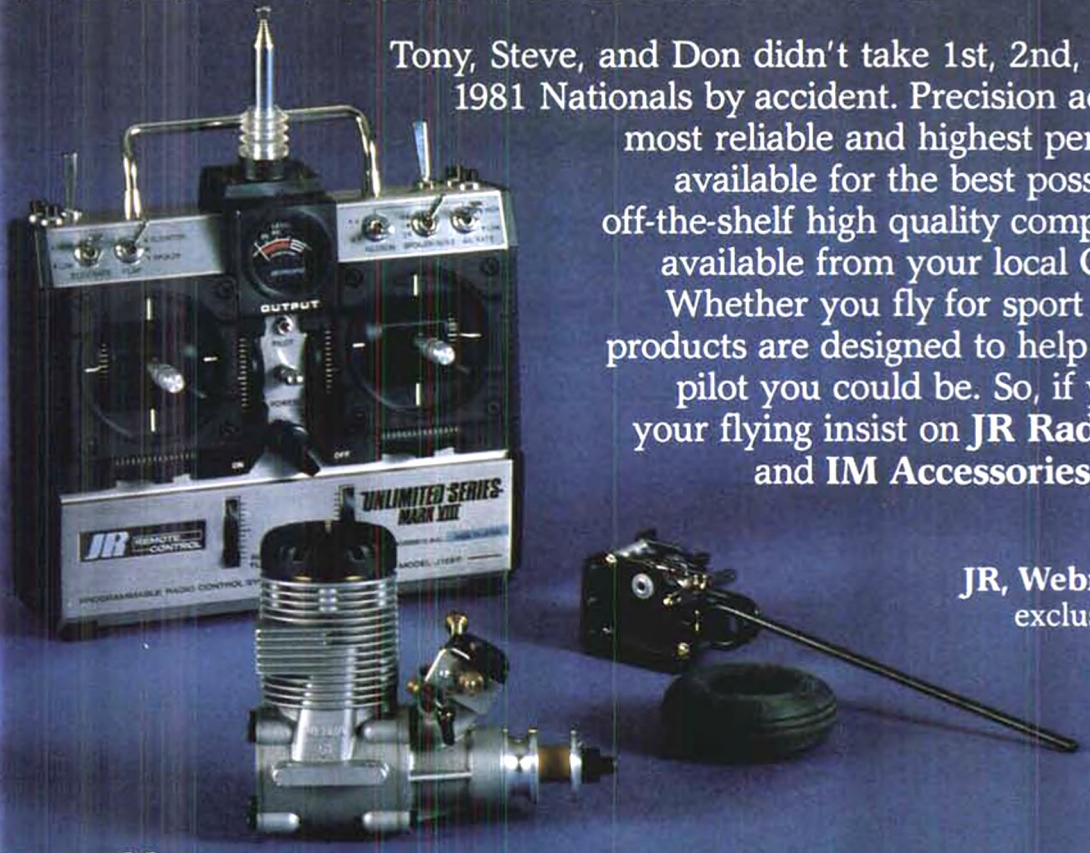
ISSN 0885-45

MODEL BUILDER

FEBRUARY 1982 $2.50 volume 12, number 121

L to R: Tony Bonetti–National Champion, Steve Helms and Donald Weitz, Jr.

THE FINISHING TOUCH



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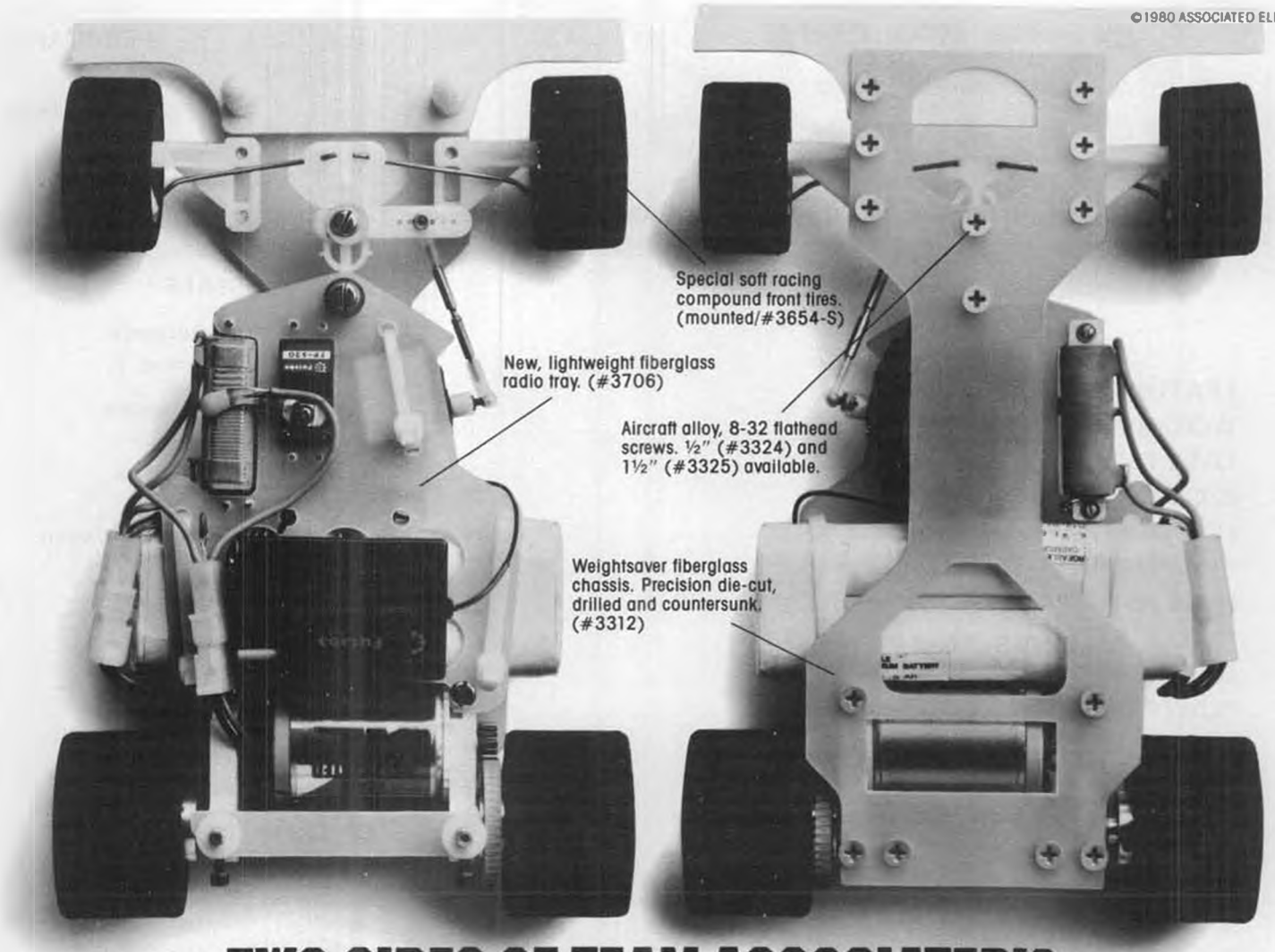

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ROAR Nationals Expert Class 1:12 Scale Electrics				
		Production	Stock	Modified
1978	4 cell	No event	MRP	**RC12E**
	6 cell	No event	**RC12E**	**RC12E**
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	6 cell	**RC12E**	**RC12E**	**RC12E**
1980	6 cell	MRP	**RC12E**	**RC12E**

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MODEL BUILDER

FEBRUARY

1982

volume 12, number 121

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

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FEATURES

SCALE VIEWS

CONSTRUCTION

Cover: The Pacific coast at La Jolla, California, provides a sparkling background for Karen Rafsdal, San Diego, and Peter Neuer's red, white, and blue Acro Sportster 40. Construction article for the Acro begins on page 15 of this issue. As for more information Karen, you're on your own! Colorful 35-mm transparency by Peter Neuer.

MODEL BUILDER (ISSN 0194 7079) is published monthly by RCMB INC., 621 West Nineteenth Street, Costa Mesa, California 92627. Phone (714) 645-8830.

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Change of address notices must be received six weeks before date of issue that new address takes effect. Send old address with new; old label preferred. Post Office will not forward copies unless you pay extra postage. Duplicate issues cannot be sent.

Second class postage paid at Costa Mesa, California, and additional offices.

Changing track conditions can send RC cars scurrying into the pits for a linkage adjustment that could take laps to complete.

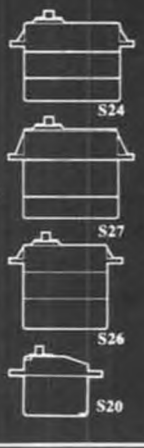
The driver with Futaba's 3FG doesn't panic though, because he has Total Control on his side.

A flick of a lever and the adjustable dual rate takes over.

Increase or decrease steering servo throw while maintaining full lock-to-lock control. The 3FG gives you a choice, on the track.

An oversteering, sliding car instantly responds to the pre-set steering ratio and is dialed-in again.

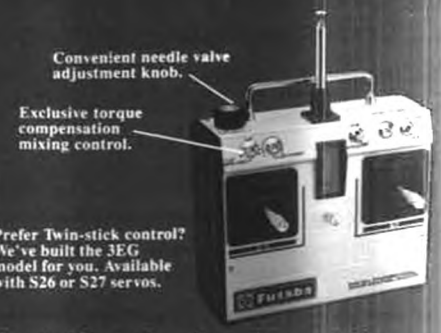
The 3FG system was developed by and for serious racers. In addition to rate control, you'll also find servo reverse switching, electronic trim, mixing and throttle fine tune in the handsome brushed alloy case.



Gentlemen, choose your servos.

The 3-channel 3FG system is available with a wide range of servo options, too. Ultra mini S20 servos are perfect for 1:12 scale electrics, while boat and gas car racers favor the watertight, heavy-duty S27's.

The deluxe 3FG/3-channel system includes R3F triple-tuned receiver, 2-S24 servos, NiCads and charger. 27 and 72MHz.

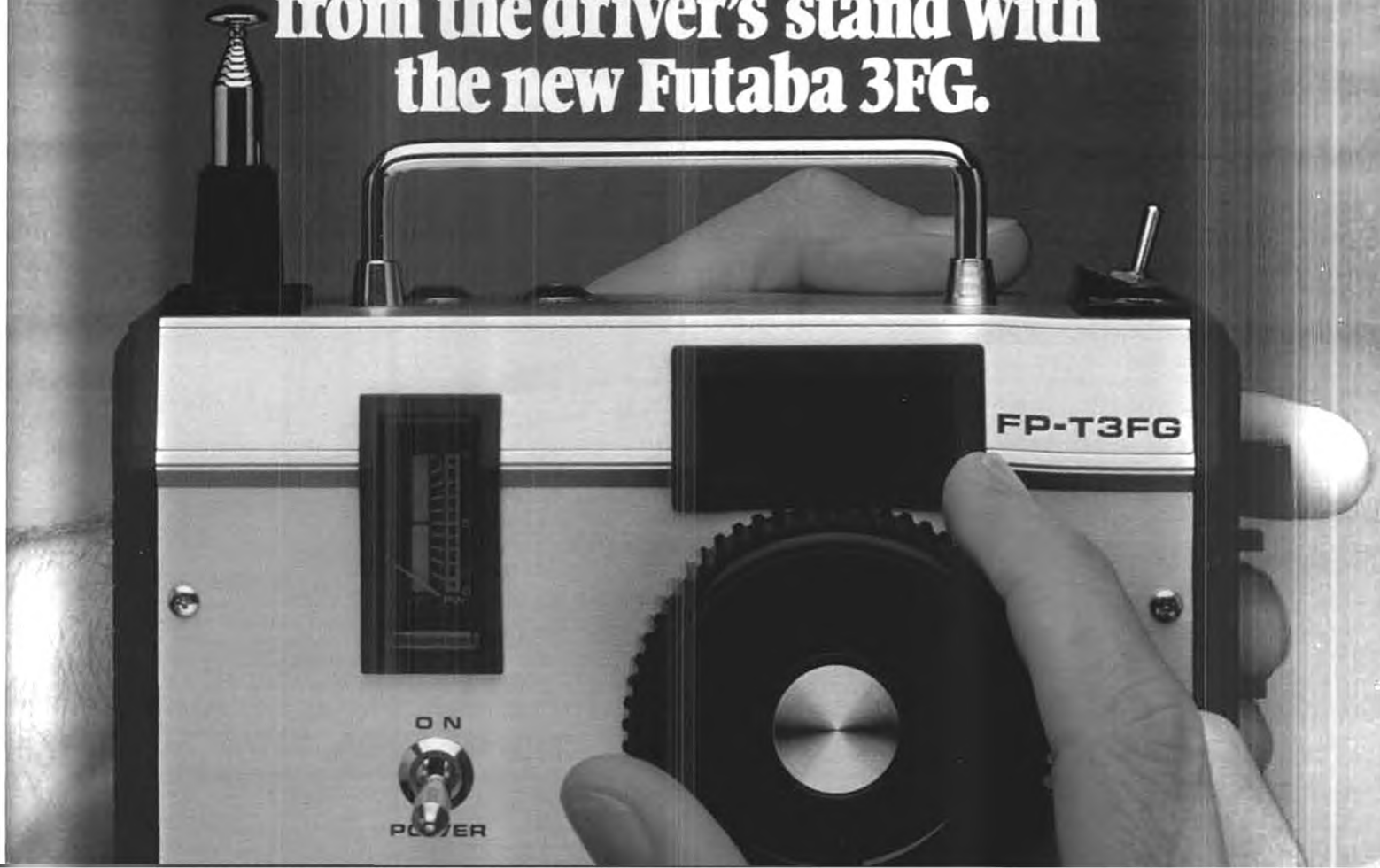


Prefer Twin-stick control? We've built the 3EG model for you. Available with S26 or S27 servos.

And for total performance, the 3FG can be ordered with high-torque, coreless motor S24's and rechargeable NiCad batteries.

Futaba

Track tune your racer from the driver's stand with the new Futaba 3FG.



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SCALE MODELS OF AMERICA'S FIRST POPULAR LIGHT PLANE

$59.95

WING SPAN: 56 In.
LENGTH: 42 In.
ENGINES: .19 to .40

KIT RC-26

The full-scale airplane is a Reed Clipped Wing Conversion, built up from a 1941 Piper J-3 Cub for Hazel Sigafoose, owner of Sig Mfg. Co. The airframe was completely rebuilt and 3-1/2 feet removed from each wing panel. With a 75 hp. engine, the result is a highly aerobatic airplane that is really a joy to fly. With its blue and white sunburst paint job it is a great crowd pleaser.

Hazel Sig's
CLIPPED WING CUB

BOTH FEATURING:
Molded Control Hinges
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Trademark and Number Decals
Built-Up Balsa Construction
Removable Wing Struts

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WING SPAN: 71 In.
LENGTH: 42 In.
ENGINES: .19 to .40

KIT RC-3

PIPER J-3 CUB

A high value kit of one of the most popular scale models ever produced. Built up balsa construction produces a strong structure without excess weight. Light wing loading aids flying performance and stability. Without doubt the Piper J-3 was the most popular airplane ever manufactured. The design is nearly perfect for R/C and makes a beautiful airplane that is easy to fly.

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WING AREA: APPROX. 1300 SQ. IN.
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WEIGHT: 14 - 15 LBS.

Unlike most of the Giant Scale "kits" that have been appearing lately, these carry the SIG trademark. That means you get:

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Hazel Sig's **CLIPPED WING CUB**

KIT NO. RC-48

$169.95

ENGINES: .60 to 1.5 GLOW OR GAS
WINGSPAN: 105 INCHES
WING AREA: APPROX. 1600 SQ. IN.
WEIGHT: 14 - 16 LBS.

SIG

New!

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from Bill Northrop's workbench

Looking back to around 1967, this was our semi-scale Schweizer 1-21 with drag brakes in the fuselage (note open door just behind wing trailing edge. Hand glides were fine, but first winch tow caused considerable damage. Still have all parts, wings have been repaired. Quadruplex radio.

THE LATE DEC. MB

It's nice to know we're missed, when something goes wrong with our magazine's distribution, but other than that, it's a blankety-blank nightmare.

In our anxiety to attend the World FAI R/C Aerobatic Championships, we had to postpone our normal printing schedule by one week. However, we were warned that with the tight schedule for other magazines going through the shipping department at our printers, that one week might get stretched a bit. DID IT EVER! The December issue, as most everyone knows by now, was about three weeks late hitting the newsstands and subscribers mail boxes.

Incidentally, the January 1982 issue is back on schedule, and hardly more than a week or two behind December. As we said before, it was nice to be missed, and though we appreciate all the phone calls inquiring about the delayed issue, we're sorry we had to put you to that trouble.

PEANUT DROUGHT

Last month a repeat from our third issue, December 1971, and this month a non-Peanut "Quickie". There's no doubt in our minds that Peanuts have peaked, however, any decline in interest or activity was not our reason for deserting our standard procedure of the month. It's simply that for the moment we have momentarily reached the bottom of the bag! Our primary source, Walt Mooney, has become so thoroughly engrossed in his second most important activity . . . working for a living . . . that he has not had time to build several Peanuts that are all penciled out on paper and need only to be brought into three dimensions through normal building processes.

If republishing some of Walt's rare oldies from early back issues, when we were only distributing 5,000 copies a month, is OK with you, we'll be glad to do it. This will only occur when necessary, but we'd still like to hear from you about it . . . or better yet, if you have a rare, unpublished Peanut that you'd like to share with our readers, send us plans, pics, and text. Don't worry about a fancy drawing, our Al Patterson can fix it up for publishing.

UP ELECTRIC POWER

Although it has been and still is slow in coming, there's no doubt in our mind that electric power is the propeller twister of the future for aeromodeling. The "infernal combustion" engine will never fade into obscurity, but with the population density forever closing in on the free air space around us, and noise pollution being a favorite, and we must admit, logical concern of that population density, it is inevitable that we modelers must concentrate our learning efforts on quieter modes of propulsion. The long-suffering free flighter will be quick to point out that you can't hardly get quieter than rubber band power, except for the loud grunts emitted by human winders trying to pack in a few more turns, and the occasional sickening explosion of balsa and tissue as a rubber motor parts company with itself. But rubber does not provide the sustained prop-turning power required for control line and radio controlled model flying.

A recent article contributor to Model Builder as he appeared in September 1946 with a glider of his own design. See if *you* can identify him, and let's see if *he* can tell us who took the photo!

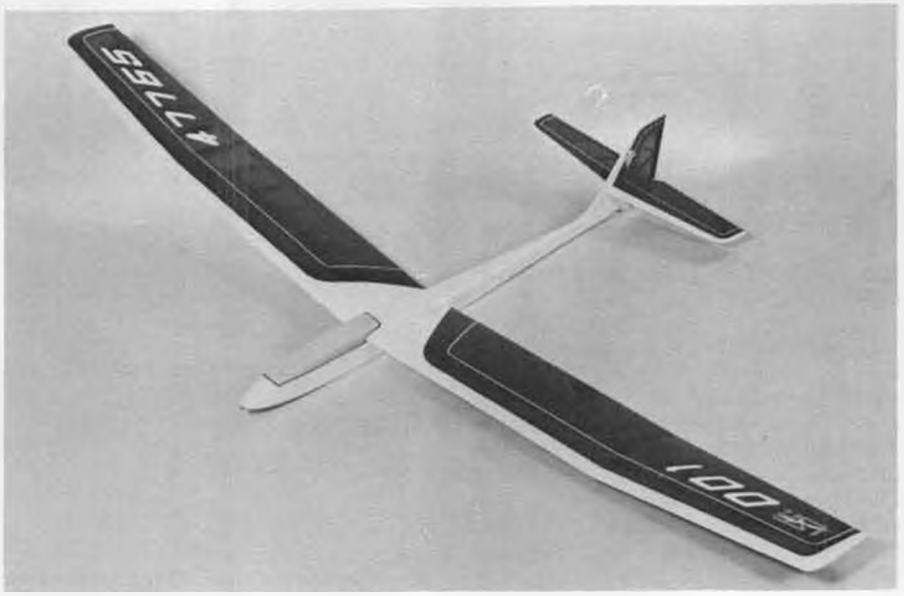
Tony Naccarato proved at the 1979 IMS show in Pasadena that it is possible to mate rubber power with radio control, and he'll demonstrate it again at the same show on January 9 and 10 of 1982, but even with the long, unlimited type fuselage used, powered flight could only last about 1-1/2 minutes.

The answer to the increasing dilemma is truly in electric power, and again, the IMS show has attempted to bring this to the public's attention over the past three years, and will also demonstrate it at the 1982 IMS show. Electric Power has come a long way in the past 10 years. Starting with over-loaded, under-powered, short duration "power landing" type flights just a few years ago, we now find an official FAI category for electric powered gliders, fully aerobatic ships capable of performing a complete pattern schedule, pylon ships that are ap-

Continued on page 99

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.



Top Flite's "Metrick", two-meter sailplane.

• Circus Hobbies has moved! That's right, Circus Hobbies, a subsidiary of Circus Circus Hotels, Inc., has relocated its offices, service, and warehousing facilities from Reno to Las Vegas, Nevada, effective as of November, 1981. In the interest of streamlining its operation and providing faster, more effective service, all marketing, sales, and customer service functions will be performed in Las Vegas. Dealers and customers of JR, Webra, and IM products, please note the new address: Circus Hobbies Inc., 3132 N. Highland Dr., Las Vegas, NV 89109 . . . Jackpot!

★ ★ ★

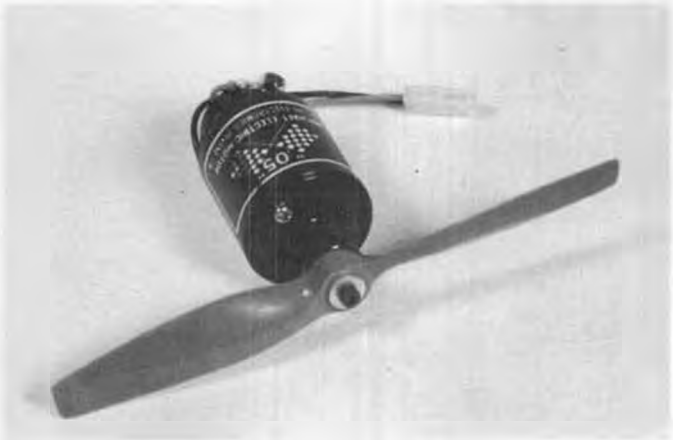
Byron Originals has put together an information package on its complete line of products, from its custom Byro-Jet Pipe Systems complete with bench test date, including specs on the General Dynamics F-16 and MIG-15, to the improved 1/3-scale Pitts Special, the 1/6-scale Beechcraft series, and its famous P-51 kit. Send $2 to: Byron Originals, P.O. Box 279, Ida Grove, IA 51445.

★ ★ ★

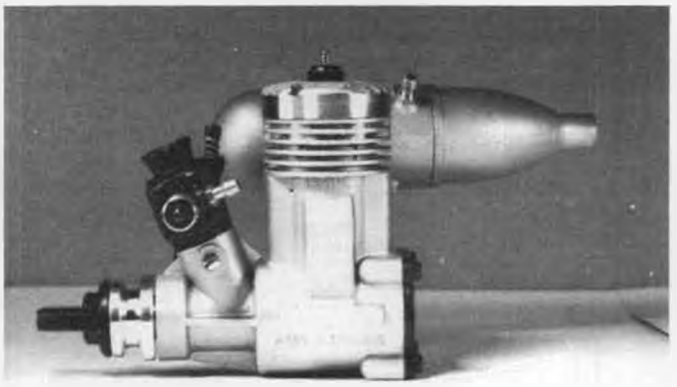
Top Flite Models, Inc., a leading manufacturer of radio-control and U-control model airplane kits, will soon enter the R/C sailplane field with its new design, the 'Metrick.' The sailplane, which is scheduled for March, 1982 distribution, is designed by Scott Christensen, Top Flite's vice president. Christensen, co-founder of The League of Silent Flight, has designed the sailplane around the popular two-meter configuration. While the design is basically two-channel in operation, it is expandable to three-channel, four-function, including spoilers and releaseable two hook. Additional specifications and features will be released at a later date, according to Top Flite. Top Flite Models, Inc., 1901 N. Narragansett Ave., Chicago, IL 60639; (312) 622-2630.

★ ★ ★

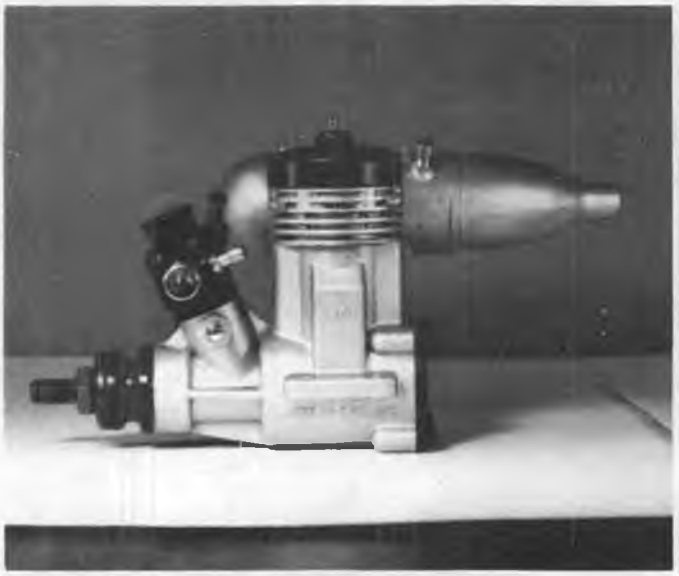
Midwest Model Supply Co. has just begun importing the Irvine line of model R/C engines, manufactured in England, that are well known for their power and reliability. The line consists of four .20 size engines, one each .25 and .30 size, three .40 size, and three .60 size engines. All the engines feature Schnuerle porting, investment cast cylinder sleeves and dykes ringed pistons, forged connecting rods with bronze bushings, dual ball bearings, multi-speed carburetors, excellent craftsmanship, smooth running, and are at competitive prices. Full stock of spare parts are available. Dealers, for more information, contact Midwest Model



Newest Leisure "05" electric motor.



The Irvine .20, available through Midwest Model Supply Co.



Irvine "Blackhead" .20, from Midwest Model Supply.

Irvine .61, another from Midwest Model Supply.

Supply Co., Box 518R, Romeoville, IL 60441; or call (312) 759-1955.

★ ★ ★

Dave Brown Products, producers of the the Southern Products line of retracts, Sorghum, Flexall, fuel pumps, and glass filled motor mounts, has announced its move to new and larger quarters. As Dave says, "More space for better service." Please note the new address and phone number: Dave Brown Products, 4560 Layhigh Rd., Hamilton, OH 45013; (513) 738-1576.

★ ★ ★

Bolt-on header for most .40 and .60 size engines, from Condor Hobbies.

The William Brothers are now producing several new items in answer to the many requests received by builders who didn't like having to fabricate their own crankcases to use with the Williams Brothers 2-inch scale dummy cylinders. For simplicity, only the basic crankcase front components are included (the parts that actually show from the front of the cowling in a stand-off, or sport scale model).

The Pratt & Whitney Wasp partial kit, retailing for $4.95, includes the crankcase front section, the front cylinder ring, and the oil sump, while the Wright J-5 Whirlwind partial kit consists of the crankcase front section, magnetos and couplings, pushrod pad section, front cylinder ring and front bearing plate, and retails for $5.45. The P & W kit is available now, and the J-5 Whirlwind kit should be available early in 1982. Send $1 for a complete catalog to: Williams Brothers, 181 Pawnee St., San Marcos, GA 92069; or call (714) 744-3082.

★ ★ ★

Delta Mfg. Inc. has available immediately its Model MOT-120 1/12 hot racing motor. Some of the features are; special wind, electronic balancing, ball bearings, epoxied and commutators diamond trued.

The quality and efficiency of these motors is accomplished by precision manufacturing and checkout of Delta's special built electronic balancer and recording dyno. Several winds are available to meet different track conditions. Send for a copy of Delta's motor rating

Pratt & Whitney Wasp case front in 2-inch scale, from Williams Brothers.

WWII book series from Ultralight Publications.

Wright J-5 case front in 2-inch scale, also from Williams Brothers.

Model MOT-120 racing motor for 1/12 car racing, by Delta Mfg. Inc.

Lightweight "035" flight system from Astro Flight.

system to select the proper motor for your track. Suggested list price for the MOT-120 racing motor is $50. Contact: Delta Mfg. Inc., 27 Racecar (!) Court, Lorimor, IA 50149; or call (515) 763-2220.

★ ★ ★

J-5 Enterprises has announced the availability of plans for all of its giant-scale planes and boats. The plans include assembly instruction booklet and full-size drawings on one sheet for the Stinson Voyager (101-3/4 inch wing span), Loadmaster (93-1/4 inch wing span), Bonzo (54-inch span), 7-foot Hydro Unlimited Tunnelhull, 6-foot, 7-inch Pickle Fork Tunnelhull, and the NEW (5-foot 6-inch) Hurricane Offshore Deep "V". The plans are drawn for the use of the Quadra or TML35 2-cycle gasoline engines. The price for any of the plans, including assembly instructions, is $17.95. Write to: J-5 Enterprises, P.O. Box 82, Belmont, Ontario, Canada N0L 1B0; (519) 644-0375.

★ ★ ★

New for 1982 from Leisure Electronics is its Modular '05' aircraft electric motor with separate, replaceable aluminum front and rear end bells and chrome plated magnet assembly. This new motor features replaceable brushes, too. It provides great performance in powered sailplanes, sport planes, and, 'Old Timers.' Two 'winds' are available; a 'pattern' wind for direct drive applications and an extra hot, 'racing' wind for racers and use in gear reduction units. For more information on all the Leisure electric motors, batteries, and charger systems, send a SASE to: Leisure Electronics, 11 Deerspring, Irvine, CA 92714; or call (714) 552-4540.

★ ★ ★

Jet Hangar Hobbies announces the acquisition of Bob Violett Models' A-4 Skyhawk 11 Ducted Fan Kit. Semi-kits are currently available at the current price of $145 suggested retail. Dealer and distributors contact Jet Hangar Hobbies for details. An updated and more complete A-4 Skyhawk kit will be offered in the near future. The update will be a three-way kit, which will afford the modeler the option of building either the A-4E, A-4N, or A-4M. In addition to drawings for a scale wing stabilizer, the update version will include the dorsal ECM pack, a fiberglass liner in front of the fan unit, and a basic decal set. These update items, as well as Blue Angel decals, centerline and wing drop tanks, are presently available on a special order basis with each item priced individually. A-4 Skyhawk Fan Units are also available from Jet Hangar Hobbies, or your local hobby dealer at a retail price of $80 each. For more information on the A-4 Skyhawk and other Jet Hangar ducted fan scale kits, contact: Jet Hangar Hobbies, 12554 Centrailia Rd., Lakewood, CA 90715; or phone (213) 860-7692.

★ ★ ★

Wilshire Model Center has available a highly informative booklet with product information listings on the Geist line of electric motors, speed controllers, folding props, gear reduction units, chargers, and batteries. The Geist motor, with samarium-cobalt magnets, are now, for the first time, available in the United States.

Several sizes of motors are available, with, and without reduction drive units. All motors have high performance magnets, very low weight, excellent effi-

Continued on page 92

Sample photo from Scale Model Research.

Irvine 25 R/C engine, Midwest Model Supply.

Beginning of triple J-3 Cub quarter-scale flight demonstration at Mile Square "Uncontest". For an impromptu act, it was very well done. Take-offs were individual, but they did some nice formation fly-bys. Built and flown by Charles Richard and sons, Erik and Brian of QSAA Chapt. 7.

R/C WORLD

Text and Photos by JOHN ELLIOT

• As you read this, hopefully someone will have 'rushed' a letter to us stating that Jeri Blaha, as mentioned in John Underwood's book, *Acrobats In The Sky*, was the originator of the LOMCEVAK, or LOMCOVAK, if you prefer. However, yet another source, *Wings Over Africa*, a magazine combining full size and model aviation (shades of *Air Trails!*), in an article on aerobatics by Dennis Bishop, credits Ladislav Bezak as the 'inventor' of the Lomcovak. We won't quibble, as both are highly rated acro pilots. It will be interesting to note, of the two, who gets named the most. . .

