather Products is also introducing radio box seals with pushrods for $8.95 for a set of three and transom spin fins for $4.98 for three. I haven't had time to try either of these new products but they appear to be good items. I have used transom spin fins on my offshore boats and feel they are very important in improving the cornering characteristics. Check with your local hobby shop or contact Prather Products.

AND ONE MORE THING. . .

During the past couple of years, I've had better than average luck with my .21 offshore boats. This particular size boat is becoming very popular here on the West Coast. Anything that can improve the performance is always of interest and recently I've found a propeller that seems to work very well on a number of .21 size boats. The Octura #445 is a low lift prop that has proven an excellent prop choice for .21 size vees. The cost is $9.95 and is available from Octura Models, 7351 N. Hamlin, Skokie, IL 60076.

IMPBA OR NAMBA?

A number of folks have written recently asking which organization they should join. I think someone interested in joining a national boating organization should join the one that is most active in the area in which they reside. There are some areas that are definitely IMPBA and some areas are definitely NAMBA. Anyone who's interested should find a local club, if one exists, and ask what their affiliation is. It's pretty safe to say that if you live in the Midwest you should join IMPBA. If you live on the West Coast, join NAMBA. Even though I belong to NAMBA, I wouldn't say it's the best organization. Check out the local situation. If you can't figure anything out, drop me a line. I'll recommend the national organization that would best meet your needs according to where you live. Jerry Dunlap, 119 Crestwood Dr. S.W., Tacoma, WA 98498. •

Choppers . . . . *Continued from page 24*

it's critical angle of attack. Why the problem in full size ships? If we increase the rotor speed of the full size chopper, we can get more lift on the retreating blade without stalling it, but now the advancing blade goes to supersonic airspeeds. Then the rotor blade, or "low speed airfoil" starts to break down because the aerodynamics change with supersonic speeds. This subject could be an article in itself, but we'll let it go here because (a) most of you are probably not interested, and (b) we don't know much more about it anyway!

Back to the original point of more forward cyclic with increased airspeed. This will go with any model, and you may want to notice it the next time you're out at the field. It takes a set amount of forward cyclic to go into forward flight from a hover, and then more and more forward input is needed as we go faster. This effect of dissymmetry of lift is more noticeable as the rigidity of the rotor head increases. What happens is that a helicopter with a Heli-Baby type head (soft) compensates for dissymmetry of lift mostly by blade *flapping* and only slightly by blade *feathering*. With a rigid rotor head (hard) like Hubert Bitner's Horizon, there is *no flapping* and *all feathering*.

All of this may seem a bit too technical, but in the months to come we'll explain what all of this has to do with real life and the set-up and maintenance of your helicopter. You might even be surprised at the conclusions we'll draw from examples such as the one above.

The last item of full size vs. model we'll compare is collective pitch. Collective pitch is actually easier to set up in full size because the throttle is finely regulated by the pilot to provide a constant blade speed at all collective pitch angles. The closest example to a model in full size is the Robinson R-22. It does have a mechanical correlator very similar to what happens on the model, when we add collective, and throttle is automatically added to overcome the increased drag of the blades. This system eliminates most all of the throttle twisting that is present to fly a Bell 47 or a Hughes 300. For this reason the R-22 flies very much like a turbine (governor controlled r.p.m.) helicopter, i.e. a Bell Jet Ranger or a Hughes 500.

Given "factory standards", all collective set-ups on full size ships are slightly different in one way or another, and each helicopter will fly slightly different from the next.

What are the problem areas, you ask? Well, the full size helicopters are so *smooth* and controllable that you get spoiled rotten . . . and they do tend to burn a hole in your pocket book. (Your wife thinks you spend a lot on your R/C model, does she?) Anyway, the model helicopter can be one of the best teachers for transitioning to full size. Not only do they allow you to get proficient at flying and learn helicopter characteristics, they also teach aerodynamics and set-up procedures. But most important, they teach respect. To fly a helicopter, R/C or full size, and not respect it is to ask for trouble. They float like butterflies, but sting like bees. . .

There are several good books available on R/C helicopters, and we have another to add to the list. It is not written specifically for models, but it contains information applicable to them, and would be of interest to most R/C pilots. Entitled "Rotary Wing Flight," the book contains 70 pages of selected reprints from the Army training manual, which is *the* publication for training and educating full size pilots. They are available from us, c/o Pacific Wing and Rotor, 3605 E. Spring St., Suite 210, Long Beach, CA 90806. Cost is $15.95 p.p. third class mail and $16.95 p.p. first class mail, your choice.

As with any helicopter, model or full size: It is one thing to get them to fly well, and completely another to get two to fly identical. You may have to pardon the analogy but helicopters are like women; delicate to handle, and no two are ever the same. See you next month. •

Plug Sparks . . *Continued from page 42*

"Upon arriving on the site, I was bug-eyed when they opened up their trailer and displayed numerous models each one powered by a strange new engine. This engine was attractice with its machined aluminum head and blue anodized cylinder fins and was called the "Bluestreak". I then learned they were the manufacturers and their new engine was expensive: $35.00!! (A no mean sum in those days.)

"The trailer also held a series of parts for the Bluestreak and during the course of the day, Ted assembled a couple of the engines and presented them to the

bigshots of the meet. This was absolutely mind boggling as I just couldn't believe anyone gave motors away and expensive ones at that. Having acquired two engines by hard work and long time saving on a paper route, I thought I would help them and perhaps they would offer me an engine.

"Hence, I spent all day shagging their big Goldberg Sailplane which won using their Bluestreak. Man! these guys knew what model flying was all about! The next day, I met my new found friends at the ball park where the controline events were being held.

"Again they entered the speed events and impressed me again with the Bluestreak engine. I observed them giving away a couple of freebies to the controline "biggies". This time, I could stand it no longer and inquired what the criteria was for getting a gift engine. I was told they were looking for the best exposure for their engine and since I hadn't brought a plane to the contest, they weren't sure I would show it off to best advantage. I remember retiring to the other side of the field, tears in my eyes, and my ego severely crushed.

"In spite of my disappointment in missing out, I always admired the Bluestreak. Imagine my excitement several months ago when I received a call from my friend who had a neighbor selling a Bluestreak engine. Would I be interested in it? I never gave him a chance to change his mind.

"Since I am not an engine collector, I probably won't display it but will keep it at the bottom of my old stuff. But, at last, after 34 years, I am the proud owner of Bluestreak S/N 479 and will cherish it along with all the old memories for the rest of my life.

"Since writing this, I have talked to Ted Tyce now living in Bonita. He recalls the meet in Salt Lake well and mentions that Bill Lake was killed in a helicopter crash several years ago. How ironic! I design helicopters for a living!"

The Planesmen

A rather tricky name has been adopted by SAM 29 of Fort Worth. Dr. James W. Buice, 4314 Ledgeview Road, Fort Worth, Texas 76109, has been responsible for sending in some photographs along with their newsletter called The Planesman (Plainsmen, get it?).

In their recent newsletter, SAM 29 editor was chortling over the R/C portion of the SAM Champs. He had good reason as the Texas group took 5 out of 7 first places! How about that? That really took the wind out of SAM 21, 30, and 49, the heavily competing California clubs.

Of course, the "big gun" for SAM 29 is shown in Photo No. 6, Bruce Norman, who has been winning an unprecedented number of trophies. At the SAM Champs he missed winning the Texaco Event with a flight of one hour, 56 minutes when he landed several hundred feet off the huge Taft field. This also cost him the Sweepstakes Trophy by two points. Sometimes it doesn't pay to get out of bed!

Along with chatter on the Planesman,

Photo No. 7 shows Jack Swain with the club pennant which is flown at all meets. This is something other SAM Chapters would do well to copy as this would liven the field up . . . seeing a variety of club flags flying on the field.

Photo No. 8, still on the Texas kick, shows James Buice (son of Dr. Jim Buice) with the most popular design in the club, a scaled up Shereshaw Cumulus. Ever since Bruce Norman scored a convincing win at the 1980 West Coast SAM Champs using this design, the Texas boys have wholeheartedly adopted the Cumulus to score their impressive wins.

Might mention at this point, the particular Cumulus that Bruce uses is a 10 percent scaled version so that he could get enough wing area to use the latest hot 60 engine. Results have been spectacular with a Rossi .60!

MORE SAM CHAPTER CHATTER

SAM 4 MINI-SAM CHAMPS

A little late with this report, but better late than never. For those SAM members who were unable to attend the SAM Champs in California, Karl Speilmaker of the Michigan Antique Modelers (SAM 4) staged a two day meet at Three Rivers, Michigan.

What made the meet real neat was that all of the features of the SAM Champs were carried out at this miniature version of the Champs. According to "Krazy Karl" about 50 fellows showed up for the "Bean Feed". Two bottles of Cold Duck were given away. Then the tables were cleared away and the engine collectors set up for a first class swap session lasting to the wee hours.

Karl sez he prayed for good weather, minded his p's and q's, in short was a real good boy, and was rewarded with a gorgeous day on Sunday. Actually, Saturday wasn't a bad day either, but you never know about the weather in southern Michigan.

Times were rather low because of the Two Minute Limit, so we won't give them but will quickly list who won to give credit where due:

Rubber
1. K. Hopkins (Korda)
2. W. Tibbs (Gollywock)
3. J. Barrette (Johnson)

Class C Pylon
1. B. Hale (Zipper)
2. H. Ochner (Gas Champ)
3. L. Willis (Kerswap)

Nostalgia
1. L. Willis (Ramrod)
2. H. Murphy (1/2A Spacer)
3. W. Brewer (1/2A Zeek)

Class C Cabin
1. B. Zehr (Playboy)
2. B. Markiewicz (Playboy)
3. L. Willis (So Long)

Nostalgia ABC
1. E. Jordan (Ramrod)
2. R. Edelstein (Spacer)
3. W. Hale (Spacer)

Class A-B Cabin
1. B. Hale (Dodger)
2. R. Edelstein (So Long)
3. E. Emde (Dodger)

"Slag" Event
1. H. Murphy (Ranger)
2. T. Banaszak (Twin Cyclone)
3. R. Edelstein (Ranger)

Pylon AB
1. J. Robinson (Alert)
2. H. Murphy (Zipper)
3. W. Bartelt (Kerswap)

.020 Replica
1. B. Tibbs (Ranger)
2. H. Murphy (Alert)
3. L. Willis (Kerswap)

HL Glider
1. L. Willis (Huguelet)
2. B. Tibbs (Thermic 20)
3. D. Dock (Burger)

Saturday and Sunday also featured two "Kiddie" Events for the youngsters. G. Bodde won the P-30 Event and Joe Kresnak won the Hand Launched Glider. Sunday again gave the boys a chance to win with R. Barrette winning the SIG R.O.G. Event and the Hand Launched Glider Event again won by J. Kresnak. A great time was had by all!

SAM 35 NOFFA

The Northern Ohio Free Flight Association held a meet on May 17 at the Plum Brook Station, Sandusky, Ohio, only to get blown out real bad. It took real heroes to fly that day!

Karl Emde sent a nice photo (No. 9) showing Joe Scuro with his ageless twin pusher. As commented in the caption, Joe has flown this particular twin pusher longer than most of us can remember.

As pointed out before, a lot of hard work and public relation work went into the securing of the Plum Brook Station as a flying site. The only drawback with holding contests at this site is that all contestants must be pre-registered a week ahead of time so that an admittance roster can be made up. Actually a small price to pay for use of such a nice flying area.

SAM 36

We are indebted to Mike Granieri for sending Photo No. 10 showing the boys back east at a recent New Jersey meet. The columnist has been repeatedly taken to task for the lack of coverage on East Coast doings, but, honest injun, fellows, you can't print what you don't have! In spite of exhortations, letters, personal requests, the Eastern boys still are reluctant to send contest info, club activities, and photos. We could surely use them!

SAM 39

Chet Lanzo of 1485 Lester Road, Valley City, Ohio 44282, sent in several photos of their club activity at Sandusky. Photo No. 11 pictures George Stephens with a 10% scaled Lanzo Record Breaker. Scaling up to this size allows the use of a 60 cu.in. displ. engine. In this case, George used a Saito 60 ignition front rotor engine that makes this Lanzo a real flying machine (to quote Chet).

SAM 8

A little out of numerical sequence, but we simply had to squeeze in Photo No. 12 showing long time free flighter, Hugo Lung, with his latest old timer, an R/C Scientific Mercury!

Ray Chalker of Tacoma, Washington is responsible for sending in this photo. No question about it, this will shake up the troops in SAM 13, SCAMPS, one of the original SAM free flight oriented chapters.

The photo, by the way, was taken at the Hart's Lake Pairie site. This is an excellent field to fly with very little drift in an area of 1-1/2 by 2 miles. Temperatures run in the seventies and eighties during June and July and the best part is that you can retrieve your model by motorbike!

Ray Chalker and SAM 8 are very much interested in sponsoring the 1985 SAM Champs on the West Coast. The Champs have been held at Taft and Las Vegas and SAM 8 feels they have a better deal to offer. Let's hope their bid is successful. Sure would like to see a different site!

SOUTH AFRICA

At the recent World Championships for R/C Glider held at Sacramento, CA, this columnist had the pleasure of personally meeting Jack Abbot, the team manager of the South African group.

Jack, who also attended the SAM Champs, is a die hard old timer enthusiast. As can be seen in Photo No. 13, Jack Abbot is with his Sailplane. We reported the model had demolished itself in a terminal dive but Jack has done an outstanding job of restoring the parts.

Jack also gave this columnist a picture of Harry Allan (Photo No. 14) with the very popular Ben Shereshaw design, "Cloud Cruiser". Right now, the emphasis is on R/C Assist Old Timers, but conditions indicate that quite a few of the modelers are gradually swinging back to their first love, free flight. Same old story, need a good field and they think they have found it!

Tiger Shark

Some time ago we featured a photo of the construction framework of a Victor Stanze controline 'Tiger Shark' as enlarged and built by Harold Lanser, 5836 W. Caldwell Ave., Visalia, CA 93277. Well, Harold has finally finished the model (Photo No. 15) and here is what he has to say about the flying qualities of the Tiger Shark:

"The model has had nine flights to-date. With the K&B 40, I haven't had it past half throttle yet, because at that setting it will do three vertical rolls with a Split-S over the top. The roll rate is terrific. I have had some of the local hot shots try the model and they think the Tiger is the finest they have flown.

"The six, quarter-inch brass tubes sticking out of the cowl is a fully functional exhaust. The tubes are silver soldered to a 5/8 manifold under the cowl that straps to the engine.

"The model glides like a dream and is almost impossible to stall as it simply breaks out straight ahead. Incidentally, there is a guy here pushing eighty years named Bud Warren (remember him, Tom Thumb engines?). Bud says hello to all his old friends."

Theft

Every so often some wise guy swipes a model figuring to cash in on the plane or to try and fly it himself. In this case, Woody Woodman was flying at the Coyle Air Drop in New Jersey and went to help a fellow modeler find his airplane.

Upon his return he found his neat Orange and Black monokote covered Bay Ridge Thermal Magnet with a Super Cyclone had been removed. Woody had advertised by word of mouth, newspaper, etc., he would like to get it back, no questions asked.

However, it now appears he has to appeal to all modelers, hobby dealers, and interest persons to keep an outlook for his model. Woody can be reached at 233 Longview Drive, Bayville, NJ 07662. Better yet, if you spot the model, give him a ring at (707) 542-7029. Hope he gets the model back!

U.S. F/F Champs Re-Visit

This columnist took so many good photos (for a change!) that he can hardly resist putting them in the column. The policy of this writer has been to try and show as many different types of models as possible. This way, modelers can gain an idea of what a particular design looks like when completed.

Photo No. 16 shows a Flying Aces Stick Gas Model as designed by Thracy Petrides and Bill Effinger. Lee Norcross selected this model from the standpoint of simplicity and because it didn't look like any other model. No reports on how it flies.

In that same line of thought, Photo No. 17 shows Ernie Johnson with an Ace Whitman Falcon, a 36 inch kit model put out before WWII. Too bad the photo doesn't clearly show, but Ernie did an exquisite job of construction employing built up ribs, multi-spars, and all sorts of lightweight goodies. Needless to say, the model really performs and proved it at the U.S. Free Flight Champs.

Obit Notice

Seems like the older we get, the more we notice the real live modelers dropping by the wayside. This month we have to acknowledge the loss of the following modelers.

1) We are indebted to Ken Soukesian for the report on Henry Ashcroft, proprietor of the Pomona Model Shop who died at the age of 50 at the Prado Dam on June 13. Seems like his model landed on the water and Henry decided to swim for the plane. Never made it, but what a way to go, dying with your beloved models!

2) At the recent SAM Champs, Dan Cross was distributing circulars on the upcoming Cactus Meet for January 28, 1982 in Phoenix. He stated he was not sure how the meet was going to fare as they had just suffered the loss of Russ Oliver, the sparkplug of SAM 31 and the energetic local hobby dealer.

Russ had a heart attack, was convalescing fine, but on the second day suffered a relapse on June 29, the eve of the SAM Champs. I do hope Oliver enjoyed his vantage viewpoint of the O/T Nationals!

The Wrap-Up

Photo No. 18 about says it all. Shown is contestant George Perryman coming up to the table manned by Karl Hatrak, Recorder, and Bill Bowen, Chief Timer. These boys have contributed mightily to the cause of the old timer events held at the AMA Nationals. Not to be outdone, George Perryman has been sponsoring a series of trophies for the Juniors in a combined rubber event. Although his little granddaughter no longer flies models, George still wants to see those juniors out there!

This, of course, is a sneaky lead-in to the Old Timer Events to be held at Seguin AFB over August 5, 6, and 7. By the time you read this, the O/T Events will be history.

Next issue we will carry a full account of the three days of flying, R/C Assist, O/T Controline, and naturally, the "biggie", the free flight events on Friday.

Hope all of you had a wonderful summer, full of flying!! •

F/F . . . . . *Continued from page 57*

for cutting off the gussets with a razor saw. Discard the first piece you cut off . . . the grain is in the wrong direction. Then, turn the strip over and make the second cut to form the right angle. Continue, alternating the direction of cuts by turning the strip over each time, and each cut will yield a complete gusset. For faster production, you can stack 3 or 4 strips together.

This method produces gussets with a 45 degree angle. If you wish to make longer, skinnier gussets, use the square corner of a metal straight edge to lay out the gusset shape you want on the strips (you can also use the corner as a cutting guide).

When installing gussets into your structure, fit them carefully, so there are no gaps and the angles match perfectly. I usually knock off a little piece of the right angle corner, so any glue fillets don't interfere with the gusset/rib fit. If necessary, make final corrections with a find sandpaper block (takes off the fuzz from the razor saw cut, too). To make a smaller gussets from larger ones, cut along the hypotenuse (with the grain), since this preserves the right angle. •

Electric . . . . . *Continued from page 47*

ever gets below 16 ounces!

Dave Robelen designed a fine low wing trainer a few years back, the Pronto, and it was available as a kit (I think it is out of production now, unfortunately). Jack likes the Pronto and scaled it down for an Astro 020. When he sent the photo he hadn't flown it yet (winter), but I have no doubt that it will fly well. I have an ME109 model that I fly with an 020 and rudder only, and it is one of my best planes. There is nothing about low wing design that bars it from electric power! If you fly with rudder, as I do, you just have to remember to use more dihedral than you would with a high wing plane, about 1-1/2 times more. The mini Pronto uses a Royal two channel receiver (another excellent receiver. I use several, and their range and reliability is super), Futaba S20 servos, a 100 mah receiver pack, and the Hobby Shack electric system (about equal to an 035, I'm not sure it is still available, however. The Cox system is similar in the Sportavia). It weighs 20 ounces with the eight cell 475 mah pack, and 19-1/2 ounces with ten 250 mah cells.

ELECTRIC POWER

By MITCH POLING, in July '81 MODEL BUILDER magazine.

How would you like to have an 05 size motor that delivers super performance and flies for 8 to 10 minutes? I would, and when I was admiring the digital charger at the Leisure Electronics booth at the IMS show, Roland Boucher showed me a motor that he said could do just that. When Roland says something works well, I listen, because Roland and his brother Bob are the pioneers of electric flight in the U.S., and they really know electric flight from start to finish. The motor is the black label Leisure Electronics Aircraft motor, available in pattern or racing wind, with ball bearings on both ends, balanced armature, and trued commutators (retail price $45.).

Roland suggested trying the motor on an 05 plane using six sub-C NiCds and a 6x4 prop. I did. And it was a revelation! In my Astro Stunt plane (my own design) it flew like a pylon plane, and could do spins, loops, and rolls on two channels with ease. In fact, the Astro Stunt flies better with this motor than any other, and it flies well with most of them. I could hardly believe the level of performance, and on 6 cells, 2 less than usual! Roland was right about duration, too. I'm getting consistent 8-10 minute flights with stunting throughout the flight, not just from going over maximum altitude. I've had several fliers say that this was the first electric that they had been impressed with (they all flew gas), and one thought I was catching a lot of thermals to stay up that long! No thermals are necessary, just good engineering by Leisure Electronics!

I did some ground testing, and the specs are; 12,000 rpm on a 6x4 prop, at 14 amperes draw, all-up weight of the system with the batteries and prop equals 17.5 oz., two ounces more than the Astro 05. Even so, the Astro Stunt weighs only 30 oz. with a Cannon receiver, Bantam midget servos, and a 250 mah receiver pack (two channel). The Astro Stunt is a 42 inch span, 290 sq. in. plane with a 10% flat bottom airfoil. The Astro Stunt kitted by Astro Flight is very similar and would be ideal for this motor.

I would think that the 475 mah cells would be better for duration (about 5 minutes). Another photo shows an even smaller Pronto for the Astro 020, with Kraft '18' servos, 70 mah GE receiver pack, and four 475 mah Sanyo cells for the Astro 020 motor. The area is 165 square inches, and 12-1/4 ounces all up. Jack is a good builder; that is an ounce less than I usually get! The last photo is of the MEN trainer with the MRC electric system (I'm not sure if the MRC system is available still, it has about the power of an 075). It has not flown yet, Jack feels it may be underpowered with the MRC system. I think it will fly all right, much like a glider. I have a MEN trainer all built and ready to fly, but I haven't had time to try it. I will put an Astro 15 or 25 in it for more zip. The MEN trainer does look well suited for electric power. Till next time, fly electric, all sizes! •

C/L..... *Continued from page 51*

Yes, gas prices are up and seem in no danger of ever coming down, so the kid will have to pay through the nose at the pumps but the money spent will be money that, when I was a kid in high school, was handed to the man selling cams, headers, manifolds, dual four-barrel setups and the like. Back when this stuff was in real demand, it was definitely not cheap. You can buy a lot of gas, even today, for what it used to cost to build a serious street-racer Chevy 327 and all the trick stuff required to get the power to the ground reliably.

★ ★ ★

To get back to CL, can't you see a similar thing happening in our little world if the pricing of glow fuel were to go out of sight? Those silly throwbacks to the old days of modeling, the laughably ridiculous quarter-scale models, unfortunately wouldn't be hurt, as they are already using fossil fuel which is still a cheap fuel for a model. But how about the guys zapping around the skies, models pulled along by great, thirsty, piped .61's that need around 16 ounces of fuel per flight. Let's see, 128 ounces to a gallon . . . yuk, yuk, it comes out to $17.50 per flight, just for glow juice.

So just imagine that two years ago the cheapest fuel we could find was going for $120 a gallon and has since been getting more expensive. The ranks at the R/C field have shrunk a bunch and *nobody* flies an engine larger than an .049 with the new .00010's starting to get real popular. We'll ignore the chainsaw powered models for now, because I'll just make another sarcastic remark about them (and when are these guys going to really get serious and stuff a full-race kart engine, something like the Bombardier 125cc, only $1,500 less pipe, on the nose of one of these models?).

Anyway, all the while we CL guys have been whining about the cost of fuel but we're still flying a lot, partly because we don't use that much fuel to begin with, have events for smaller motors already established, and they have become more popular, but the big thing is that the fuel bill represents a much lower percentage of our hobby expenses than it does for the R/C guys. The climb up the pyramid to win any local Combat meet means only four flights and even first-round losers are still winners, in a way, as they don't have to use up any more fuel that day. The same thing applies to FF, also showing signs of coming back big, but we really should let the (ex) Round Man take care of that.

With CL still doing well, some of the R/C guys have started to do a bit of thinking about those old, but still very good, big motors kicking around and what a shame it is to let them rust up. In our scenario, they are building CL models to accept these powerplants while the CL guys, locally and on a national basis, are busy hashing out new classes of Speed, Stunt, Combat, and Racing events geared specifically for these motors. Oh yes, forgot Carrier, a real mistake as all the touch-'n-go freaks from years past will want to get in on this event.

And even though the CL group already had several classes ready-made for previously unused big 'n fast motors, now supplemented with classes like "Rossi .61 Speed" and "K&B 40 Goodyear Racing", the current nationwide rage of economy-think has been incorporated with no less than 14 classes of Economy-Speed, an event where top speed and the number of laps completed on a maximum load of 2 ounces

of fuel count equally toward the final score. A few years ago, having this many classes for an event that, back then, would have been regarded as little more than stupid, is necessary just to accommodate the huge numbers of contestants flying a very wide variety of engines. And, who could have foreseen the necessity of hiring a Bill France clone just to administer a rubber rulebook that is continually in need of "restructuring" to keep each engine and venturi restrictor combination in a class where it is competitive and yet not dominant?

But the glamor events of yesterday are still glamorous and exciting. Just different. Stunt is now freestyle and a fuel-conserving two-minute maximum flight rule in effect. The combination of big, powerful engines, huge models and blending of CL wires with R/C servos actuating the surfaces results in truly spectacular aerobatics. Combat is just as nasty as ever, maybe even more so, with the he-man, top-of-the-ladder event being completely unlimited; any engine, any kind of model. The only real rules govern getting cuts and kills, a match is only a minute long, made possible by the insistence of the ex-R/C guys to allow electric starters, plus everybody agreeing on an FAI-style warming-up period prior to the start of the match. But the really neat thing about Combat is that with so many people now wanting to fly the event, there are lots of classes, mainly based on engine size played against model size in a fairly complex formula and this results in some classes seeing very sophisticated models, while there are also entry-level classes for the novice to pick from, depending upon what motor he has at hand and how large a model he wishes to fly.

Carrier still has many "pure" Carrier events, but the real action is in the offshoot event referred to by the more serious as the "Bunny Hop" event, populated primarily by the previously-mentioned touch 'n go freaks that used to enter R/C Fun Fly events. Basically, you get one ounce of fuel and two minutes to do as many touch 'n go's as you can with the model required to reach a minimum altitude of 6 feet between each touch 'n go landing. This is an event where it is very rare to see an old-time, dyed-in-the-wool CL flier participating, and, for obvious reasons...

Returning back to the 'Real World' for a moment, I think it is time for us CL folk to pool our resources, buy up all of the alky available, take over that lone producer of nitro and set ourselves up as the only source of glow fuel in the world. After a proper period of time, we can stage a glow fuel shortage, reducing supplies to just a trickle. As soon as everybody is feeling the squeeze we'll open the spigot again, but of course, the price will have to go up some, a target top-end price of about $140 per gallon of the brew sounds about right. Of course, the long-established CL fliers taking part in this scheme will get a substantial discount on fuel, paid for by the huge profits gained from what is a plan that should work beautifully, judging from a similar one pulled off in the last few years, the price of pump gas and profits being realized by the refiners of petro products. . .

★ ★ ★

SOMETHING TO THINK ABOUT. . .

A recent note from Mike Hazel, one of the real 'Good Guys' we have in CL, prompted this thought and the thought is that we are missing out big by not having an event, other than one that only Junior fliers are allowed to enter, for the very highly developed and potent .21 (3.5cc) engines that are so widely available from so many different companies. Mike's idea was that if we were to start with a fresh piece of paper and formulate all-new rules, that for Rat Race we would specify .21's and not the .40's now in use. I won't go into why the .21's would make the models more easily flown by beginning racing fliers, that is obvious, as is the fact that the smaller motors would also be plenty fast for the pros. Instead, let's look at the facts. One is that in CL, we demand the best in performance but that the situation works best when this performance is available, with minimum effort, to all, not just those with years of experience and a Wonder Shop for hand building super engines. . . Another fact is that many of the .21's available today are the result of years of development in R/C boat and car racing. So much development that little, if anything at all, needs

to be done to them to win races. Sure, the detail stuff like getting just-right head clearance, the right fuel blend and so on, can realize an increase in performance, but they do not need trick porting and such.

Another fact: Sitting right here someplace close is the very car, a Delta Super J, that Arturo Carbonell used to win the recent R/C Car World Championships with. The serious look at the car itself is another article this month, but here it needs to be mentioned that Art's Picco .21 is a *stocker!* Stock and powerful enough to win at the WC's. . .

I'm not saying that we should change the Rat rules to allow only .21's, there are too many letter-writing, well-known pros out there with a large investment in .40's to ever see such a change passed. That they are more interested in protecting their investment than in opening up the event to more racers is fairly obvious. . .

What I am saying is that we should be going more with the flow and setting up new events that allow .21 sized engines, as they are very good now and getting even better all of the time, all at a decent cost. The new K&B .21, their response to the Picco .21, looks *very good* and it will retail for only $95! Even the Picco .21, widely rumored to be a $200 number, can be had for around $120 or so, would come in at even less in CL configuration as the carb and heat sink head wouldn't be required.

Do think about it, OK? •

Soaring . . . . . *Continued from page 23*

lifting portion). The Eppler 186 airfoil was designed to provide the kind of reflex required by a flying wing. The other plane, designed by Maurice Benner, is more suitable for light air. It has greater sweep-back, larger root chord, and a more scale-like fuselage. Considerable washout is built into the foam wings which are covered with cardboard, then doped and Solarfilmed. It spans 70 inches and covers 823 square inches. According to Wayne, "It's almost impossible to tip-stall either of these machines."

Raul Lomeli of Guadalajara, Mexico, says there's some slope soaring down that-a-way, but most of the flying is thermal. "Some years ago we tried to fly off an artificial slope created by the construction of a road to the top of a hill where there's a new development, but the wind was unpredictable and the landings difficult. Best thing to do is to use the local slopes to launch into thermals."

And good slope sites are hard to find right here in America. If you're in the northern part of Virginia, and the wind is blowing from the northeast, head for Westmoreland State Park on the shore of the Potomac River (take Route 347 off Route 3). There is a 200 foot drop to the water and a clear, grassy landing area next to the cliff . . . a perfect setting . . . if the wind cooperates.

Nearer to home, Peter Edridge of San Rafael, California, has come up with a new minimum fuselage drag design. All the electronics is in the wing. A lead-nosed deep sea fishing pole connects the wing to the tail section. Every component of this machine is made of molded epoxy glass. The swept back (10 degrees), constant chord (10 inch) wing spans 106 inches. The airfoil is a slightly reflexed 11 percent thick modified Eppler 205 section. The fuselage is 58 inches long. The 90 degree V-tail completes this eleven pound plane that cruises at 27.5 ounces per square foot wing loading. According to Peter, this sailplane has a wide speed range . . . and that really helps when you try to land with such high wing loading. Never satisfied, Peter is now working on a new bi-plane glider with four ailerons. I look forward to sharing further news.

If you like bedside reading, try *Gossamer Odyssey: The Triumph of Human-powered Flight* by Morton Grossan, Houghton Mifflin Company; *The Gossamer Condor and Albatross: A Case Study in Aircraft Design* by J.D. Burke, American Institute of Aeronautics and Astronautics, 1290 Avenue of the Americas, New York, New York 10104; and *Cross-Country Soaring: A Handbook for Performance and Competition Soaring* by Helmut Reichmann, Thomson Publications, a division of Graham Thomas, Ltd., Motorbuch Verlag, Stuttgart, West Germany (in English) . . . an authoritative text on full scale sailplaning that provides ideas for cross-country R/C modelers. And, on the lighter side, there's *The World's Worst Aircraft* by Jim Gilbert, St. Martin Press, Inc., New York, 1975. You won't forget some of these misadventures.

See you next month. •

Thornburg . . . *Continued from page 20*

the ceiling and between hanging light fixtures. I don't know if it's the toughest free flight event, but it's tough enough and doesn't deserve to be regarded in such cavalier fashion.