★ ★ ★

As we mentioned a month or two ago, some more news on the 1981 'Coppa Schneider,' as sifted from *Radio Modeller*. As this was the third running of the event in two years, our hardy cousins across the big pond are getting the problems of their Schneider racers sorted out, this time, 10 models getting dialed in and making successful flights. Quoting Brian Peckham, "For scale Schneider planes, a light wing loading is essential, the scale floats should be simplified to replace the deep concave 'V' with a shallower flat 'V', and fitted parallel to or at a negative angle to the wing. The balance point needs to be at about 15% chord rather than the accepted 20% to 25%, a thickening of the wing sections on the later racers from the scale 8% to nearer a 12% semi-symmetrical section is important, and the leading edges should be blunt rather than sharp as used on the prototypes." (Sounds as though the lads should have checked in with the local pylon racer types for some thoughts on balancing. . .)

With 10 out of 20 entries getting airborne, the learning curve is picking

Violett Skyhawk built and flown by Bob Fiorenze, Brooklyn, N.Y. PARC's club. Photo by Bud Gay, Bristol, Conn.

Dion Luke's 1/4-scale Pitcairn Mailwing. Scratch-built, Quadra engine. Brooklyn, N.Y., East Coast Scale Flyers. Bud Gay photo.

Jerry Behrens (Behrens Plan Service), Far Rockaway, N.J., Travel Air 2000, Quadra. First at R/C Club of Conn. meet. Bud Gay pic.

Nice cockpit and door detail in P-39 based on Top Flite kit. Seen at Mile Square "Uncontest". Sorry, no name of builder.

Williams Brothers' Larry, with his nice flying Supermarine S-4 Schneider Cup racer.

up and the invitation to "us Yanks" to come play still stands. Granger and Larry Williams were invited over for fun and games in September, but due to business commitments, it was impossible for them to do so. Granger has sent up some pics of Larry's S-4 and his Mercury that were built several years ago. Flew quite well, from all reports. Can't you just see four of these birds jockeying for position, diving for the starting flag, and heading for the No. 1 pylon??

★ ★ ★

November 8, 1981 saw the first contest for electric powered sailplanes staged in the United States, the beginning of the 'learning curve' to hopefully train a winner for the 1983 World Champs, CD'ed by Larry Jolly and hosted by the P.S.A., the contest was lightly attended, but interest was high. Two classes were contested, '05' and unlimited. Most of the '05' powered birds were conventional sailplanes with an electric motor set up 'added,' even an electric powered old timer was entered. In the '05' class, John Krug was first, Mike Charles was second, Larry Frakes third, Bruce McAvinew fourth, and Larry (ho ho) Jolly, fifth. The open class saw Larry Jolly with a prototype of his new kit, the 'Olympian,' first, followed by Steve Neu in second, while Doug Taylor, flying his twin '05' powered Windrifter wound up third. Larry's 'Olympian' sported a 125-inch span supporting an 80 ounce flying weight. A Wilshire Models Geist 40/14 motor swinging a folding prop utilizing a 1.2 amp, 12-cell pack providing 'fuel,' hauled all this uphill at an alarming rate. That is to say, it climbed out "right smartly!"

Larry's S-4 (left) and Granger Williams' Mercury, on shore of Lake Elsinore. Mercury was American entry in Schneider Cup, built by Naval Aircraft Factory, flown by Al Williams.

It's safe to say that a lot of R/C'ers have considered giving electric powered flights a go, but have probably been disillusioned by RTF products that didn't quite deliver as advertised in regards to performance and flight time. . . In the past eight to ten years, much progress has been made in electric 'engines' (motors, if you please!) and especially so with regard to rechargeable batteries. Flight performance has increased to the point where, in Europe as an example, electric powered pattern contests are a reality, and electric powered pylon races have been staged many times here in the States. With further advances in electric motor design/materials, and the fact that it makes many, many more flying sites available, the next several years could be most interesting, challenging, and a great asset to the progress of our hobby/sport. We've come a long way, baby. . . Check out the information of a new group of R/C'ers dedicated to the development and growth of 'electric' powered R/C aircraft in this month's *"Workbench"* column.

Beautiful Fairchild 'Ranger', developed and built by Jerry Heaton. EWH "Hustler" engine suffered from ignition problems.

Fat-as-a-Gee Bee Hall/Springfield racer built by Ed Erfurth. Real pretty!

Olympian electric powered sailplane prototype by Larry Jolly. Placed first in Open Class F3E contest. Geist 40/14 motor using 12-cell pack for "fuel".

Doug Taylor's Open Class F3E is a modified Craft-Air Windrifter with two Astro 05 motors. Placed 3rd. No one-engine cuts in electric!

★ ★ ★

Southern California's famous Scale Squadron (infamous to Arizona's "One Ape", or 1/8 Air Force) hosted its year end 'Uncontest' on the 15th of November. The past several years were plagued with 'Santa Anas' (high winds) and unseasonable rain. Yes, it *do* rain in Southern California now and then. This year, advanced reservations for good weather paid off handsomely . . . temperatures in the very low 70s and very gentle breezes were presented to the R/C Scale crowd. Over 115 ships were registered(!), although only a very few were not ready for flight; the theme of the 'Uncontest' is to bring your pet project, finished or not, out for what amounts to as a giant show and tell, or fly and tell! Or both. . .

John Nicolaci's six-year old PBM taking off at R/C Club of Conn. meet. He's from New Bedford, Mass. Lots of styrofoam used in its construction.

Close-up of Larry Jolly's Olympian, Geist motor, folding prop. Terrific climb rate. Gotta see it to believe it!

Thanks to some excellent pre-Uncontest promotional endeavors by Uncontest coordinator Bert Ayers with several local newspapers, it was estimated that over 3,000 spectators were on hand to enjoy scale R/C modeling at its finest. With knowledgeable people such as Fred Brown on the mike, continually describing the aircraft, maneuvers being performed, history on the full-size bird and even a little history about each R/C pilot, the large and appreciative crowd was well informed and entertained and they showed it by their applause. Even if the snack bar was completely sold out by 2:30. . .

Of the over 115 planes registered, about 25 percent were of the 1/4 or giant-scale variety. One of the highlights of the day was a flight of three 1/4-scale J-3 Cubs tooling around in a loose formation series of fly-bys. They all taxied out together, but wisely took off in single file. With a bit more practice and working to a prearranged flight plan,

Lockheed SR-71, by Bob Gales, Hemet, CA. Two K&B 7.5s with Jet Hangar fan units. Futaba radio, not yet flown.

P-51B "Camel Back" in glass and foam, sized to fly on a .90, by Don's Custom Models.

perhaps they will be able to 'join-up' a bit closer and really wow the troops. . .

The general quality of the models present was the highest yet seen at any of these gatherings; especially ships like Jerry Heaton's large Fairchild. Jerry had gone so far as to make special tooling to shape the stringers used on the fuselage; t'was beautifully finished, too. Only problem was the revamped ignition system on his Hustler refused to spark. . .

Another beautiful Golden Era bird was Ed Erfurths 'Hall Racer', resplendent in its acrylic enamel finish. Ed, of Victorville, California, says he has a few more details to add, and early next spring, it should be ready for test flights. Would like to be there for the event.

Several new pre-production models were also being shown for modeler retion, for the first time. One, a P-51 B (yes, another P-51, but not the overdone "D" this time) by Don's Custom Models via Rick Lewis), with exact scale outlines at somewhere between 1/6 and 1/5 scale. Reason for the odd-ball scale was to meet a wing area/loading power loading concept, rather than to try to satisfy some thinking that it has to be exactly 1/6 or 1/5, or whatever. Kinda like FAI scale in a way, with its 11-pound limit, sure rules out a lot of interesting subjects. . . Shane Cramer was racking up flight time on his MK XIV-C Spitfire, this at 1/6 scale (soon to be offered by Holman Plans), and flying most realistically. Walt Clark had several nice flights on his big Mulligan, a crowd pleaser.

What with a complete airplane/engine/radio package being raffled off, good weather, lots of R/C scale models being flown, and a huge crowd, it was, indeed, a good day. . .

★ ★ ★

We have received an interesting report on a non-official flight held in conjunction with the annual QSAA event in 'Vegas' that's worth passing along. Harry Dickinson and friends, of Pomona, California, were working on a large model of the Northrop 'Gamma' as their entry in the QSAA Marathon of Flight. Name of the game was to first, fly from Cucamonga, California to Las Vegas, Nevada as a warm-up, and then fly the Marathon of Flight course in Nevada. As the Gamma could not be completed in time, a modified 'Big Stik' was substituted so experience could be gained in cross-country flying.

Big Stik "Tanker", for distance flying. See text. (l to r) Bill Comstock, Ron Meyer, Harry Dickinson, Calvin Orr, Jeff Dickinson, and Ralph Perkins. Note huge fuel tank slung under fuselage. Tail dragger configuration used.

Ready for take-off from Cucamonga to Las Vegas (l to r): Ralph Perkins, Jeff Dickinson, Calvin Orr, and Ron Meyer. Note truck-style wind streamliner on front of tank.

Three vehicles made the trip, carrying drivers, observers, frequency scanner, and pilots, all equipped with C.B. The 'Big Stik' utilized the 3.8 gallon tank designed for the 'Gamma.' Takeoff weight was 46 pounds, carrying 3 gallons of fuel. Flight time was 4-1/2 hours, covering 228 miles. Highest point of the flight was through a mountain pass with an elevation of 4,730 feet (MSL). One brief 'pit stop' for creature comfort was made as the model was circled overhead. The flight terminated at the Silver Bowl Stadium in Las Vegas, site of the QSAA Fly-In.

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Jerry Behrens' Travel Air 2000 takes to the air at R/C Club of Conn. meet. First in Giant. Bud Gay photo.

Leonard Crawford, Levittown, Pa., placed 2nd with his Pica kit T-28 at R/C Club of Conn. meet. OS 60, Kraft 7-channel. Bud Gay photo.

FUEL LINES

JOE KLAUSE
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THE SCIENTIFIC MODELER

He doesn't exist! At least not at the local flying site. When they're out flying their models, scientists behave like modelers. If you ask one if he gets much power from his engine, he'll probably reply in a pleasant tone, "Quite a bit." That's much more friendly than saying, "Ninety-eight inch-ounces at 20,500 RPM." Even a reply of, "One point ninety-nine BHP," would turn off a lot of people. That's why modelers use the jargon that they do. It may not always be exactly correct, but it does express their point of view very well. Referring to an engine as a "powerhouse," or a free flight model as a "real floater" are just two of so many examples that contribute to the great camaraderie of modelers. We should be proud of it.

Nevertheless, there obviously are other times when modelers are quite technically oriented. This fact was emphasized recently by the number of inquiries in response to our test report on the new OS Max .40 racing engine. (November, 1981 issue of **Model Builder**.) Most of them wanted to know about the dynamometer, how is it used to test an engine, where can you buy one, how do you get those performance curves, and what do they really mean? Unfortunately (there's always an unfortunately), there are no brief but adequate answers to such questions. That doesn't mean they'll be ignored. On the contrary, there was more than enough interest to convince us that a mini-series on engine testing is warranted. This month we'll provide some introductory or background information, and in the next two issues we'll describe, in detail, the dynamometer, and do a step-by-step walk-through of an engine test. So, let's get on with it.

ENGINE PERFORMANCE

That caption infers some system of comparison or measurement. Does that mean wading through a bunch of advanced math and physics? Wrong. This background, hopefully, will be quite easy to assimilate. We won't even go into the bit about precisely defining energy or work. You already have an innate sense of what they are. We'll just begin with horsepower. The term comes from the 18th century tests James Watt performed on a steam engine which he had invented. He simply compared the work the engine could do to that of a so-called average horse. His reported measurements became the standard that is used today. One such horse could theoretically pull a 550 pound weight one foot in one second. Thus, horsepower is nothing more than how fast work can be done. Along the way, measurements were made on engine crankshafts by applying calibrated brakes to them. Thus, the horsepower at the crankshaft of an engine became known as brake horsepower (BHP).

MEASURING BHP

Today, we commonly measure brake horsepower on a dynamometer. Although there are many types of dynamometers, by convention, the term brake horsepower is still used. Not only that, but dynamometers seem to be gaining wide popularity. These days, if you have an engine tune-up on your automobile and the shop doesn't have a dynamometer, you might have nagging doubts about the quality of the work. Certainly a dyno is a very useful testing device if it's used properly.

We'll now conveniently skip the physics and derivative math, and provide you with one simple formula for computing the brake horsepower of model engines:

$$BHP = \frac{(\text{Torque in inch-ounces})\ (RPM)}{1008400}$$

If that leaves you a bit skeptical, go to the library or dig out your scientific texts, and check it out. Alternatively, you can take our word on it.

OK, with that simple formula, all we need to measure are engine RPM and the inch-ounces of torque at the crankshaft. RPM measurement should be quite easy . . . there are many tachometers readily available on the market today. A word of caution . . . to determine reasonably accurate brake horsepower, your tachometer should be able to measure RPM in 100 increments without interpolating. A Heathkit Thumb Tach won't do. A Royal Pro Tach will do nicely.

In order to measure torque, we need a dynamometer. That will be the subject of next month's column. We'll provide a detailed explanation of how it works, together with a goodly number of photographs and appropriate drawings. In the April issue, we'll cover the step-by-step test of an engine.

For now, let's just assume that we can measure torque and full throttle RPM, and then plug the two numbers into the BHP formula. The result is one brake horsepower figure that isn't too meaningful by itself. It isn't meaningful because the efficiency of our engine will vary with the load imposed upon it. A big prop will load down the engine, thereby decreasing RPM . . . probably lower than the RPM where the engine breathes most efficiently. All that means is that for every two-cycle engine and it's specific carburetor, there is one full throttle RPM when it ingests, transfers, burns, and exhausts a specific mixture of fuel and air most efficiently. That's where you'll realize the maximum BHP. We can find that point by imposing a series of different loads on the engine. To change the load, we change prop diameter, or pitch, or both. Each load will provide a torque and RPM figure from which we can compute BHP. If we plot BHP versus RPM, we'll have what is commonly called a BHP curve. Plotting torque versus RPM will provide a torque curve. The accompanying graph illustrates these curves. From these curves we can determine at what RPM the engine produces the most horsepower, and we can prop or load the engine accordingly. Remember, however, that the curves apply to only one specific fuel, glow plug, and carburetor. If you

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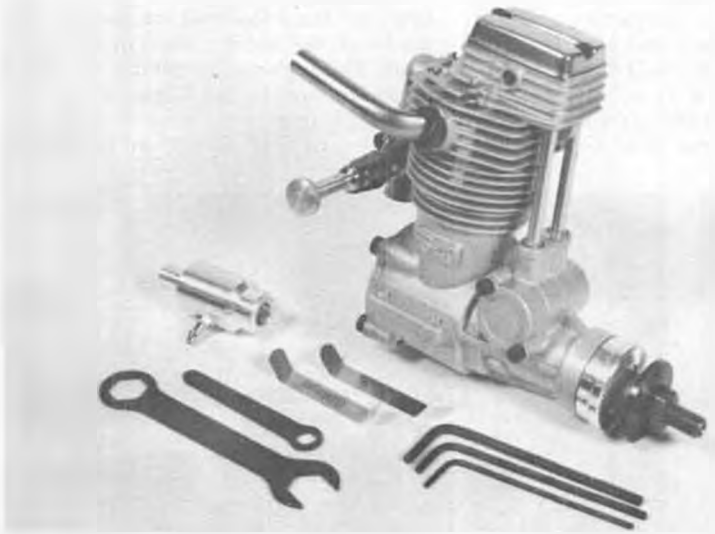
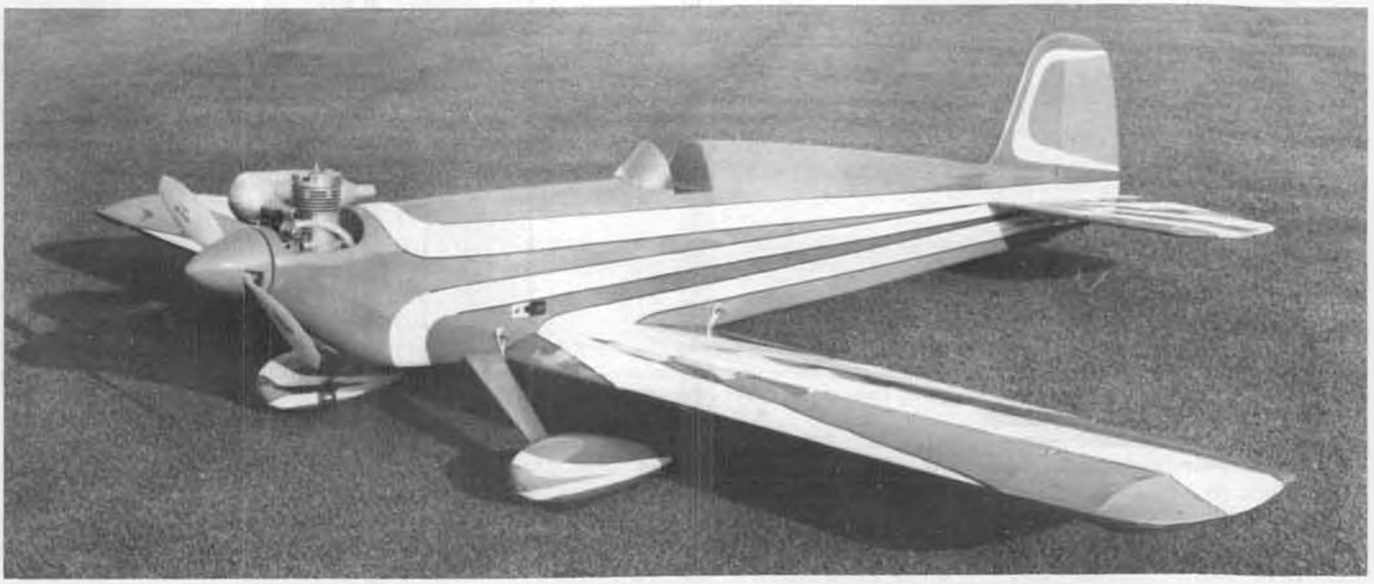


Third and newest four-cycle engine from O.S. is this FS 40, distributed in U.S. by World Engines, priced at $149.95. Mini-muffler like gadget set-screws on exhaust pipe to supply mild tank pressure when needed in certain installations. All tools are included. Joe will test ours very soon. Lick your chops, OTers!



ACRO SPORTSTER 40

By PETER NEUER . . . "Super-smooth; would be great for fun-flys and pre-novice and novice pattern, thanks in part to the longer-than-average tail moment. So says Assist. Editor John Elliot after flying this sharp looking sport/pattern model of basic balsa and plywood construction.

• Have you ever thought about designing that perfect single-purpose airplane, you know, the perfect trainer or the smoothest pattern ship, or perhaps a really good looking scale job that took off and landed with ease.

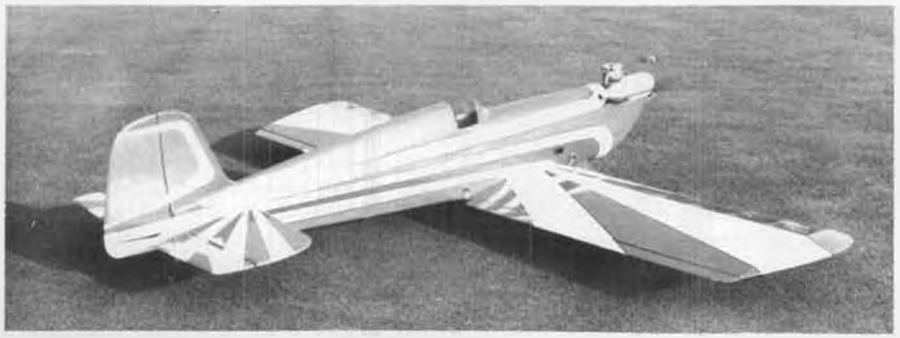
How about one plane that has all those planes rolled into one? Too good to be true, well that's what I thought until I flew my latest creation, the "Acro Sportster 40". This ship has been flown by lots of people who fly a lot better than I, and they all loved it, in fact, I had a hard time getting my transmitter back in some cases. Well, if you want a real fun flyer with good looks, easy ground handling, and great aerobatic ability, then wait no longer, get a set of plans and starts chopping balsa.

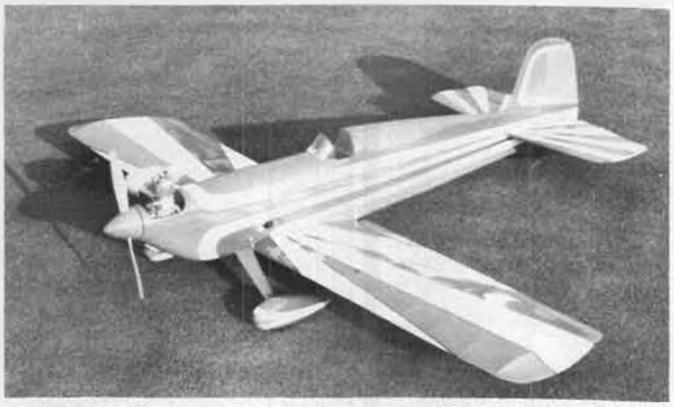
The construction is straight forward and should be no problem for anyone except an absolute beginner. I think that it's a real time saver when scratch building to start by cutting out all the parts shown on the plans, thereby making yourself a kit.

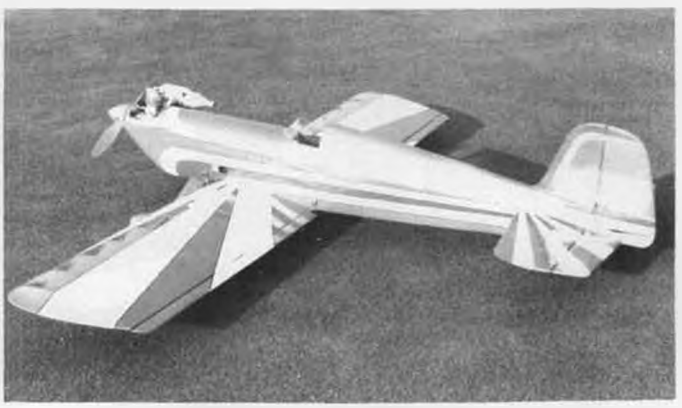
I use a spray adhesive on the back of each pattern, then stick it to a piece of shelf paper. After cutting out the pattern, peel off the backing of the shelf paper and press the pattern onto the wood. The shelf paper will peel off without leaving any adhesive residue.

Use the plans as a guide to mark the 1/8 x 4 x 36 inch fuselage sides. This is to show where the 1/4 sq. balsa longerons and uprights will be glued onto the sheets. Use a ball point pen, don't press hard. Be sure to make one LEFT and one RIGHT. Chose two sheets that are the same hardness, if possible. Use firm to hard sticks for the longerons.

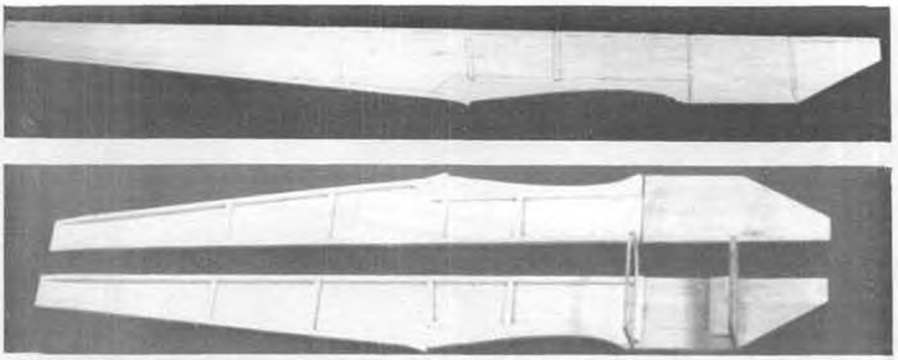
After you have glued the longerons and uprights onto the sides, glue F-13 also. Take the 3/16 birch ply firewall and mark a vertical and horizontal line indicating the engine center thrust line. Using a Kraft engine mount or similar, place the mount on the firewall and drill







A real nice looking sport/pattern machine for .40 size engines, the Aero Sportster is well designed for fast, accurate building and easy flying for anyone with a little trainer experience. Two rubber bands on wing for photos, ten for flying!



Early steps in fuselage construction. Sides are marked on inside with ball-point pen for longerons, verticals, doublers, and bulkhead locations. Care at this time will produce aligned fuselage.

the mounting holes; use 4-40 allen head bolts, they're slightly undersize and will enable you to adjust the mount.

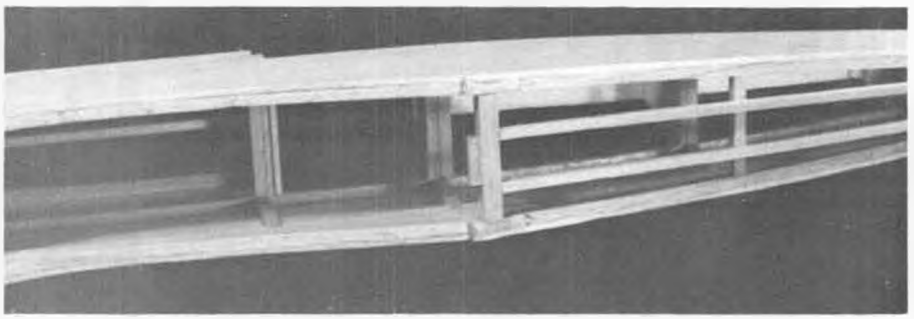
Pull the blind nuts into place, then remove the mount and put the firewall aside until you have glued the side doublers FD-1 and FD-2 in place. Now use a triangle to align the firewall, make sure that it is vertical and at a right angle to the fuselage center line. Glue the one-inch trailing edge stock behind the firewall to reinforce it. Position F-3 into place, and using a triangle for alignment, put the 3/16 x 1/4 balsa upright in front of F-3 as indicated on the plans.

Before fitting the left fuselage side onto the right, bevel the ends of the longerons as shown on the plans at the rear of the fuselage (see top view). Trial fit F-3 between FD-1 and F-13, check to see that the fuselage sides are parallel, and once you are satisfied that everything is in alignment, go ahead and glue the left fuselage half to the right.

Cut the 3/8 x 1/2 balsa stick that goes between the two sides at the back of F-13, right under the dowel hole, pin and glue. Cut the two 1/4 sq. cross braces that are against F-4 and F-5 pin and glue. Now pull the rear fuselage ends together. Check carefully their alignment and glue. Put the rest of the top and bottom cross braces in and glue. Fit and glue LG-1 in place between the fuselage doublers with epoxy glue, use hard 1/4 inch balsa as shown on plans. I use a Hallco B 106-4 landing gear, it's 12.8 inches wide. Drill four mounting holes as shown. I put the nut on the outside of the landing gear and use flat washers on the inside against the wood to keep the heads from pulling through. File off any part of the screws that sticks through.

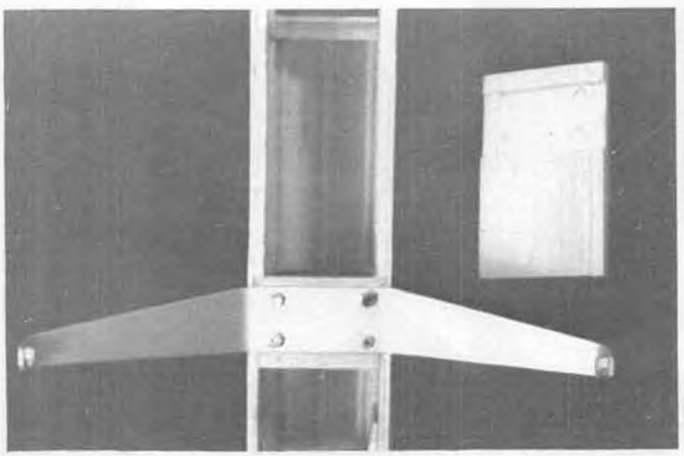
Drill the lock nuts that are provided or punch them out. I use 5/32 axle shafts (Dubro #247) and Dubro 2-inch Low Bounce wheels. This method allows me to use the flange nut that is on the steel axle to hold the wheels pants on, or you can drill two small holes through the landing gear and use blind nuts and screws to hold them on. If you use the first method, it is advisable to put the wheel and axle assembly into the wheel pant before putting the sides on.

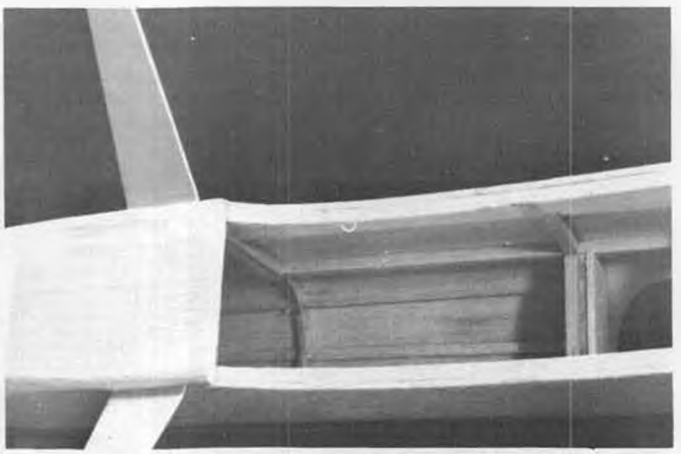
Install F-6 to F-9, put a mark at the top center of each former as an alignment reference. Fit F-10 at the bottom between the longerons, see that there is 1/8 inch that drops down to meet the 3/16 x 1/4 bottom stringers. Fit F1-A at the fuselage front between doublers FD-1 and FD-2; use your engine on its mount to check alignment. Glue F-1 to F1-A. Glue the 3/8" x 1-1/2" trailing edge stock behind F1-A, cut the bottom of the trailing edge stock flush with sides of FD-1 and FD-2. Take some 3/8 inch balsa sheet and bevel it with a sanding block to match the back of F1-A, then glue into place and cut the sheeting to match the fuselage bottom. Take another piece of



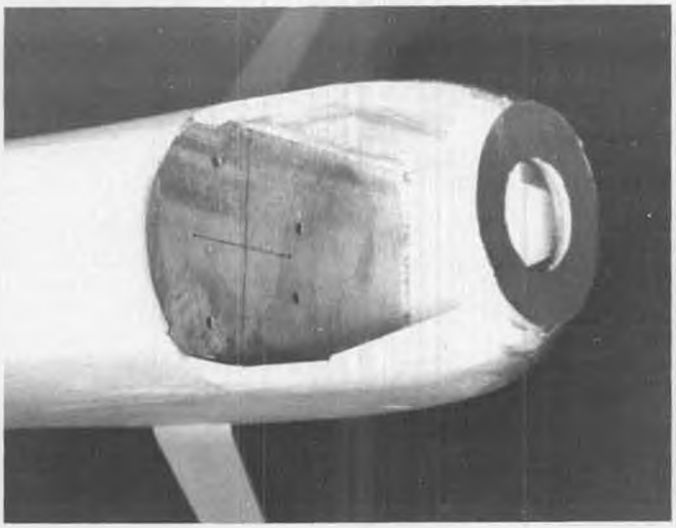
Bottom stringers butt into cross-piece at aft end of wing opening, then rest on outside of cross-pieces going back to tail post.

Stringers on top of fuselage forward deck provide joint backing for three planking sheets which are wet-bent formed before gluing.

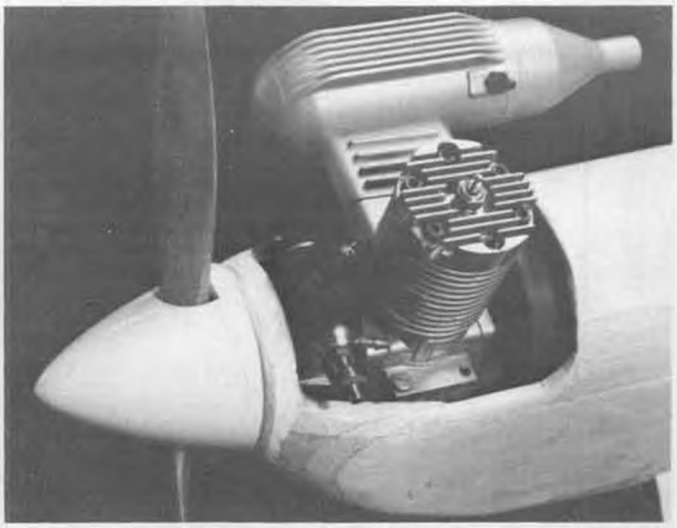




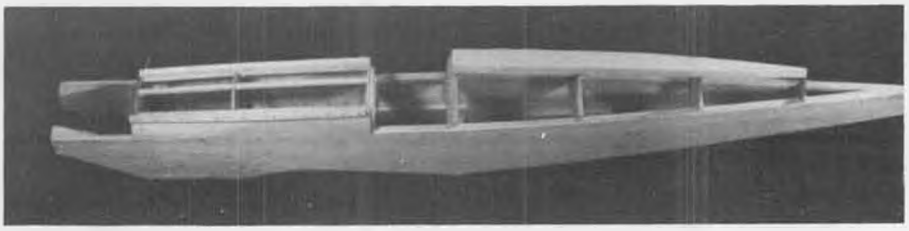
Hallco gear is bolted to plywood plate, nuts outside, and bolts filed flush with nuts. Bottom 3/8 sheet is notched and partially drilled to clear gear and nuts before gluing in place.