"Another point worth mentioning is that the trade-off between what it costs in materials and time and what you can learn about model aerodynamics from HL flying is enormous. Nothing in modeling, that I am aware of, pays such dividends. Besides, it's a heck of a lot of fun.

"If you haven't already done this, let me suggest that you take your gliders, sans DT's, out to the field about an hour before sunset when the air is still and dense. Listen to the slight whistle as she leaves your hand. Catch the flash of sunlight reflected during roll-out. Watch her float proudly, nose-high, in majestic circles. Move a few feet if necessary to have her settle in your hand. Try to get that silly grin off your face if you can. Do this as many times as you can without overtaxing your euphoria tolerance level. Then try to find the ground with

your feet on the way back to the car."

Hurrah, Mr. Slobod . . . it's never been better said! And what's more, nothing that you guys discovered in the '40s, '50s, and '60s is the least bit out of date! For example, I saw both the half-loop and the corkscrew launches at the U.S. Free Flight Champs at Taft this year. Every model that I saw in the competition could have come straight out of a Zaic Yearbook. Only a couple had built-up wings: one of the nicest of these was Mike Stoy's "Wasp" from August 1981 *Model Aviation*.

Virtually everyone used DT's, mostly the fuse-and-weight or fuse-and-pop-up-stab varieties. A couple of gliders showed up using the Tomy Toy windup motors, and these look like the key to the next (and long overdue) step in HLG evolution: folding wings.

Lots of folk at Taft were talking about folding-wing gliders, but no one, apparently, is doing much about them. The principle sounds deceptively simple. You build a model with a perfectly flat-bottomed airfoil, using polyhedral wings with inner and outer panels of the same length. You hinge the outer panels on the bottom at the poly break and fold them under the inner panels for the launch. What this gives you is a model with just half the extended (gliding) wing area and a symmetrical airfoil . . . a perfect combination for a straight, high launch! At the top of the launch the wings unfold, just like the wings on Jim Walker's old "Interceptor" catapult planes, and you get a slow, floating glide.

(The 'folders' must work, as the Rulebook lawyers . . . whose models are getting beaten by the folders . . . are beginning to voice objections. wcn)

How do you get the wings to open at just the right time? Walker used air pressure to keep the Interceptor's wings folded until the plane ran out of momentum . . . not a very efficient system, dragwise. That's where the Tomy Toy motors come in . . . But be careful when you go shopping for the Tomys. There are a couple of variations of the basic motor available, and you may discover after you've bought the toy, opened the package and destroyed the plastic-doll housing that you have the wrong motor. The only motors that work are those that have a built-in escapement pawl to slow the motor down. It's this pawl that you must add weight to, in the form of a long straight pin, to make the motor slow down and run reliably for a full two minutes. (Stock motors, with escapements, run only about 30 seconds.) To avoid mistakes, I buy only one of the dozen or more Tomy models: the little robot that looks like R2D2 in "Star Wars." It costs under $2, and is available at almost every large toy store.

At Taft this year, I got to see hand-launch glider's first cousin: catapult. This is a great event for weak arms, but it can be dangerous. Saw Ron St. Jean and his son flying a miniature (about 12") glider built just like a HLG but tougher, and launched with about ten strands of 1/4 flat rubber, about a yard long. They pulled the model back, released it, and it simply *disappeared*, reappearing at about 150' in a gentle glide. I was amazed . . . guess my idea of catapult has been watered down by too many years of high-starting those big, slow, majestic R/C gliders. To have a model leave your hand like a rock out of a slingshot is awesome.

I just bought a pound of 1/4 Sig rubber from the hobby shop. Bet you can't guess what my next project will be! •

F/F Scale . . . *Continued from page 59*

cause we only made two passes around a lake, then we got in line to land at Whitman Field. We landed at 1:25 p.m. on Friday. After parking the Charger, Jack and I registered, and then went back to the airplane to get it secured, and to sit back and watch the rest of the airplanes land.

What was to follow is hard to describe. By 3 p.m. the announcer said that by this time, there were more airplanes here than there were after the fifth day, three years before. They were actually landing one airplane every 20 seconds!! Yes, you read that right! At one time, Jack and I counted sixteen airplanes on final. What a show! Thank goodness, we arrived just ahead of all of this traffic.

On Saturday, there was another full day of people and airplanes. Jack and I walked miles this official first day of Oshkosh. We drooled at the many varied and beautiful antiques, home-builts and warbirds. However, Sunday was the day to remember. No more production type aircraft were permitted to land, because they had physically run out of space, and they were requested to fly to other neighboring airports. There were something like 13,000 airplanes there by only the 3rd day! The crowd was reported to be around 200,000. Can you imagine how much Coke and hot dogs this many people can put away? The potty lines were also something else. . .

Several hours before the airshow was to begin, the crowds were already sitting down picking out wings to sit under. We kept close to the Charger just to protect

it from curious hands.

Each afternoon from 3-7 p.m., there is an Air Show, and they always start off with the Warbirds. When the Air Show started this day, none of us were disappointed. The first attraction was 24 T-6's and SNJ's flying overhead in formation. Can you imagine how that sounded? I mean it's incredible. There were three B-17's with a 4th on the ground, a couple of B-25's, a B-29, an ME 109, a Zero, Corsairs (one of them 4000 hp!) a P-40, P-38, Sea Fury, Wildcat, Hellcat, TBM, several T-28's about a dozen P-51's, a couple of Avro Ansons, and Mentors. All in the air at the same time!

The airplanes were sequenced in such a way that all were not flying by at the same time, but done in such a way that there was action in front of us continually. Oh what sounds! The Air Force even had an F-14 with a scant 42,000 lbs of thrust. The pilot of this bird put on a show I'll never forget. We even got to see an Air Force tanker with the long spout hanging out and a couple of F-80 jets simulating taking on fuel. Also a Quantas Airlines 747 doing a fly-by with gear and flaps down followed by a real buzz job a couple of hundred feet off the ground.

There was more to the air shows, but mostly aerobatics, and neither Jack nor I care that much for one aerobatic routine after the other. We usually left for the dorms when the Warbirds were over, and that eliminated fighting the crowds.

Monday was pretty much a normal day with the crowds being more realistic in size. This gave Jack and I the opportunity to really check out all of the antiques and homebuilts. With a show of this magnitude there's always some airplanes that leaves you with an impression you can't forget. Such was a 1928 Cessna Airmaster. We've all seen models of it, but until you see the real machine, it's hard to appreciate just how neat this airplane truly is. The restoration was letter perfect, and was as original as possible. The all-red Cessna had no radio or a tailwheel, just a skid. The owner probably has his own grass strip. It had a Mohair interior, and the instrument panel had but a few dials to read. It had my vote for best antique.

In the homebuilt section, there was an increase in 'composite' aircraft with the Varieze's leading the pack. I really didn't see any new designs, but well built examples of many of the standard favorites. The RV-4 was there, and I was able to check it over pretty well.

I have only scratched the surface of all the things we saw and did. There is not enough space to cover it in full detail. Oshkosh is to full-size aircraft that the Flying Aces is to F/F Scale modeling. You have to treat yourself to it once, at least, in your life.

Jack and I had planned to leave early Wednesday morning and head for Dallas, were we had expected to visit with Bill Caldwell and Vic Larsen. The weather briefing indicated a front coming in our flight path, but all indications were that we could stay ahead of it. We took off and headed south to Rockford. A few miles later we came to a screeching halt with a landing at Rochelle. Who should be there but a friend of mine with a Charger from Atlanta. He had left before us but obviously couldn't make it any further, either. Soon after, a Christian Eagle landed, and we all sat around waiting for some kind of break. About 2-1/2 hours later, it quit raining and off we all went. The other two planes headed south in terrible looking stuff and we headed west. Twenty miles later we were down again because of rain. We spent the rest of the day and night in Dixon, Illinois, only about 160 miles from Oshkosh.

The next morning was foggy. The local people told me that this seldom ever happens. At this point, we were climbing walls. We checked out of the motel and headed for the airport. I checked weather, and it was supposed to get better by noon and be clear north and west of us. The front we were in was not moving and was enroute all the way to Texas. We decided to go home pretty much by the route we came after the last weather briefing.

As we were preparing to leave, the unmistaken sound of a radial was heard. Of all things, it was a beautifully restored Clipped Wing Monocoupe on its way to Oshkosh. We were hoping to get a weather report from the pilot, but since he had come from the opposite direction we were going, he couldn't help. Let's say that we were able to nurse our way to Dubuque, Iowa, where the weather was definitely O.K. We got as

far as Worthington, Minnesota, where we spent the night.

The next flying day was a very long one . . . 10 hours in the cockpit, but we got all the way to Provo, Utah. At this point, we could see being home a reality. We spent the night in Provo, and departed early the next morning to Cedar City and Las Vegas. In Vegas, it was already 113 degrees by 11:30 a.m.! We got off O.K. but the Charger just would not climb high enough to get us safely over one of the passes. So, I had to turn back and land in Las Vegas again, with the two of us sporting the longest faces you've ever seen! Fortunately, Bob Haight was home, so he came out and picked us up and provided us with his hospitality. I hated to get Bob out of bed at 4 in the morning, but I wanted to be ready to leave Vegas at daybreak. The flight home was uneventful, and Corona was a most welcome sight. Another trip to Mecca and back was safely over! •

R/C Cars . . . . *Continued from page 38*

Team already races three Delta Super J's, so we know them pretty well, as I have raced my car for three years now, Cheri (Dear Wife) has had hers for a couple of years, Billie Lee's (daughter, 14) car was new this season and we are presently scheming on how to get Joshua fixed up with one. Yes, I know the basic, out-of-the-box Super J extremely well, but the Champ's car ought to be something special. . .

OK, it is special, but I could have taken any of our cars apart and learned about as much as dismembering Art's car, which is why I'm not overly excited anymore.

Still, there are a couple of things that are different. The most obvious was the front crossbar being machined some to get it a little lighter and the pics show what was done. Looks like a lot of work for little gained. Second thing to catch my eye was the black radio tray, which turned out to be another off-the-shelf part, just painted black. While checking out the tray I finally noticed that Art had mounted it about 1/4 inch lower than stock, done by notching the forward ends of the hangers and shortening the forward nylon stand-off. Just to show you that even the World Champ of car racing is not above little mistakes, the notches in the hangers are 1/4 inch, but that was a touch too much as there are .020 nylon washers used to space that tray back up a bit.

I guess the rear hangers contained the only real surprise on the whole car, as they are drilled for lightness, from the bottom up, the drill runs stopped just short of coming through on the top side of the hangers.

Actually, there were two surprises, the car is fitted with the Delta differential, a ball-type diff that I have had super success with, both because it works and is very reliable. But at large races like this the traction generally goes way up and Art is one who can usually be seen running a solid axle with most of the other fast guys doing the same. There have been very few big races, especially in the U.S., won with diff-equipped cars. This particular unit was set tighter than I ever run mine, so there was enough traction to need a relatively tight diff setting.

The pipe is an experimental one, carrying the designation EXP-3, a pipe that seems to work well on a Picco but has been less than spectacular on other engines. In any case, it is one of very few pieces on this car that you can't just go out and buy, although an improved version will probably be out as you read this.

Most of the radio system is also hard to buy, incidentally. Yes, it is a KO radio, made in Japan and presently being imported by Kraft, referred to as the K-Line series. However, Art used the older Delta "Blue Box" transmitter that he has raced with for years and the particular servos used in this car did come from KO, in fact direct from them, as Kraft so far has not added them to the line. The car came to me without a transmitter and so far efforts at getting mine to work the radio properly have failed. Still, the servos do seem to be pretty quick and if Art went to so much trouble to get them, they must have something going for them.

Also missing was a battery pack for the receiver, the one shown in the car is actually one of our spare packs. Don't know what pack Art used, Delta does sell a small capacity, lightweight pack that is

similar.

I still prefer the older Delta fillers for tanks but they now sell tanks equipped with the Gits filler lids and as shown in the pics. Do notice that a 1/16 wire handle has been added for easy filling. Much more importantly, extra closing power has been added with the cross-piece on the top and the short springs seen on each side. I still remember the first time, several years ago, that I tried a Gits filler, two in fact, and it took only a few minutes to decide that neither one would seal worth a damn, leading to real funny engine runs. Since then, I have seen many racers have "unsolvable" motor problems with this type of tank filler, so if you are using one do be sure to copy what Art has done, or to figure out another way to get the same result.

Back to the radio, you may be able to see that Art spaced the servos back up a little by mounting them to 3/32 inch nylon plate. The front bumper is also nylon and a stock piece, except for leaving out two of the screws that hold it to the chassis pan and some profiling in the front center to lighten it. Yes, the drilled body posts are stock parts, even if taking the lightweight theme a bit further than I can relate to!

And now, The Engine: Here is where you would expect to find some real tricks. Wrong again, Bucko, this car has a very stock Picco .21 sitting in it, one just like you can buy from Delta, importer of Picco engines. As you may recall from an earlier column, Picco's are available several different ways from Delta, to duplicate this one you order a short-block (unassembled) motor, asking for the version supplied with a phenolic retainer rear bearing, price is $130.00. Either use the stock Picco head (as I do), or order Delta's button head/heat sink combination. Slip on a Delta SVC800 carb, their own header and you've got it.

I very carefully checked the whole motor for port work and so on and there simply isn't any. A couple of corners were knocked off, probably just to clean up the crankcase casting, an RPM rod was used, deck clearance was set at about .015 and the carb was run with no insert, leaving a huge .375 hole for fuel and air. Only thing in the motor worth looking at twice was a very slight scuffing on the liner and the piston in the area of the forward transfer ports. It may have been caused by almost anything, but at some time one of those dreaded foreign objects did go whistling through and stayed long enough to leave a mark, leaving me wondering if possibly the car wasn't at one time fired up without an air cleaner in place. . .?

Even racing a stock car there are a number of things that are optional, dependent upon track conditions and these are next up. The nylon bumper is simply a little lighter than Kydex but can also be bent easier. Front rubber is from Associated, their familiar molded pieces. Notice that the completed tire/wheel assemblies were balanced with brads stuck in the tire from the inside edge . . . highly recommended practice with any molded tire. Rear rubber used was Delta's grade B, the hardest and least likely to bounce of all their compounds. Also gives less traction but that helps the car turn well and we'll go into that very subject, tire selection, in a future column.

Gearing used was pretty short, a 9 tooth pinion against a 51 tooth main gear, giving a 5.77:1 gear ratio. That is a pretty low ratio that gives really good acceleration off the corners and spins the motor on the straights so tight that you would swear it would break.

As mentioned already, the differential setting was tighter than what I normally use. A long ways from locked solid, just not at the setting I use, which is just tight enough to keep from spinning the main gear on acceleration. The clutch shoes were cut as shown in the Delta instructions for their cars, where I was expecting to see almost full shoes in place.

The caster blocks used were the 4 degree units, which means they add 4 degrees to whatever the crossbar already has, which is 7 degrees. We normally use them same blocks while 2 and 0 degree blocks are also available.

Hmmm, guess that is about it, except for the fact that Art used Delta fuel, lit off by a K&B long idle bar plug. And just a smattering of proven driving skills. . .

Cripe, almost forgot the body used, mainly because it didn't come with the car, but Art used MRP's very effective Budweiser Spyder body, which is also the Dirty Racing Team's favored body for the Delta cars.

SO, WHAT DOES IT ALL MEAN?

Several things. Delta has built a reputation on racing what they sell and proven it yet again, this time with a World Championship, won with a car that you, literally, can buy right off the shelf and duplicate easily.

However, we aren't doing to our Super J's any of the little things that Art did to his. None of us can handle that much power so we run .187 venturis in our Picco's and K&B's. Kydex bumpers are more up to club racing abuses than nylon and the same material also makes a better radio tray, at least for our

purposes. I'm not interested in the special pipe, the constant diameter ones still working well. And for club racing, machining the crossbar and drilling the hangers would be a waste of time, even having the right tools, and I do.

To me, strictly as an observer of this type of competition, it is also nice to see truly stock equipment starting to win more and more, in both 1/8 and 1/12 scale racing. It hasn't always been this way, for instance, recent advertisements in the Rev-Up, ROAR's house publication, state that Bill Jianas, a very well-known racer, has used a car that only looks like an Associated car, actually almost completely hand-built with magnesium used for motor mounts, rear bearing blocks, front and rear body mounts, wheel hubs, and radio tray mounts with ball bearings in the steering arms and servo saver, aluminum tie rods and so on, stuff that simply has been unavailable to you and I in the past. This is starting to change, in fact the shift to ready-to-race equipment has been going on for sometime, reaching new highs with cars like the Super J just gone over and the Asociated RC12E that we have been detailing in recent columns.