Radial mount is located and blind mounting nuts installed in firewall before it is epoxied in place.



HB 40 engine bolted in place (four bolts for running, less for picture taking!). Vertical mounting simplifies starting operations.



Rear deck is formed by curving, gluing, and beveling sheet backbone to bulkheads. Side pieces are then curved and glued in place prior to final shaping.

3/8 inch sheet and file a notch to clear the landing gear, drill some reliefs part way through to clear the landing gear nuts, glue the block and sand to shape. Fill in the top edges of the engine cowl between F1-A and F-2 with 1/4 sq. sticks and use scrap wood to blend in cowl area.

Soak F-11 in water so that it will bend easily, then glue to the tops of formers F-6 to F-9. After it dries, bevel the edges to match the countours of the former sides. See drawing FC. Glue F4A and F6A into place, wet FC-1 and also FC-2, then bend and glue to F5A and F6A. Before going further on the fuselage it is required that you put together the stabilizer and rudder assemblies. Draw a center reference line where the rudder will go on top of the stabilizer; be sure to use a triangle to check it. This will also help to align the stabilizer on top of the fuselage, so it will be on straight. After gluing the stabilizer to the fuselage, place the vertical fin on top, align and glue it in place.

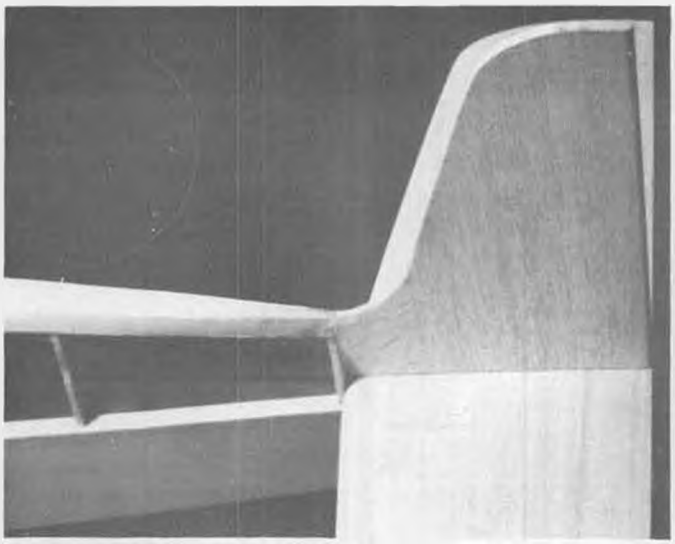
Use the side view on the plans to make a pattern for the turtle deck sheeting allowing some extra as it curves in toward the top, then glue the bottom edge to the top edge of the fuselage sides, then bend to F-11 and glue. Fit and glue the 3/16 stringers on top of F-2 to F-4. Cut three pieces of 1/8 sheet soft grade preferred, dampen with household ammonia in water, and fit on top of the cowl formers. When dry, glue in place. See drawings FA and FB. Drill the holes for the 1/4 inch dowels, fit and glue. Glue the 1/8 inch ply tailwheel platform in place. Drill a 3/32 hole in the 1/4 inch ply rudder insert for the tailwheel wire. Trial fit and then remove until plane is painted.

Cut the windshield from acetate plastic, using the pattern on the plans. I use a polyester resin to hold the acetate on. Fillet the bond with micro balloons.

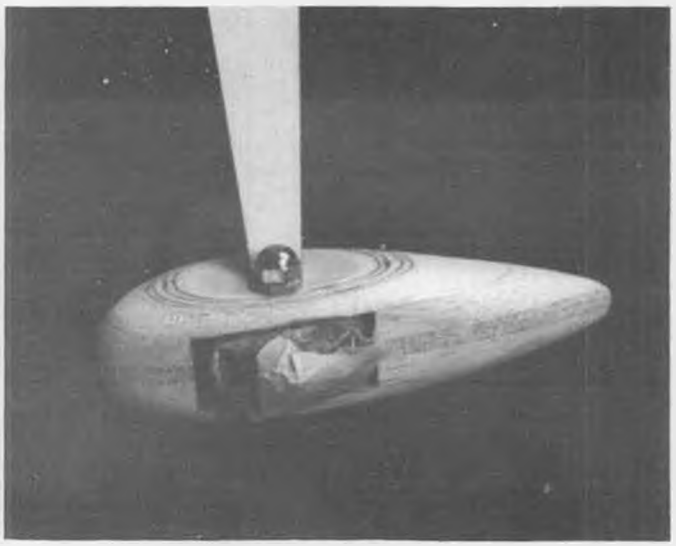
The wheels pants are a cinch. They're strong because of the 1/8 plywood backing, and if you use the single bolt method of attachment, you'll have no trouble with them breaking off; they will just swivel if they make a hard contact. Use the sandwich construction shown on the plans and lots of sanding to get those pretty contours.

TIME TO BUILD THE WINGS

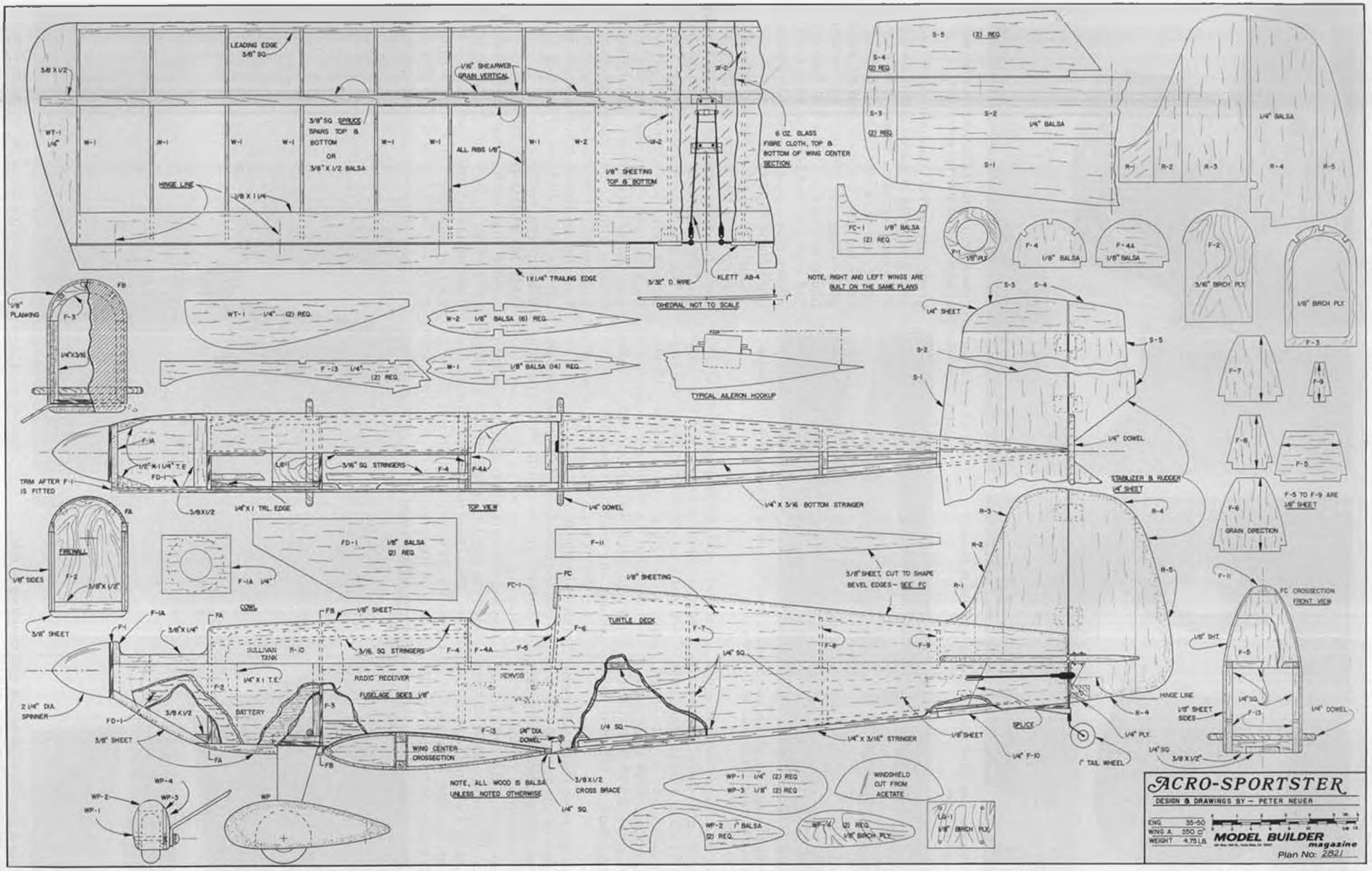
Note that both wing panels are the same; they're built on the same set of drawings. The main spars are 3/8 sq. spruce, however you may substitute 3/8 x 1/2 balsa if you wish, however, if



Stabilizer and fin are glued in place before final mounting of rear deck siding. Note blending of top piece into fin.



Built-up wheel pants have outside ply facing. By mounting with single nut on axle, they are free to pivot on hard contact.



FULL SIZE PLANS AVAILABLE – SEE PAGE 100

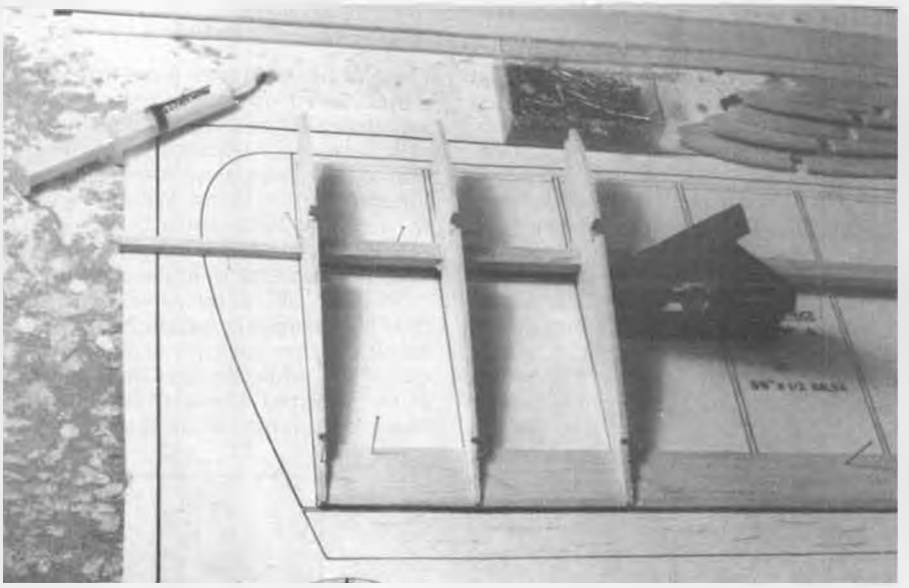
you choose balsa, I suggest that you use 1/8 vertical grain shear webs in between the first four wing ribs. Start construction by pinning down the trailing edge sheet over the plans. Spot glue a piece of 1/4 sq. balsa to the bottom side of the bottom 3/8-square spruce spar. Now gradually bevel the 1/4 sq. on the bottom until it supports the spar at the correct angle to join the notch in the ribs when they are glued to the trailing edge. After the panel is lifted from the plan, pop the beveled 1/4 square shim loose and reuse it for building the second wing panel. Glue the wing rib closest to the wing tip in first; use a triangle to be sure that it is vertical. Check to see that the top edge of the rib is even with the top edge of the spar. Install all the ribs in the same manner except that when you get to W-2 note, that the top of the rib will be 1/8-inch from the spar edge to accommodate the 1/8 sheeting. Sheet the wing on top and bottom, then cut out the area behind the top main spar for the aileron servo. Both the right and left wings are built the same (fully symmetrical). After completion of both wings, put a slight bevel on the center rib W-2 to accommodate the 1/2-inch (per panel) dihedral, then glue the two wing halves together, using 5-minute epoxy. Take a two-inch wide strip of 6 oz. fiberglass cloth and resin it around the wing center as a reinforcement. Sand the edges flat.

The ailerons are made from 1 inch trailing edge stock. Draw a line lengthwise on the 1/4 inch side as a hinge reference line, use a large type of pinned hinges. The aileron hardware is made from 3/32 music wire and you must use a Klett AB-4 type hinge as it acts as a support over the wire so that the rubber bands will not rub.

For best results use a fabric covering on the wings, or Super Monokote if preferred.

Use a Sullivan R-10 fuel tank. It's round and will fit easily. The plane flies great on any .40 to .50 size engine, but it will perform quite well on a good 30, provided that the weight is kept low.

Bottom stringers blend into V-block where sides join at rear. Note hardwood dowel joining elevators, notch in rudder for ply insert.

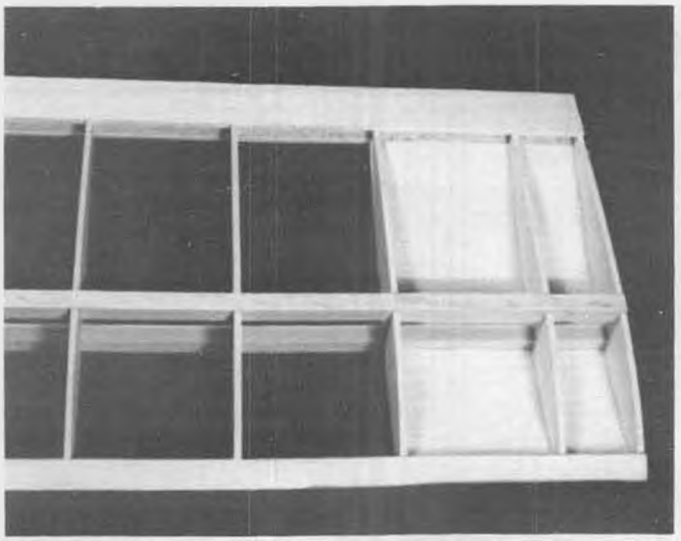


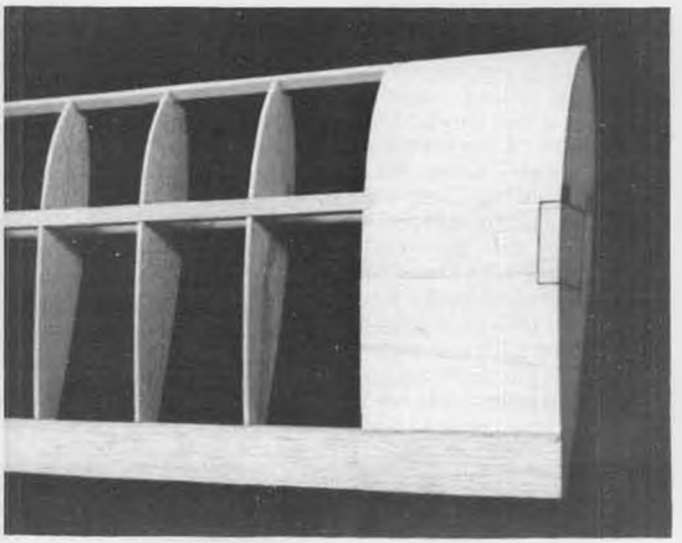
Main spar is shimmed up so ribs fit properly for gluing when being attached to trailing edge. Wing is fully symmetrical, build both panels over same plan.

Install the servos under the cockpit area. The receiver and the battery should go on top of the front portion of the wing, you can use the battery to adjust the balance point. Use a flexible throttle pushrod; nylon or braided steel cable works fine. The control surface throws are as follows: Ailerons 3/8 inch up and down, rudder 1-1/4 inch left and right, and the elevator 5/8 inch up and down.

Use what ever prop the engine manufacturer suggests.

Well, I hope that some time I will have a chance to see someone else having a ball with their Acro Sportster. As for me, I am tired of typing, so I think I'll go fly mine. Happy landings. •





Three root ribs are 1/8-inch smaller to accommodate 1/8 sheeted center section. After completing each panel, bevel-sand roots for 1/2-inch dihedral, join with glass cloth and resin reinforcing, then cut out section for aileron servo.

CHOPPER CHATTER

By RAY HOSTETLER PHOTOS BY THE AUTHOR

Hughes 300 from Kobe-Kiko Co., Japan, for .50 power. Distributed by Orange Coast Hobbies. Ray begins detailed review next month.

• Lately I've been thinking quite a bit about servos and control forces needed to adequately fly our model helicopters. Thought I'd share some of this information with you.

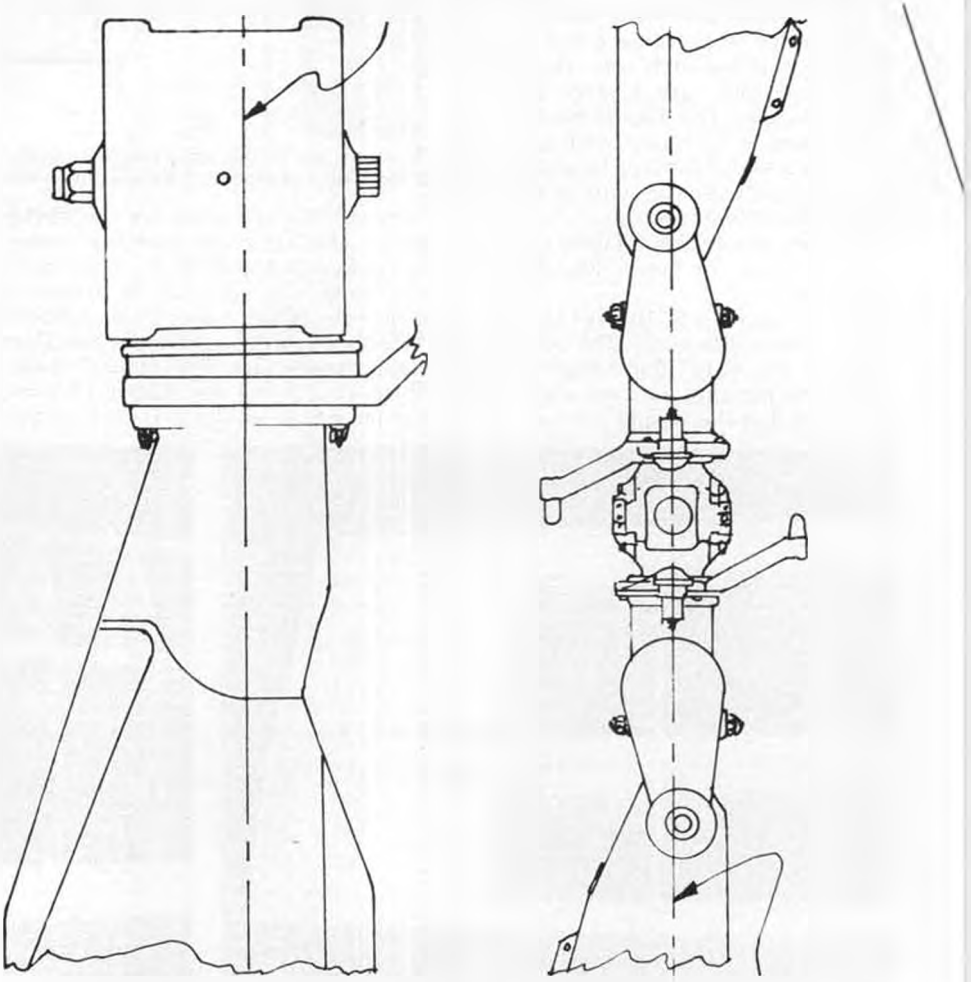
Some of you may have read George Meyers' "Radio Technique" in the April 1981 issue of *Model Aviation*. George discussed various servos, their torque, current draw, and efficiency. Then with reference to giant scale, he proceeded to figure out how much servo torque was needed to control the elevator on a large scale Waco. (Turned out to be 82.7 oz. in.). It happens that I am flying a super scale Bucker Jungmeister from my father's plans, and it is of similar size to the Waco evaluated above. Before I give my conclusions on the subject, let's start at the root of the basic viewpoints and work from that point.

There are basically two "theories" about control forces and power needed, if I understand them correctly. One states that as the power and weight of the machine increase, so does the force needed to overcome obstacles such as the blowback of wind over the elevator in order to change the attitude of the aircraft. The faster the airplane flies, i.e. in a dive, more control power is needed to level out.

The other theory states that if a craft is aerodynamically balanced, small surface throws and very little servo power will enable it to fly fine and recover from any attitude at various airspeeds. As I examine these two viewpoints, pay special attention to "if the craft is aerodynamically balanced". Given this, the second view will hold true. Very little force will give superb performance. I saw a perfect example of this last year at Dayton, Ohio, visiting with Don Chapman, Don Lowe and Steve Rojecki. Steve was flying a Brushfire (MB plan 4801) making low level figure eights at high speeds and tight radius circles. It appeared that the ship was on an invisible rail 50 feet in the air. After Steve landed I had the chance to operate the control surfaces of the Brushfire. Couldn't believe what I saw . . . It looked like three-eighths inch up and down, one quarter inch deflection up and down on ailerons, and of course, as much rudder throw as could be had. The control surfaces were not large, either. Steve obviously knew what he was doing. That ship was *aerodynamically balanced.* Another example (mostly due to luck, mind you) is the giant scale Jungmeister I'm flying. With a ready-to-fly weight of 25 lbs. and a 77 inch span, a PLS 1511 servo (28 oz. in. of torque) will hold this monster in knife edge flight.

Through all of this, I've concluded that the properly balanced, aerodynamically true airplane or helicopter is quite rare. While I believe that I could fly a .60 powered Horizon or a Kioritz-powered Jungmeister on 28 oz.in. servos, assuming all was truly balanced, it just doesn't work out that way on a usual, practical basis. You're better off to use overkill and be sure, than struggle with an underpowered servo for the demand placed on it. I'm using Futaba FP-S14 servos on my Jungmeister, one an elevator and one on ailerons. They put out about 165 oz. in. of torque. Now while that's overkill, I sure don't worry about stalling the servos when I do snap rolls.

Another example, this one from full size, caught my eye. Steve Govus, in the February '81 issue of *Flying*, has written a delightful article on the "Masterful



Arrows point to feathering axis of Robinson R-22 (left) and Bell 206B Jet Ranger rotor blades. At 33% and 25% back from leading edge, respectively.

Pattern Flying

By DICK HANSON . . . Part 19: Two Rolls and Two Snap Rolls in Opposite Directions.

• Here are two maneuvers which apparently are the same except for the "Snap". Let's take the simpler maneuver first.

TWO ROLLS IN OPPOSITE DIRECTIONS

The Rule Book calls for the second roll to immediately follow the first roll. The judges interpretation of "immediate" is the key to getting this one scored high.

I feel that it is necessary to demonstrate the accurate completion of the first 360 roll by holding a level heading for approximately one second. This will allow time to make a smooth shift into the second, opposite roll. The total time frame allowed is six seconds (four seconds minimum), and if it is fully utilized, the sequence is quite pretty.

The whole thing goes like this: call the start early enough to permit the first roll to start at the outer edge of the frame. The completion of the roll should be just prior to the frame center . . . this is where the aforementioned one second pause occurs. This pause can be modified to center the entire sequence. The second roll (opposite direction) should be equal to the first in duration and rate.

We should mention here that an adjustable roll rate is desirable to establish predictable rolls. Some fliers use a triple roll rate switch and set the one rate just for this maneuver.

Another arrangement is left and right roll buttons which are programmable on some transmitters. The choice of systems is up to you, but the triple rate set-up is very slick, especially if you have adjustable centering for the aileron function.

TWO SNAP ROLLS IN OPPOSITE DIRECTIONS

Let's start with some design analysis. Most of the present pattern designs have, through evolution, become fairly long in fuselage and have rather generous moment arms. This contributes to a look of stability, because long moment arms are harder to upset by outside forces (wind gusts for instance). Short light wings, which will recover quickly from a snap, are sometimes less stable appearing than, say, long wings with a pound of lead in each tip.

Here are some other points to ponder.

A. Snap rolls only occur when the wing is stalled, regardless of the air speed.

B. Predictable snap rolls are easiest with a plane having low inertia.

C. A highly effective elevator is also required.

D. Some rudder force to help upset the wing (quick yaw) is usually required.

Now here's the problem . . . The model must pitch up to correctly start the snap. Also, the rudder usually starts the model in a new direction (this varies). *When* the snap actually starts in this sequence, the plane will increase in roll rate. The roll rate will then decrease and stop, dependent on the rolling inertia (wing weight) and the self-stablizing characteristics of the model. These characteristics are very interrelated and include some neat sounding stuff like polar moments (that's when two Eskimo lovers meet) lateral area placement, horizontal stablizer effectiveness, wing loading etc.

If the snap starts late, the completion will likely be off course . . . no matter if the wings stop in a level attitude. The course change will usually be off in the direction of the *roll.*

If the snap starts instantly, the only problem may be a recovery in a nose high attitude.

If for God knows what reason the snap occurs on course and the wings end up level, you only have to contend with speed loss. Now the problem is to get the next roll to look the same as the last . . . good luck.

Here are some helpful points:

1. Determine which way the plane snaps the most quickly and do that direction last.

2. Try to find the slowest speed possible for the sequence (this will require high rates on all surface throws).

3. Re-establish heading after the first roll before attempting the second roll.

If you wish to make your model snap easier, try the following . . . but, remember . . . you may develop some other flying traits you don't like.

1. Increase elevator throw . . . a lot.
2. Shift C.G. back more.
3. Saw about 18 inches off each wing panel (joke!).

So much for humor . . . and snap rolls. One last point I would like to bring up is "The Rule Book" and the present rules.

Rules are made to be broken as someone said. I guess he was a pattern flyer. The last contest I participated in was really well attended, had many excellent fliers, and a dedicated and fair group of judges. I had a short conversation with one of the judges concerning judging styles around the country. This gave the opportunity to ask a question I had been pondering all through the contest. Why was *no* penalty given for flying out of the frame? The answer was honest, "we like the smooth look when the flight is out (about 600 feet in my estimate) and the maneuvers are open."

That's fine. I liked the styles I saw. "The Book" says on page 44 in the paragraphs defining positioning and size of maneuvers that 100 meters is a maximum average distance and 100 meters (again) is more than ample altitude.

I would really like some feedback on just what liberties or changes are intended under these rules. If any of you readers are on the contest rules committee and could offer some light on this, please, please do so. •

Jungmeister", and I quote:

Actually, if you never flew another type of airplane you would not notice anything special about a Bucker. It does everything it is supposed to do, exactly the way it should. Only when you fly other airplanes do you realize the rarity of that "simple" (my quote marks) accomplishment. The Bucker's combination of excellent control effectiveness and light control pressures make a good pilot look better and a ham-fisted pilot look terrible. . . Slow rolls in either Jungmann or Jungmeister can be a two-finger affair at nearly any airspeed, and the roll rate can be increased or decreased at will. By contrast, the modern aerobatic trainer that I instruct in has only one roll rate, and that is with teeth gritted and muscles straining.

The Robinson R-22 that I fly can also be flown with two fingers nearly all of the time. It has extremely light control pressures, which make it a pleasure to maneuver. This results from numerous factors; one is the positioning of the rotor blade's feathering axis as well as airfoil selection. Back to this point in a moment.

Aside from aircraft design and layout, the major factor in aerodynamically balancing a ship is center of gravity. The ship must pivot on that point for the minimum power/throw to be effective. If you fly a nose-heavy airplane, there will be more servo power required than one that has it's CG moved further back. And the faster it goes in a dive the more surface force will be required to return it to straight and level flight.

By now you are asking "What has all of this to do with model helicopters?" Well, I'm not so concerned about the balance point of the helicopter right now as I am with the aerodynamics of the rotor disc itself. How much servo power does it take to drive a model helicopter's rotor blades?

The feathering axis of a rotor blade, or

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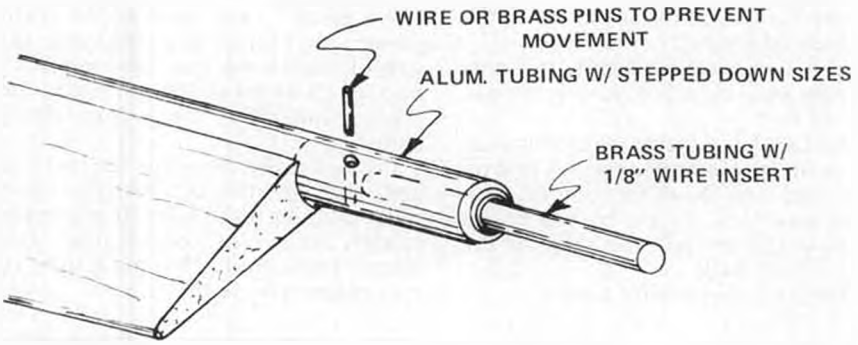
Beautiful quarter-scale Travel Air Mystery Ship R614K, almost completed, built by veteran modeler and early-days Great Lakes Trainer owner/pilot, Cedric Galloway, San Diego, California.

1 TO 1 SCALE

By BOB UNDERWOOD PHOTOS BY AUTHOR



Roger Geer's Shrike Commander on take-off run at Scale Masters. Has super finish, lights, brakes, retracts. Photo by Cathy Underwood.

• Gosh! It's 1982! And it looks like a great year ahead. A new sport scale Hiperbipe is in the almost finished stages. The very successful PE-2, with some repair, is set for the coming season. A real beauty is in the beginning stages at this household. The acquiring of an OS Max 90 has prompted me to start a not-quite-1/3-scale "Bonzo". Now I know that those of you who have viewed the fantastic beauty of my 1/4-scale Bonzo probably can't wait to see an even bigger version. If it works out right, I'll have a model capable of meeting giant, sport scale, and FAI rules and specifications. Let's see; wing span about 5 ft. (with an almost 20" chord) and a fuselage about 7 ft. long. I suspect there *may* be a wag or two out there wondering why anyone would ever build *one* model of such an ugly aircraft, let alone several. Beats me! But what the heck, I'll bet you're strange in *some* way too!

Another project is the result of obtaining a Jet Hangar Hobby "Kafir" ducted fan kit at the Scale Masters event in Louisville. Larry Wolfe's model, which garnered the top static score is a real looker and attention getter. The kit is described as a "semi-kit" and actually contains the fuselage, fan ducting inlets, and some molded items like canopy, external drop tanks, etc. The big feature is the sheets of plans. There are enough to wallpaper an average house. They include an oversize wing plan as well as the scale size wing. Many extra optional items, like cockpit detail, gear struts, etc. can be purchased from Jet Hangar.

As you can see, my winter tasks are cut out for me. Oh heck, I almost forgot, I've got to finish up my pattern model for 1982 (sorry about that you scale-only types). The unveiling of my fantastic offering in this field will be the "Under-Bird." This model, I assure you, will be the means of my finally moving from that no man's land of Expert to the Dave Brown Class. Some not-so-kind

"friends" have suggested *something* had better happen soon because at my present rate of obtaining pattern advancement points, I'll be 93 before I finally make it. Tell them you read it here first when the UnderBird blows away the competition in 1982.

Scale moves forward and the comfortable walking shoes it enjoyed for several years have been replaced by jogging shoes. The increased activity is smile-producing for everyone. As we look toward the 1982 Championships (which by the time you read this will either have been set for Kiev, Russia in August, or *hopefully* for Reno in June) we see generated more interest with the following letter sent to me through this august publication.

Dear Mr. Underwood,

Please let me introduce, my name is Nicholes John Argone-Rogers and I am the R/C Scale Director for the Associacao de Aeromodelismo, ABA (Brazilian Aeromodeling Assocation), the local controlling body for all aeromodeling activities in Brazil. The local equivalent to your AMA. I am taking the liberty of writing to you via the **Model Builder** *magazine as I have had no reply from the FAI in Paris after writing twice to them.*

Here in S.P. (Sao Paulo, Brazil), we have been pushing R/C scale for over five years and it has finally taken off, with this year being included as an event in the South and Pan American Championships, which were held in S.P. in April, using SMAE rules. We are now in a position to put together a team to send to compete in the Scale World Championships, and it is to this end we need a copy of the Stand Off Scale Provisional rules as used at Scale 80 in Canada. As the FAI do not answer my letters would you please send me a copy of these rules. We would appreciate everything you could do in this respect.