RC car racing is getting better and better all the time, just look at how good the equipment is today, regardless of the brand name on the label. . . •

Pattern . . . . . *Continued from page 25*

engine set up". However, the most reliable, trouble-free set-up we have seen is the side-mounted engine utilizing exhaust pressure only. Schnuerle, non-Schnuerle, rear exhaust, side exhaust . . . it really doesn't matter. This set-up seems to be the least affected by attitude in the air. The fuel tank must, of course, be fairly well centered with the engine.

Why should this set up be preferred? Try the following reasons:

1) The fuel pressure head is more constant (tank-to-engine centerline).

2) The crankcase is less likely to puddle up with fuel if the fuel system is siphoning while on the ground.

3) Flooding is easier to clear.

4) The exhaust system is usually easier to set up and maintain.

The chief drawbacks are the unbalanced weight, drag, and appearance. Obviously, many other set-ups can work perfectly, *but*, until you learn how to handle pressure system problems, enclosed pipe heat problems, inverted starting problems, tank location problems, etc., keep to the simple set up and reduce the frustrations. •

Pylon . . . . . *Continued from page 45*

thanks goes out to the sponsors, the Chicagoland R/C Club and the Skylark's Club, for conducting a novel and interesting race. I can only suggest that if your club is interested in a new event that is sure to grow, try Sport Scale Warbird Air Racing!

Painting and Such

One of the marks of a racer is a generally superior-looking aircraft in workmanship and finish. And finishes seem to be where most questions come about. So, assuming you're interested in doing more than painting your planes with a brush, here's a run-down on the kind of equipment you'll desire. Remember, though, some guys can get by with a car inner tube as a source of air supply and their wife's perfume atomizer for the paint application, and still wind up with a decent looking finish.

Ideally, if you're buying all your spray equipment from scratch, you should match everything together.

If you're not a prolific painter you may find what's called a "touch-up gun," in the automotive repair business, adequate. Typically, they run somewhere around one hundred bucks in cost and require an air supply of 2-1/2 cubic feet per minute at 50 lbs. pressure. *(Will work quite nicely down to 30 lbs. je)* For anything up to Formula I size aircraft, they work just fine. For anything larger in size you'll probably find the "touch-up gun" has too small a spray pattern and you'll find yourself fighting an over-spray/drying problem. The "touch-up" size gun does come in handy for those touch-ups and minor trim painting situations. *(Different spray head/needle combo's are available for most guns. je)*

A production type automotive spray gun will be priced around $150.00, and requires a much stronger air supply. Probably up to 8 cu. ft. per minute at 80 lbs. pressure. This size gun makes quick work of "our" size airplanes. Its only drawback is that it's less than ideal for detail and trim or repair work. A third type of spray applicator is the air brush. These can run anywhere from $20-$150.00, depending upon how fine a line you'd care to paint. Something in the neighborhood of $30.00 will get you a decent air brush; certainly adequate for our trim and minor repair work. Most air brushes will work from a can of compressed air, or from your air compressor with the pressure regulated down to around 20 pounds. Another form of gun you might be tempted to use is called 'airless spraying.' Relatively inexpensive and compact, its drawbacks far outweighs its advantages, that is film thickness is difficult to control, resulting in sags or runs, especially on contoured surfaces; it is difficult to obtain a fine surface finish with epoxies or enamels.

We've mentioned the air supply several times which leads into the types of air compressors available. The cheapest initial source is a can of compressed air or freon which sells for 3-4 bucks a can. The only problem with these is that as you spray, the release of the product tends to cool the can, which lessens the spraying pressure. It's also an expensive, non-replenishing air source. I was once detailing a Japanese Ki-61 scale job and went through 5 or 6 cans before it finally dawned on me that the money could be going to pay for an air compressor, rather than what were soon to be empty

cans. Next in line would be a piston type compressor without an air storage tank. The drawbacks to this are: it's difficult to regulate the air, generally of lower capacity in cubic feet per minute and pressure available, and this type seems to compress as much water into the air as it compresses air. Cost would run from $100.00 and up.

Last in line would be a 1 hp or greater compressor with an air storage tank with an inclusive pressure regulator/filter. One which operated in our need range (depending on you spray gun, of course) would put out 6/8 cu. ft. of air a minute at 100# pressure. Some form of air regulator is needed to both control the amount of air reaching your spray gun, and equally important, to trap any moisture or oil created by the act of compressing air. My best advice would be to go talk to the automotive paint dealer in your neighborhood. Not only can he sell you top of the line matched equipment, but chances are, he'll have some good used stuff he'd deal on. In the next column we'll get into how to use this equipment.

Odds & Ends

Getting ready to mask off the trim on your new bird, but you're tired of paint creeping under regular masking tape? Or you've pulled the masking tape off only to find the finish coming off a curve with vinyl tape and having it creep off line just as you hit it with the spray paint? SICK of painting on the liquid films and then cutting away what you wanted to paint? Well, Bunky, try Scotch 3M Fine Line Tape, part #DC 021200. This is a smooth masking tape which resembles vinyl tape with none of vinyl's bad characteristics. Available in widths from 1/16 up to one inch at your friendly (see, I told you) neighborhood automotive paint store. The tape works particularly nice if you want to mask off a pin stripe next to your main color scheme. Simply determine the width of the separating stripe and mask off using the same width Fine Line Tape. Paint, let dry, and then pull off the tape, and there you have it. A constant width separating line, no bleed-under, and no finish pulled away.

Turn left. •

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1 to 1 Scale . . *Continued from page 10*

responsive and very respectful crowd that understood the flying and the effort the modelers put into the competition.

The static judging in Sport and Giant Scale was done in a most unusual area. After the judges previewed each set of models (C/L, R/C Sportsman, Expert, etc.), the models were placed in the center of a small pavilion in front of the Coliseum. It just happened that the structure was 31 feet in diameter to the inside edges of the stone benches. The judges, therefore, had a shady, but naturally lighted area to operate in. The models were placed on the concrete floor and, in deference to the heat so the judges wouldn't have to walk back and forth, rotated to the positions they desired by Bob Spivey, a local support member who was *always* around to help when needed. After each classification was completed, the scores were reviewed to see if the judges felt any one might be way out of line.

The static scores revealed a 16 point spread in Expert, with 85% of the models falling under a 10 point spread. The high score was Earl Thompson's Howard Ike with a 95. The static scores in each class kept most models in the competition and the consistency revealed in the flying was often the deciding factor. Several persons experienced problems of one sort or another. Tom Cook fought engine gremlins as well as his drag chute. Those who have watched Tom fly his beautiful twin ducted fan F-4 have marveled at the efficiency and reliability of the model. It just didn't seem to be in the books this time. Hal Parenti fought a troublesome spinner on Round One, engine problems on Round Two, and succumbed to a rate switch on the elevator in Round Three, resulting in serious damage to his new Zero.

The results in the Expert class found Art Johnson with his beautiful twin Mustang in first, Leonard McCoy (Dornier) second, Phil Sibille (Spitfire) third, Cliff Tacie (Citabria) fourth, and Roger Geers (Shrike) fifth. The team selection for the Sport Scale World Championships berths included Phil Sibille, Cliff Tacie, and Charlie Chambers. The alternates are Hal Parenti and Bob Karlsson. A number of the finishers either did not

have "legal" FAI models or did not elect to try for the team. Charlie Chambers flew a ducted fan and is eagerly looking forward to flying the first successful model of that type in the World Championships. We'll have to hope that if the W.C.'s are held in Reno next year that he can hack the altitude!

In the Sportsman class, Wayne Frederick brought a P-39 into a first place win just .34 of a point ahead of Bill Coombes. Third was claimed by an F-16 flown by Robert Gibson, an astronaut in the NASA space program. Dr. James Word maneuvered a Smith Miniplane into fourth place and Bob Wilson's T-28 brought up fifth place.

Giant Scale was, of course, a crowd pleaser. Art Johnson's P-40 was in fine form and "cleaned everyone's plow" by almost 10 points to win. (Featured in June '81 **MB**.) Vito Tomeo and his Sea Fury garnered second, and third place was captured by Mario Yederlinic on the very last flight of the day when he squeezed out John Pagan by less than two points! John, incidentally, flew twin Jungmeisters in Giant and Sport Scale. Everyone wondered where the other parent was when they saw the junior version nestled neatly under mother's wing. In the Sport Scale division, Michael Moore flew to a first place Senior win over John Shliesing. Michael's score would have placed him well up in the Sportsman open division.

In Precision, there were four contestants vying for the three FAI team berths. On Saturday, the strong crosswinds were quite a problem on round one. As a result of the winds, Earl Thompson lost his Focke Wulf biplane on his landing approach. It was a devastating loss for Earl. You may recall that Earl missed the last team by less than a point. This time, he posted the highest static score. He will be an alternate for the team for 1982. The winner of the event was a very familiar name to the FAI process: one Bob Wischer. Steve Sauger with his beautiful red Orion was a close second, and George Rose with his P6-E was third. The flying weather late on Saturday evening and Sunday was virtually perfect, making the team selections a wide open affair due to the necessity of really putting in a barn burner. Sunday was so perfect we had difficulty determining a wind direction (rats . . . what a year to pick to run the event instead of flying in it!).

Since I had the opportunity to work with all three scale disciplines, handle the models, and documentation, oversee the judging, and tabulate the scoring, I was privy to some interesting facts. While our scale rules are generally unified, there is much latitude in their application between free flight, control line, and R/C. The problems which I experienced in trying to fairly administrate the competition were those generally caused by a lack of understanding of the rules. I found scale rulers in Precision which measured the *full* scale aircraft in inches! This, of course, is of no value at all in measuring the model. Some had no ruler and others, no three view. In Sport Scale, the presentations were checked for "6 pages 8-1/2 x 11 or the equivalent". Many had less, but some much more. They were asked to pare down to the maximum. One official stated that when this was done at his contests, they counted off the first six pages and stopped. Several models suffered by lack of documentation. A couple probably had documentation which did a better job of proving the model inaccurate. . .

One modeler provided the kit plans as the "three view". Some no indication as to which of two or more three views to use. A couple did not indicate any information for color, either written or otherwise. One provided a three view for a different airplane. Several Precision models had rulers which consistently revealed the model was undersize. It could only be assumed that the model was accurate overall but the ruler was wrong. The basic purpose of this information is only to point out what every scale writer has reiterated many times; read the rule book and spend time on the presentation. I really felt for the fellow who did such a fine photo job on his *model* for his presentation and had only one photo of the actual full scale counterpart.

The concept of having a pilot's meeting on Friday before the flying Saturday as proposed by my predecessor, Dale

Arvin, was very valuable. There was ample relaxed time to voice opinions, etc. and set the ground rules. Two very evident gaps in the book became clear. What is an attempt or an official flight? The determination which was presented and worked well was that (A) an "attempt" is a round. When the clock starts, that's it, and (B) an "official flight" was designated as occurring when the wheels left the ground.

The instructions and decisions made at the pilot's meeting were transmitted to the judges at a meeting prior to flying on Saturday. Evidently the procedure worked well since *very little* feedback occurred during flying indicating displeasure with judging. All flyers, if they flew all four rounds, received equal exposure before the judges. The range of scores were wide with a poor maneuver getting a high score. The sometimes seen 7-8-9 spread didn't seem to exist. The three judges on each line were reasonably well balanced and while there was some "easy" or "hard" combinations, the spread was not great.

Well, at any rate guys and gals, my first excursion into Nats Scale officialdom was *really* a most enjoyable experience. While I couldn't be at the flying site for free flight, I appreciated the contact I did have at the Coliseum when they turned in their models. The control line contestants were very helpful in steering us through the competition. There was much joking about the shirt that read "R/C Scale Event Director" on the guy who was working at the circle. I counted it a victory when, in a day and a half, I didn't step on a single set of lines. . .

To Bill Pepin who winged it; Bert Dugan and Bob Adair who just appeared and worked in all three categories beautifully; to Dave Abel, Paul Clements, Art Johnson, Bob Karlsson, Walter Stivik, and Steve Sauger who judged static; to Frank Broach and his judge crew; Ron Hesselbrock on the flight line; Suzi Stream and mom Betty who tabulated; and Monty Groves who processed FAI models and did millions of important jobs, a big thank you. Lastly, to Cathy, a thank you that is impossible to express fully. She knows I love her. And what of the dozens of others who manned the transmitter impound, ran scores, and were timers? Thanks guys and gals. At the risk of plugging NASA, the only way it happened at the last moment was because of the NASA network and membership.

COUNCIL APPROVES RENO BID FOR '82

At the Saturday Council meeting during the Nats, the possibility of a Reno Scale World Championships moved one step closer. The basic plan put together so ably by Monty and Patty Groves was overwhelmingly approved. All of the paper work is to be completed in order that if the final vote in December goes in our direction, entry forms, etc. will be available at the meeting in Paris.

Slides of the area were shown and a discussion of the proposed event occurred during a Thursday evening NASA meeting. Some key personnel were contacted during the week. There has to be a finalization of some aspects of the proposal and that should occur soon.

THE FINAL VOTE

The final vote for our 1982-83 rules changes has come and gone. I sincerely hope that you have taken the time to voice your feelings sometime during the cycle. Personally, I have received only four pieces of mail during the period from District VI. This makes it very difficult to adequately arrive at a decision that reflects the thinking of the membership. I hope it comes out the way you wanted it. . . •

R/C World . . . *Continued from page 11*

(Five laps must be flown to qualify).

10. Competing aircraft to be flown one at a time *(Methinks we 'Yanks' will have to have some 'match races'! je).*

11. No limit on the number of models entered, however, a separate entrance fee will be charged for each one.

12. Each turn point will be flagged.

13. Turning inside the Pylon will be deemed a cut and will result in a loss of 50 points (You will not be required to go back around the pylon).

14. A three-view scale drawing must be supplied of each model entered.

15. Documentation must be supplied

on the model entered, giving a brief description of the actual machine, plus photos and proof of the color scheme, where available.

16. Builder of model rule does not apply.

17. The pilot does not have to be the builder of the model. (This rule has been brought in to enable a two-man team to enter.)

18. In addition, there will be a team prize for which a team of three pilots may enter to represent their country.

19. An entrant may enter any model used in the full-size event regardless of his nationality; i.e. Americans do not have to fly CURTISS machines only *(That's damn sporting of 'em, ain't it guv! je).*

Now, I'm just waiting for someone to say, "Just what we need . . . another event." But remember troops, variety is, after all, the spice of life. . .

★ ★ ★

Did you know that way back in the early 1900's, a pilot by the name of Charles C. Contact discovered that props made convenient handles for hand-starting aircraft engines? This was before the advent of the electric starter and Mr. Coffman's famous invention, and pilots throughout the world have honored this man by saying his name each time an aircraft engine is started! (From the South African Newsletter, *Flysheet.*)

★ ★ ★

In September R/C WORLD, we mentioned that the German Model-flying Association and the model flying club 'IKARUS' was planning on sponsoring an international competition of R/C model formation flying this September. Due to the short time available to plan this first contest, it has been re-scheduled for May of 1982. This will allow more time for finalizing details and to expand the present proposed flying site. Specifications and details of the contest are now available by writing to: IKARUS Harsewinkel e.v., Postfach 1234, 4834 Harsewinkel, W. Germany. As a matter of interest, Harsewinkel is about 25 miles, or 40 kilometers, south-southeast of Osnabruck . . . has to be pretty country.

★ ★ ★

Again, referring to the September R/C World and Don Godfrey's big B-25, it's sad to relate that this effort 'bought the farm' at Olean, New York, on the 25th of July. As Al Alman reported in the *Titan Tabloid*, Vol. 1, No. 2, it "succumbed to a severely herniated pushrod aggravated by an over-articulated and sensitized protracted glitch."

To learn from the demise of Don's B-25 (we also understand he will build another one, with retracts, etc. this time), let's examine a possibility that may have happened to Don, reading several thoughts from Al's report. I'm sure the following has been observed, or experienced, by some of us, at one time or another. This is not to say that this is what happened to Don, but it might have. . .