What further news regarding the Scale Champs being held in Reno in '82? This really interests us as for Brazil to send a team to the States is a lot easier than sending four people to say Russia. As I said before, we have a good nucleus of scale fliers and we want to send a team in '82.

Thanking you in advance for any help with the above.

Won't it be great to add Brazil to the scale roster? It grows and grows.

Speaking of letters (ain't that a wild transition?), here's another.

From Cedric Galloway, a note and some snaps of his Travel Air Mystery ship 'R'. A beautiful looking model.

Hi Bob:

Just wanted to tell you again how much I appreciated your generosity in giving me the two decals of the Hamilton Standard logo for my quarter-scale project in 1979. It took about twice as long to build the R/C model of the Travel Air Mystery Ship R614K as I thought it would. Got far enough along to take it to the QSAA Fly In in Las Vegas. There is still some work to be done before it is ready to fly, such as installing a fuel tank, running the engine controls through the firewall, and installing the radio flight pack.

Tom Weems' Gee Bee at Scale Masters'. Flew nice until faulty radio caused crash.

The prop shown on the model in the photos is for display only. The hub is aluminum turned on a small metal lathe. The blades are hand carved from aluminum bar stock with a hacksaw and a file and lots of elbow grease.

Thanks again.

And I bet you've heard the latest hit show just slightly off Broadway next summer will be "The Nats Go East". Barring a few minor things like World War III, the pine groves of New Jersey will whisper the sound "the Nats are here." The facility at Lakehurst is the location, and if the huge number of local modelers that were on hand to extol the virtues of the site to the Nats Committee is any indication, it will be a large Nats for 1982. The proposal set up for Lakehurst in '82, Lincoln in '83, Reno in '84, and Lake Charles in '85, does much to provide that rotating Nats concept.

Having the opportuity to share some ideas concerning scale at the Nats hopefully will prove at least somewhat fruitful. The one area that would probably provide the most relief to the competitor is the compression of time requirements necessary to run the event. The days of reasonable housing, food, and transportation costs is past. Nothing much can be done about the transportation costs, however, the other two can be spoken to. I firmly believe there is no reason why the static portion of the judging cannot be accomplished in a single day, with the possible exception of Precision Scale. By using the separate judging teams for each Sport Scale classification

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First Place winners at 1981 Rhinebeck (l to r): standing; Nick Ziroli Jr. and Sr., staged combat. Kneeling: Frank Tiano, Mission; Frank Stanton, Precision Scale and Maneuvers; Dick Allen, who accepted Giant Scale prizes for Ralph Jackson.

the Electronics Corner

By ELOY MAREZ

• As I am writing this, we are gearing up for the invasion of witches, vampires, and other beasties that will soon be at our door for their annual "treats"; no tricks here. As you read this, it will be only a month until the time to be saying "Happy Valentine's Day, Love"... All very confusing, and hard for a person who usually doesn't know what day it is, to keep straight in his head.

Funny thing happened to me on the way to the typewriter! Received a letter from a Roger Chapman, Airport Manager of the Municipal Airport in Kenosha, Wisconsin. The subject is the Field Strength Meter which appeared in September '81 Model Builder. The story, in Roger's own words, follows:

"The FAA has mandated that all aircraft that wander more than 50 miles from home base possess an ELT (Emergency Locator Transmitter). Well, these little black boxes are known to activate on just a bad landing and not just crashes. Unknown to the pilot in most cases (who listens constantly on 121.5, ELT frequency?) he locks the aircraft and goes home. At 3:22 a.m., Flight Service calls and says that an airliner passing overhead checking 121.5 reported an ELT transmitting in the Kenosha area. Out on the field, a receiver with an aircraft band tells you it is on your airport, and even helps you find the general area, but which plane is it exactly? Enter the Maree FSM, and a quick stroll through the airplanes, and with a quick wiggle of the needle, the culprit is located."

INTERESTING ... and proof positive of something I wrote here recently about us RC'ers being a pretty resourceful bunch. Thanks Roger, for passing along the information.

In last month's column extolling the many virtues of Mode One (I wonder if that has anything to do with the fact that no one talks to me out at the field anymore?), I mentioned the need for rudder-to-aileron coupling on the larger airplanes. There are a number of mechanical mixer methods of doing this, but being a firm believer that electronics does it better, I have to tell you about Jomar Products' C.A.R. System. It rides the plane, plugs in between the receiver and the associated servos, and provides coupling of the rudder from the aileron channel, completely proportional and automatic.

However, you are not tied down to this only, you still have independent rudder control for ground steering or in-flight maneuvering, as required. The coupler is small, see photo, and light, weighing in at under three ounces. It is furnished without connectors, so you can tailor it to your particular system. For this, you will have to obtain two aileron extension cables, or two each servo and

Jomar automatic airborne rudder/aileron coupler allows full rudder control when needed for ground control or crossed controls, yet couples controls when using aileron stick.

single servo receiver harnesses from the maker of your system, and solder them to the coupler according to the instructions. The detailed and comprehensive instructions tell you to "carefully" solder these cables in place ... we cannot stress that too much, as loss of a single connection here will render that servo inoperative, with all sorts of disastrous possibilities. Don't be foolishly proud, if you are in doubts about your capabilities on something this important, seek some expert assistance.

I can assure you that it works; I have been using one in the world's oldest Telemaster (six, possibly seven years old) for a couple of years, and it puts a new kind of life into the bird. This handy dandy is priced at $44.95 and manufactured by Jomar Products, 2028 Knightsbridge Dr., Cincinnati, OH 45244.

SWITCHES

Don't take switches for granted; they have feelings too, you know! If you don't believe that, at least believe that they do have ratings. This thought was triggered by seeing yet another drawing recently about a simple method of controlling the motor in an electric powered model with a servo driven micro switch, with no further comments made about the switch, as if any old thing will do, and this is *not* the case!

Generally, switches in R/C gear are virtually trouble free, and ask only to be kept reasonably free of dirt and oil. One reason for their dependability is that in most cases, our R/C manufacturers start off with a high quality switch. Another reason is that they are being used to control very low voltages and currents, well within their maximum capacity. Using a switch, any switch, to operate a high current device such as an electric motor is a completely different story.

Switches are rated as to the maximum voltage and current they are designed to control for the greatest life expectancy. This information is often found marked right on the switch itself, or is available from the maker's spec sheets. A number of things affect this voltage and current rating, such as whether they are used in an AC, or a DC circuit, and the actual device being operated, as some types of loads are harder on a switch than others. The reasons are numerous and complex, and have little bearing here, so we'll accept their existence and consider more their effects.

There are some exceptions to switch ratings, but normally, we find them rated at 125 and 250 volts AC, and 24-28 volts DC; full scale aircraft voltages. Even though the automotive market must be tremendous, I don't recall ever seeing any switches stamped with a 12-volt DC rating.

Unfortunately, there doesn't seem to be a formula or rule of thumb for converting these ratings to another type or amount of voltage. It seems that the rating in watts is somewhat applicable, but not fully. For example, the "ALCO-SWITCH" catalog lists a certain switch at 6 amps @ 125 VAC; 3 amps @ 250 VAC, and 6 amps at 30 VDC. These ratings convert into 750 watts for both of the AC values, and are thus related. However, the DC rating in watts is only 180, about 25%.

Another switch, much smaller, is rated at 500 ma at 125 VAC, for a power rating of 62.5 watts, however the DC rating is only 2.4 watts, or just a fraction of a watt. It is easy to see that with differentials like this, you cannot establish an average that even begins to sound different.

So far, I have only stated the problem, with apparently no solution. Not the way I like to do things! Thinking it best to go to the source, I called the Micro Switch Company, which is located nearby, and talked to a very knowledgeable switch-person. It turns out that my deductions are correct ... there is no formula. What this company does for their quantity

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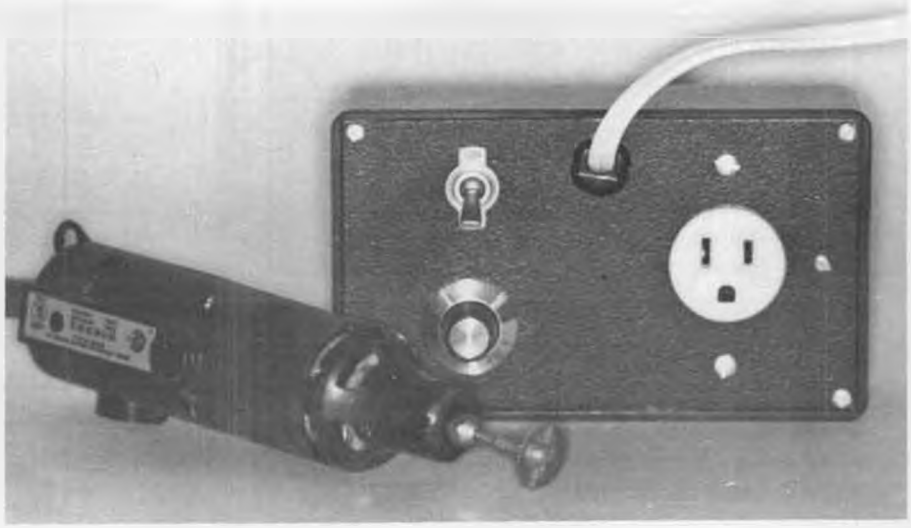
VARIABLE SPEED CONTROL



By ELOY MAREZ . . . A quick and easy-to-build speed controller for most any small power tool, and even some home appliances.

• There are few power tools as versatile and useful to the active modeler as his "Dremel", officially known as a "Moto-Tool", as manufactured by the Dremel Mfg. Co., which also makes a variety of lesser known small power tools. The Moto-Tool has many applications in modeling, and can be equipped with a large number of accessories which further increase it's value and precision. However, for some jobs, it turns too fast. The advertised RPM of even the bronze brushing models is 30,000 RPM; great for some jobs, like grinding and cutting, but for others, such as drilling, this extremely high rate can work against you. For example, in drilling a maple motor mount at full speed, this high RPM quickly overheats the bit and can ruin it if it is allowed to run too long.

Apparently the Dremel Co. recognizes this problem, as they make available a couple of it's Motor-Tools with an integral variable speed control, and also make a couple of accessory controls for the other models. They both do an excellent job, however, we wouldn't be modelers or be reading this magazine if we didn't like to build things, so let's take a look at how involved, and how expensive it is to roll your own.

It is relatively inexpensive . . . in fact, the "bare bones Marez speed control" as described could be built from parts all obtained at your nearest Radio Shack store for right around five bucks. The deluxe model shown and described in detail, with its commercial case, shiny knob, etc., can be duplicated for a paltry sixteen dollars. I will describe the non-Radio Shack parts and possible alternates as we go along, but first, let me tell you a bit more about the controller, and its uses.

This is a modern, state of the art, solid state device that utilizes the latest components and technology. Wow! That ought to send you running to the nearest parts store! Seriously, it will control the speed of any universal type motor (AC/DC), the type with brushes, with a maximum current requirement of five amps or 550 watts, from zero to about 99% of its normal power. It will *not* operate with repulsion induction or capacitor start motors, such as found on heavy duty power tools. It can also be used to control the temperature of soldering irons, incandescent (not fluorescent) lamps, and can also be used for non-modeling chores such as a speed control for fans, mixers, blenders, sewing machines, and other motor-driven household devices. Very versatile, this controller; besides it is guaranteed not to go on strike.

HOW IT WORKS

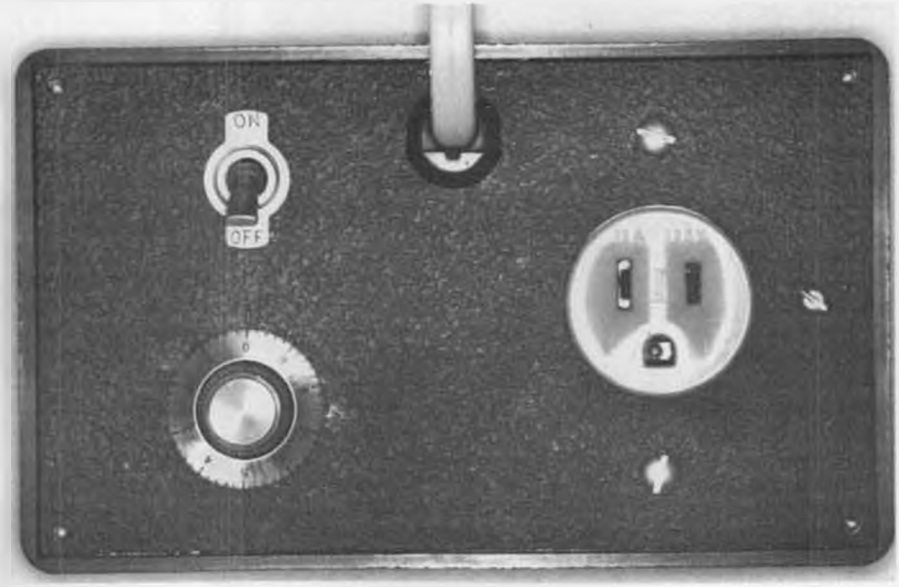
The heart and secret of the controller is a solid state device called a "Triac", a type of electronic switch which passes a percentage of any alternating current applied to it, as controlled by trigger pulses applied to its "gate" terminal. These pulses are controlled by the setting of the pot, and are fed to the triac through another device called a "Diac". The rest of the stuff goes along for simply practical, logistical, and safety reasons.

HOW TO BUILD IT

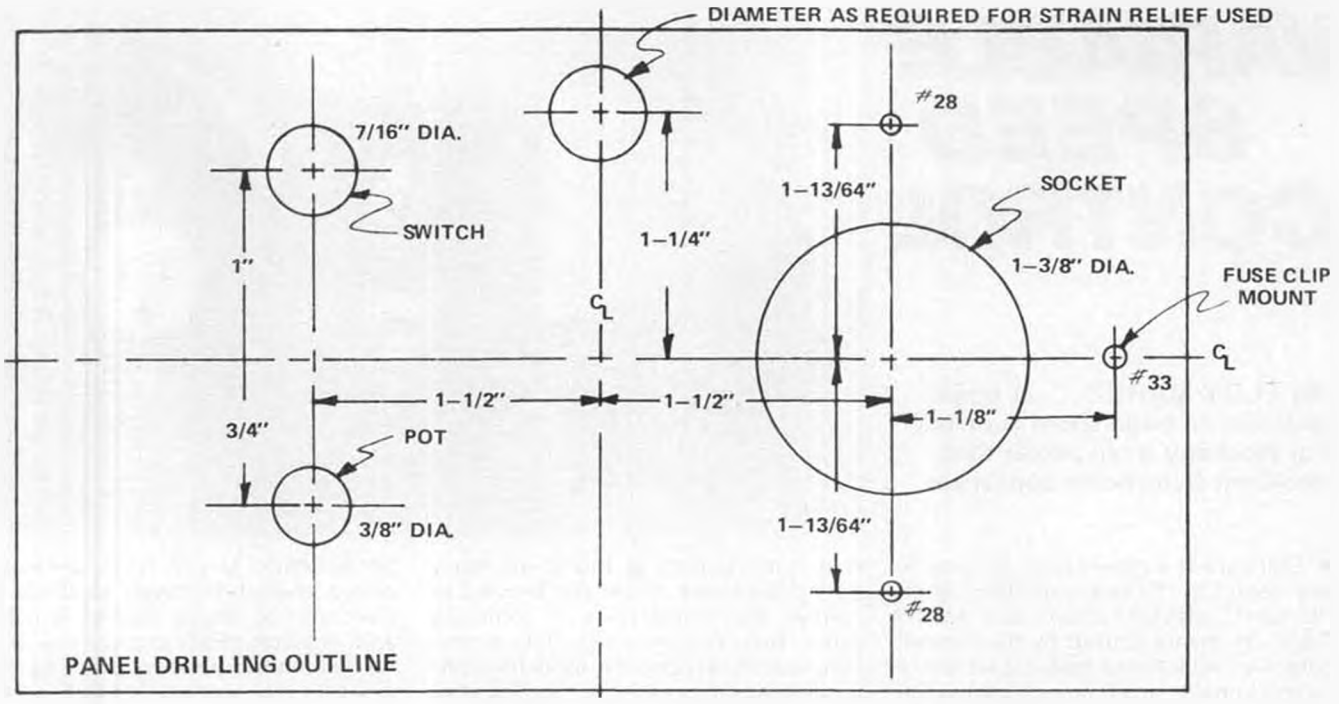
We'll start with the safety reasons, which bring up the only critical thing about the project. You are working with the full 110 volts coming out of that wall socket, which is enough to ground you permanently. So unless you are experienced enough in things electrical and electronic to insure perfect insulation and isolation, don't change any of the recommended building procedures. In any event, be extremely careful during the testing stage before you have all those exposed electrons safely buttoned up inside their plastic cage.

Said plastic cage is one of the many plastic cases available to electronics buffs, such as the Radio Shack item listed. Though I used another brand simply because I had it, the dimensions are so close, one to the other, that only minor adjustments to the panel outline shown will be required, if at all. Hole sizes are given for the parts used; if you make substitutions, check sizes before you chop into the panel.

Some electrical parts have to come from your hardware store. The socket used is a commercially available home type outlet, made by Leviton. It is called a Single Flush Receptable, Parallel Slotted, No. 5015-1. Notice that is the three prong variety, which allows us to take advantage of the extra safety offered by this system. The socket is made for



Unit is simple to operate. Plug into wall socket. Plug in tool or appliance. Turn on switches (box and tool) and advance speed knob to desired position.

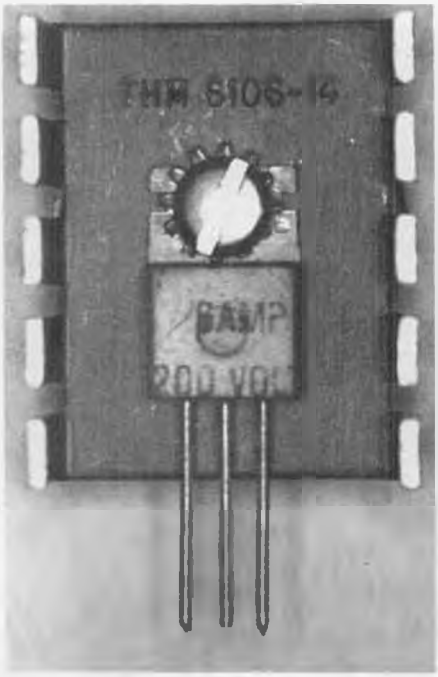


mounting in a wall outlet box, and has some long mounting ears which have to be trimmed off just outside the number six tapped holes closest to the body.

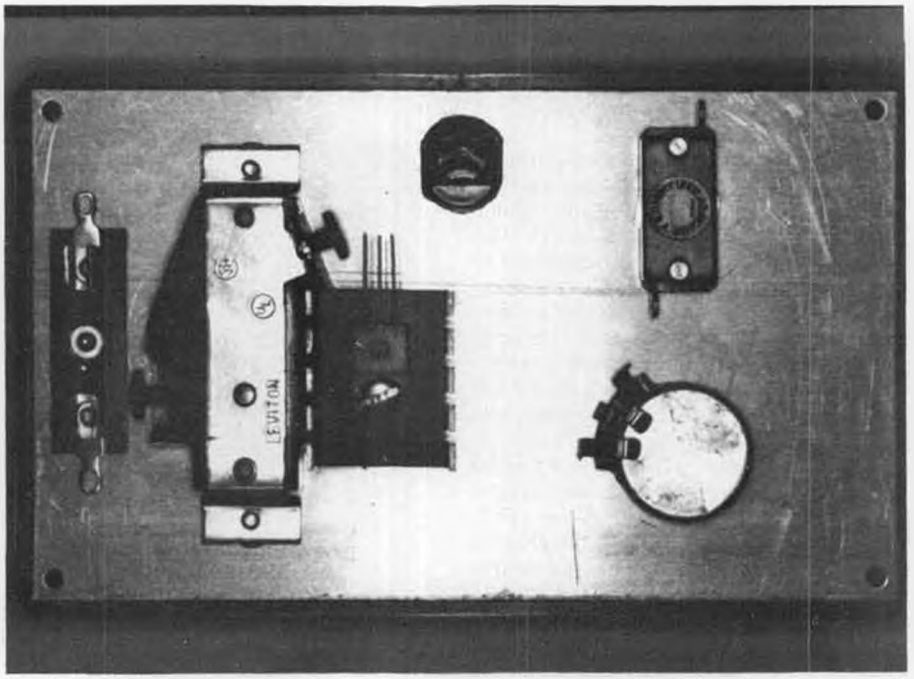
The three-conductor wiring mentioned requires that kind of a cord and plug, for which purpose I found it cheaper to purchase an extension cord, cut the socket end off, and use the cord with its secure, molded-on plug. The one chosen is also readily available everywhere including drug and grocery stores. It is from Electricord, called a Triple Outlet Extension Cord, Cat. No. A-1800-008-WH. It is made up of 18 gauge wire, rated at 10 amps, which is a little heavy for this application, but there isn't too much choice to be had. If you can locate one made of smaller wire, with a five or six amp rating, it will do just fine. Use a strain relief or rubber grommet where the cord goes through the panel.

Everything else comes from Radio Shack, for which parts numbers are included in the shopping list. Use the triac, diac, pot, and capacitor combination as shown, everything else can be substituted for with something cheaper or different. For example, some of you may prefer a panel mounted fuse, or a different switch, which must be rated at five amps or more at 110 volts, but is otherwise not critical. Actually, the switch is not even necessary, as the controller draws no current by itself when plugged in, even with the switch in the "ON" position. The switch is there because I often find it more convenient to use than the one mounted on whatever tool I am using; I simply leave the latter "ON" all the time and control the tool with the controller switch.

The wiring is simple, and not critical. Follow the schematic and pictorial diagram, and you can't go wrong. Install the knob on the pot so "0" is at 12 o'clock with the pot fully counterclockwise, inscribe a line in the panel just over the "0" as an index. As you turn the knob clockwise, at some point, depending on



Heart of speed control is solid state "Triac", shown here mounted in heat-sink.



Major parts mounted on panel, prior to wiring. Plenty of room for everything, and none of the parts or wiring placement is critical.

the motor, your tool or appliance will start to operate slowly, and will increase in speed as you turn the knob further, till you reach the end of the pot rotation 270 degrees later.

Note that the triac and its heat sink are attached directly to one of the socket connector screws with a metal right angle bracket, which in this case started life off as a landing gear hold down strap, with the screw holes increased to No. 18 for the No. 8 screw on the socket, and to No. 28 for the No. 6 screw that holds the triac and heat sink. There is also a solder lug mounted on the same socket screw for the wire that goes from that point to the pot.

The other connections to the socket are made with a short piece of wire in the case of the fuse side, and directly from the green center ground lead out of the power cord. In both cases, I used solder lugs on the end of the wires, which I find much more secure than a length of multi strand wire under a screw head.

The connections to the triac are made by soldering the diac and a short piece of wire which goes to the switch directly to it's wire leads, trimmed to about half their original length. These connections are protected and insulated by short lengths of small shrink tubing. There is no connection to the center wire of the triac, which is common to its mounting tab . . . a connection is automatically made through the screw and right angle bracket to the socket screw.

The diac and capacitor are non-polarized . . . that is, either lead can go to either connection.

Das ist alles . . . check your connections, insert a five amp fuse in the fuse holder, set the controller into its case, set the switch to off, set the knob to "0", plug in the power cord, and plug your Moto-Tool or whatever into the controller. Now turn the controller switch to "ON", and slowly advance the speed knob. Nothing happened, did it? Well, at least it isn't smoking. Back down the knob, now turn the Moto-Tool switch to "ON", and slowly advance the knob. Eureka, it works! And doesn't it feel great to wrestle with and beat these nasty electronic beasties?

You'll doubtlessly read this . . . and build your speed controller some time in 1982. I am writing this in 1981; this year I have been fortunate to have visited about 20 different countries, and visited with modelers in every one, I am happy to say. I am well aware of the problems faced by our foreign flying friends, and as promised, I have not forgotten you. For those of you without access to Radio Shack stores, again, the parts are non critical. For the triac, any 200 volt, 6 amp unit will do, while the diac is rated at 150 milli-watts, at 2 amp peak current. The controller will work in the same manner in a 50 Hertz (cycle) country; those of you residing where the voltage is 220 can use the same circuit with a triac rated at 400 volts . . . everything else remains the

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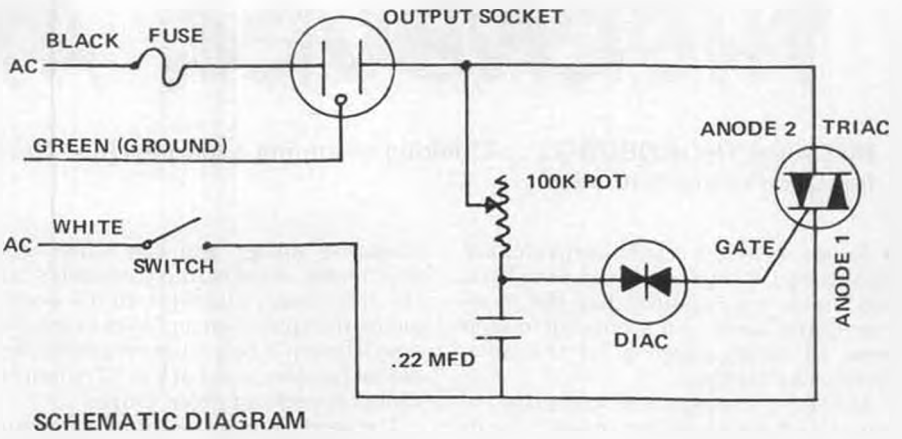
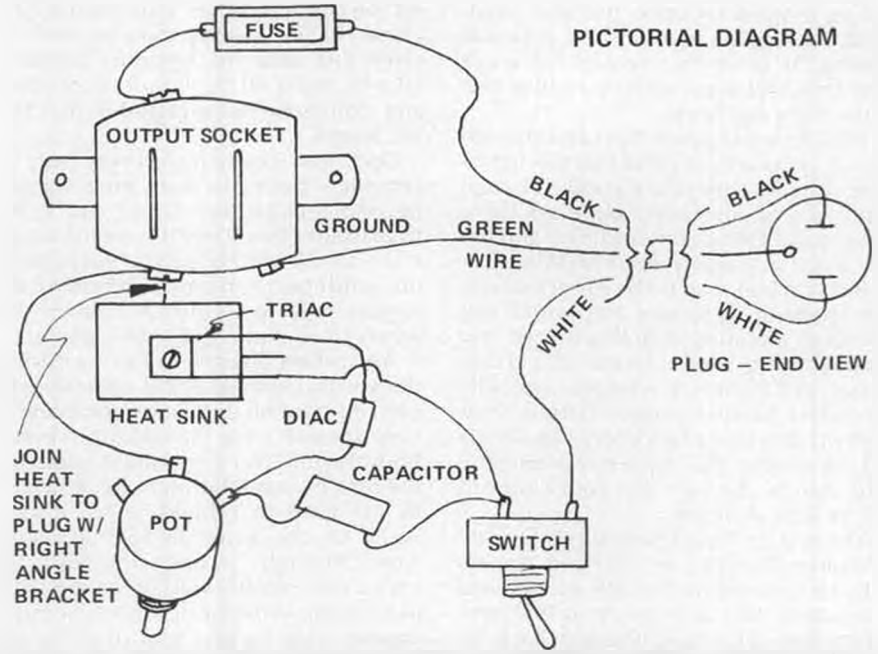
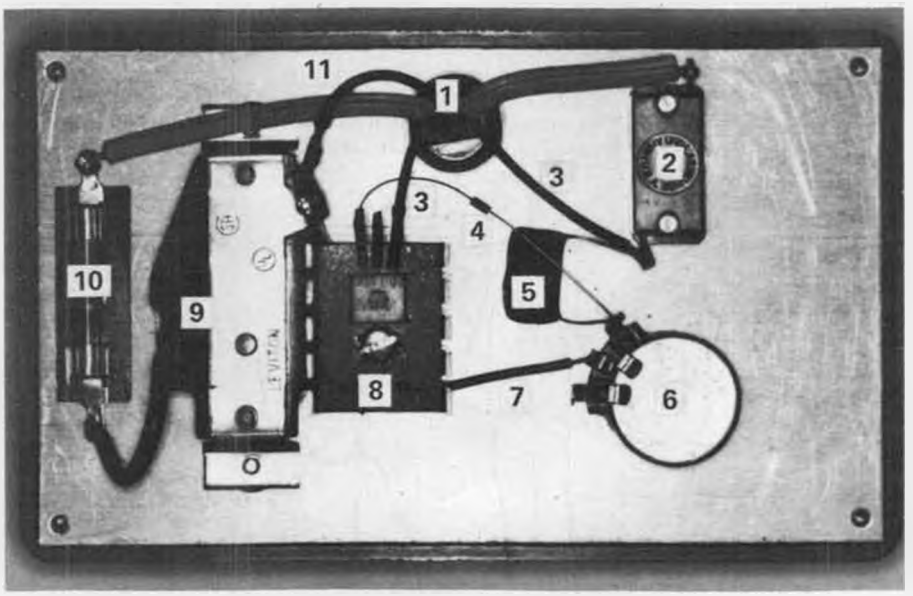


SCHEMATIC DIAGRAM





All parts and wiring in place, identified as follows, in clockwise order: (1) strain relief or grommet, (2) switch, (3) wire to Triac, (4) Diac, (5) capacitor, (6) pot (not to be smoked!), (7) wire to socket, (8) Triac on heat sink, (9) output socket, (10) fuse and fuse holder, (11) green ground wire in power cord.

THORNBURG AT LARGE

By DAVE THORNBURG . . . Thinking of joining a soaring club? Our resident Crank describes some of the folks you're likely to meet . . .

• Sailplaners are a cranky and independent breed. They tend to shy away from too much organization; just the mention of the word *club* is enough to send most of them galloping for the open spaces like buffalo.

Still, there comes a time in the dead of winter when even the molecules of misanthropy cease their restless whirling, and some of us begin to think about sitting around an open fire and swapping lies with a few kindred (soaring) spirits. It is in this season of weak thermals and even weaker resolve that most clubs are born.

Now do not suppose that I am opposed to all clubs and organizations whatsoever. I believe there are good clubs and bad, just as my father believed there were good Democrats and bad, and the last good one was Woodrow Wilson.

But I do feel that, in the event that you are thinking of joining (or, worse yet, forming) a soaring club this winter, you ought to be made aware of certain Types, or Characters, who are invariably attracted to such organizations. Not every club will contain every Type in my list, of course; but nature is profligate, and you can be sure that your club will get at least its share.

The first of these characters is Dudley Weppon. Dudley's an old hand at soaring: he crashed his first RC model into the judges' tent at a contest in 1957, and when they refused to give him back his engine, he took up sailplanes. He's been learning to fly ever since.

Dudley is proud of his reputation as a fast builder: he can destroy an airplane on Sunday and have a completely new model ready to crash by the following Saturday. He has built every kit and magazine design you can name, and flown most of them into someone's car. He milks every crash for all it's worth, telling the story over and over to anyone who'll listen; it helps him recapture a bit of that fame he won back in '57, when he almost wiped out those judges. . .

The next chap you want to watch out for is Lemmie Givyahand. Lemmie is always the first guy to greet a newcomer on the flying field. His confident air, his cheerful, devil-may-care attitude is often just what the beginner needs to take his mind off the hundreds of hours and dollars he has invested in that first RC model.

Optimism oozes from every pore of Lemmie's body: Is your wing warped beyond recognition? Don't worry, it'll fly. Batteries low? They'll make it through a couple of test hops. And what about the wind? No problem . . . Lemmie has a simple rule for wind: *it's never too windy to fly somebody else's plane.*

And when disaster strikes, as it often does with Lemmie at the controls, you can count on his unfailing good cheer to help smooth over the situation. Everybody, he tells you with a smile, wipes out the first few models they build. You have to get used to rebuilding . . . it's the name of the game in soaring. Don't worry, though . . . once you learn the tricks, your models will last for years, just like his do. What he doesn't tell you, of course, is the biggest trick of all: he's so busy helping other people crash their planes that he seldom gets his own planes out of the car.

Red Snapper is the hottest competitor in the club. Mention the word *contest* and Red will be out practicing before dawn, and calling the CD every night for weeks, looking for loopholes in the rules.