Almost all of today's servos do not have internal stops to limit rotary wheel travel (linear types obviously do), so the possibility exists that, when improper, or no information is detected by the receiver, a "glitch" can sometimes occur that will cause over-rotation of the servo output arm and cause a clevis on the servo output arm or wheel to disconnect itself! Yes, some R/C types do utilize snap-on devices on servo wheels, or arms, as an expedient. This 'over-rotation' of the servo output shaft can also deform or damage the end of the pushrod, and with the possibility of control surfaces flutter, viola, instant kits-ville. . . Even though most of today's servos feature heavy-duty gear trains, a servo that can be stalled by a binding pushrod (or glitch) and/or subjected to extra punishment induced by control surface flutter, can, in time, have a damaged gear train, and this can further aggravate control surface flutter. Check your radio (servo) installation frequently, whether you're flying a 'biggie' or not. The model you save . . . may be yours. . .

Along these lines of thought, just received a note from, and, a revised edition of Dick 'Big is beautiful Phillips' booklet, *Building Big Is Beautiful.* It contains quite a bit more information than the first edition and is a recommended addition to your modeling library. Excellent construction thoughts for the builders of 'biggie's, for example, but a lot of food for thought for R/C airplane drivers in general. Well worth the $7.95 per copy, postpaid. Dash off a check to "Dick Phillips", 9 Geneva Cresent, St. Albert, Alberta, Canada T8N 0Z3 (dig that crazy zipcode!). *(Have you heard about the 9-digit ones we're getting? wcn).*

★ ★ ★

The following letter was recently sent in by Jean Andrews, a professional full-scale helicopter pilot. Jean used to fly the "Highway Patrol" for a Los Angeles radio station; now flies search missions for a large fishing company in the South Pacific, and is momentarily home on leave. He is a free flight modeler, and also put in a brief stint as Assistant Editor for **Model Builder** *in the early '70s.*

Jean's letter is written as a modeler talking to modelers, and should be taken in that respect. We certainly appreciate his concern for our hobby/sport, and believe his comments are important to keep in mind. wcn)

"Dear Bill:

"Let me tell you of an incident which occurred recently. As you know I am a Free Flight modeler and also a professional helicopter pilot.

"Last Thursday, July 29, I ferried a helicopter from Van Nuys to San Diego and, because of weather, my route took me over a well-known model flying site in Orange County.

"Being a modeler, I was alert for radio controlled traffic over the spot, and overflew the area at seven hundred feet. Sure enough, though, there was a model

at my altitude. It appeared to be a quarter-scale J-3 Cub. Whoever was flying the model knew his business, because he got out of my way, and there was no danger at any time of collision.

"Two things frightened me about the incident, however. . .

"1. My initial impression, because of the size of the model was that it was a full-scale aircraft, at considerable distance from me, rather than a model which was actually much closer. It was only because of my modeling background that I was able to correctly perceive the possible hazard.

"2. Based on the evasive tactics of the modeler who was flying the ship, it was obvious that he was experienced and a very capable pilot. The excessive and illegal altitude of the model, therefore, was probably due to the above-normal size of the ship. The pilot probably was not even aware that he was operating at an unsafe altitude.

"Bill, please use your forum to caution modelers of these larger ships . . . that their altitude perception may be incorrect due to the large size of the ships they are flying. The resemblance of their models to full-sized aircraft, when seen from another aircraft, is almost surreal, and may mislead a full-scale pilot into flying into unsafe proximity with the models. This site is very close to two major Orange County airports, both of which have a large percentage of training flights in progress at all times. These non-modeling oriented and preoccupied students may be lured into serious danger if caution is not emphasized in model flying near any airport." Kindest regards, Jean Andrews, AMA 11001

NICE TO KNOW DEPT. . .

Manufacturers of hobby items will come on the scene and produce a product. Most are 'legit and try hard to provide a good product at a fair price, and have replacement parts/service available, as required. It wasn't the VW's macho good looks that made it what it became in this country, it was spare parts availability and service. That simple. And yet, some manufacturers are reluctant to provide a spare parts list because of the 'hassle'.

Some years ago, I purchased a Sterling R/C P-51 kit and had an improperly die-cut fuselage side. The guarantee card was filled out, defective part noted, and dropped off at the post office. It seems like the replacement parts were waiting for me when I arrived home . . . Service.

Many years ago, Top Flite had some difficulties with the original MonoKote. Many, many replacement rolls were sent out to customers . . . Service.

Radio system manufacturers have suffered from and profited by the degree of service provided their customers. My first digital R/C system, affectionately named an "Electronic Aircraft Disposal System," spent a good portion of its life, traveling to and from the manufacturer, plus getting plenty of rest sitting on a repair shelf. Service? Not really.

Byron Originals has been shipping its big P-51 for nearly eight months as you read this, and has received many complimentary letters, phone calls, and such from happy Mustang owners. And, along with the words of praise and thanks, comes some suggestions and constructive criticisms. Byron has responded with update information sheets, containing hints regarding the balancing of control surfaces, retract system sequencing, landing gear alignment, and several other items, which are sent to all P-51 kit owners and to dealers stocking the kits. If you own a Byron '51 and haven't received an update, drop Byron a line. Speaking of P-51's, look for M.B.'s review of the 'Big Byron Bird' in a near future issue. Skip Ruff has been working diligently on his and promises to crawl out of the kit box very soon. . .●

Sport Scene . . *Continued from page 34*

gear with 1-3/4 inch wheels and a 1-3/4 oz. Pilot tank. It flies for about 6 minutes at full throttle. Harry says: "Aerobatically it's more than I could have hoped for . . . it does everything except Lomcevack. The small servos are just too slow to change the direction of the snap. I designed the little bipe because I didn't want to give up aerobatic performance just to fly in a school yard. Naturally, it's at its best in calm air, however I did fly it off of the dichondra at Bill Merwin's ranch in Sacramento (where the 1/4 scale guys get together) in a 25 knot wind and did a snap on takeoff, and then a snap-and-a-half on takeoff on the next flight.

"For my next bipe, I think I'll bump it up to about 32 inch span and use a O.S. 10 FSR and some Bantam Midget servos. And then I think I'll really have something. The .10 won't be as noisy as the T.D. and the servos are much faster for quicker response."

Unfortunately, Harry sent no black and white photos to share with us, so I'll try to describe the model. The fuselage is quite reminiscent of a Southwest Sailplanes "Honker". The engine is half cowled and mounted upright. The wings are a fully symmetrical airfoil of roughly 15% thickness. The upper wing is slightly swept, the bottom is straight. The wingtips look to be in the same longitudinal location. Only lower wing ailerons are used. Wings rubber band on, the upper wing is supported by a pair of vertical struts similar to those on a Q-Tee. No interplane struts or flying wires are used. One of the snapshots is of the model flying inverted. It looks great.

The final feedback item is excerpts from a long letter written by Bob Foster of Greensboro, North Carolina. Bob writes, "Several years ago I sent for Davis info. While I was intrigued, I could not forget an ill-contrived McCoy .049 I had in the '50s. It *never* ran, but did leave some lasting marks on my index finger. I decided to wait and see. Maybe two years later, I was writing to Earl Van Gorder of *Flying Models* about CO_2 stuff and mentioned the Davis Diesel. His reply included a good recommendation so I ordered the kit. Some months earlier I had inadvertently gotten into

1/2A R/C with a Q-Tee with QRC kit which a friend found in a dumpster behind the department store where he works and gave it to me. I had been back into models for a year or two with Peanut Scale and CO_2 so my skills had recovered. The Q-Tee turned out very well. *But*, the short engine runs made me feel I'd really been gypped . . . 1-1/2 minutes in the air is not how to gain your ease with R/C planes. The increased running time of the diesel seemed just the thing, but . . . would it have enough power? In the meantime I built a Papillion glider and after running the diesel a few times, put the two together, using a 7x4 prop.

"Well, it worked! After warmup, the motor runs a consistent 5 minutes and that's long enough to get the Papillion pretty high. I learned to fly R/C on that combo because the engine run offered plenty of time to practice. I still fly it for fun and let others fly it to feel R/C. After 275 flights with the diesel, I've had no trouble other than two disc replacements (total cost on repairs, 30¢).

"Now, in your column you ask for experience with these things. Obviously, I'm not involved with controlling applications, but here are a few things I've found in the last two years with the QRC. Van Gorder told me, and I agree, the heavy-duty crank is a must. The heads do require some looking after to keep them tight initially, but after a while they seem to seat. I wonder if this isn't due to the heat seal (fluorocarbon disc) when it's new, being a little springy. I have had no trouble with the compression screw slipping; I ground the ends of the coil spring so they would not dig into the aluminum head and compression screw. I did change the reed to Davis teflon about 200 flights ago and it did change things, especially starting. I now use 2-3/4 turns open to start instead of 2-1/2. The Davis reed does work better after some use. I had no trouble starting it since I learned to close the needle valve completely when fueling (should have known that, anyway!) (I'll have to try that myself! l.r.) After starting, I let the engine warmup about 15 seconds and I don't lean the needle valve to final setting until the engine is warmed up. The final setting is about 1-1/4 turns open. During these flights, I've used mainly 7x3 and 7x4 props, though I have run 6x3 and 6x4 and even 8x4. All work, but on the QRC, 7x4 seems best. . . The instructions say to use a well broken-in engine and I agree because I've dieselized a Black Widow which wasn't as loose as the QRC and it has yet to start as easily as the QRC (which rarely takes more than 5 flips)."

Bob goes on to mention that the reduced fuel volume requirement is one of his key points in selecting a diesel over a glow engine. In 1/2A, where to build in an adequate tank is a significant problem. He also notes that he doesn't require maximum power from the engines, so they perform extremely well in his applications. If any of you have experience with the diesel conversions in either C/L (especially stunt) or competition FF, I am sure that we would all like to hear of it.

Models and photos for the month:

David Unruh, our Alaskan connection, has sent along photos of the model he built for the G-Mark 5 cylinder radial. He started with the plans for a Super Brigadier, molded the wing to the bottom, added ailerons, and used a NACA 2515 airfoil. At five pounds, it is a bit heavy, David says, but it will still loop from level flight! The Super Brigadier was chosen because David thought the slightly heavy radial would compensate for the short nose moment. David ended up adding a two ounce spinner nut! The model is covered with yellow and gray MonoKote, it looks great in the color slides he sent along with the black and whites for publication. Thanks Dave, it is always a pleasure to hear from you and see your projects (they seem to keep getting better, too).

Next aircraft is the "Foxbat" 1/2A unlimited Pylon racer. This model was built and flown by Larry Laulom. Weight is 17 oz. with a very hot Tee Dee .051 up front and guess whose radio inside?

Larry flew the model for demonstrations at the last MACS and wowed the crowd with the speed and maneuverability of such a small model. The wing is foam cored with 1/32 balsa covering. Finish is K&B epoxy to resist the 60% nitro fuel.

Third model is another one which was on display at the MACS. The P-51 is built stock from a House of Balsa kit by Pete Young. At the time of the show he had not installed the R/C gear. The airplane is very light, I would guess that with the lightest radio he could come in under 20 oz. That 4-blade display prop is sure a nice touch!

Final item for this month is a photo of the display of a new line of modeling tools. New to our field, but well established in the tool business, SIRS Surgical Instruments has begun marketing its beautiful implements through hobby shops. Prices are very reasonable (none of those beauties is even $10!) and they are the same quality as sold in sterile condition to surgeons (bet they triple in price or worse by the time you meet the FDA sterility requirements). For a price list if your dealer hasn't got 'em, send a SASE to SIRS, 3109 Orange Grove Ave., North Highlands, CA 95660. •

Engine Test . . *Continued from page 28*

issue of **Model Builder.**

Finally, for those of you who like the nitty gritty, here are the engine specifications:

Bore	.8345
Stroke	.724
Displacement	.396
Timing	
Exhaust	
Open 100 degrees ATDC	
Close 80 degrees ABDC	
Period 160 degrees	
Intake	
Open 35 degrees ABDC	
Close 62 degrees ATDC	
Period 207 degrees	
Main Bypasses	
Open 116 degrees ATDC	
Close 64 degrees ABDC	
Period 128 degrees	
Boost Part	
Open 117 degrees ATDC	
Close 63 degrees ABDC	
Period 126 degrees	
Combustion Chamber	
Piston Clearance	.014
Diameter	.483
Chamber Radius	7/64
Chamber Depth	.140
Venturi Bore	10mm
Rear Rotor Spacing	.0025

Rear Bearing	
ID	10mm
OD	26mm
Front Bearing	
ID	8mm
OD	22mm
Wrist Pin	5mm
Crank Pin	6mm
Connecting Rod	
Bronze Bushing	
Top	Yes
Bottom	Yes
Head Screws	3 0.5 x 12mm
Front End Screws	3.5-0.6 x 10mm
Backplate Screws	(3) 3.5-0.6 x 8mm
	(1) 3.5-0.6 x 10mm
Prop Nut	1/4-28

That's it for now. If you'd like to read more special features such as this, write to YOE, Bill Northrop. •

St. Clair . . . . . *Continued from page 33*

were available, but the engine instructions recommended a 16 inch diameter prop, but didn't mention pitch. Oba carved an ash prop to 6 inch pitch, which later proved to be a good selection. Construction of Oba's Berliner/Joyce Fighter was well along, ready for covering with engine mounted, when Oba says, "I was not going to. .005. Look at that picture where it's skinnied down. No way can I turn that little fragile airplane loose on its own and even hope to have it come down in one piece. No way! I cannot do that and I didn't!" There were no fields around where Oba could fly that were larger than a quarter mile diameter and they were full of ditches and hedgerows. He couldn't take the chance. He said, "My dream would be destroyed." Had Oba had a good flying field, he would have flown free flight and control line might have come much later. Oba reasoned that if he could fly in a circle the wing would always point to the same spot on the ground. If he mounted a fishing line on the left side and set the airplane controls to turn right, he could fly in a circle. He also reasoned that if he had low power it would do some ground hopping. This he thought could be very dangerous, so he designed an engine shut-off that he refers to as "no ground hopping" that worked when he touched down.

Next, he thought that if the nose of the airplane starts to turn in to the center of the circle or away from the center, the distance from the pilot to the center of the airplane will get smaller, due to the wing pushing the line in a bend. This he reasoned would make a long wing more safe to fly than a short wing. His airplane was already built, so he added a long spar to the inboard wing to work as a long wing. His reasoning now told him that all the drag was on the inside so he put a spar on the outside wing to equalize the inside guide spar, then put an airsock on the end of the spar to compensate for the drag of the fishing line. He used a fishing pole to keep the lines tight. The first flight was made in June, 1936, and was a total success. The engine would slow down when it was low on fuel and slowly descend until the "no ground hopping" shutoff would take over and cut the engine for a perfect landing. Oba was delighted.

Experimentation soon began by shortening the inboard spars that acted as a fishing line connector and the outboard spar that held the wind sock. The process continued until they were shortened to within the dimensions of the wingspan. Everything was working well, but Oba says he was really busy moving his fishing pole around on days that were windy. He mentioned his airplane had a tendency to climb into the wind and descend down wind. He figured that if he had two lines he could change the trim in flight. Then he thought, "Why trim? Why not just operate the elevators as on the real aircraft?" And so, BINGO! That was the way to go. It was June, 1936 and Oba was going to change the Berliner/Joyce Fighter biplane to two lines, but his wife was expecting a child soon. He didn't have time to make the conversion before, so he decided to fly it as it was since he was having so much fun and he would wait to build a new plane that coming winter.

His daughter was born August 12, after much difficulty to all involved. When things settled down, design work on the new plane began. It was named after his new daughter, "Miss Shirley". Although not yet proved, Oba believed if one line worked, two lines must work and four lines would give him 'full house' control. He had no metal control lines, only fishing line that he found stretched in unequal amounts with equal pressure. To solve this problem, he used a large handle. He attached this handle to four poles to replace the fishing pole he used on the biplane. He had already reasoned that his large control mechanism was not necessary and could never be used commercially, but the name of the game to Oba was 'safety.' No way would he take a chance with his 'dream.' The long poles

could take up any slack in a second without running to gain line tension. The system could be improved later as it had been on the single line biplane. Oba was asked how he knew where to place all the four lines. He replied that it just seemed obvious to him that all four lines should be slightly behind the center of gravity. When Oba was asked if he had a lot of questions about the design, he answered, "Oh, I had lots of questions; when you start designing something like this four-line control system, you want to use every safety precaution you can think of and still have that plane fly. You're going to have a lot of questions that you've got to search out in your mind, don't you see, because you're putting all your eggs in one basket and you're going to send them up into the air. You have never flown a plane yourself, you have got to learn to fly that plane and 'You're Not Going to Crack It Up.' That is what I told myself. It's got to be able to fly on its own . . . hands off controls like we'd be flying a large airplane . . . take your hand off the control, the inherent stability is there . . . it's trimmed out and, if you've got the motor power, the motor RPM just right for you, trim and all, it will go ahead and fly level."

Oba called the four line control 'full house.' His design thought was, "I won't need the rudder, except offset for right hand turn, and of course, test flights will use plenty of rudder to hold the nose out, but for take off, I will attach another line to that rudder so when I push the stick full forward, it will almost straighten out the rudder. That will keep it from having tendencies of going sideways around the field when I take off." The control system has two lines for elevator control, the other two lines are connected to the engine throttle and aileron. To lower engine rpm, a quick left aileron control, then return to neutral. For more power, you flip right aileron control, then return to neutral. RPM will increase each time operation is performed until full throttle is reached.

The airplane has an eight foot wingspan with a 16 inch chord. Weight is 10 pounds. It's covered with silk and painted blue and yellow. All strength members are spruce and filled pieces are balsa. Oba went out by himself on July 4, 1937, to test his dream, "Miss Shirley." He didn't want anyone around in case he wasn't successful, or in case it was, he wanted to protect his idea. He cleared off a circle by cutting and clearing the hay and then driving a company truck around and around in circles until it was smooth. The plan was to taxi around for a few tankfulls until he got the feel of the controls. There was about a six foot rise and fall around the circle. Oba released the airplane, turned on the throttle to get up the rise and when the plane came around to the lower side of the circle, it took off. Oba was totally unprepared for flying. He took his hand off the control stick to let the airplane fly itself. It was about six feet from the ground and coming around to the high side when he decided he should give it a little up control, but it was too little too late — the airplane hit the ground and blew out a tire. The airplane was OK, but Oba was a wreck! He smoked four cigarettes in 30 minutes while he thought about the situation and patched his tire. He fired up the Forster again and this time taxied around properly, decreasing the throttle on the downhill side. Oba then made history that day by putting in several flights. He continued to fly the airplane until 1941, when the war started, and he never had that first crash. He did install his twin engine as planned (two Forsters geared together, using auto oil pump gears). The airplane had excessive pull downwind, but Oba soon learned to correct for this by feeding a little left aileron into the control. If it felt light on the lines, he would use a little right aileron. When you think about all the problems he overcame from the control handle to the flying line stretch problems, the airplane design and control mechanism, the twin engine pulling a single prop with throttle control, it is staggering. When you think of how this man, or genius, was able to anticipate all these problems and logically solve them, put the solutions into practice and fly the airplane for four years without so much as a CG adjustment, you begin to get a small glimpse at the creativity and

practicable ability of Oba St. Clair. Oba, thank you. Our hats are off to you!

To be continued. •

Electronics . . . *Continued from page 29*

a 'no go' situation, when the LED is dim or flickering you have a marginal ('go if you must') situation, and when the LED is bright, it's a definite 'go' condition.

"The LED doesn't waste much electricity, as it doesn't come on until the Zener begins to bypass current and the battery has a fairly decent charge. Even when it's on it draws less than 25 milliamps compared to the charger output of over 250 milliamps. The charger will bring a low battery up to a 'go' state in about an hour in full sunlight. We confidently launch with the LED just turning on dim.

"This little indicator setup only adds about 85 cents to our cost of materials in the Airborne Solar Battery Charger kits, so we added it to the kits and kept the price the same ($85.00). We liked this idea so much we also added it to the Solar Charger for Transmitters (see the October '81 issue of **Model Builder**), also at no extra charge ($65.00 for the 9.6 volt charger, etc.). You can see the LED right through the polyester resin." Lot's of lift, Ed Karns

Upon receiving the above, we contacted Ed for details of modifying the transmitter charger circuit, for those who are scratch building. The revised circuit, and component list are shown. Incidentally, Ed points out that the LED life span exceeds 100 years, so don't worry about burying it in the potting resin!

Between the publishing of the September and October issues, Ed Karns moved his Departure Company from Bloomfield Rd., Petaluma, California, to 339 Myrtle Ave., Cotati, CA 94928. As you might expect, filling out all the proper post office forms for negotiating a transfer of mail to the new address was about as useless as trying to fly with dead batteries.

If you write to Ed at the old address and have not received an answer by now, or worse yet, had your letter returned as "Undeliverable", write again to the Cotati address. You can also call him during normal business hours at (707) 664-1733. wcn.

Kadet . . . . . *Continued from page 30*

hinging the ailerons and attaching them to the wing.

BUILDING THE FUSELAGE

The sides, top, and bottom of the fuselage are cut from the printed balsa wood in the kit. The balsa wood in the kit is of excellent quality and very well matched in weight and grain. The fuselage construction is relatively simple following the step-by-step booklet and the gluing areas on the sides of the fuselage. The fuselage is of 3/32 inch balsa sides reinforced with 1/4 and 1/8 inch bracing and 1/8 inch lite-ply bulkheads.

Instead of drilling the large hole in the firewall like the booklet said, I drilled holes just large enough for the fuel tubing to pass through. The firewall was attached to the fuselage with expoxy.

There were two windshields to pick from. I chose to build the regular windshield over the simplified windshield because it looked more streamlined and prettier.

The rudder is solid 1/4 inch planks of balsa wood glued together. The elevator is built-up of 1/8 by 3/8 inch balsa strips covered with 1/16 inch balsa on each side.

After hinging the elevator and rudder, gluing the rudder to the elevator, and gluing this assembly to the top of the fuselage, the fuselage is ready for sanding and covering.

COVERING THE KADET MARK II

To cover the Kadet Mark II, I used silk and Sig Lite-Coat dope over the entire airplane. With a lot of help from my husband, Ed, and the instruction booklet, I got through the covering without too big of a mess.

Now came the biggest problem of building the Kadet Mark II. What color will I paint it? Between my husband and all our friends I got lots of ideas but none of them were me. I wanted just the right color so that when anybody saw my plane, they knew it was mine! But, before I tell you what color I chose, let me explain why I chose this special color. I have a Piggy collection of over 100 different shape and size pigs. All of our friends know me and my Piggy collection and since most of my pigs are pink in color, I decided to paint my Kadet Mark II "HOT PINK". I painted the fuselage (along with the floor and one wall of my husband's garage) hot pink and the wings hot pink with white trim. I also nicknamed my Kadet Mark II "This Little Piggy Went Flying". Needless to say, I got lots of teasing and laughing about my 'Pink Plane' until MonoKote came out with their new color Circus Circus Pink. Now I got the last laugh . . .

INSTALLING THE ENGINE AND THE RADIO

Installation of the engine is explained very well in the instruction booklet. The kit comes with aluminum engine mounts for attaching the engine to the firewall. I installed the O.S. Max .40 R/C engine with muffler. On a 10 ounce tank of fuel the engine is thrifty enough to give me about 20 plus minutes of flight time. The engine is very easy starting every time. The late Mr. Bud Hartranft gave me this engine for my Kadet Mark II.

The radio that I installed is the Tower Hobbies New System 4 that Ed won at the IMS Show in Pasadena. I would like to thank Al Green of Tower Hobbies because, if Ed had not won the radio, I would not have had this great opportunity to become involved in the hobby of R/C modeling. I am now hooked!

FLYING THE KADET MARK II

Since my husband had not flown power planes for a couple of years, Steve McCann, our friend and expert Pattern

pilot volunteered. The Kadet Mark II flew great the first flight. Down elevator trim as stated in the booklet was required. The Kadet Mark II is a joy to fly. It is docile yet responsive. Now my husband and friends don't laugh or tease me about my Hot Pink plane. Whenever we go out flying, everyone wants to fly my "This Little Piggy Went Flying" and flying . . . and flying . . . and flying . . .●

Counter . . . . *Continued from page 9*

further adhesive build-up. What's more, 'Ironex' can be used to thin Balsarite and clean up excess adhesive that develops from seams, etc. At your favorite dealers now. Coverite, 420 Babylon Rd., Horsham, PA 19044.

★ ★ ★

The Pro Line division of Ace R/C, Inc., is now shipping the following replacement or spare items for Pro Line systems: 225, 500, and 550mah battery packs; PLS 180 degree servos, PLS 15 111, PLS 1, PLS 21 and PLS 14 11 servos; 5 channel Challenger receivers; also, 5 and 7 channel Competition receivers. Ace R/C asks that if a Pro Line owner will simply write, enclosing a SASE, they will be happy to send a complete Pro Line/Ace parts/price list, that also includes a listing of Pro Line Service Centers. Pro Line, Box 735, Higginsville, MO 64037.

★ ★ ★

Tatone Products has recently added another goodie to its ever expanding line of Quarter scale items. A new choke, featuring a neoprene disc for more effective 'choking' and designed for Tillotson and Walbro carburetors, and made from aluminum, attaches easily with the two existing mounting screws. The spring loaded choke arm may be operated manually, or by servo. The catalog number is CC-1 and it retails for $8.95. Tatone Products Corp., 1209 Geneva Ave., San Francisco, CA 94112; or call (415) 334-7189.

★ ★ ★

'Barrons Scale Classics' announces that fiberglass cowls and wheel pants are now available for all of its design in 2 inch and 1/4 scale. All items are of epoxy glass construction. Cowl rear edges and wheel pant attachment areas have extra reinforcement material added for extra strength.

As of the 1st of November 1981, Barrons Scale Classics will be at a new address! Please Note . . . Send $1 for latest catalog and price list to: Barrons Scale Classics, 10529 Puget, Peoria, AZ 85345.

★ ★ ★

Dynamic Models has announced the release of its latest offering, a one piece, 38-1/2 inch long fiberglass hull/plans kit, featured as a construction article in the October 1981 issue of **Model Builder**. An accessory package, containing all fittings and accessories is also being released, as shown on the plans for the model. Introductory price for the hull/plans kit is $59.95, FOB Port Jefferson.

Catalog #4, listing over 19 different hulls and over 250 accessory items may be had for $3, refundable on your first order. Great for large scale R/C model boat builders! Dynamic Models, Drawer C, Port Jefferson Station, NY 11776.

★ ★ ★

Indoor Model Supply has a complete line of rubber powered models, gliders, and supplies for beginner through expert. The 'Flapping Flyer', the worlds first Ornithopter kit, recently set a new record at West Baden, Indiana, this summer of 3 minutes and 9 seconds! The kit contains select satin smooth balsa, drilled metal hinges, condenser paper, Pirelli rubber, micro washers, full size plans, and complete instructions. The kit is $5.95, plus 65¢ postage.

For the indoor and outdoor novice glider flyer, Indoor Model Supply offers its three gliders in one box concept, with select balsa, full size plans, pre-cut wings, sandpaper, and complete instructions. Span is 12 inches and flying weight is around 1/8 ounce, each. Three I.M.S. gliders in a box, only $5.95, plus 65¢ postage. A catalog listing many, many, indoor and outdoor items, including balsa, rubber strip, covering materials, etc., is available for $1. Indoor Model Supply, Box C, Sparrow Creek Rd., Garberville, CA 95440.

★ ★ ★

The Dual Digital Charger, item #110, from MRP, has a unique "constant potential" circuitry that monitors charge condition of the batteries and automatically adjusts charge 'current', not voltage. A deluxe LED meter monitors both voltage and amperage. Both 4 and 6 cell packs may be charged at either a high or low rate. A secondary output automatically peaks and balances a second battery pack while the timed circuit is in use. At better pit stops everywhere, or contact: MRP Model Racing Products, 12706 N.E. 124th St., Kirkland, WA 98033; or call (206) 823-0800.

★ ★ ★

Another 'Robart Exclusive' is the "Scale Modelers Scale," specifically designed with the scale modeler and scale judge in mind! A precision device, fabricated on a durable 2 foot long laminate, it is equipped with four popular scales; 1/8. . . 1-1/2 inches = 1 foot; 1/5. . . 2.4 inches = 1 foot; 1/6. . . 2 inches = foot; and 1/4. . . 3 inches = 1 foot. Measure chords, spans, thicknesses, etc., in feet and inches directly from a 3 view drawing. This handy item, #406, retails for $6.95 at your dealers. Robart, 310 N. 5th St., St. Charles, IL 60174.

★ ★ ★

House of Balsa, ever expanding into the sailplane market place, is now offering its H.O.B. 2-S (2 channel, standard class) with a 96-1/2 inch wingspan (demountable into three sections for easy transporting), and a wing area of 792 square inches. An all up weight of 35 ounces will yield a low wing loading of only 6.36 ounces per square foot. The kit is basically balsa construction with ply

fuselage sides for added strength, preshaped Aero-shaft leading edges, and includes a canopy and cockpit, hidden towhook and features the 'H.O.B.' photo instruction book and full size plans concept. Designed to accept any 2 channel radio, it can be built in 8 to 10 hours. A free H.O.B. 'Up-right' is included, too. Suggested retail is $39.95 for this standard class sailplane. House of Balsa, 20134 State Rd., Cerritos, CA 90700; or call (213) 860-1276 for more information.

★ ★ ★

Vito Tomeo models continues to expand its 1/6 scale series with the Hawker Tempest MK-5 plans/parts package. Designed for straight drive .90's, the model has a 80 inch wingspan with a wing area of 1100 square inches. The 'pack' contains three 3 foot by 7 foot plans, scale canopy, fiberglass cowl, gun blisters, and exhaust stacks. The complete pack is $60, plans only are $28, and a 5 inch aluminum spinner can be had for $22.95. All prices are postpaid. Write or call: Vito Tomeo Models, 1050 Alabama Ave., Ft. Lauderdale, FL 33312; (305) 792-8591.

★ ★ ★

"Pull on my ZIPPER," for $6.50 postpaid, and wear a tribute to model aviation. This red-on-yellow T-shirt is available in adult sizes S,M,L, and XL. Childs sizes S,M, and L are $6 postpaid from Hobby Hideaway, R.R. #2, Box 19, Delevan, IL 61734.

★ ★ ★

Pica Enterprises has now introduced its Rapier II, a .25 to .40 powered version of the Rapier, as mentioned in 'Over the Counter,' June '81. Super stable and gentle, it's designed not to snap under any circumstances. After mastering the art of flying R/C, the newcomer may cut one rib section from each wing for a fantastically different fun model. The extended wing rib is 54 inches in span, and 50 inches with 2 rib sections removed. Engineered to be built in about a week of spare time. Pica Enterprises, Inc., 2657 N.E. 188th St., Miami, FL 33180; (305) 932-8008.

★ ★ ★

Champ Model Products has the answer to your scale landing gear problems. They are producing wire landing gear to fit the Robart scale landing gear struts. The wire gear is bent to exact tolerances, including the difficult axle bend and they leave the top of the strut to be bent or cut off by you to suit your fixed or retract gear installation. Available in 5/32 dia. wire for .40 powered models at $3.50 per pair, and 3/16 dia. wire for .60 powered models at $4 per pair. If your dealer cannot supply you, order direct, adding $1 for UPS delivery. To solve your custom wire bending problems in sizes from 1/16 to 1/4 inch diameter, send a sketch and description for a quote to: Champ Model Products, 14625 Carmenita Rd., #229, Norwalk, CA 90650; or call (213) 921-7060. •

Workbench . . *Continued from page 6*

it the General Manager had ordered a Sailaire glider kit from Craft-Air, and our vacation trip had turned into a record attempt expedition!

One month and one bottle each of Hot Stuff, Super-T, and Super Jet later (honest, this is what we had on hand, and we used it all!), the glider was finished and packed in a crate we borrowed from Tom Williams, in which he takes his Sailaire to trade shows. No time to even hand-glide it for the first time before leaving! Incidentally, we installed our J-series Futaba radio on 6 meters, FM, and used a 1 amp airborne pack.

Two days after arriving on Maui, and after a couple of no-trimming-necessary test flights at a different site, we went to the high-lift site and, much to Al Tuttle's embarrassment, were met with weather in which we could have flown Easy-Bs without any worry about drifting! And it stayed this way for almost a week!