Unfortunately, the only way Red can handle contest pressure is by screaming at his helpers, blaming them for every mistake he makes, treating them as if they were subhuman. Before and after the contest he's a normal guy, but the contest itself is just one long tantrum for Red Snapper.

His wife helped him at two contests before leaving him for good, mumbling "You won't have *me* to kick around anymore," or words to that effect. Since then, Red has gone through at least two helpers a season.

But don't worry about him running out of helpers. He'll be gone long before that happens. Red Snapper's a *competitor*, you see, not a *modeler*. When he runs out of contests to win, Red will go some place else.

Another guy to watch out for is old Harley Handout. Harley never remembers to bring any supplies with him to the field; he manages to borrow everything he needs. (Rumor has it he's even living on borrowed time.) And the things Harley borrows are never the sort that can be returned, like a pair of pliers. The things Harley borrows are things that shrink (like Ambroid), things that evaporate to nothing (like Aero Gloss), things that disappear without a trace (like your first wife and your red Pontiac convertible).

Harley's the guy who *RCM* made famous a few years ago, in a story that went something like this:

"Say, can I borrow a 10-6 prop?"

"Yeah, sure, just grab one from my field box there."

(One landing later.)

"Say, I nicked that prop . . . can I borrow another one?"

"Why, uh, I guess so. Yeah."

(Another landing later.)

"Hey, I need to borrow another one of them props."

"Look, friend, those props cost me $1.25 apiece."

"Hey, man . . . if you can't afford this hobby you shouldn't oughta be in it, man!"

Another regular member of most soaring clubs is a fellow named Tab U. LaRasa. Tab's a bright enough fellow under most circumstances, but he has an absolute mental block about aerodynamics. "I don't *care* what makes my plane fly," he jokes over and over; "I just want to know what makes it crash!" You can explain very clearly to him on Saturday about just how washout prevents tip stalls; by Sunday morning his mind's a blank slate again.

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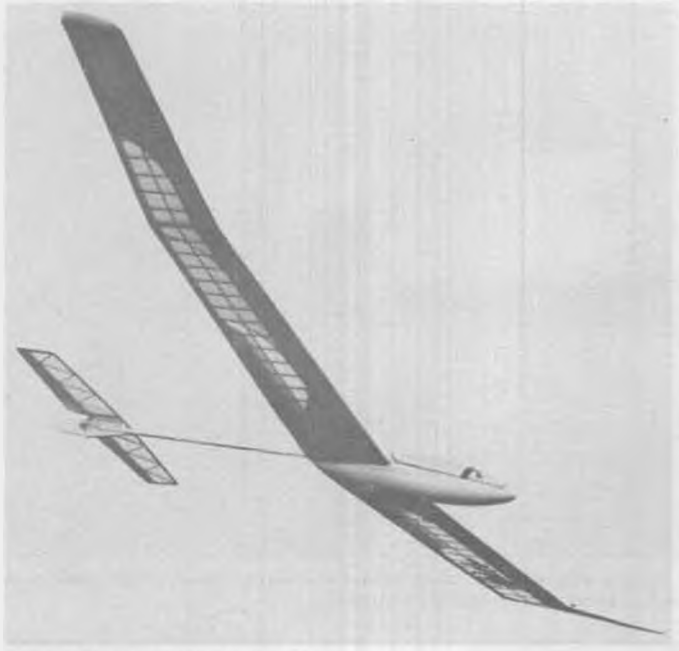
"WE HAD TO CANCEL THE DONUT DROP CONTEST BECAUSE HE ATE ALL THE DONUTS!"



George Chambers' Miri 120.

Dave Fewing's 1/4-scale FS-25.

R/C SOARING

by Dr. LARRY FOGEL.

• Sometimes it's fun to look over the other guy's shoulder. Keith Thomas lives in Somerset, England. He's a dedicated glider guider and provides astute comments on R/C soaring in Britain.

His own design, the Tallis VI, looks mighty fast . . . but, that's due to trick photography in Keith's photolab.

The Miri 120, built by George Chambers, has a GRP molded ridged foam pod with built-in alloy tail tube. All up weight is about four pounds . . . a wing loading of ten ounces per square foot. Here's a very stable and forgiving plane.

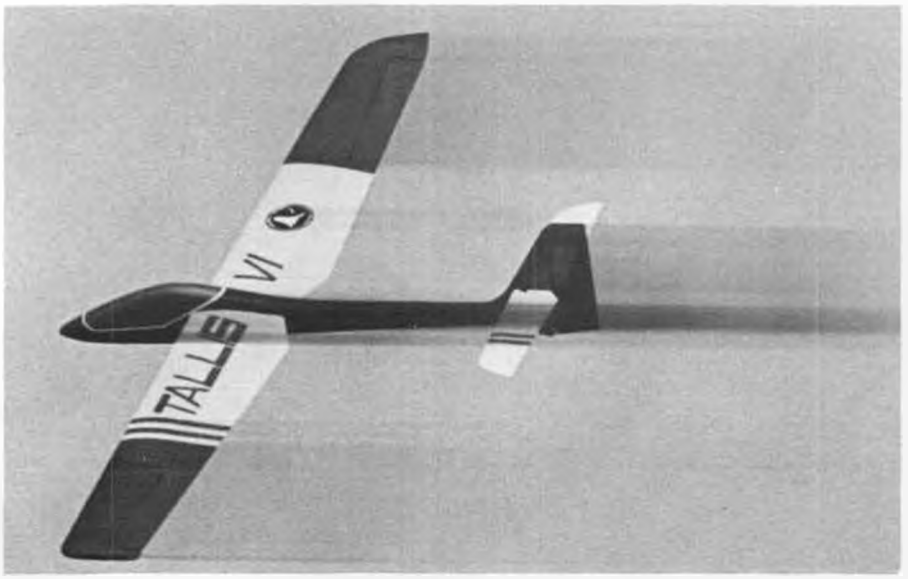
Pete Bradshaw devised a neat way to transport his sailplanes. The rear tube telescopes inside the front section to accommodate different wing lengths. Both curved sections are made of 1/8-inch thick compressed fiberboard, the textured side out for decoration.

No, not a rocket assist family sedan! This is Pete Bradshaw's adjustable-length car-top R/C soarer carrier. Neato!

SZD Cobra (Veron kit) after lift off by aero tow.

A good way to obtain straight inverted flight! Chris Greengrass' aerobatic ship off to a good start.

Ken Herridge's Standard Cirrus on its first test flight.



Keith Thomas' Tallis VI leaves a stream of wet paint behind as it flashes by on a high speed pass. If you believe that, contact us about a great buy on a bridge!

Ken Herridge takes a last-minute check on the balance point of his 1:5 Standard Cirrus before launching for its first flight.

Terry Thomas' SZD Jantar 1, 1:5 scale, on aero tow.

The wind was light at a recent aerobatic contest. Chris Greengrass called his next maneuver "Straight Inverted Flight," and was accommodated with just such a launch. That's real efficiency.

Mike Smart's new aerobatics trainer, the Triad, will soon appear as a kit. The Eppler 374 foam core wing spans 62 inches, having an average chord of 7-1/2 inches. It weighs 2 pounds 3 ounces and can be flown aileron/elevator, aileron/elevator/rudder, or on rudder/elevator if the dihedral is increased.

Dave Fewing's 1:4 scale FS-25 is from a German kit. The SZD 120-inch span Cobra is built from a British Veron kit . . . molded fuselage and built-up wings and tail.

Jim Wild has been flying his 1:5 scale Slingsby T-46. Note that aero-tow was in use.

Terry Thomas of Glouchester built a SZD Jantar 1 from Mike Trew's plans. Again built-up flying surfaces complement the GRP molded fuselage. This model features full-house controls, including flaps, airbrakes (called "spoilers" over here), and retractable landing gear. It's quite a feat to pack all that into this 1:5 scale 118-inch span sailplane.

Steve Churchill has been flying his 1:4 scale ASK-18 at the magnificent soaring stie used by the Clwyd (rhymes with "fluid") Club in Wales. The site, named Moel Fammeau (pronounced "Mole Vameye") is 2,000 feet above the surrounding countryside. This year the Clwyd competition attracted twenty-four entries.

Graham Cox and his vintage Slingsby T-31.

Me-163 power kit converted to slope soarer by Mike Smart. Strictly for very windy days!

Ken Merritt's Blanik at 1/4-scale. See MB plan for slightly smaller version.

Pete Bradshaw, completely surrounded by 1/4-scale DFS Reiker he designed and built.

Jim Wild's 1:5 Slingsby T-46 on aero tow. Interesting way to get 'em up!

Vic Grist and his "Japanese" Pilatus.

Ken Herridge built a 1:5 scale standard Cirrus from Mike Tew's plans. This model handles well in spite of the tiny tip chord (two inches). The high wing loading and thin airfoil make this a high speed machine. . . Anyone for pylon racing?

Mike Smart converted the scale Messerschmidt Me-163 power plane kit by Rojair into a slope soarer. This one is heavy, and the wing area is small. Mike said he needs a 30-knot gale to keep it aloft.

Peter Bradshaw designed and built a 1:4 scale DFS Reiher. Here is a super realistic model in both appearance and flight performance. The wings are built in an orthodox manner with the correct number of ribs in place. The rear portion of the fuselage is of rolled plywood while the forward section is of planked balsa over formers. Two servos are located half way along each wing panel to operate the ailerons and airbrakes. So far the five-foot long servo extension wires have caused no trouble.

Roger Howe of Plymouth designed and built a 1:4 scale model of the Slingsby Vega (GRP molded fuselage and foam wings). This model flies exceptionally well: good scale speed, smooth turns and powerful yet good-natured airbrakes, that is, the pitch change is hardly noticeable. The hinge point is half-way across the chord of the flap so that the tip comes up above the

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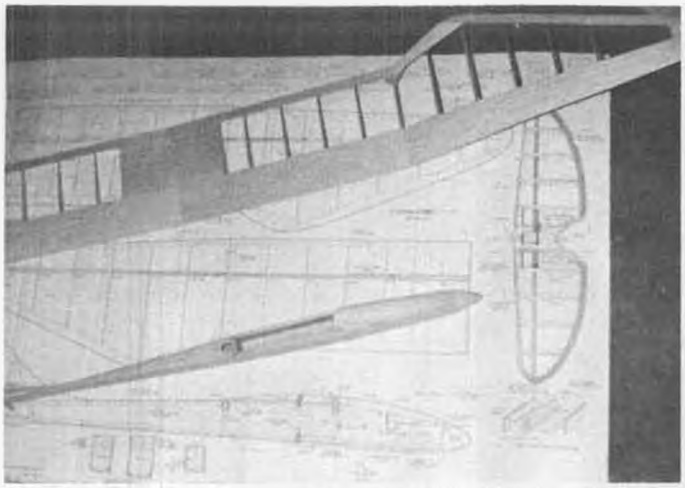
John Fletcher and his Caproni A-215. Note the size of that canopy!

John Watkins' Slingsby Eagle gets the heave-ho.



Basic parts of the Mini-Bird during assembly from Marks Models kit by Mary Ann Devlin.

A real makes-you-wanna-go-out-and-fly photo of Mary Ann about to launch her pink and white Mini-Bird over the Pacific.

PRODUCT$ IN U$E

MARKS MODELS "MINI-BIRD", by MARY ANN DEVLIN.

• The "Mini Bird" was designed by Mark Smith. Retailing for $39.95, the Mini Bird has a length of 40 inches, wing span of 79 inches, wing area of 609 square inches, and a flying weight of approximately 22 to 26 ounces.

The Mini Bird is a two-meter version of Dave Thornburg's "Bird of Time". The "Minimoa" wing platform is the trademark of this design.

I first saw this wing design on a Bird of Time at Malibu, where we fly. I fell in love with it and wanted one, but my husband, Ed, doesn't care for it and has "his" favorites. So I did not get mine.

Ed called my attention to the "Mini Bird" article in the August 1981 **Model Builder** magazine. After I read and studied Mark Smith's article on constructing and the plans for the Mini Bird I knew it was goin to be "my" next project. Us wives are known never to listen to our husbands so why should I listen to him now. Right?!

The pictures in the article, on the kit box, and on the cover of **Model Builder** magazine, August 1981, should appeal to anyone interested in this bird.

The wood in my kit is of good quality. The die-cutting is excellent, particularly the wing ribs. My Mini Bird is constructed entirely with Hot Stuff and Sig Wood-Prep.

With this kit a nice feature is introduced in construction. Before you start construction you have to decide on the airfoil you want. You can choose an 8% or 11% thick wing. I chose to duplicate the 11% thick wing out of separate balsa wood not in the kit, so that when I was an experienced glider pilot, I could then build and use the 8% thick wing.

I also put holes in the ribs to make the Mini Bird lighter. A piece of sharpened brass or aluminum tubing makes nice round holes.

The builder also has the choice of a two-piece or one-piece wing. The one-piece wing is easier to build and a little bit lighter, while the two-piece wing is easier to transport. I built the one-piece wing. I placed 1/4-inch shear webs where the plug-in tubing would be in the two-piece wing to give it torsional strength. Also, before each shear web is glued, make sure it does not extend above the spar. A good butt joint against the spar is a necessity. The outboard panel shear webs must be tapered before gluing. It is not easy to sand after gluing. One glue joint after another and the wing is ready for sanding and covering.

The elevator can be a bit delicate, but with enough patience the elevator assembles easily. There is a discrepancy here. The plans call for 3/8 inch square leading edge. The kit had a piece of 3/16 square. I referred to the magazine article and it shows a 3/16 x 1/8 piece on the plan. When putting in the two pins, care must be used to assure straightness.

The rudder consists of 1/8-inch sheet balsa and lite ply to be glued and hinged. It is then ready for the body. I used two large and two small hinges instead of the two the plan calls for. The reason being is so the rudder will not flutter as much.

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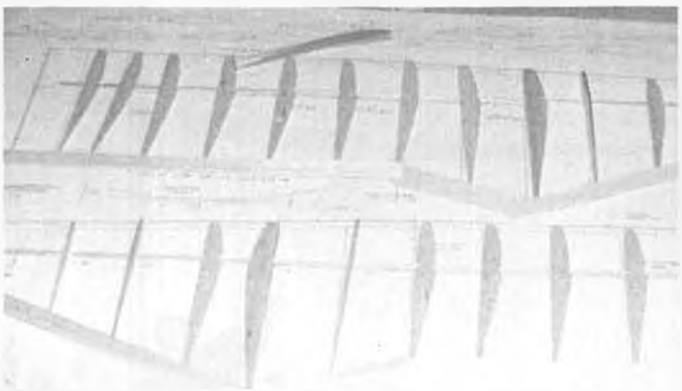
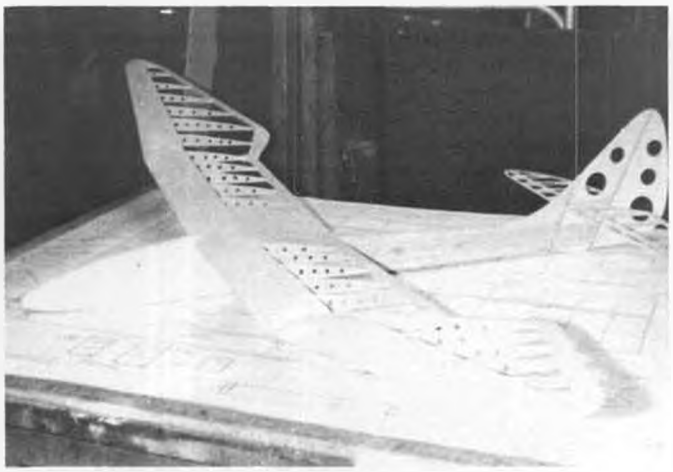


Mary Ann scratch-built the 11% thick wing, saving the kit parts for when she's ready to handle the 8% thick version.



Assembled Mini-Bird before application of pink and white Monokote. Note lightening holes in ribs, fin, and rudder.

1. Colorful group shot of the contestants at the Salinas Area Modelers O/T Contest. Photo credit and more details in text.

PLUG SPARKS

By JOHN POND

• As everyone knows, this column is pretty well contest oriented, and anytime a new club makes a big splash into the O/T Contest schedule, this columnist feels it is incumbent upon him to give them encouragement in the form of magazine coverage.

Such is the case of Jack Jella (a renowned O/T free flighter) and his fellow Salinas Area Modelers (SAM) Club members, who put on the best darn contest these old tired eyes have seen in a coon's age.

Photo No. 1 just about says it all as this lead photo taken by the club photographer shows the majority of the contestants. If you weren't in it, we did hollar long and loud to gather most of the contestants for a group shot.

Would you believe it? At the Saturday night banquet, each contestant received an 8x10 color photo to commemorate the meet. What a neat way to remember this meet.

Jella and his club members really went all out to make everyone feel at home. Before the contest even started Saturday morning, coffee and doughnuts were available to get the boys started. Now get this! For the later arriving boys, a dollar bill bought you a breakfast of bacon and eggs hot off the griddle.

Not to be outdone, the women of the club provided a lunchtime fare of hot

2. Editor and publisher, Bill Burleson, of the Gridley Herald, really enjoys old timers. Rich Kultti on the watch.

Another newcomer to the game, Chuck Trantham, SAM 30, with his Dallaire Sportster.

Sal Taibi's Powerhouse is a most popular O/T design. Dave Marshall, SAM 21, about to crank the OS 60 four-cycle in his.

5. Salinas Co-Director Walt "Waldo" Parker, congratulates Jim Kyncy on his win.

6. Joe Ott, when he was 38 years old (circa 1936), with his nine-foot span twin-engined amphibian. Those props would be close to the water!

hamburgers and hot dogs at 75¢ each. Even McDonald's can't do that good! No question about it, this meet was off to a great start before any flying took place!

Upon entering the meet, each contestant was given a commemorative metal tag with double sided sticky tape that could be put up at home as a souvenir. If you pre-entered this contest, it only cost $16.00 for six events. Your dinner ticket (by the way, an excellent meal) cost only $10.00. When was the last time you had a ten dollar dinner in a high class restaurant?

However, like all good things, something had to put a damper on spirits. This time of the year (September) the Salinas area suffers from tule fog conditions which last up until 10 o'clock or later.

At that time, this columnist put his Schneurle powered Playboy up for a flight only to see it vanish in the fog at 10 seconds. Naturally calling an abort and diving the model back into sight, our "hero" found there was a tremendous amount of ground lift as the fog was rising. The model easily maxed despite full down trim and diving tactics. There's another way to lose a meet!

Actually, once the fog dissipated, the flying was very good. One had to really know his thermals and the area to find lift good enough to get a "max" flight. In some respects, this was an aid to help speed up the contest: Jack Jella stayed right on top of the boys, insisting they either get started in the alloted time or give up the frequency pin. It does work!

After a day of flying, an exceptionally fine dinner was provided by the Shutters Restaurant in Salinas. At that time, trophies were handed out to the day's winners, along with some merchandise! We mentioned the large color photo given to each contestant that night. You would think with all the other activities that would be enough, but Jack had movies of previous O/T meets to show. In short, a great time was had by all.

Sunday was almost a carbon copy of Saturday, with the Texaco boys playing hide and seek in the cloud area sur-

11. The outstanding model on the eastern seaboard, Mike Granieri's M-G. George Hacy's version in the background.

8. A group of the Aurora MAC boys with their successful TORC (MB plan) models. This was only the first-day turn-out!

10. Peerless retrieving team (l to r): Pauline Csuti, Bobby Haley, and Dorothy Granieri, deserve credit for finding Joe Beshar's model after the men gave up!

9. Perennial Contest Director, Woody Woodman weighs Frank Laschek's Bombshell. Coyle Air Drop area.

7. Another Bruce Lester goodie! The lineup for the Berryloid Finish Event. Wayne County Airport, 1938 Nats.

rounding the sun. Actually, the best flights of the day were registered at this time, with Forrette, Pond, and Alten coming in that order.

Photo No. 2 shows Bill Burleson doing his thing with his black and orange Dallaire Sportster. Bill has been tremendously helpful to the SAM movement through the publicity in his paper for SAM 30. It is neat when you have the printing facilities available for your newsletter right in your own club!

Photo No. 3 is another SAM 30 member, newcomer Chuck Trantham, who has blossomed out with a Dallaire Sportster for Antique and an M-G for Texaco. Potent flying airplanes.

Of particular notice is the background which consists of gentle rolling hills liberally sprinkled with cattle. Actually no one could complain, as the cattle stayed away from the noises. Didya ever stand around a hot Schneurle engine for a minute?

Photo No. 4 shows a fairly new man to radio control, Dave Marshall, a confirmed controline man of 30 years. Dave, a member of SAM 21, is quickly adapting to this old timer type of flying. Nice thing about the SAM 21 boys is that they take time out to tell Marshall how to get better motor and model performance out of what he has. That's what this O/T game is all about . . . FUN!

The meet actually ended on a very exciting note, as Rich Kultti, in the very last flight of the day, found two consecutive thermals to win the Texaco Event.

Talking about winning, Photo No. 5 shows Walter Parker (often called "The Great Waldo Parker"), the co-director of this meet, awarding the 1/2A Texaco Trophy to Jim Kyncy, one of the leading lights of SAM 30.

No meet would be complete unless crackups and missing planes were mentioned. Ed Solenberger, SAM 27, had the darndest time finding his 1/2A Texaco Anderson Pylon model that dropped in the "briar patch". Finally, Jack Jella went back to the airport, wheeled out one of his Cessna 172 planes (he runs a service known as Air Trials), and spotted the model from the air. Even then it took several trips into the brambles to recover the model.

Well, this is about the last shot of the year using the 1981 SAM Rules, so you might as well read what the boys were using. For all intents and purposes, glow engines have been effectively eliminated from competition, with 15-second engine runs as compared to 55-second motor run for ignition engines. A real overspill! Results:

SATURDAY, CLASS A

1. John Pond (Playboy/K&B 19)	805
2. Loren Schmidt (Ranger/K&B 15)	734
3. Don Bekins (Strato Streak/Cox)	580

CLASS B

1. Don Bekins (Playboy/OS 30)	1320
2. John Pond (Playboy/K&B 19)	1109
3. Loren Schmidt (Kloud King/ Fox 29)	877

CLASS C

1. Jim Kyncy (Playboy Jr/Hornet)	1275
2. Charles Critch (Ehling/K&B 45)	1220
3. Don Bekins (Playboy/ Super Cyke)	1177

ANTIQUE

1. Don Bekins (Gas Bird/Enya 60)	1841
2. Loren Schmidt (Yates/OS 61)	1695
3. Jack Alten (Dallaire/HB 61)	1603

SUNDAY, 1/2A TEXACO (15 min. flights)

1. Jim Kyncy (Playboy Jr.)	29:39
2. Doug Stringer (Mike)	27:54
3. Jack Alten (Playboy Jr.)	25:36

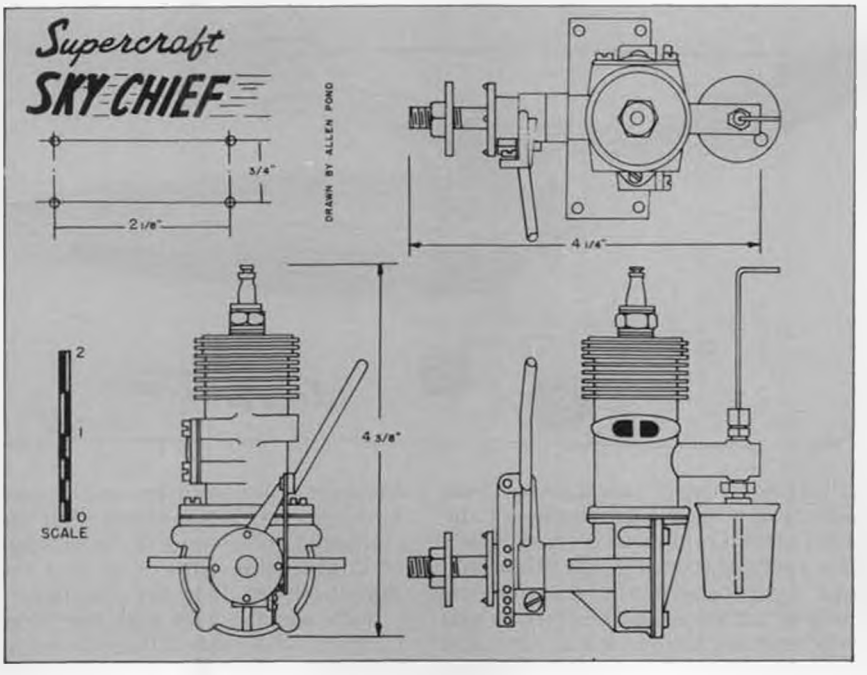
TEXACO

1. Richard Kultti (Dallaire/ OS640C)	28:16
2. Paul Forrette (Quaker/ST 35)	25:33
3. John Pond (Dallaire/OS604C)	23:28

Worth noting the next series of places to eighth ran from 21:55 to 20:22. Real close competition! The SAM 21 boys were really after this event!

ENGINE OF THE MONTH

Talk about a look-alike, the "Sky Chief", as manufactured by American Supercraft Corp. was practically a dead ringer for the Dennymite engine. It should be pointed out the Sky Chief had



13. The seldom seen Red Ripper (MB plan). Functional, but not too pretty. Built by Ken Sykora, SCIF newsletter editor.

14. Much modified Ohlsson Pacemaker for the "Old Ruler" class, by Gordon Codding. Prop is "modified" too!

15. Bruce Norman readying his latest threat to the R/C Ignition event, a Torp .29 powered Kerswap.

12. Neat Scientific Coronet by Larry Fry. Clear cover over light blue framework. Oughtta disappear real quick!

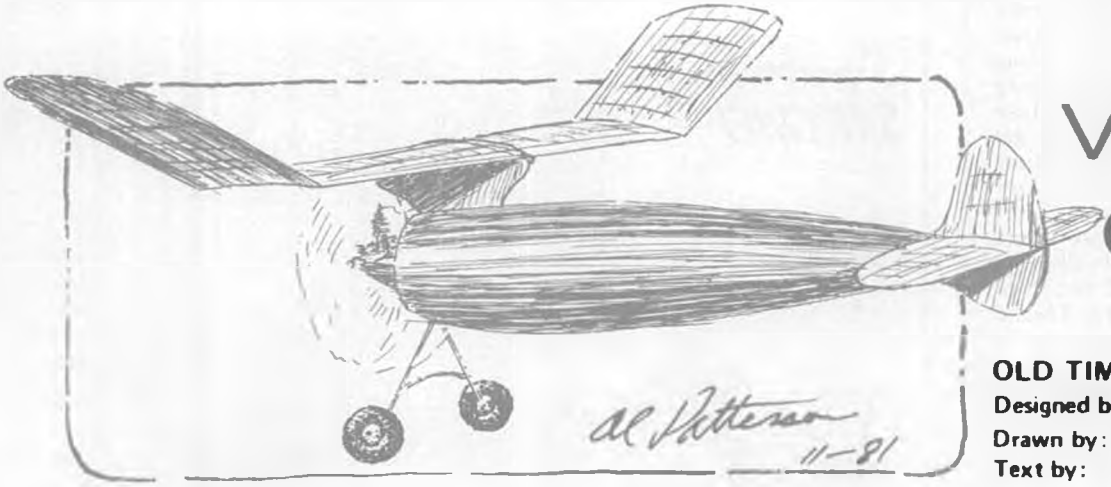
a displacement of 52 cu. in., as compared to the Denny engines of 56 cu. in.

In the January issue of *Model Airplane News* (just in time for the Chrismas trade), a startingly priced engine called the Sky Chief was introduced at the price of $6.95, which included the coil and condenser!! Made primarily of cast iron, this engine was no junk and was absolutely guaranteed to run.

Even the box that the engine was packaged in was a durable item. Matter of fact, it made an excellent parts box, small tool box, you name it. To assist the engine owner, a complete pictorial list of the parts was printed on the inside. There could be no mistaking the part you would need to keep your motor in running condition.

The Sky Chief, a product of the American Supercraft Corp., located at Union and Lake Streets, Chicago, Illinois, was offered through the jobbers who in turn

Continued on page 84



VIRGINIA CHAMP

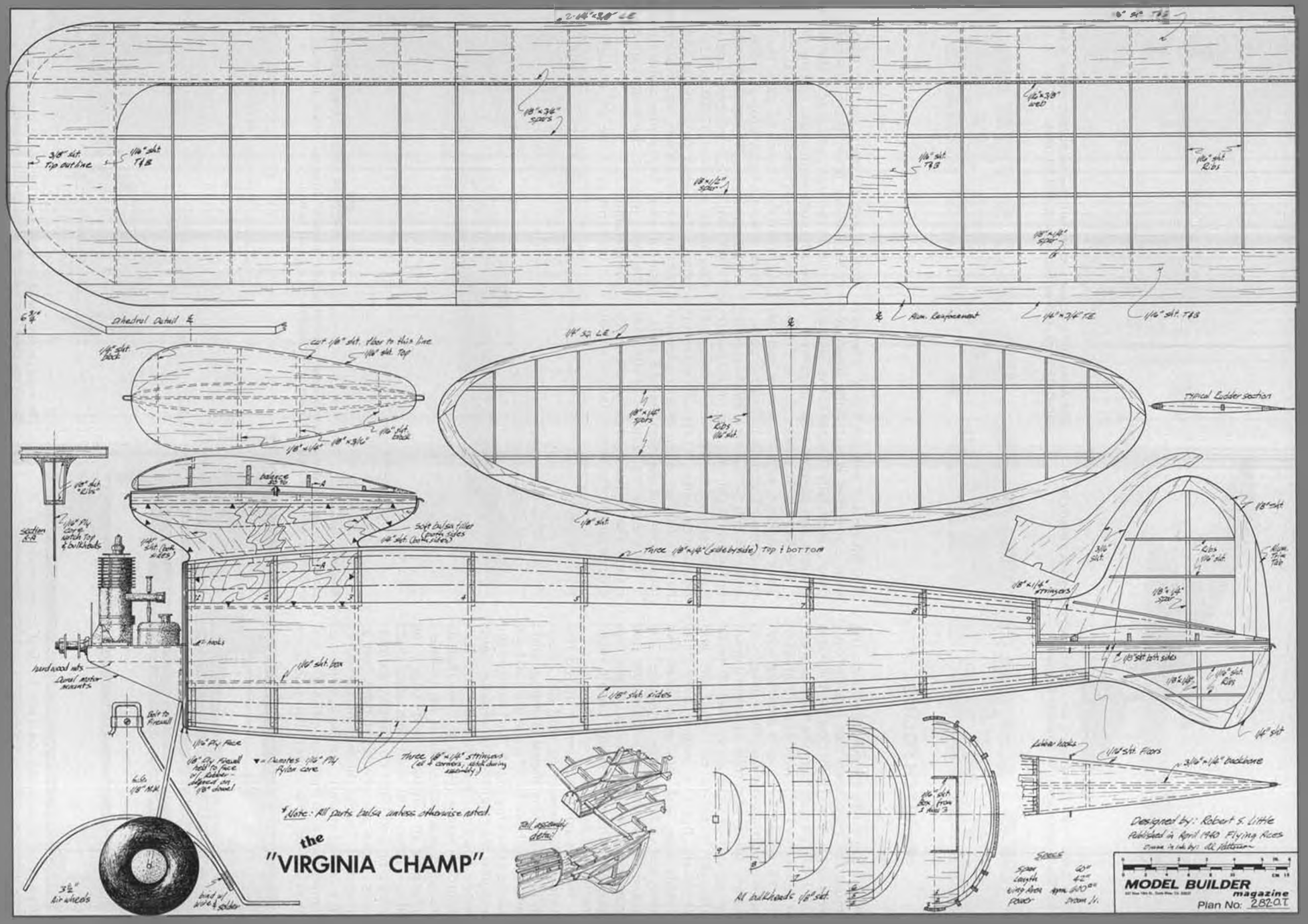
OLD TIMER Model of the Month

Designed by: Bob Little
Drawn by: Al Patterson
Text by: Bill Northrop

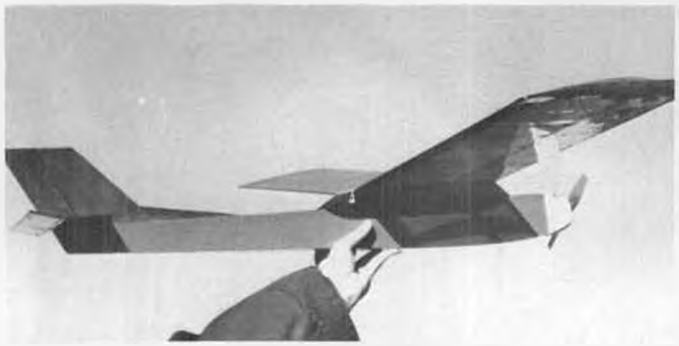
Flying Aces magazine was always kinda misleading in its design credits for the model plans it presented . . . particularly gas models. Many times, the title would name a particular model, and then the byline or author would be listed. If you never read any further, it was natural to assume that the author was the designer, however, this was often not the case. If nothing else, it sometimes left some confusion about some of the fine points of construction, which no one could describe better than the designer.

Such was the case with the Virginia Champ. The table of contents said, "Virginia Champ . . . Herb Weiss." Turning to page 44 of this April, 1940 issue, we see "The VIRGINIA CHAMP", by Herb Weiss. But having been led astray before, we read on. The sub-title was typical *Flying Aces* in its best Howdy Doody style. "So you'd like to build a contest winning gas model? Well, fel-

Continued on page 98



FULL SIZE PLANS AVAILABLE -- SEE PAGE 100



The Astro Flight Astro Sport, with 05XL six-cell system, already to go. Kinda reminiscent of Midwest Esquire.

The Astro 05XL power system, with motor mount, motor, 6-cell sub-C GE pack, and wiring harness, $69.95 total.

ELECTRIC POWER

By MITCH POLING

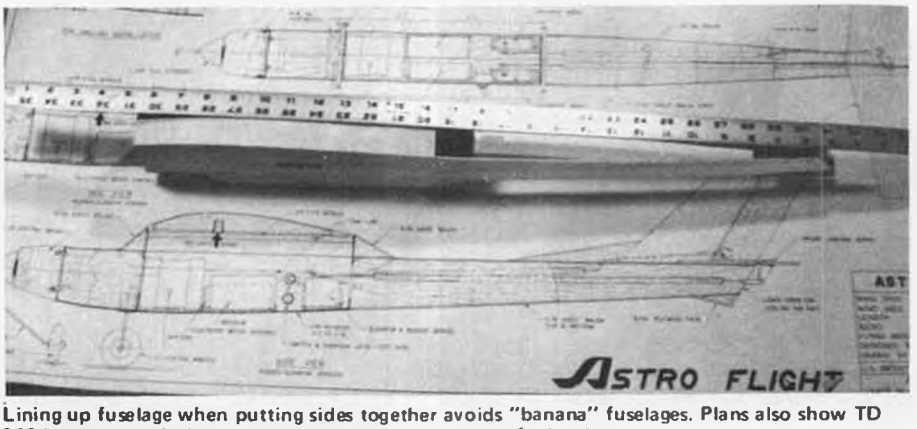
• The more I fly six-cell 05 systems, the more I'm convinced that it is the only way to go. Astro Flight now has the Astro 05XL six-cell system on the market, and it is fantastic! The power and duration in an Astro Sport are really amazing, with such a high rate of climb that I have to do loops, spins, and rolls to keep it from going out of sight above me! At first I thought it had to be "good air" and thermals, but I've logged over thirty flights now, and they've all been like that, so I've been made a believer! The usual flight time on a flight like that comes out to six minutes. If you use digital charging or motor on-off, eight minutes is possible.

In an earlier column I tested the Leisure Electronics 05, and did I boo-boo! I was using digital charging, and I also must have had "good air", so I got some extra long flights. So, I wrote in the column that eight to ten minute flights were routine. Bob Kopski and Bob Boucher wrote me to tell me that six minutes was more like it on ordinary charging and flying. I have kept a log since then, and with the usual field charging and flight conditions, six minutes is the average flight time, just as they said. Thanks, both Bobs, for setting the record straight. Anyhow, what it all comes out to is that a six-cell sub-C system will fly 50% longer than one using .550 Ah cells, if you are flying "man on man", and that is a definite improvement, especially because the six-cell systems also have an edge in power.

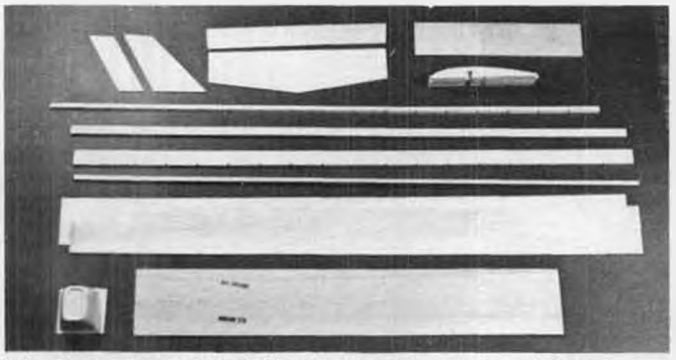
The Astro 05XL comes in a very complete package, with the wiring harness, motor mount, and six-cell sub-C pack. I got a six-cell GE (General Electric) pack, but Astro Flight says that in the future, Sanyo cells will be supplied. That is good news, because the 1/12th scale car racers have found that Sanyo cells do produce more rpm and duration than GE cells.

There are some features of the 05XL system that I like especially; there is a charge jack in the wiring harness so you don't have to open up the plane to charge every time; there are cooling holes in the front and rear of the motor for adequate ventilation, and the motor mount is really handy for firewall mounting. With the six-cell GE pack, the 05XL turns a 6x4 Cox gray prop at 13,500 rpm at 14.5 amperes, a 7x4 Top Flight nylon at 11,500 rpm at 16.5 amperes, and a 6x3 Cox black nylon at 15,000 at 12.0 amperes. The Sanyo pack might add 500 rpm to these numbers, which are quite good already. My Leisure motor turned the same rpms, so the motors are quite comparable.

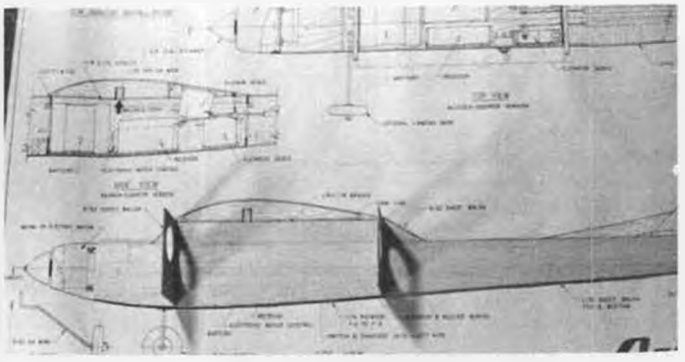
The proof is in the air, though, so I



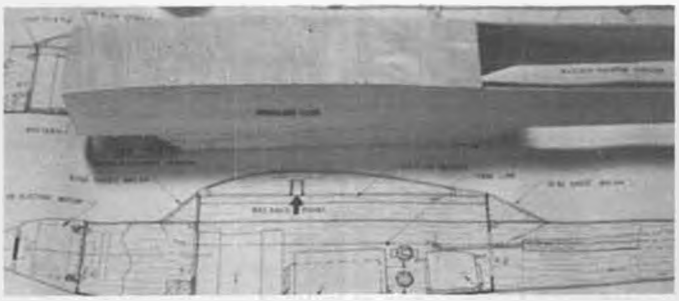
Lining up fuselage when putting sides together avoids "banana" fuselages. Plans also show TD 049 installation. In long run, electric is cheaper . . . no fuel to buy.



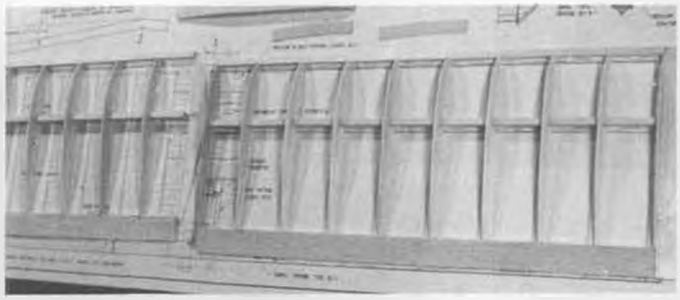
Nice simple parts layout. Kit is easy to build . . . not much to it . . . very light. Few problems mentioned in text have been cured.



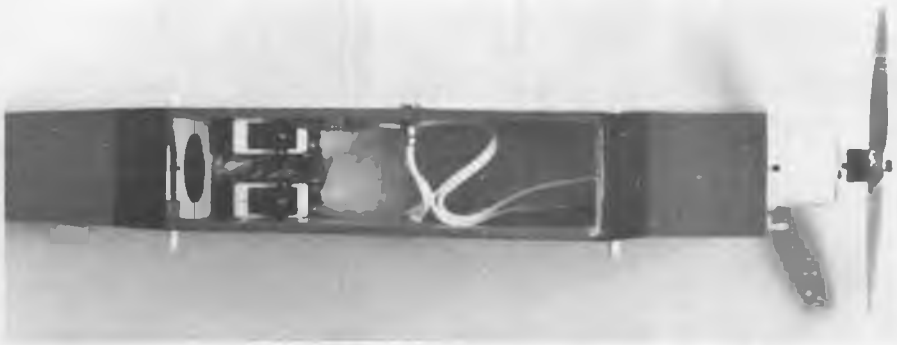
The only formers needed! Make sure top line of fuselage is straight. Plans very clear. Formers revised since this review.



Single-piece ply bottom. Author chose to leave off landing gear. Unless you have access to a smooth field, why bother?



Like the rest, wing construction is simple, light, but strong. Plans show alternate aileron wing for shoulder mounting.



Inside fuselage. No fuel-proofing required! Roomy enough for most radios. Wiring is Mitch's, not stock. Motor mount bolts to firewall, and set screw holds motor in place.

ordered an Astro Sport from Astro Flight for the flight tests. When I opened the box I was impressed by the plans, the photo instruction book, and the simplicity of the design. The kit includes everything except wheels, glue and covering. I started out with the fuselage, and did find some problems. The fuselage sides are die-cut and still part of the sheet. You must use a model knife to cut them free. Once you do this, you *must* check the top line of the fuselage sides and make sure they are straight. If they are not, trim or add to them so they are straight, as this is critical in building a straight fuselage. Compare the sides to the plans, and to each other, and make sure they match. I didn't do this, and had to knock out a former and rebuild part of the fuselage to get it all right. The other problem is that the fuselage formers are not spaced far enough apart to let the wing set between them.

There are two options; a shoulder wing with ailerons, and a high cabin with dihedral. I chose the high cabin, and found the wing would not sit in the cabin once I had finished. I had to cut a "vee" in the formers with an Exacto saw to get it to work out right. It would be easier to do this before you start building. Once I had this all sorted out, the rest was easy. The fuselage is very simple to build, with only two formers and a firewall, and a plywood floor to keep the alignment in the cabin area true and square. I like this, and it worked well. I made sure the fuselage tail was lined up right with a steel yard stick lined up on center marks on the cabin bottom. This avoided the "banana" fuselage shape problem. Astro Flight was more than generous with the 1/16 balsa sheeting for the top and bottom, I had a full sheet left when I was done. I covered the fuselage in red Solarfilm and put in the windshield and cabin windows with black shelving paper. The plans show square pegs for the wing hold downs, but dowels were supplied in the kit, so I used them.

The tail surfaces were simple sheet, and I covered them in one piece, so the Solarfilm makes the hinges as well as the covering. I have used this type of hinging for many years, and it is quite reliable, simple, and aerodynamically clean. The wing is, again, quite simple, just a leading edge, spar, and trailing edge. The ribs are very nicely cut, and fit the notches in the leading edge and trailing edge perfectly. I did find that one wing panel did not have the same rib spacing as the plans show. The plans were right, and the notches in the leading and trailing edge were off a little, about 1/16. I went ahead and used the notch spacing as it was, and it didn't have any effect on flying, so no problem. The spar is 1/2 x 1/4 balsa, which I used, but I would prefer spruce or bass wood for extra strength. I have flown the plane on floats at 37 ounces with no problems, so the balsa does do the job. I chose to build the wing with dihedral, and the plywood braces did not have enough dihedral cut into them. A little work with an Exacto saw fixed that.

I covered the wing in transparent red Solarfilm for that "red baron" look, and then weighed the empty plane, ready to fly except for the power pack and radio. Would you believe eight ounces? That is the advantage of simple structure, what isn't there can't weigh you down. The

Continued on page 83

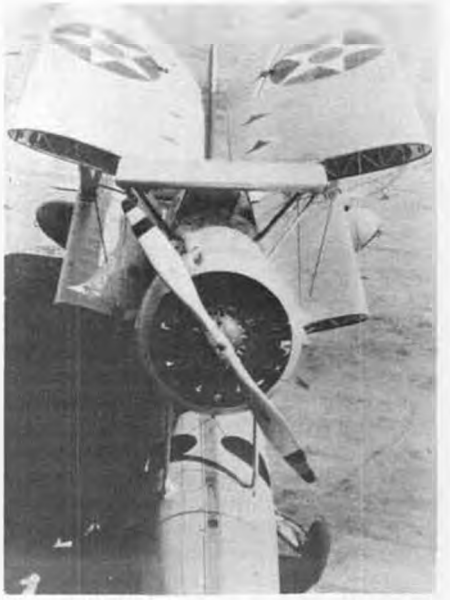
See? It doesn't *always* rain in Seattle, just most of the time! Author with the completed Astro Sport. Clothes stay cleaner with electric!

Mitch's O.D. water glider with Astro 05XL, Ace foam wings. Strictly hand launch and water landings only! Six ft. span, 44 oz.

The XO2D-1 during Navy evaluation at NAS Anacostia. Photo from McDonnell Douglas via Harry Gann.

DOUGLAS XO2D-1

By NICK KARSTENS



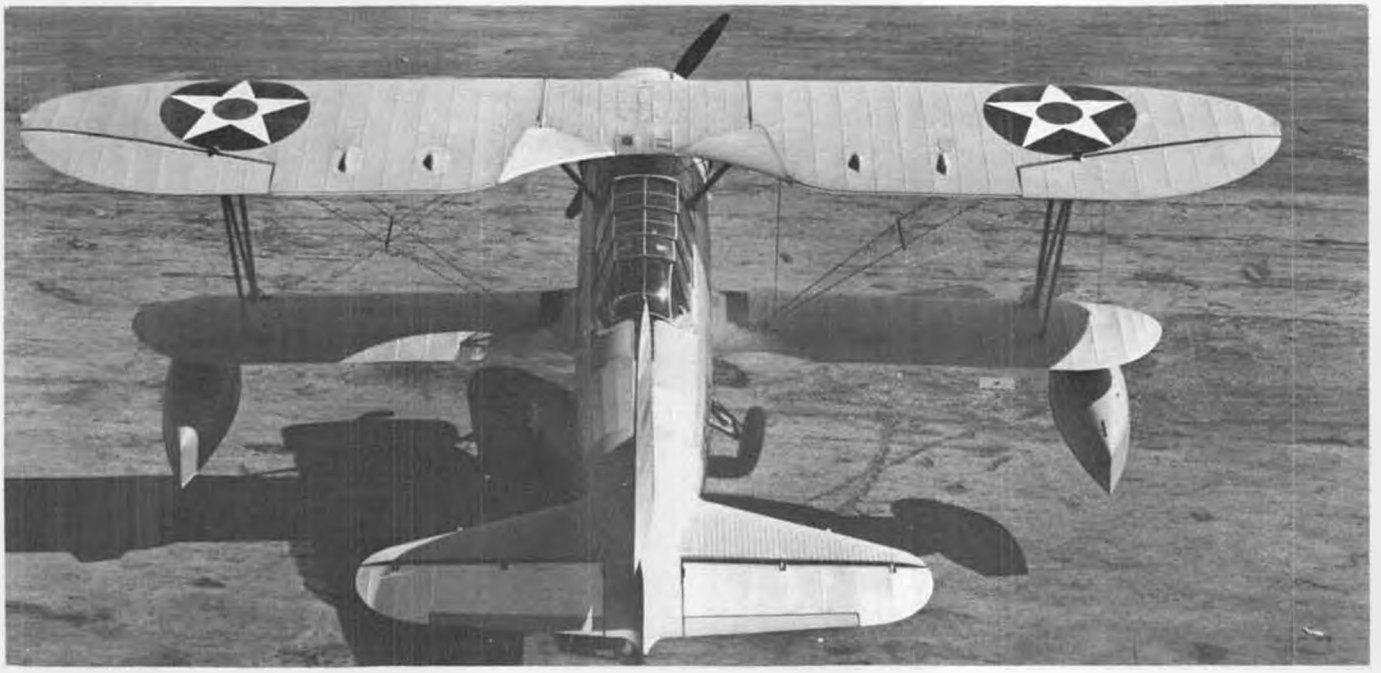
With wings folded, widest part is 13-1/2 foot stabilizer. Photo from Ed Young.

(Continued from January 1982 issue)

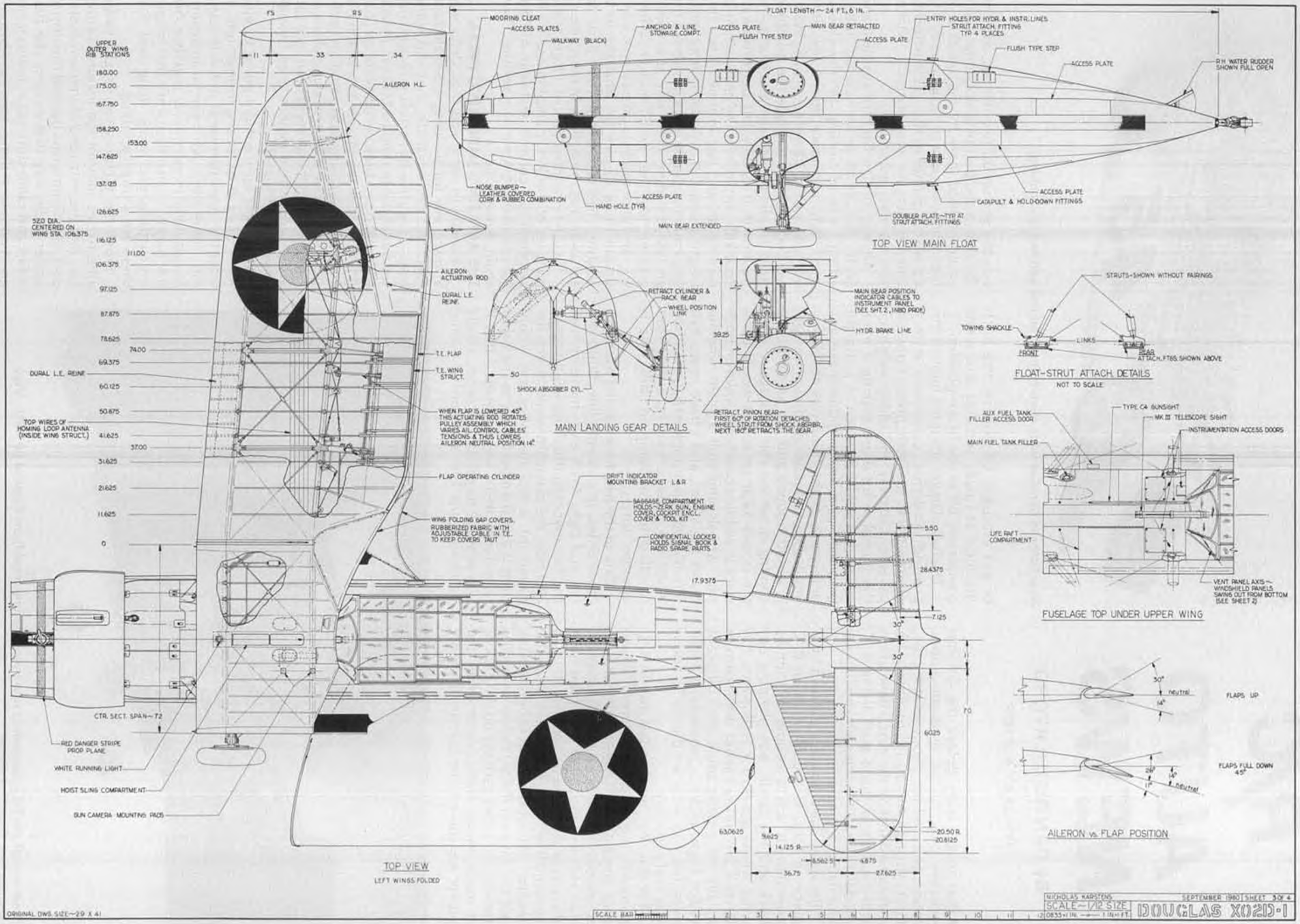
The foldable wings were released from flying position by backing out the wing locking shear pins (in the front of each wing) using the wing locking crank. The wings didn't require bracing struts for this operation as the flying and landing wires terminated in a fitting at the wing root hinge area. The folded wings were held in place by engaging a small fitting on the top rear of each wire float, into the latch plate installed on each side of the fuselage just forward of the monocoque section attach joint.

A big minus in having the amphibian type aircraft is the ever-present weight penalty in having a float plus a wheeled landing gear. The XO2D-1 had provisions for carrying a 30-gallon auxiliary fuel tank under the right forward fuselage cowling, attached to the outside of the steel tube frame. However, to get the additional range this fuel allowed, the wheels and detachable portions of the landing gear had to be removed to stay within the weight limits. As can be seen

Continued on page 93



Triangular shapes at aft portion of wing joints are rubberized fabric gap covers which fold when wings swing back. When extended, they're held taut by cables buried in trailing edge. Wing bumps cover aileron and flap controls. Photo from McDonnell Douglas via Harry Gann.


FS
RS
UPPER OUTER WING RIB STATIONS
180.00
175.00
167.750
158.250
153.00
147.625
137.125
126.625
120 DIA. CENTERED ON WING STA. 106.375
116.125
111.00
106.375
97.125
87.875
78.625
74.00
69.375
60.125
50.875
41.625
37.00
31.625
21.625
11.625
0
11
33
34
AILERON H.L.
AILERON ACTUATING ROD
DURAL L.E. REINF.
T.E. FLAP
T.E. WING STRUCT.
DURAL L.E. REINF.
TOP WIRES OF HOMING LOOP ANTENNA (INSIDE WING STRUCT.)
WHEN FLAP IS LOWERED 45° THIS ACTUATING ROD ROTATES PULLEY ASSEMBLY WHICH VARIES AIL. CONTROL CABLES' TENSIONS & THUS LOWERS AILERON NEUTRAL POSITION 14°
FLAP OPERATING CYLINDER
WING FOLDING GAP COVERS. RUBBERIZED FABRIC WITH ADJUSTABLE CABLE IN T.E. TO KEEP COVERS TAUT
CTR. SECT. SPAN—72
RED DANGER STRIPE PROP PLANE
WHITE RUNNING LIGHT
HOIST SLING COMPARTMENT
GUN CAMERA MOUNTING PADS
DRIFT INDICATOR MOUNTING BRACKET L&R
BAGGAGE COMPARTMENT HOLDS—ZERK GUN, ENGINE COVER, COCKPIT ENCL. COVER & TOOL KIT
CONFIDENTIAL LOCKER HOLDS SIGNAL BOOK & RADIO SPARE PARTS
17.9375
5.50
28.4375
7.125
30°
30°
70
60.125
63.0625
9.625
14.125 R.
20.50 R.
20.6125
8.562.5
4.875
36.75
27.625
TOP VIEW
LEFT WINGS FOLDED
FLOAT LENGTH—24 FT. 6 IN.
MOORING CLEAT
ACCESS PLATES
WALKWAY (BLACK)
ANCHOR & LINE STOWAGE COMPT.
ACCESS PLATE
FLUSH TYPE STEP
MAIN GEAR RETRACTED
ACCESS PLATE
ENTRY HOLES FOR HYDR. & INSTR. LINES
STRUT ATTACH. FITTING TYP 4 PLACES
FLUSH TYPE STEP
ACCESS PLATE
R.H. WATER RUDDER SHOWN FULL OPEN
NOSE BUMPER—LEATHER COVERED CORK & RUBBER COMBINATION
HAND HOLE (TYP)
ACCESS PLATE
DOUBLER PLATE—TYP AT STRUT ATTACH. FITTINGS
CATAPULT & HOLD-DOWN FITTINGS
ACCESS PLATE
MAIN GEAR EXTENDED
TOP VIEW MAIN FLOAT
RETRACT CYLINDER & RACK GEAR
WHEEL POSITION LINK
SHOCK ABSORBER CYL.
50
MAIN LANDING GEAR DETAILS
MAIN GEAR POSITION INDICATOR CABLES TO INSTRUMENT PANEL (SEE SHT. 2, INBD PROF.)
HYDR. BRAKE LINE
39.25
RETRACT PINION GEAR—FIRST 60° OF ROTATION DETACHES WHEEL STRUT FROM SHOCK ABSRBR, NEXT 180° RETRACTS THE GEAR.
STRUTS—SHOWN WITHOUT FAIRINGS
TOWING SHACKLE
LINKS
FRONT
REAR
STRUT ATTACH. FTGS. SHOWN ABOVE
FLOAT-STRUT ATTACH. DETAILS
NOT TO SCALE
AUX. FUEL TANK FILLER ACCESS DOOR
MAIN FUEL TANK FILLER
TYPE C4 GUNSIGHT
MK III TELESCOPE SIGHT
INSTRUMENTATION ACCESS DOORS
LIFE RAFT COMPARTMENT
VENT PANEL AXIS—WINDSHIELD PANELS SWING OUT FROM BOTTOM (SEE SHEET 2)
FUSELAGE TOP UNDER UPPER WING
30°
neutral
14°
FLAPS UP
20°
14°
neutral
17°
FLAPS FULL DOWN 45°
AILERON vs. FLAP POSITION
ORIGINAL DWG. SIZE—29 X 41
SCALE BAR
NICHOLAS KAPSTENS
SEPTEMBER 1980 SHEET 3 OF 4
SCALE—1/2 SIZE
(0.833 in. = 1 in.) (1 in. = 1 ft.)
DOUGLAS XO2D-1

R/C AUTO NEWS

By DAN RUTHERFORD

PHOTOS BY AUTHOR

New Sorbello Can-Am body from Parma, real low and swoopy looking.

• Just to get crazy before the column switches over to the medium-serious mode, gotta tell you about my latest toy. First, though, it should probably be mentioned that, in the past, I have often taken pokes at those guys flying R/C models, at least the ones who build trash like flying dog houses.

Because I have now got my own little piece of foof, in the form of an R/C pumpkin. It was a couple of months back and the family was planning out what we would do for Halloween, the Dirty Clan being rather well-known locally for pulling some very different Witch Night tricks . . . someday I might even tell you what we did in '80 and it was *real* repulsive.

For this year, we decided that an R/C pumpkin ought to be different, so we took the BoLink "Digger" off the wall, strapped one of those molded pumpkins that kids use to collect junk food in to the top of the radio tray and wired in an automotive turn signal bulb to the resistor. Some extra paint to better black out the face on the pumpkin, as well as the cat and other garbage on the back of it made things better, and when the power was full-on, the bulb lit up plenty bright enough. Of course, the bulb dimmed at lower settings and went completely off at the brake position.

The basic Digger sits quite high off the ground, and this, combined with a narrow track, makes it pretty tippy on pavement anyway, the added weight of the pumpkin up there making it even worse. It could be driven in a straight line, with care, but it didn't make any difference, as the thing was absolutely impossible to put upside down. Instead, it would bounce and flip around until coming down on the tires again. With the power kept on full, it would even once in awhile come back down on both rear wheels and pull a giant wheelie down the street, and I have never had much need of a pumpkin that would do wheelies. I have had race cars that handled like a pumpkin, but that is another story. . .

One of the best tricks with it was to go more or less in a straight line, flipping it left and right. With each movement of the front wheels, the thing would tip to one side, the pumpkin would touch the pavement, a flip the other way would right it and then back over to the other side. From there we discovered that it was possible to get it in a corner, slowly tightening up the arc until it would actually get up on two wheels, without the side of the pumpkin dragging, and it could be held there for maybe 20 or 30 feet. All these years of racing cars to end up with a pumpkin that pulls wheelies and will run on two wheels. . . Makes you wonder, doesn't it?

Anyway, on The Night, it was clear and pretty dark, because we have an "interesting" way of turning off the closest street light and more than a few little urchins got a genuine scare. What worked best was to place the pumpkin right inside the garage door, chasing them with it as they left our driveway. Poor kids would hear the gears whining, turning around just in time to see this bright pumpkin, evidently magically suspended a couple of inches above the ground, heading their way at a speed greater than they could muster. When we ran out of candy to give away, it was a simple thing to pick up what the little blighters had dropped in their haste to get away. Yes, we believe in recycling. . .

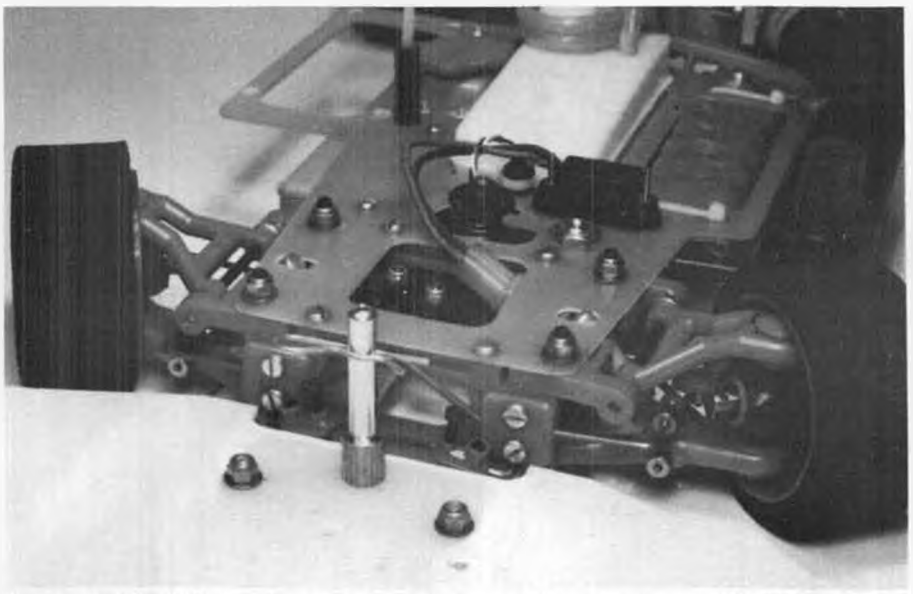
If I can remember to do it, I'll get some pictures of this R/C pumpkin and try to get them in a column next year, in time for you to do up your own version. Then again, I may not. . .

THE AMAZING SHRINKING DELTA. . .

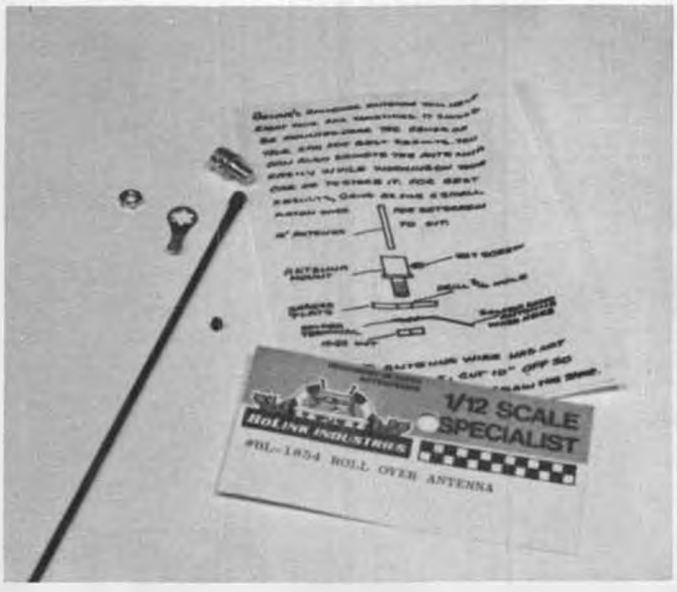
Wasn't too long ago that Delta was known only for building 1/8-scale race cars, and quite frankly, they did some foot-dragging before finally getting serious about building a 1/12 car. In fact, they still don't build a complete car, but do now offer the Phaser 120, which is a conversion kit using Associated's wheels, steering blocks, diff, bearings, axles and kingpins. And it is a very serious race car, just as you would expect, even though being a half-breed.

Still, right up front I'm going to give them a big zero for the instructions, at least the ones that went out with early kits. There is enough there for an experienced racer to get the car together, but just barely. I can only assume that proper instructions are being done and that these are a stop-gap thing.