Not to waste time, we turned tourist and visited many beautiful spots on Maui, including, much to our surprise as it is not publicized, the site of Charles Lindbergh's grave! It is in a remote and secluded area, not known to general tourists, and in keeping with all others who respect and admire this great man, we can only say that if you really want to see this quiet and restful spot overlooking the Pacific some 1500 feet almost straight below, and see the tiny, one-room church, and maybe talk to Lindbergh's good friend Mr. Pryer, who visits the site every day, just ask around . . . we're sure you'll find it.

To really entice the slope wind into returning, we flew to Oahu, coming in over Pearl Harbor and Hickam Field, rented a car and drove to Kaneohe to visit with friends, Dr. Gary Stice (oceanographer) and his wife, Apalonia (Hawaiian). Our first night there we had dinner with our hosts, along with Mr. and Mrs. Paul Strona, and a friend who happened to be visiting them . . . one Dick Everett! In case that last name doesn't ring a bell, Dick was a long-time

modeler/writer/contributing editor to model magazines in the early post-war years. Paul is a member of the Mid-Pacific Soaring Society. You'll see their pictures on page 11.

Following a day of sight-seeing, we joined the Mid-Pac Club at their state maintained flying field the following morning, and met Mid-Pac club members who had come out for their monthly soaring contest; Ed Danzinger, Allen Morgan, Wayne and Dee Linschied and son Wade, Charlie Foo, Paul Strona's son Marcelo, and a few others whose names we apologize for not writing down.

Incidentally, the club shares the site on an unwritten agreement basis with power fliers who take over the field around 12:30. We walked over to talk with a few of them as they were assembling their models. One model was a nice looking Godfrey 1/4-scale Stearman with Quadra Power. Although we were wearing a **Model Builder** T-shirt, we didn't walk up and do the glad-hand bit or identify ourself. Instead, we complimented the modeler on the nice job and asked him a few questions about performance. The answers consisted of a few rude grunts. As we had heard from some other sources . . . a wierd bunch. Oh well, the glider guys were sure nice.

We left Belinda with the Stices (they had a swimming pool and youngsters around) and returned to Maui to find that the reluctant wind was waiting for us. A call to the airline extended our return for two days, so we decided to give it hell on Monday and Tuesday and hit the beach on Wednesday, prior to leaving on Thursday.

R/C'ers Jim Martin (now we have a Pukalani Jim Martin) and Peter Wolford took the barograph in Peter's Cessna 172, while Al Tuttle and Dave Kendall accompanied us to the slope site. Although the wind was good down below, it was only *pretty* good on the hill, and the clouds hung over the edge. We couldn't do better than about 1800 feet after two hours in the air.

Next morning, the control tower at Kahului Airport and the FAA on Oahu passed the buck back and forth, but finally concluded that the chase plane could *not* fly in the hill area, as both Hawaiian and Aloha Airlines DC-9s and 737s would be passing by, at our altitudes. We were about to scratch the whole thing when we remembered Walt Mooney's comment, "Why don't you strap the barograph on the model." If he was willing, so were we, and besides, the General Manager had been suggesting it all along.

This time the wind was really pumping, as Jim Martin, Dave Kendall, Al Tuttle, Stan and Duane Yamato, and Bob Murdoch joined us on the hill. Winds were blasting at around 25 knots and it was very bumpy, however, once through the bumpy layer, the wind became smooth and steady as we gained altitude, the Sniffler playing a pretty, high register note. But now we found the final deterrent to a successful record attempt; the model is basically a thermal soarer and could not penetrate the high wind even though ballasted and carrying the barograph. We could gain altitude like an elevator if we allowed the model to drift back over our heads. But then it would go into the clouds and/or fly across the sun. To go out over the clear slope air, we had to shove the stick forward and shallow dive, blowing any altitude we gained. At times, over the clouds, the model cast long shadows through the clouds, a beautiful, but kinda frightening sight. When a cloud thickened up, you held your breath as the glider disappeared completely before showing up on the other side. The recording barograph chart later indicated that we had gained a little over 3000 feet at the highest point . . . one of those hide-and-seek moments above the clouds. Conclusion: Take this model to a thermal site, or build a quarter-scale type penetrator that could handle the wind. The lift is there, as aerobatic slope soarers, ballasted for the wind, have flown straight overhead until they are specks. A larger size is necessary just for visibility.

Wait'll next year!

Materials . . . . *Continued from page 35*

please don't think that the definitions we are coming forth with are normal engineering practice.

Something else should be said at this point. Nothing you will read here is some pie-in-the-sky idea. All of what you will read here has been done, much by the author, tested, weighed, measured, and used by those standards with which we are familiar in the model airplane business. You will see the results and techniques. Those of you who visited the Aerolite Products, Incorporated booth at the recent Toledo show can attest to this. Having got that out of the way, let's get at it. Now, how do we relate to these new materials? It occurred to us the best way is like the old joke,

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DEALERS/DISTRIBUTORS: Free flight enthusiast would purchase K&B 3.25cc (NOT 3.5cc!) control line/free flight engines. Walter C. Hanson, 1528 W. Fern Ave., Redlands, CA 92373.

ROPER 1.9 cubic inch engines now available in ready-to-assemble kits. Lowest prices ever. $45 includes postage and handling. E. Yost, Rt. 1, Box 37, Sauk City, WI 53583.

FOR SALE: 9 original complete Berkeley "600" FF Kits — $35 ea. + $1.50 shipping — 3 Dick Korda Power House "62" — 1 Berkeley "Cavalier Sixty" $40 ea. + $1.75 shipping. D. Bianchi, 210 W. Elm St., Kent, OH 44240, (216) 673-3066.

WANTED: FF, Scale, OT, Kits, Magazines, Plans. Sell/trade that kit, you'll never build. Will exchange lists. George Stanley, 521 3rd Ave. N., Sauk Rapids, MN 56379, (612) 251-0471.

WANTED — OLD MODEL ignition engines, cars, etc. Paying top dollar. Bill Simpson, 7413 Via Lorado, Rancho Palos Verdes, CA 90274, (213) 377-3532.

WW-I & II PRINTS. Aircraft, tanks, trains & more. Reasonable prices. Send $1.50 for color brochure. Classic Prints, P.O. Box 58105, Houston, TX 77058.

EMBLEMS — Direct from manufacturer. Swiss embroidered. Custom made to your design. Send sample or sketch and quantity needed for free quotation. David Haemmerle & Sons, Inc., Box 711, West New York, NJ 07093-0711.

PEANUT SCALE new plans now available. Brewster SB2A-2 Buccaneer and Blackburn Firebrand $1.50 ea. plus 40¢ postage. SAE for list or $1 for sample plan and list. David Diels, Box 101, Woodville, OH 43469.

SEVEN full pages of ready-built models and used equipment bargains in the last issue of "Hobby Swap News." Hundreds of items of all descriptions. 35 word ad only $4. BUY, Sell-Trade your first ad free with subscription. $10/yr. (10 issues), $19/2 yr., $27/3 yr. Add $3/yr. for first class postage. Canada and Mexico must use 1st class rates. MC & Visa accepted. Hobby Swap News, Dept. FLC-31, Box 834, Santa Maria, CA 93456.

R/C PILOT LOGBOOK and FLIGHT RECORD — Here for the first time is the logbook designed for the R/C pilot. No more guesswork. Valuable tool for expert, sport or novice fliers. Durable black hardbound cover with gold stamped lettering. $6.90 each postpaid (Ohio residents add $.31 sales tax.) Champion Hobies, 3715 Reemelin Rd., Cincinnati, OH 45211.

WANTED: Old model airplane engines, gas model race cars, related items 1935-55. Arthur Suhr, W218 N5866 Maclynn Court, Menomonee Falls, WI 53051.

ATOM ARDEN Dooling to Wasp model engines, race cars, spark plugs wanted. D.L. Wehrly, 4325 Winding Way Dr., Fort Wayne, IN 46815.

020 REPLICA Old Time Kits. Free list. Write J&R Models, 5021 W. Sheridan St., Phoenix, AZ 85035.

"How's your wife?" "Compared to what?" In this case, compared to something we can all relate to: wood. And even that has to be clarified. And now is as good a time as any to talk about wood, those which directly relate to airplane construction; balsa, pine, spruce, ash, maple and bass wood. We know specifically what advanced materials are made of because man made them, and they can be neatly defined both chemically and physically. So let's get a firm base to work from by learning as much as we can about wood, so that we can make some valid comparisons.

Dry wood is made up chiefly of the following substances, listed in decreasing order of amounts present: cellulose, lignin, hemicelluloses, extractives, and ash forming minerals. Cellulose, the major constituant, comprises approximately 50 percent of wood substance by weight. It is a high molecularal weight linear polymer. During growth of a tree, the linear cellulose molecules are arranged into highly ordered strands called fibrils, which in turn are organized into the larger structural elements comprising the cell wall of wood fibers. The intimate physical, and perhaps partially chemical, association of cellulose with lignan and the hemicelluloses imparts to wood its useful physical properties. Lignin comprises 23% to 33% of soft woods but only 15% to 25% of hard woods. It occurs in the wood largely as an intercellular material and like cellulose, it has a macromolecular chemical structure, but its three dimensional network is far more complex and not yet completely worked out. As a chemical, lignin is an intractable, insoluble material, probably bonded at least loosely to the cellulose. It is the plastasizing of the lignin by ammonia that allows us to bend wood pretty much to our liking and have it retain that bent shape after drying. If you haven't read it, you would be well advised to dig out your April, 1979 issue and read the article by Bud Croshere. This will give you further insight into the chemical reaction of ammonia on the wood itself. Since that subject was thoroughly covered by Bud, and very well, we'll leave it to you to read more on that subject from his article. So that's all we have to say

about wood at this point and you have to admit that that's a tough act to follow.

Okay, so now we know more about wood, and in fact, we know quite a bit, but we also have to know its mechanical properties such as tensile strength, elasticity and bending strength. Fortunately, others have done this for us, and we have a table of sorts to start with. Included in the table are other materials for which we have definite data and they are inserted to give us a comparison of strength. We are referring to aluminum, steel, stainless steel, and the various fiberglasses, Kevlar and carbon. Let's face it guys, we all do an awful lot of designing by plain old copying. By that, we mean that we know that a certain airplane was plenty strong enough with a spar of a certain size and leading edge sheeting, etc., and so we can go ahead and design our own on safe grounds because so and so already did it and we know it worked pretty well. Only a few of the more venturesome designers such as Harold Debolt really stick their necks out and come up with lightweight high strength innovative designs with the conventional materials we have at hand. The purpose of this entire article and the use of our table will be to give us some comparative data so we can shave a little off here and a little off there and do it with a reasonable degree of confidence and not have to stick a spar into a wing that we know darn well is going to work, even though we secretly know that it's overkill.

Before examining the data table on the materials, it would be wise for us to clarify a few definitions. Don't let words like modulus scare you. The modulus of elasticity, known sometimes as Youngs modulus or also, Hooks law, is simply a measure of how rigid a given material is under load. The higher the number the more resistance to bending under load the material will have. If you glance at the table and compare spruce to balsa for example, and using data from this table, we take the modulus for spruce which is 1.55 and divide it by the modulus for balsa which is .55 and we come up with a number 2.82. This tells us that spruce is about 2-3/4 to 3 times stiffer than balsa with the same load. Or, to put it another way, spruce will bend almost three times less than balsa under the same load. All of this occurs with the same physical size piece of material. So we have to relate to the weight as well. From the weight column in the table we see that spruce weighs about three times more than balsa. We are now faced with an option, which will depend a great deal upon what we are looking for, of either using a heavier piece and getting a great deal more rigidity, or shaving the size of the piece of spruce to the same weight and coming up with the same strength. With the case of balsa wood today, the latter choice is by far the better one.

Now let's define ultimate tensile strength. This is the load applied to a rope in a tug-of-war when the rope breaks. Simple as that. What isn't so simple is how a spar or leading edge acts in tension under load. But that, and spar testing, will be fully explored in the next article. This time we're establishing a base to work from.

Compressive stress in loading is very difficult to pin down for many materials. The load applied to a nut in a nutcracker when the nut breaks is the ultimate compressive load a nut can take. Again, simple. But a nut is brittle and the stuff we work with isn't, so we are interested in how much it can take in compression before it fails. And how much deformation of the part takes place at, or before failure. Again, the next article will get into this in depth. And now that you have a rudimentary explanation of what the table is all about, take a good look at it and use the facts and figures shown as reference values to compare one thing to another, not forgetting to put the emphasis on weight as well.

We should also make an important point at this time. It is our design philosophy that good design for high-strength-to-weight-ratio means that the airplane will break if it is abused. We are not of the school that believes in building very heavy unbreakable airplanes in an attempt to make them impervious to the tilt of the earth. So bear that in mind. While we won't go into all the extreme details at this time, by utilizing information in the table, we can come up with a piece of steel, a piece of carbon fiber, and piece of balsa wood which are all the same weight or the same strength. A piece of carbon fiber approximately 1/4 of an inch in diameter has the same strength as a piece of 1/8 inch diameter steel, and you will be able to bend the steel in your fingers. You will not be able to break the piece of carbon fiber rod with your bare hands and I don't care how big you are! We had such a demonstration at Toledo and we had some massive people try and they could not do it. We'll get into a lot more of that in the next article but for the moment, since we have gone over wood to the degree that we have, let's find out what these other materials are composed of, so it will make a great deal more sense in how to work them. At no time in this series are we suggesting that you throw all your wood away because we are talking composites. We are just as traditionalist as you are and we don't intend to abandon wood, but to utilize these other materials to strengthen wood beyond what you might believe could be done. Now a look at the new materials.

Fiberglass in a registered trademark of Owens-Corning Fiberglass Corporation and has really come to be the generic term for all fiberglass products. Why do we consider this a new material? Because, through dramatic improvements in recent years, it really is. Our particular usage of it in the hobby has been pretty well confined to using glass cloth either in a layup or fuselage shell, or as a post covering, to improve the strength of the airplane. There are many, many other ways to use glass fibers and we'll get into that. But it's kind of important to know what's available and it's interesting to know how it happens. The actual production of glass reinforcement began in the early 1940s. This was, and is still, a

product known as E-glass. This was named E-glass because of certain electrical properties it possessed. Later on, C-glass was produced and so named for its chemical resistance properties. Later still, a product called D-glass was produced and it was so named because of its particular dielectric properties. As the space program evolved, and an obvious demand for better materials came about, the company developed what is known as S-glass in the early 1960s to meet the needs of the military and aerospace industry. A glance at the table as you read this will show you the dramatic improvements between E and S-glass. In the period between 1966 and 1968, S-2 glass was developed, because S-glass is extremely expensive and is a very extreme, premium product and yet there were commercial applications demanding almost the properties of S-glass but at a much lower cost. Owens-Corning began a program to upgrade E-glass to S-2 glass to fill this requirement. They were extremely successful and the S-2 glass has nearly the properties of S-glass, both of which are immensely superior to E-glass, and yet the cost is nowhere in proportion to its proximity to S-glass characteristics.

From our viewpoint in modeling, only E and S-2 glass are of real interest. (For your information, all of the fabric in the hobby industry is made up of E-glass.) The other glasses do not interest us because they don't offer anything that we can't get with E-glass or S-2, and E-glass in particular is far and away the cheapest material. The hobby market to date, and I am speaking of airplanes, is used to dealing with only glass cloth. There are many other ways to use glass fibers in yarn and roving forms and we'll get into this, because materials in this form are not very expensive and are extremely efficient in reinforcing.

Fiberglass is made by using alumina-borosilicate glass marbles as a raw material. The S and S-2 grades use a low alkamagnesiauminasilicate glass composition as a raw material. The filaments, sometimes called fibers, are made by melting the specific raw material in a very high temperature furnace and drawing the molten glass through pure platinum dies. It is then cooled slightly and a sizing is immediately applied. As a matter of interest, Owens-Corning owns more platinum than anyone else in the world, except the U.S. Government.

At this point we had better get a few more definitions out because we will be talking about other filaments and fibers and there is a different language to describe and understand the properties of these materials.

Definitions

Denier — Weight in grams of 9000 meters of yarn.