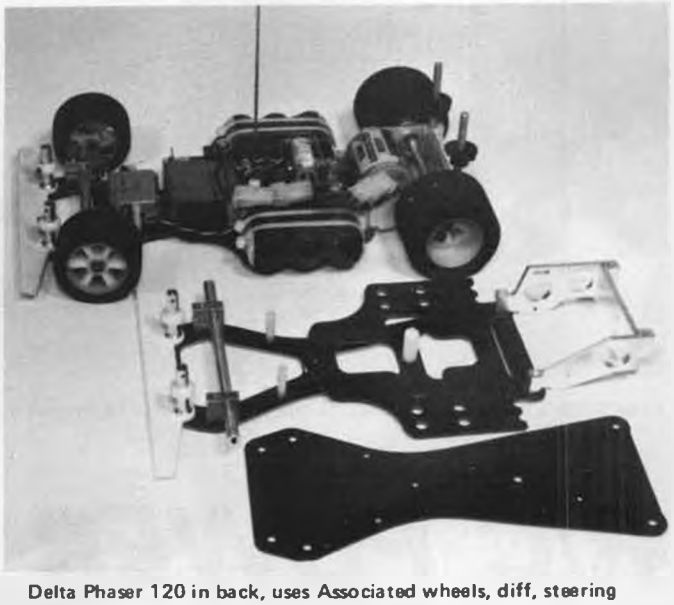
From the pictures you ought to be able to see most of the features of this car, like the extruded aluminum motor pod, aluminum cross bar and the down-under radio tray that mounts the batteries and radio stuff just as low as it can go. A couple of things aren't so obvious;



Front end of the PB independent suspension car imported from England by MRP. Very business-like. Beautiful pieces.



Roll-over antenna kit from BoLink. Has all good stuff. Nice mounting block for antenna, solder fitting for receiver wire.



Delta Phaser 120 in back, uses Associated wheels, diff, steering blocks, etc. Bantam Midget servos, naturally.

the body posts are drilled down the center, still plenty strong but also very light. The cross bar is not clamped on the left side but is on the right, so the caster can be easily adjusted by loosening one screw, yet there is no chance of this setting changing. This is a super feature, one that takes some practice to use effectively, but once you know how much caster to put in or take out to get the right amount of power-on steering, you'll really appreciate it.

That radio tray is spaced up very slightly from the chassis pan and is attached solidly at the rear only, the front simply floats, resting on a small foam pad. The tray is drilled to accept any battery packs currently in use, the car shown uses three-to-a-side packs, for 4-cell packs you just strap them to the rearmost holes in the tray. I have two of these cars and the other uses the stick-type packs, again strapped to the rear holes and with the servo/resistor assembly moved forward, of course.

That white nylon piece sticking up from the center of the pan is the antenna mount, a chunk of 1/16 wire goes right in and a set-screw holds it in place for a pretty sanitary "roll-over" antenna installation.

The first car I built completely stock and then started changing a little. The steering blocks were the first to go, as they aren't always flat on the bottom and need to be in this car, where in the RC12E, it makes no difference. Leisure makes a steering block that is a twin to Associated's, but machined from aluminum, so those went in and straightened out a little camber problem I had on one side. While doing this, Associated front axles were installed as kingpins, as the two are of different materials, the axles being harder, and no matter which is used need to be trimmed off anyway. The Delta bumper is nice and light, but a stock Associated lightweight bumper fits perfectly and gives more protection, so that change was made.

The kits come with good quality Phillips head screws, but the hot tip is to replace them with the Super Screws (no, I didn't make that up) Delta sells and that are commonly used in the 1/8 scale Super J. Actually, I hesitate to even mention this, as the screws sell two for $1.50 (really!) and the special bit to fit them goes for $6, so you're looking at 12 bucks to make the switch. Sounds like a lot, and is, but once the change is made you will never again have problems with the fasteners holding the car together. I've got Super Screws in all our Super J's, some have been in and out a bunch of times in the last three years but never has one of them come loose and once I quit tightening them down with a ratchet have never had the head on a screw get stripped out.

In case you are wondering how I got a resistor to lay in between the packs, it is one of the new "short-stroke" numbers from Parma and is mounted directly to extensions that bolt onto the mounting lugs of the Bantam Midget servo, the servo itself mounted to the tray with servo tape, as is the receiver.

Of the two cars I built, the one shown seems to handle the best, although it may be too early to be sure. It also has the most sanitary installation, with the servo/resistor assembly mounted in the center of the car and just as low as possible. On the other car, I did once try the solid pan shown and had so much steering I immediately switched back to the cut-out pan. Believe it or not, I was using Associated hard front tires in con-

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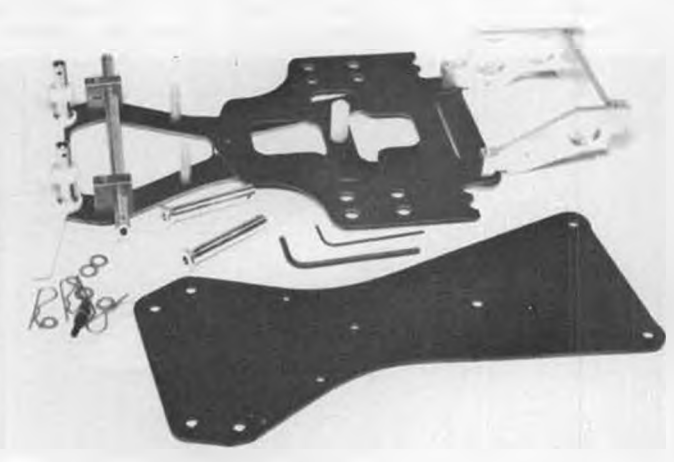
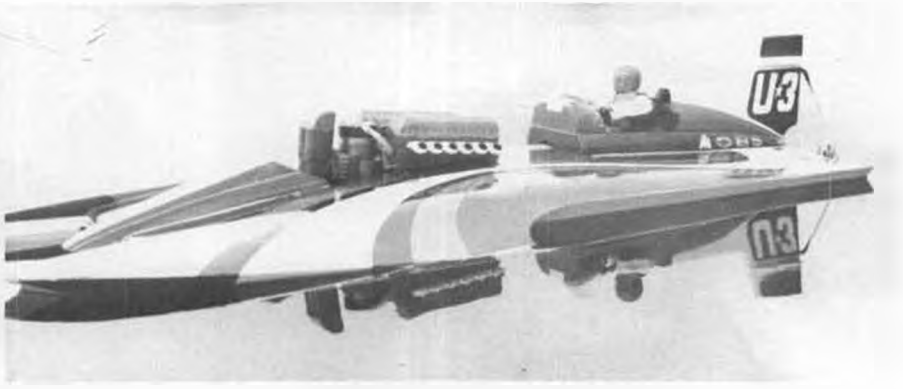
Modified class rewound motors now available from Delta. Ball bearings, diamond-trued commutators, super balance job. The works.



Delta "Phaser 120" 1/12 conversion kit in back . . . optional solid chassis pan in foreground.



Lynn Miller's beautiful U-3, Class C scale hydro. District 19. Photos by Miller.

R/C POWER BOATS

By JERRY DUNLAP

HERE'S A NEW PRODUCT TO TWIST AND LIGHT UP YOUR GLOWPLUG

One of the things I've enjoyed about writing this column is the opportunity to try out new products. Product review has filled many a page of the material I've written. It doesn't happen too often that a manufacturer asks me to try something out before it becomes available to the general hobby public. Such, however, was the case with a new item from McDaniel R/C Service, 1202 Bryan Ave., Bellevue, NE 68005. McDaniel R/C Service introduced the Ni-Starter awhile back and it has become popular for starting model engines. Bob McDaniel, an avid R/C flyer and owner of the company, recognized a special need for the model boater when it comes to starting competition engines.

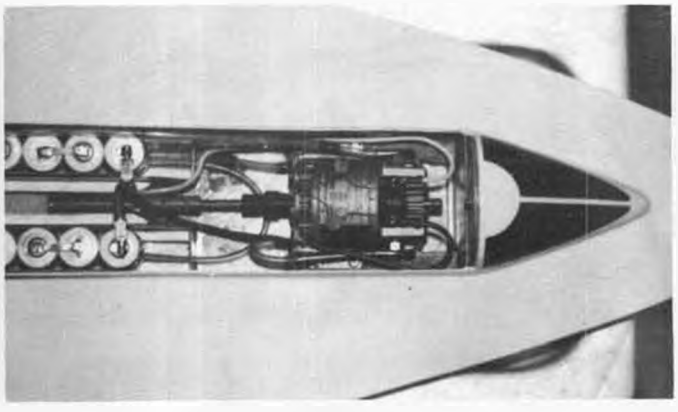
Like many other model boaters, I sometimes find it necessary to start my model boat engines with the glowplug not tightened because the engine is slightly flooded or compression made it difficult to turn over the flywheel. When the engine fires, you grab a glowplug wrench and tighten down the glowplug. It can sometimes be a bit of a hassle. What would you think of a tool that was designed to both light the plug as well as tighten it? Well, think of the Bo-Starter. With a price of $27.95, the Bo-Starter comes complete with a charging unit and a detailed set of instructions. Bob McDaniel sent out a few preproduction units for evaluation by model boaters and actively sought feedback on this device. His main concern was that the

David Blacksten set 58.22 mph mark in Sport 40 Division II (unrestricted). See text.

The McDaniel R/C Service Bo-Starter, described in the text.

Modified Northwind, Kroker Sea-Wasp 12, 24 G.E. NiCds. Speed 35 mph plus.

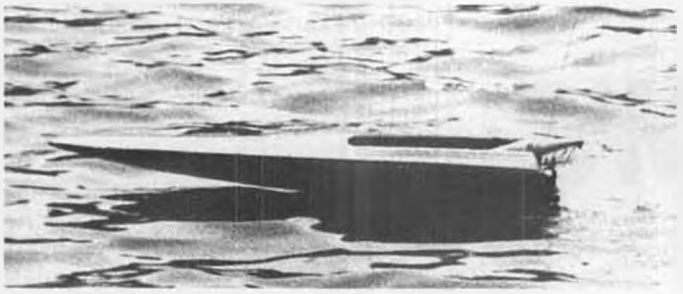
View of electric Northwind at rest. GE's are 650 ma miniature sub-C cells, Northwind photos by Charles Hausler.



Innards of Kroker powered Northwind. Bearings and brushes water cooled. Turns over 20,000 rpm for two minutes.

More water out than in at the Mutineers Fun Race. All Mutineer photos by Robb Scott. See Ginnie Farber report in text.

Joel Putters launches his brother's Hughey hydro.



Bill Jones' 3D Ruff Stuff was a stiff competitor in B-C Mono.

Bill Jones passes Gary Maxon in B hydro.

Bo-Starter be able to stand up to the demands of starting model boat engines.

I took the Bo-Starter to a 1/16 mile speed trials back in October and made over 50 starts of different people's engines. The unit was used on everything from K&B .21s to O.P.S. .65s and fired every engine to which it was attached. No matter the brand or type of glowplug, the Bo-Starter did the job. The capability of this unit to light the plug and also tighten it is a neat feature. The only thing the unit won't do is tell you if the plug is burned out when the plug is in the engine. However, it only takes a few seconds to completely remove the plug and visually check the plug's condition.

The Ni-Cd battery that provides the power source is capable of accepting hundreds of rechargings. There is also a Fast Charger available for $10.95 that works off a car cigarette lighter. I have used the Bo-Starter on a number of occasions and have found it to be a valued addition to my boating accessories.

HOW ABOUT A BOOK ON THE "BASICS OF RADIO CONTROL POWER BOAT MODELING?"

David Thomas, who used to write the boating section for *R/C Modeler* before Howard Power took it over, up and did what I've contemplated doing for many years. He wrote a book about model power boats. I'm sure the book will be available in many hobby stores or could be obtained directly from Kalmbach Publishing Co., 1027 North Seventh St., Milwaukee, WI 53233. The 80-page soft-cover book carries a $9.95 price tag. David Thomas is an Englishman living in France and has had an extensive background in model boating. I found the

Continued on page 78

Chi Farber readies his Polaris submarine for the opening ceremonies.

Steve Slusher takes Gary Maxon's modified Hughey rigger to launch area.

Andy Anderson with his 2nd place .21 Pro-Glass.

Cessna Skymaster from Airtronics, for two .049 engines. Will fly on one.

Sport SCENE

By LARRY RENGER

• The topic for this month will be painting of models with canned spray. Now as any of the local graffiti artists can tell you, the paint spray can is a simple, convenient, technique for applying paint without the hassle of clean-up, brushing technique, brush hairs, expensive brush replacement, etc. There is no comparison between the average spray paint finish and a good brush finish. Spray will put on a lighter, more even finish every time.

For ultimate quality, a properly handled spray gun will give the best finish, but there is a lot of room for error. The expense of purchasing good spray equipment presents a significant barrier also. Spray can painting represents a technique for getting an outstanding finish with a minimum of investment. The advantages of spray cans are that there is minimal maintenance and clean-up, low initial cost, and consistent spray quality. Drawbacks include higher running expense, limited color selection (some exceptions to be covered later), and a relatively large spray pattern.

There are some tricks and techniques which will help you to do a great finish with spray cans. The key elements are temperature, distance and stroke. The most important learning technique is to practice actual painting. Buy a few cans of the cheapest spray paint you can find and paint a bunch of old cardboard boxes, toys, garden furniture, or what-have-you before aiming a nozzle at your latest winged creation. Don't try to learn spray technique on something you value!

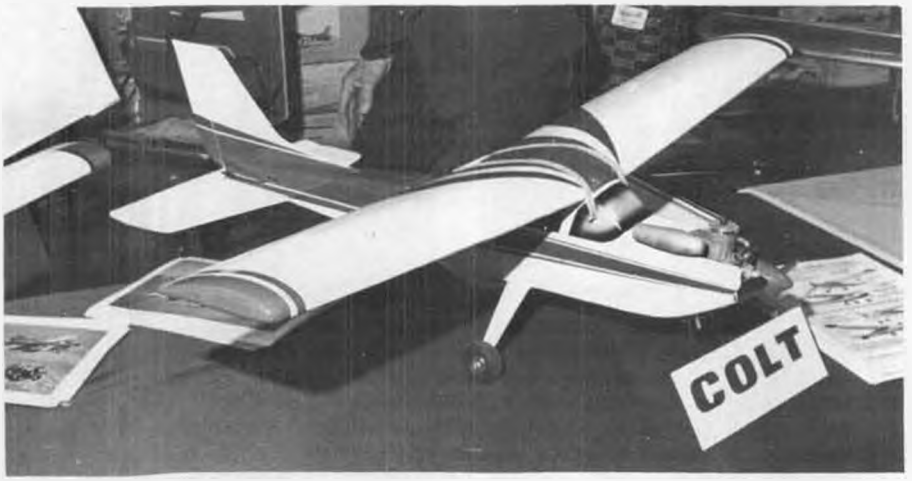
A spray can is an interesting device which runs on internally contained gas pressure. As your friendly neighborhood thermodynamicist can tell you, pressure is directly related to temperature. If the spray can is chilled to start with, or allowed to cool down from expansion chilling through extended use, the pressure will drop and the spray pattern will go to pot. There is a delicate balance to be met here . . . those cans are potential bombs if overheated, and duds if chilled. I prefer to allow my spray cans to warm up in a pan of warm water. I also return the can to the water periodically. If you are doing a large job, consider having two cans of the same color going at once so one can be warming while the other is spraying. The water should be just warm to the touch, just above body temperature, not even as hot as you might use in a spa or bathtub. If your hand is uncomfortable in the water, it is much too hot.

Distance is the next key to spray success. Too close and the paint accumulates unevenly and tends to splatter or run. If you spray from too great a distance, the paint fogs out too far and it is difficult to get even coverage. Use the distance specified on the can as a starting point and try it out on a piece of cardboard. Try both closer and farther distances to evaluate the effect. At first you might even keep a ruler nearby so that you can get a better idea of the distance. Most important is to keep the spray nozzle a constant distance away from your piece of work.

The final item of the big three of spray can technique is the stroke. Start your spray flowing before you stroke onto your model. Stroke smoothly across the entire piece and don't let up until the spray is off the other side. Each stroke should overlap the previous one by about a third of its width to get even coverage. Stroke speed, not distance, controls the amount of paint laid on when you are painting properly. Distance is a function of the pressure, nozzle configuration and paint consistency. Those are constant on a given spray can at a given temperature. You must resist the urge to move in with the spray can to increase the coating of the spray. Just slow down your stroke rate instead. Rate of travel of your stroke will control how heavy a coat you are applying.

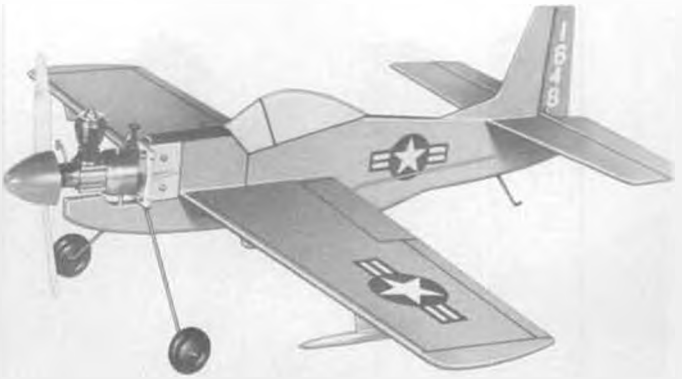
In actual practice, there are some additional techniques which will help you in getting professional results. First, when painting, it is good practice to put on each coat of paint in two stages. First, dust the entire area with the lightest possible coating, let it dry for just enough time to become tacky (spray a small card at the same time so you needn't touch the model), then spray on your full coat.

Second, plan to spray multiple light coats of color with light sanding in between. You will be rewarded with a smoother, run-free finish with a minimum of weight build-up. A single heavy coat is extremely difficult to do well, and tends to be uneven (and you're almost sure to get runs!). In multiple coats, you



Sig's "Colt", a 45-inch span trainer for .09 to .15 engines.

The Sterling "Lil Roughneck", oldie kit, with Cox .010 and Cannon Super Micro on rudder and elevator. Weighs 7-3/4 ozs. total.



Excellent Ukie trainer P-51 profile by Midwest Model Products. Ultra-simple construction.

can change the direction of your spray pattern to even out the coating even more. For two coats, I spray the second coat at a 90° angle to the first. Each of three coats is laid on at 60° to the others.

If you do chance to spray too heavily, pick up the model and keep rotating it in all different directions to let the paint dry without developing runs. Remember, a heavy coat takes a lot longer to dry thoroughly, as the solvents at the bottom have to creep through a lot of paint.

An important part of spray painting involves safety, both for yourself and your surroundings. Cover your surroundings with drop cloths. Even the fast dry lacquers stay sticky for a remarkable length of time. The family car looks funny with a light dusting of a gaily contrasting color and your parents or spouse just might notice it. In the same vein, your lungs and nasal passages would look even worse coated with stray paint particles and solvents. My rule of thumb is that if I can smell the chemicals, I'm getting an overdose. I spray in an open garage and use a carbon filter mask when at home. At work, we have a professional spray booth with positive filtered airflow. There have been numerous articles in the modeling press lately about the dangers of some of the chemicals we use for building aircraft. BELIEVE THEM!

When you are through with your spray job, hang the model in a clean area with only very slow air exchange initially, until it dries to the point where dust will no longer stick to the surface (known as "dust free" time). Then the model should be hung in a well ventilated, warm environment until it loses all solvent odor. Note that with enamels, the drying time can run from days to a couple of weeks. Only then will the finish have reached its ultimate capabilities in durability and chemical resistance.

I mentioned that there is some possibility of color modification even with spray cans. I have found that, except for viewing at very close range, you can change a color satisfactorily by fogging a second color over a base coat. Black can become "gunmetal" with a light silver overspray, white can turn gray, pink, or pastel colors with a faint dusting of a second color. The trick is to back way off with the spray can and then dust as evenly as possible. This takes some real practice, and don't expect terrifically even coloration. Consult the classic color combination chart to determine the mixtures to try to get the color you want.

When you have a spot of damage you need to repair, or perhaps if you wish to do a camouflage paint scheme with soft borders, the trick is to use a stencil held at a small distance from the painted surface. I find that brown paper shopping bags cut or torn to shape make perfectly adequate stencil masks. Just be sure to somehow control the mask-to-surface distance to determine the sharpness of your border.

Finally, there are a couple of tricks to keeping those spray cans useable. I follow the typical manufacturers directions and invert the spray can after use and spray until the paint is cleared out. However, then to retain the best possible performance, I remove the spray nozzle and leave it in a small bottle of MEK or acetone. The nozzles seem to be impervious to those chemicals, and haven't suffered from long immersion. Be sure to spray a bit to clear out the solvent before reuse. All this may seem wasteful, but believe me it isn't half the waste of having half a spray can go in the trash because the nozzle is jammed.

You can do just as fancy and neat a paint job as you please with cans, all you have to do is practice.

Models for the month. Just a few quick notes on this month's presentations due to the length of the above tirade.

First up is one of Midwest Model's excellent trainer series for U/C fliers. This P-51 features a rugged Nylon engine mount which also retains the wire landing gear struts. The engine is protected by a plywood skid underneath its entire length. Construction is utterly simple, being all sheet wood solid parts. Tail area is generous, so stability should be smooth and easy. There are several different configurations in the series in case you are one of the few who isn't a P-51 freak.

We have a pair of sport-trainer models this month, one is all foam, the other is foam and balsa. Airtronics has begun to sell a "beginner's twin". Their semi-scale model of the Cessna Skymaster features fore and aft engines. No engine out handling problems here. I understand that the Skymaster can maintain flight on one engine. Control is via rudders and elevator. Engines recommended are two Cox QRC .049's.

The second trainer is SIG's "Colt". Again you see a rudder and elevator controlled aircraft, but you would probably want throttle on this baby too. Power ranges from a strong .09 to a docile .15 for recommended performance. Wingspan is 45 inches.

Fourth model for this month is a real

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Randy Wrisley's scratch-built, one-inch scale Alco Sport free flight with Cox Pee Wee .02 engine. Second cylinder is epoxied-on dummy.

Jordy Segal and Bob Burch during break in action at Nashville. Jordy is alternate for the team.

Run away, run away! McFadden moves out of the way while pit crew launches for Gene Pape.

Control line

By "DIRTY DAN" RUTHERFORD

PHOTOS BY CHARLIE JOHNSON

• It is only out of necessity that I even have what is loosely referred to as an office, tucked down here in a corner of the basement. Being a salesmam, quite often finishing up orders and then transmitting them by phone, in itself makes the office a needed item, and I will probably never be able to get over the silly feeling of calling a nameless computer and then letting my machine talk to it's machine; both machines telling me when to "send" information and then whistling at me they are done. See, it is having an effect already, two years ago I wouldn't have written a sentence like that . . . Well, maybe not.

Third team member Gary Arnold from Michigan, novel radially mounted Tigre 15 and a cool head.

Anyway, there is this office space down here and just the clutter from my sales job is bad enough. But intermingled with it all is notes, pictures, press releases, club newsletters and all the other garbage, including *tons* of magazines, needed to refer to when doing the two columns for **Model Builder** and another for *Model Retailer*.

It's really a mess . . . Or was. I just spent valuable time searching through the piles for a contest announcement that you might find interesting. The office is now cleaner than it has been for months. Didn't find the announcement, though.

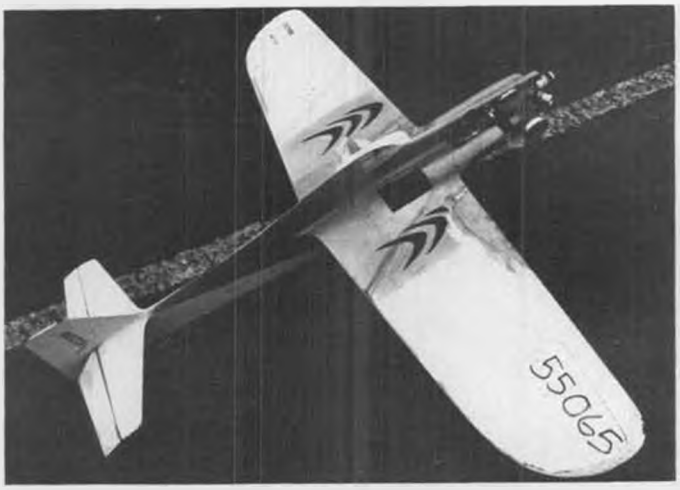
It came from Parma and told of the upcoming World Championships for Womp-Womp. Dates, times and stuff don't matter. What does matter is that it is a *World Champs* event, so, hey! This is a big deal, right? And this W/C's event is for Womp-Womping. Or doing something to a Womp-Womp. Or having a Womp-Womp do something to . . . A Wimp-Wimp? Maybe Womp-Womps bounce and the contestants are scored on how high the *second* bounce is. Get it? The first bounce is a Womp, singular. Second bounce, the one that really counts, is another Womp, but as the second can't take place without the first, the event is Womp-Womp.

There is no end to the speculation. What really matters is that the announcement had all of the right stuff on it, was easily as well-prepared as any contest flier you've ever seen. But you had to know, in advance, what the hell Womp-Womp is to make any sense at all out of it. To avoid the suspense, Womp-Womp is a racing event, slot cars in 1/32 scale, flat pan frame, in-line motor. Evidently a low-cost, one-design type of event and Parma manufactures a line of these tiny race cars, for which a World Champ race is of dubious value, no doubt. Kind of like a W/C's for Northwest Sport Race, for instance.

And there is the point. I mention NWSR and you know what I mean. It is highly unlikely that an involved Womp-Womp racer, could such a person be found, would know what NWSR is. Or what Rat, Mouse, Combat, Team Race, and Carrier are either. Well, he might be able to envision Carrier, but not at all accurately.

Just take a minute to place yourself in the pit of ignorance, a very short trip for some of you, and think about model airplane contest announcements you have seen in the past year. Imagine a flyer describing a Peanut Scale contest, one for Rat Race, another for Mouse Race and so on. Without drawing on your modeling background, can you figure out whatinhell any of them mean?

I've been guilty of doing-up contest flyers with the minimum of information, so this isn't just your problem, by the way. Most probably recall the "Bladder Grabber" Combat meets we have had up here every year for the past six. Somehow I was stuck with a lot of the organization for the first and one of the things I did was to type up the flyers. Needed a name, something catchy, Bladder Grabber came to mind and so it



Above: Tim Gillott's Goodyear with Nelson. Not enough poop for Regionals action, so went back to Rossi. Right: Kerry Turner (left) and Tim Gillott. Tim will have to change lettering on tail of his Shark!

has been ever since. If one of those elusive Womp-Womp racers happened upon one of those flyers, he was probably just as baffled as he should have been.

So I have tried to mend my ways, at least as far as preparing flyers that will be distributed to local hobby shops, and so seen by anybody who just happens in off the street. A couple of added lines of information sometimes are enough to describe the event(s), in a few cases (Mouse Race and Slow Rat come to mind immediately) it will be necessary to describe the event a little more completely.

The object of all this is to make the flyer more worthwhile, the expected result being more contestants at the meets; at the least a bit more understanding by the general public. You really don't want Joe Public to think you are racing mice, now do you? In the case of Mouse Race, a well-prepared, detailed flyer may even draw in a few of the RC or FF types; everybody in modeling has Cox 049 engines laying around. It's nothing at all to knock out a model that will at least fly, there are even a few kits that are satisfactory for entry-level racers and here comes RC Daddy, his CL Kid in tow, ready to find that racing around in circles can be a terrific kick in the butt.

And all it takes is doing those contest flyers in a more complete and detailed manner. The extra effort is easily worth the trouble.

BEFORE THE SEASON STARTS. . .

No, I'm not going to tell you to get all those models built and tested in advance of the new season. First, you won't do it, and second, half the fun in getting ready is doing everything at the last moment.

What you should be doing, seeing as how this is the procrastination period anyway, is to finally build a decent pit box. It's a nice change of pace, building something from ply and screws instead of balsa and Hot Stuff, plus you really have to have one of the things and, if designed and built properly, it will last for years. More important than that, a good pit box can actually be a big factor in winning contests. I could tell you that over and over and until you desperately needed an item, right in the heat of a contest, finding that whatever laying right there in your Super Pit Box, you wouldn't believe it. So we can trade. I won't give you a tirade on why you need that SPB. But you have to believe me when I say you do.

Standard old shop-grade 1/4 inch ply from Local Hardware is a decent material, it is fairly light, easy to work and clean. If you want to use high-zoot ply, go to a specialty wood shop and pick up on some Baltic Birch plywood. It has a real close, smooth grain on both sides, no voids and the center ply is real wood, instead of whatever trash they put in standard ply, so you can install screws directly in the edges of the ply, where with common ply it is necessary to in-lay strips . . . an operation that you probably don't want to get involved in, besides it requires a good table saw to do accurately. For a while there, due to that embargo thing we had, Baltic ply wasn't being imported, but should be available again by now. Use if it you can find it. It is not cheap.

Best way to get started seems to be to get together all of the various items you would need during a heat race, Combat match, whatever. That will probably amount to 118 pounds of junk, so start cutting it down. Remember that all you want is what is absolutely necessary . . . without omitting something that might only be needed a couple of times in a whole season of competition . . . Because those couple of times might be right in the middle of the most important contest of the year. For instance, you won't need more than four spare plugs at the ready, if you go through that many in a race or match, you've lost already. Same thing with props, bladders, and so on. Keep huge quantities of these things in your big toolbox or the car, the pit box needs just enough to do the job and no more.

As the battery is probably the heaviest thing that will go in the SPB, plop it right down in the middle of an oversize piece

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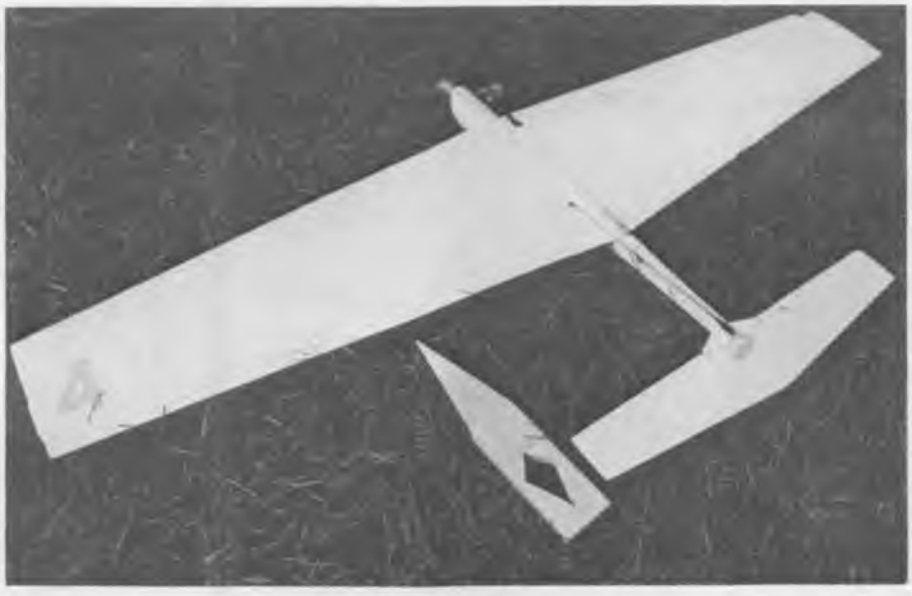
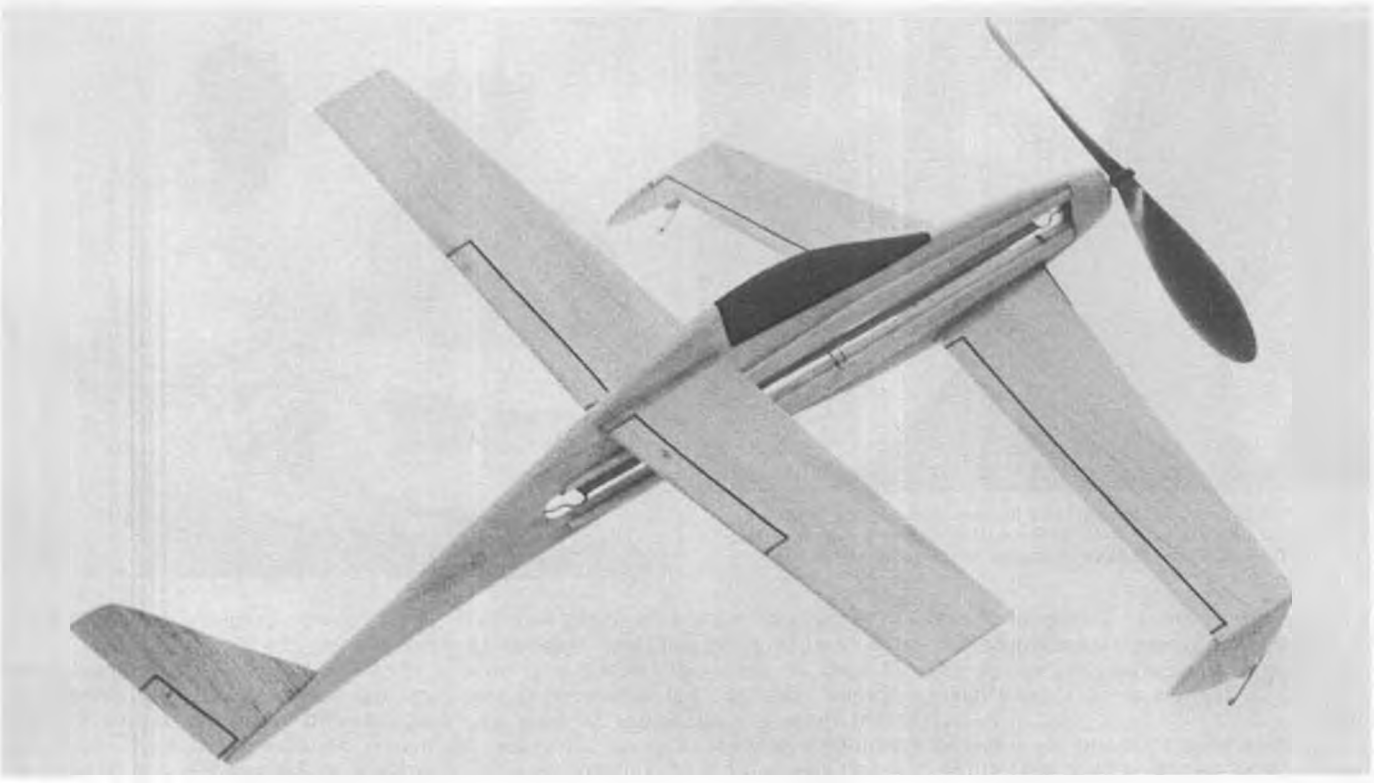


Novel idea from Howard. Plug device on tail. When handle in neutral, pointer aims at wing trailing edge.