Fiber — An individual rod of material of sufficiently small diameter to be flexible, having a known or approximate limit of strength.

Fiber Diameter — The measurement (usually expressed in hundred-thousandths of an inch) of the diameter of an individual filament.

Filament — A single thread or thread-like object. Many of these are put together to form a yarn. Usually the higher the filament count, the lower the price of the yarn.

Fill — The 90° yarns in a fabric, also called the woof or weft.

Finish — A surface treatment given to fibers or filaments after they are fabricated into strands, yarn or woven fabrics.

Grams — 1 oz. = 28.349 grams.

Hts — A size applied to the glass fiber surface during forming of the fibers to give high performance compatibility with resin and resistance to mechanical damage to the individual filament, strands, or ends. (Trademark OCF)

Hybrid — Two or more different reinforcing fibers combined into a single resin matrix is a hybrid composite.

Matrix — A combination of resins and reinforcing materials of any type.

Meter — 1 meter = 3.281 feet.

Micron — 1 micron = .001 MM = .00003937 in.

Mil — .001 in.

Modus of Elasticity — The ratio of unit stress to unit strain within the proportional or elastic range of a material. Also known as "Young's Modulus".

Prepreg — Used to describe fibers or fabrics which have been impregnated with resin and partially cured to the B-stage. Prepreg at this stage is drapable, tacky, and can be easily handled.

Roving — A number of ends or strands of material gathered together into a ribbon without twist.

Strands — A primary assembly of continuous filaments combined in a single compact unit with twist.

Yarn — A generic term for an assemblage of twisted fibers or strands, either natural or manufactured, to form a continuous yarn suitable for use in weaving or otherwise interweaving into textile materials.

Wetout Rate — The speed with which a given sizing or treatment on the material surface will allow the material strand to be completely saturated with resin. This rate is usually determined visually and measured in elapsed time.

Warp — Yarns extended along the length of the fabric (in the 0° direction).

and being crossed by the fill yarns.

Woof — See Fill.

The sizing we mentioned is a material usually organic in nature, that is applied to the filament to enable them to be handled more readily without breakage. Sometimes the sizing enhances the compatibility of the filaments to different types of resins, but this is normally done when the company knows exactly what resin system the customer is going to use with that particular batch of filaments. The filaments are produced in various diameters, depending on their end use, from .00006 to .00095 inches in diameter. As some comparison, the paper that this is printed on is 2 thousandth of an inch thick or .002. The filaments are then gathered into what are called strands and then sold to either prepreggers, or weavers. The weavers make cloth out of it. The prepeggers impregnate the fibers or cloth with a resin and partially cure it to what is called the B-stage. At this point, the cloth or filament bundle is tacky and drapeable, and can be laid in a mold to be heat cured, usually at about 400 degrees farenheit, and under pressure. We don't use it this way, but it is important to understand what 'prepreg' is because, as we stray from the normal hobby market, a great many fibers are available only as prepreg material and this is not the way to use them. This is particularly true of Kevlar, carbon fiber and cloth.

The E-glass cloth we use in the hobby is the fabric made by various weaving mills in many different weights. One more thing can be done to greatly improve resin wetability and wet-out and that is called finish. An Amino silane finish on the fabric greatly improves its wet-out characteristics, and its end strength with either epoxy or polyester resin systems. As a matter of interest, all Aerolite Products, glass, cloth, etc., are so finished.

We don't believe it's important here to tell you how to use glass cloth as I'm sure you have all done it. Later on, however, the use of yarn and strands and roving will be explored. "Onward and upward"!

Now, let's look at Kevlar. Kevlar is a registered trademark of the DuPont Company. Fiber B, as it was originally called, was discovered in 1965 following a concentrated effort by a research group aimed at specifically coming up with a polymer exhibiting new high levels of physical properties. DuPont knew that if a polymer molecule could be made from a symmetrical molecule having para-type orientation, a super rigid molecular chain could be made. All precursor chemicals had to be made from scratch to form the polymer. The polymer also had to be dissolved in solvent because it would not melt, before it could be extruded as a fiber. After many spinning attempts, fibers were successfully spun and initial property tests showed that the years of intense research were about to pay off. The modulus of the fiber tested at a high value, which meant that it was even stiffer than glass. Later the modulus was raised making the fiber two and one half times as stiff as fiberglass on a weight basis. Much more work, in fact 8 years of it, took place before fiber B now identified by the trademark Kevlar, would reach the market place. In early 1970 there was a significant break through. An ingenious spinning process which is highly proprietary, was developed which quadrupled the spinning speed and provided an unbelievable bonus; the fibers turned out to be almost twice as strong as those made with the first process. And that is how it came about. Three forms of Kevlar are made; Kevlar, Kevlar 29, and Kevlar 49. All are pale yellow color and all feel somewhat similar to fiberglass until you try to cut them. The DuPont Company makes only the fibers, filaments, and rovings. Once again, the weavers and prepreggers get into the act. We've already gone over that end and it doesn't change with Kevlar. From a hobby viewpoint, since we don't use high temperature and pressure to cure resins, prepregging again isn't desirable. Kevlar has the unique property of absorbing resin and wetting out very well all by itself. Therefore we supply only scoured fabrics, tapes, and yarns with no pre-finish of any kind required.

Some of the real life uses of Kevlar boggle the mind. Five thicknesses of Kevlar cloth will stop a .38 caliber hand gun bullet at close range. It is used for lightweight bullet proof vests for police all over the country. One of the first uses was to replace steel in radial tire cords and the automotive industry is looking very hard at it in various parts of automobiles. The Sikorsky S76 helicopter used a fair amount of Kevlar in composite form to the degree that they could add one more passenger seat to the helicopter and extend the range 20% because of the weight savings. The new Boeing 757 and 767 will use a great deal of Kevlar composite material to the extent that they will save over 1000 pounds per airplane. The Lockheed 1011 has been flying with Kevlar parts since 1974 at a savings of 800 pounds per airplane. It's used to make lightweight canoes, and thousands of other things, and so we

should be using it.

One more complaint we've heard about Kevlar relates to cutting it or more specifically trimming the excess around the edge of a layup. Remember this trick: Wait until the material is semi-cured, when it has that leathery feel, and cut it at that time. For some weird reason, regular hobby knives or blades will cut it quite well at that one stage. How does it compare to fiberglass? We'll go over that later, but hold on now while we tell you about carbon fiber and then we will look at all three materials.

Carbon: Nobody has registered a trademark on this or graphite (which we will use interchangeably). So here goes. The processes used by various companies to produce carbon fibers are essentially similar but are all highly proprietary. The raw material is polyacrylonitril, which has a high carbon content and is a synthetic organic fiber. The polymer is spun into very thin filaments to make double knit clothes, and that is the reason it is so popular as a raw material because there are large available stocks plus it can be readily spun. This material is called Pan base. The other raw material is Pitch base using pitch which is a by-product of oil refining operations. The majority of materials on the market are Pan based because they have a higher modulus and better Hybrid properties. We stock only Pan based materials.

After the spinning operation, the filaments pass into a very high temperature furnace; in the order of 1900 degrees centigrade. From that point to the gathering of the fibers into a tow after sizing, is the secret part of each company's process. What is not necessarily secret is the fact that the fibers are called carbon fibers up to about a 96% pure carbon composition and true graphitization takes place when the temperature is up much higher, in the order of 23 to 2500 degrees centigrade. The higher the temperature the higher the modulus, but that is accompanied by a decrease in tensile strength. However, the neat part of this is that by controlling certain parameters in the process, many combinations of strength and modulus can be obtained. Some of the materials are available with 450,000 PSI tensile strength and 80 million PSI modulus. These latter are extemely high priced, premium aerospace materials. The ones that we list on the table are the ones that are reasonably priced and available now. It is interesting to note that the Japanese are large producers of carbon fibers and are very, very expert in the production of that product. Some of the major companies in this country are only now committing to production to produce their own carbon fiber and have, in fact, been marketing under their own name, materials made by two different Japanese companies. However high priced they are at the moment, it is inevitable the price will come down as time goes by. The automotive industry is very interested in graphite component materials. The Ford Motor Company carried

out a lightweight vehicle program (graphite / component / weight / summary), and compared to steel they would save an average of 58% in weight for a small car. So, if the automobile people get into the act, and we suspect very strongly they will soon, the price will definitely come down. But back to the fibers themselves. The filaments, as drawn out of the furnace, are roughly 13 microns in diameter. A glance at our definitions will tell you how big a micron is, and 13 microns are about 1/4th the thickness of the paper this is printed on. So you can see that they are really small. The tow that we offer is about as thin as this paper and about an inch wide contains 40,000 filaments. Again, the yarn, strands, and roving are available and fabric is available, too. Once again there are separate weavers and prepreggers who get into the act and the same thing applies here as applied to Kevlar and glass. We are really not interested in prepreg. All carbon filaments are sized to keep them in some semblance of tow and tape form or we couldn't handle them.

As to hobby use, carbon fibers simply blow your mind! They impart such incredible strength and stiffness to a piece of punky soft balsa that it has to be seen to be believed. And at such a minimum weight! Those of you who saw our laminated spars at Toledo can verify this statement. Again, we'll show you all this in the next installment. But, check the table again and take a look at the strength values and the weight that accompanies it. This is super material and, in our opinion, the best by far of the composite materials available today. Its use in aircraft is also mind boggling. The wing skin of the McDonald-Douglas AV-88 Advance Harrier is the largest graphite epoxy composite ever built for an aircraft. It has 121 square feet of area and it's all laminated from .01 inch thick graphite epoxy composite. The speed brake on the F15 is also a graphite composite. A support truss for a satellite launched in 1974 was one of the early major composit structures launched into space. This truss was a large tubular frame 14-1/2 feet long connecting the earth viewing module to the parabolic antenna. It consisted of 8 graphite epoxy tubes that weigh less than 8 pounds each but can withstand compression loadings of 20,000 pounds. Using this material saved 50% over a comparable aluminum structure and the thermal expansion was less than .01 inches. Aluminum would have changed .75 inches! Boeing, McDonald-Douglas, Lockheed, Bell, and just about everybody is using it somewhere.

Probably the most dramatic use of it is the new Learfan aircraft with which I'm sure you're familiar. The entire airplane including the fuselage, the wings, the frame, the tail fins, and the controls surfaces are all made of carbon fiber composites. Even the seats are carbon fiber. This airplane can carry more fuel (1700 pounds), than the weight of the carbon fiber used to fabricate it. We carry this very same material in stock.

We've covered a lot of ground so far, and I hope you are still with us. This is the boring part, learning all about the materials. It is very important to realize that the only way we can utilize the high strength and light weight of these new materials is to use it with a suitable resin. Unless the resin will bond properly to the materials we build with, and unless the resin will bond equally well to the composite material, we will never realize the advantages they offer. Fortunately, we have spent a great deal of time developing proper sizing for the fiber products that require it, to make them compatible with the resin systems used in the hobby industry. Since we have accomplished this sort of thing, we can start the type of construction which is called Hybrid. Hybrid techniques can yield terrific products. For example, the combination of carbon fiber and glass increases the fatigue strength of a laminate, the impact strength, and the overall stiffness. So, the inner combination of carbon fibers, Kevlar, and various types of glass in a resin system can make a very large difference in the end results. We'll cover that sort of thing in the next article as well as getting down to actual tests on spars and other parts. Before we get off the subject of advance composites, you may be wondering why we didn't involve titanium and boron in this article. The reason is simply that the costs of these materials are extremely high and while they are used on the F14, F15, and F16 aircraft to name just a few, they are 12 to 15 times as expensive as carbon fiber and carbon fiber is 20 times as expensive as glass. Titanium is a special metal which you can look up in any metals book. It is simply a super strong lightweight material generally regarded as having the strength of steel and the weight of aluminum.

Boron is another story. Filaments are made in continuous form by decomposing boron and trichloride and depositing the elemental boron on thin tungsten wire. High and uniform modulus and tensile strength are attainable with a tensile modulus of 555 to 58 million PSI as an average and a tensile strength of about 530,000 PSI average. They are available in 2, 4, 5.6, and 8 mil diameter filaments. Recently, a less expensive boron-on-carbon filament with lower tensile strength and modules has been developed, but these materials are simply way too expensive and virtually impossible to get as far as we're concerned. Well that's about it for now guys, and next time we'll get into the good stuff. Any questions, please write and include a SASE.

We would like to acknowledge: Owens-Corning Fiberglass Corporation, The Celanese Corporation, Hercules, DuPont, Fiberite, Narmco, Hexcell, Gentex, Merlin, Toray and Toho Beslon of Japan. •

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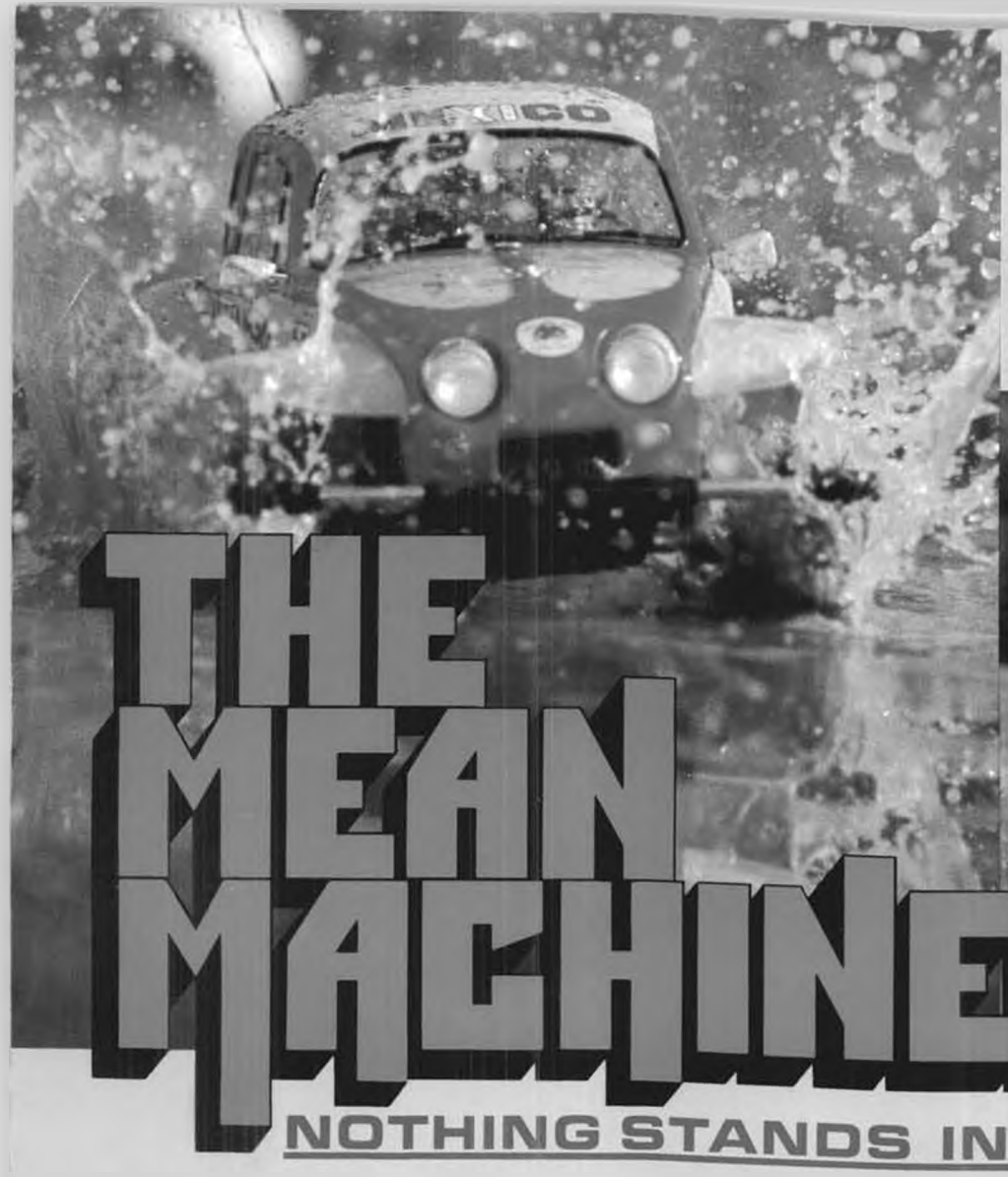

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