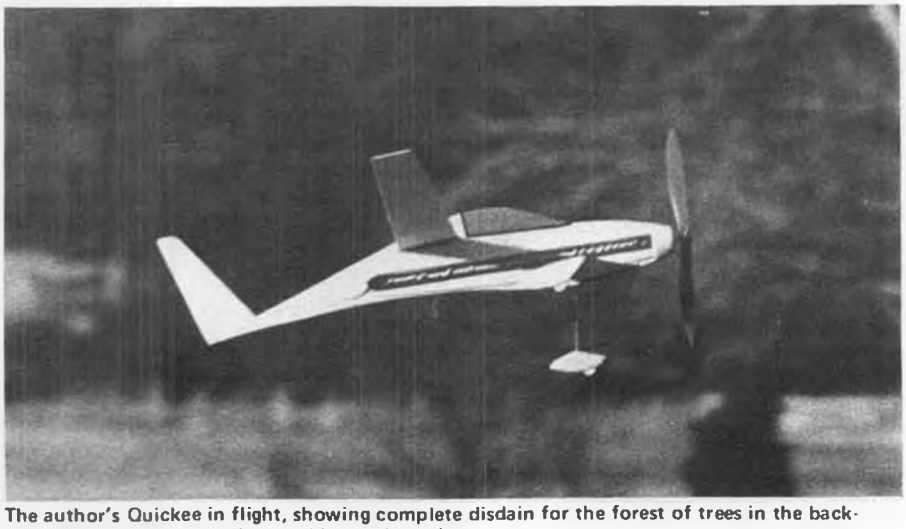
PROFILE QUICKIE

By JOHN WALKER . . . You could call this a "Quickie Quickie", because the profile fuselage and all-sheet construction make this unusual scale subject an ultra-fast building project.

• It's difficult to determine whether this model QUICKIE should be classified as a biplane, low wing, high wing, tandem wing, pusher with the engine in front(?) or what. One thing you must admit, it is different.

The full size QUICKIE was designed and built by Burt Rutan (of VARI-EZE fame) and is not only radical in appearance but also highly efficient energy-wise. It is constructed of foam and fiberglass (sounds familiar). For more information on the real thing, read Don Berliner's article in the May 1978 *MODEL AVIATION*.

Our model is in profile form. Profile models have been around for 40-45 years. In the early 1930's Cleveland Model & Supply Co. sold profile kits. I think you can still get plans for those models from Mr. E.T. Packard, who still runs the company and advertises in most model magazines. Back in the late 1930's and early 1940's, all of the model magazines featured one such model in just about every issue, by such modelers as Louis Garami, Rex Hall, Alan Orthof, and a few others I don't remember.



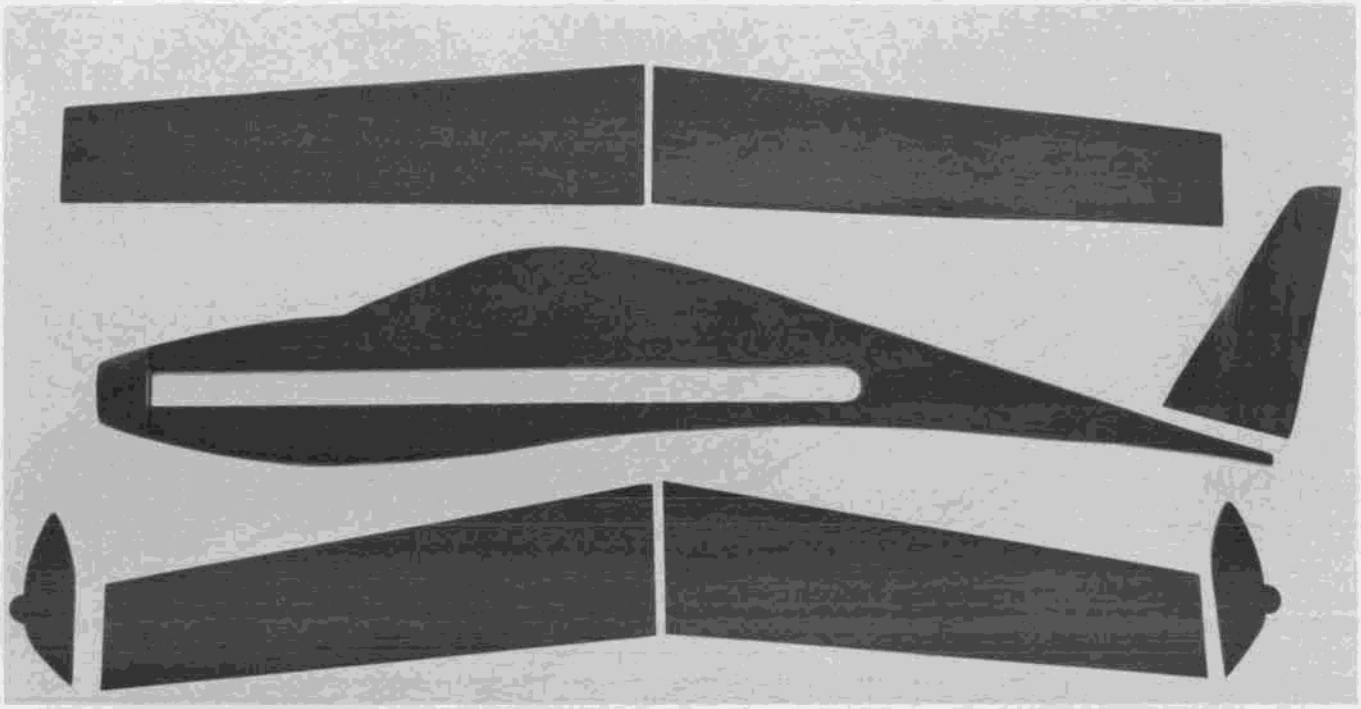
The author's Quickee in flight, showing complete disdain for the forest of trees in the background, which it managed to avoid completely!

The idea when building models of any type is to construct them as light as possible. Select the wood carefully from contest grade balsa. Our model was assembled with cyanoacrylate as the adhesive. It is quick, light and strong.

The plan is full size and contains all necessary information to make the model. Cut the fuselage to shape. If the wood you use is stiff enough you can omit the fuselage stiffeners above and below the motor slot.

Cut the rudder to shape. Sand it to a symmetrical airfoil shape. Cut the slits for control. Attach to the fuselage.

Cut the wing and canard panels to shape. Note grain direction on the plan. Sand the panels to an airfoil section. Remember there is a RIGHT and a LEFT panel. Cement the panel together. Be sure the dihedral and anhedral are correct. Carefully slide the wing and canard through the slots cut in the fuselage. Cement them in place. You might want to add an epoxy "skin" around the areas where the wing and canard intersect the fuselage. This will provide extra strength.



In a fine silhouette-like photo, John shows the simplicity of the all-sheet parts which make up this model. A weekend should do it!

Attach wheel pants to each canard tip. Blend the joint in with fine sandpaper. Add "whisker" landing skids if you want to ROG (Rise Off Ground) your QUICKIE. Be sure they are long enough to permit the prop to clear the ground.

If not already done, cut notches in the canard for the elevators/flaps and ailerons in the wing panels. Cement thin, soft copper wire where indicated. This will hold control settings permanently.

Sand the entire model lightly. Apply two coats of thinned (50-50) Sig Lite-Cote. Sand after each coat. Trim with India ink or 1/32 or 1/16 trim tape. Use color dope to outline the canopy.

FLYING QUICKIE

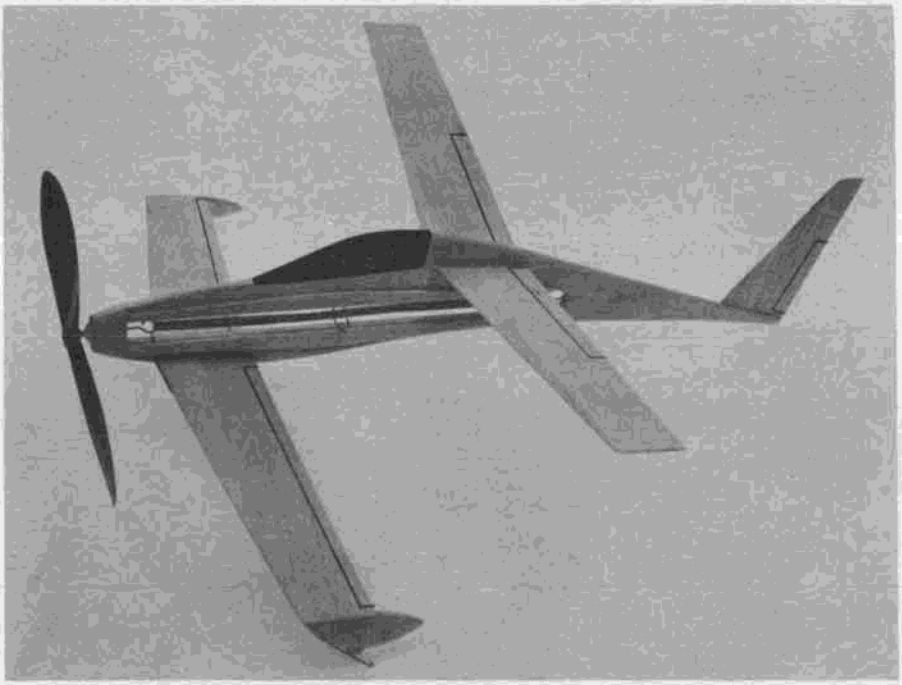
We now use a new psychological approach flying our models. In the past, our field was clear except for ONE TREE. As usual, the tree seemed to be endowed with magnetic qualities for model aircraft. No matter where the model was launched, eight out of 10 flights ended in the tree, hitting the tree or landing near it. So when it came time to test fly Quickie, we tried a place surrounded with trees. Why, you may ask? Well, I'll tell you . . . We remembered the unknown CHARLIE BROWN KITE EATING THEORY. A close study of the CBKETT indicated that the tree did not necessarily attract the kite. Rather, the wood in the kite missed its "mommy" (being taken away at an early age) and mistook the tree as its long lost mother. Taking this approach one step further we theorized that the CBKETT might also apply to model aircraft. We further speculated that flying in an area surrounded by trees would so confuse the model that it would land before flying into the tree it thought might be its mother.

We think we are onto something big because our model landed clear of the trees seven out of 10 flights . . . an almost complete reversal of when models were flown in a field with only one tree. Perhaps one of you planning to work on your PHD might want to delve more completely into CBKETT and its relation to model aircraft and put it into more easily understandable terms. Here's your chance to make model aircraft history.

Back to flying the model. Not knowing where such a model should balance, we took the old approach of test gliding it over tall grass. Adjustments were made by adding clay or manipulating the control surfaces until the model glided without stalling or diving.

Power was a loop of 3/16 Sig rubber. Add about a hundred turns and hand launch with a gentle push. Our model needed a slight amount of down thrust. Flights were smooth, slow and easy. Heavier models may require additional power.

For further experimenting, enlarge the plans 50 percent, make a three-dimensional fuselage of foam, and add CO2 power. Such a model should prove interesting. *(Now, let's see . . . with a Quadra, we should enlarge the plans to . . . wcn)* •



The fully assembled model from another angle. You can't say designer Bert Rutan is in a rut!

NOTE
ARROWS INDICATE WOOD GRAIN DIRECTION.

ALL WOOD CONTEST GRADE BALSA.

A-A

FINISH WITH 2-3 COATS OF SIG "LITE COTE"

USE 7 INCH PLASTIC PROPELLER

1/16 THK. REINFORC-ING STRIPS, BOTH SIDES

3/16 CHEEKS

I. DIHEDRAL

I. ANHEDRAL

A

AFTER ASSEMBLY DRILL FOR NYLON THRUST BEARING

0.025 DIA. M.W. LANDING SKID

GLUE FILLET

FABRICATE FROM 1/16 SHEET

0.031 M.W. HOOK

A

POWER-START WITH ONE LOOP OF 3/16 RUBBER

FUSELAGE 3/16 THK.

RIGHT FRONT WING

CUT

SOFT ALUMINUM WIRE (TYP.)

CUT

RUDDER 1/16 THK.

WINGS 3/32 THK.

N770

CUT

SOFT ALUM. WIRE

CUT

TAILSKID 0.025 DIA. M.W. & 1/16 SCRAP

LEFT REAR WING

CUT

CUT

PROFILE

QUICKIE

ULTRA-LIGHT HOMEBUILT

(ADDITIONAL INFORMATION IN 5-78 MODEL AVIATION)

JRW 1-79

Fokker Trimotor F-VIIa-3M, in 3/4-inch scale rubber by Bill Noonan. Props shown are display only. Center one replaced by 12" prop to fly 48" span model. Wild colors: ochre wings, silver nose, red forward fuselage, lavender aft. Tail striped green, white, and red.

FREE FLIGHT SCALE

By FERNANDO RAMOS

• I believe that kit building can be a very frustrating experience. As we all know, there are good kits and there are bad ones. I have talked about the good ones in the past and I will continue to talk about them in the future. The experienced modeler can take any poor kit, and change it as necessary to make it a good looking, functional flying model. But what about the beginner, what does he do? I talked about this situation recently, so I won't go into the pitfalls, but rather, what the beginner can do to start with a so-so kit and end up with a winner. Such, I hope will be the case, and the reason for this article.

I chose Guillow's Spitfire for a couple of reasons. First, I like the airplane and have never built one before, and it's a favorite of WW II buffs. I should have weighed the wood in this kit, but I didn't have any balances that weighed that much! Actually it would have made pretty good firewood! In reality, to me, the vacuum formed canopy, and other parts, along with the decal sheet and plan, are worth the price of the kit.

OK, where does one start with the modification? First, start by planning to laminate the wing's trailing edge, and the outline of the rudder and stabilizer. This is done by making a tagboard (light cardboard) template of each flying surface, which has been undercut by the thickness of the lamination. The material I used for the wing was three laminations of 1/32 x 3/32. Two pieces were basswood, with a balsa strip sandwiched in between. This gives plenty of size to the trailing edge, plus the balsa in the middle helps cut down the weight fractionally.

Another, closer view of front end of Bill Noonan's Fokker Trimotor. He's truly a master modeler. Note tight joint where wing panel plugs in.

I took the wing drawing and placed it over the tag board, then with a pair of dividers set at 3/32", I made a pair of holes following the wing's trailing edge outline. I drew a line connecting all of the inner holes, then the templates was cut out using a pair of scissors. A bit of sanding with a block will eliminate any rough spots. Immediately after this step is completed, I coat the edge with wax so that the laminations will not be permanently attached to the template. The exact same procedure is repeated for the rudder and stab. For the tail surfaces, I used three laminations of 1/32 x 1/16 basswood.

While I'm actually making the templates, I have the wood soaking in ammonia water. (The ammonia is needed only for the balsa. It helps balsa bend without cracking.) Once the templates are made, and the wood soaked (about 15 minutes) you can proceed with the laminating. Whenever ammonia is used, glue like Titebond cannot be used because it curdles, so I use regular white glue for this application. The three sticks are glued together then tightly wrapped around the form, pulling slightly on the wood as it goes around the form. Masking tape was used to hold the laminations in place. The whole thing is pinned flat on the workboard and left to dry. I usually leave them to dry overnight. The wing and tail outlines are done in the same manner.

While the laminations are drying, let's figure out what to do about the fuselage bulkheads. There are several approaches to this step. Because of time (trying to meet deadlines that are hard to make), I did the following. I took each die-cut sheet that had the fuselage bulkheads, and sanded them from the back with very coarse sandpaper to about one half the original thickness. This accomplishes two things. One, it cuts the weight of each bulkhead in half, and the parts should now fall right out from the sheet. Before removing all of the notches from each bulkhead, I placed a little Super Jet on each of the long notches on the top, bottom and sides of each bulkhead. Since the keel material in the kit will not be used, the notches would be way too deep. Each of these keel notches were cut so that they would only be 1/8 inch deep. (See sketch.) The two halves of each bulkhead are glued together and placed aside.

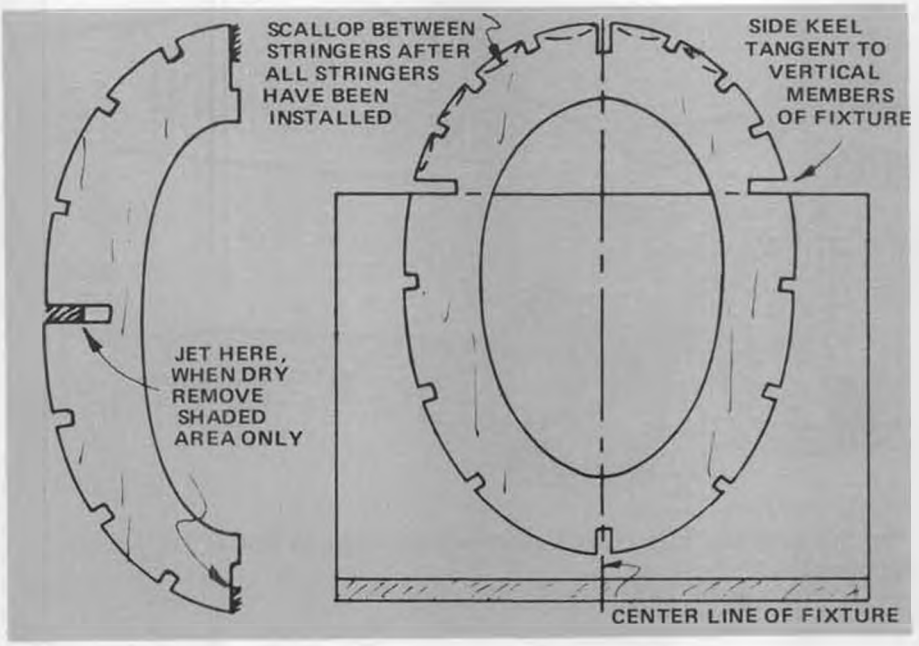
What would I have done had I had more time? Well, since each bulkhead half is shown on the plans, I would have made new ones using much lighter stock. The best approach is to cross-grain-laminate two sheets of 1/32 balsa, using Jet, and cut the bulkhead from this. Then the centers of each bulkhead can be opened up so that each bulkhead is only about a 1/4 inch wide all around. These would be very strong and light.

I mentioned before, that I did not use the keels provided in the kit. Instead, I used the drawings on the plan and made the keels by laminating two lengths of 1/16 square balsa sticks, and pinning them directly on the plan. Again, this is done to save weight.

At this point, you have a choice you can make as to how you actually want to build the fuselage. It can be made by the half-shell method as shown on the plans, or a fixture can be fabricated which will hold each bulkhead. As you can see from the photographs, I chose to use the fixture. This is preferred because it holds each bulkhead perfectly aligned and vertical for the "stringering".

Next the two side keels are glued in place, each one being tangent to the vertical members of the fixture. This is followed by the placement of the upper two keels. Please note the addition of the balsa sheet at the rearmost part of the upper keel. This is necessary to provide a slot for the elevator to slip through, and also provides a tail post. All of the upper stringers are glued into place, making certain that they flow correctly from the front to the back, and that they also are straight. So often, the notches in the bulkheads do not align to form a straight flowing line from the front to the back of the fuselage. It may be necessary to open some of the notches in order that you can get the correct alignment of the stringers.

When this assembly has dried, it is carefully removed from the fixture and then the lower keel and the balance of the lower stringers are glued in place, along with the wing saddle pieces. If you want to lighten up the structure a bit more, take a Moto Tool with a standing drum and work over the inside of each bulkhead before "stringering" the lower half of the fuselage.

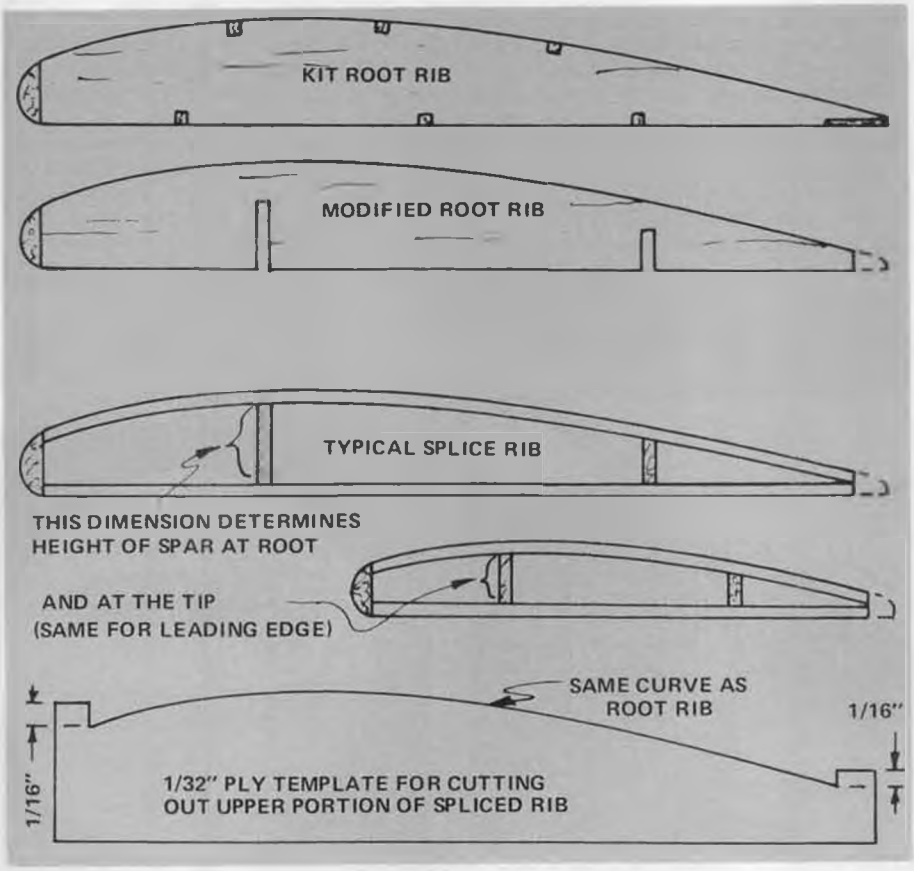


With the fuselage completed, sand the stringers overall then scallop the bulkheads between each stringer so that they won't show after being covered. (See illustration.)

The tail is now constructed using your own select balsa along with the laminated outlines. When dry, the laminations are carefully sanded to a round cross-section. Set these aside for later.

The wings aren't complicated, but do require a bit of doing. Again, you have a choice of building them in a couple of different ways. One would be to copy each wing rib from the plans from good contest balsa, changing only the rear of each to accommodate the new trailing edge. Then just build it just like it shows on the plan. I chose to use spliced wing ribs. This type of structure is more fragile, but by far the lightest in weight.

Continued on page 89



Modification of root rib, and then strip ribs for remainder of wing. To cut top curve strips; (1) make a cut using template, (2) slide down 1/16 as marked at ends, (3) make another cut along template, (4) repeat for as many ribs as needed. Trim from trailing edge for each proper length.

"In the world of affairs we live in our own age; in books we live in all ages."

• Our lead-in line is chiseled into the facade of the Los Angeles public library, and makes an appropriate introduction to our unusually historically oriented column this month.

YOU CAN GO BACK

Quite a number of recent television stories have centered upon the futility of trying to go back in time to recapture one's earlier life. This may hold true in the case of athletics and romance, but in the world of model aeroplaning, almost anything is possible! Not only can we recreate aviation history in miniature, but we *can* relive the days of our youth by building the kinds of models we built then. And, the emotional rewards are just as vivid as they once were.

Further, thanks to the intervening years of experience, we can produce work of higher standards and improved performance. During our youthful days in Montana, "exotic" items such as mechanical winders and rubber lube were simply unavailable. Sure they existed, but not within our rudimentary knowledge. An average life of a stick-and-tissue model in our neighborhood seldom exceeded half a dozen flights". Duration? A joke, by today's standards. Gas engines? We read about 'em, but couldn't afford them, even had they been available locally.

But thanks to this unique hobby with its books, magazines, carefully preserved construction plans and dedicated practitioners, we *can* recapture the days of our youth . . . or at least a facet of them. Perhaps model building is our Time Machine. Don't delay, go back today!

AND SPEAKING OF HISTORY

Mik Mikkelson gave us a newspaper clipping describing a collection of model aircraft, kits and parts recently obtained by the Oregon Historical Society. Chief Curator Dale Archibald is quoted as saying: "Model planes are not usually recognized for their part in Oregon history. But they do have a history." The man behind these models was Jim Walker, who made Portland the model manufacturing capitol of the world, according to Frank Macy, who organized collection of the artifacts. Walker's business, started during 1929 was not sold until 1962, after the owner's death. According to Macy, some 200 million models were sold, including the vast numbers of gliders used as military targets during World War II.

Siegfried Glockner, Germany, with his Lacey M 10, one of many to participate in recent Flemall, Belgium, International Peanut Concours. Photo via Benno Sabel.

MORE GOOD OLD DAYS

Bill Bishop, founder of Comet Model Airplane and Supply Company, favored us with a copy of his firm's first price list, circa 1930, from which we excerpted these few tantalizingly priced items:

1/16" x 2" x 36" sheet balsa . . . 10 cents
Baby R.O.G. propeller blanks . . 2 cents
Japanese rice paper 21" x 31" . . 5 cents
Superfine quality tissue . . . . . 9 cents
Aerofoil section ribs,
up to 4-1/2" in length,
per dozen . . . . . 15 cents

AND FINALLY

Author Geoge Collinge loaned us his copy of the 1920 book *"Model Aeroplanes"*, by F.J. Camm, and we had to chuckle at this statement: "Scale models, as a rule, are unsatisfactory flyers, and if they fly at all, the flight is so short that little can be learned from their performance."

PEANUTS IN BELGIUM

Thanks to Roger Aime, we have a report of the 5th International Concours for indoor models which was held in Flemalle, Belgium. Although several indoor categories were flown, the most popular class in terms of participation was the "Section Cacahuetes" (Peanut Scale). Countries represented included

Continued on page 94

Simple beginnings. The now famous Dr. Paul MacCready, of Gossamer Condor fame, tries on Richard Miller's Bamboo Butterfly hang glider, back in Nov. 1965.

Bill Noonan hand-made these badges depicting Bill Hannan flying a CO_2 Nieuport monoplane. Note expended cartridges on ground and tolerant bird on back.

Barnaby Wainfan holds the Lesher Teal Peanut model designed and built by his friend Lynne Buben.

Lynne Buben and her Cessna 150. Took flying lessons while an aeronautics student at Univ. of Michigan. Barnaby Wainfan photo.

INDOOR

By KEN JOHNSON

WOMEN INDOOR MODELERS, PROFILE #2

Lynne Buben grew up in Flint, Michigan. Her early interests were musical. She played clarinet in the marching band for 8 years. While at the University of Michigan, Lynne and the marching band performed at one Orange Bowl and three Rose Bowl games.

It was Lynne's original intent to study writing, but since she wanted to become a pilot, aerospace engineering was finally chosen as her major.

While attending the university, she met Barnaby Wainfan, a graduate student. Stan Stoy and Barnaby were calibrating Stan's wind triggered, foldable, hand launch glider in a small wind tunnel at school. Since Lynne was taking flying lessons and Barnaby was building his own plane, they hit if off, right away.

One of the instructors, Ed Lesher, influenced Miss Buben's thinking toward unusual aircraft concepts. Professor Lesher is famous for the Lesher Teal, a pusher airplane that set several world records.

After graduation, Lynne and Barnaby ended up in Los Angeles, he going with Lockheed, and she with Hughes Aircraft as a dynamics analyst.

Lynne's first model was a Peck-Polymers "One Night Sixteen" kit. The model flew well and was followed by a Peck Ganagobi Peanut. Next Lynne researched and built Ed Lesher's Teal. This indoor peanut model flew very well.

Barnaby and Lynne share an interest in unorthodox configurations and fancy flying wings, canards, VTOs, etc.

The Delt-Air 250 was a prime example. The full size delta wing pusher was built, flown, and crashed in Lynne's home town. So she designed and built a rubber scale model of this plane. After flying her model at the Taft, California NFFS Champs, Lynne was asked to write an article on the Dean Delt-Air for one of the national model magazines.

Miss Buben flies indoor scale, Peanut scale, Hawthorne Flying Wings, and handlaunch glider. Outdoor events include: R/C electric sailplanes, P-30 rubber, and rubber powered flying wings.

On weekends, Lynne flies a real Cessna 150 out of Hawthorne, California airport. Most recently, she placed 3rd in rubber powered flying wings at the Northrop Flying Wing meet at Mile Square Park, California. She had a flight of 1 minute, 38 seconds. Her combined total was 2 minutes, 46 seconds.

Pretty Lynne Buben launches her "Housefly" canard. She designed this P-30 class rubber model. Wainfan pic.

Currently, Lynne Buben is building a model of the Bell XV15 tilt-rotor. This airplane has wing tip props that tilt upward on takeoff, like a helicopter, then rotate to the horizontal to become a conventional plane. If successful, this rubber scale model could be quite spectacular in flight. Lynne's future plans include UFOs, indoor ornithopters, and a lot of scale models.

In July of 1982, Lynne will have her masters degree in mechanical engineering. I know that whether Lynne Buben is flying models, her Cessna 150, or the Space Shuttle, she will be a credit to aeronautics.

Next month, our indoor column will look at Mrs. Addie Mae Naccarato . . . hobby shop owner and modeler. Addie and her son, Tony, build and fly every-

Lynne Buben and her model of the Dean Delt-Air 250. Full-size homebuilt didn't fly as well as model. Anyone remember the R/C version that also flew successfully at a Chicago Nats in the early '70's? Believe the contestant was Loren Tregellas. Tony Naccarato photo.

Jeri Kalina, Czechoslovakia, and his Peanut Jodel. He's internationally known FAI Indoor champion. Photo by Lubomir Koutny.

thing from R/C scale to microfilm, as well as instructing novice modelers, young and not so young, on how to build flying models.

DOUBLE DELTA FUN MODEL

The model featured this month is an indoor canard designed by the above mentioned Barnaby Wainfan, of Los Angeles, California.

The double-delta wing design used in this airplane is the same as the wing shape on the Dyke Delta homebuilt. The Dyke was featured in an earlier indoor column by this author. Incidentally, a 22 inch Dyke Delta was built sometime after the peanut version. This model, along with four other rubber scale models, was stolen from the ceiling of my garage. The most sorely missed by me was the Dyke; since I had not flown it enough to realize its potential. Perhaps a 44 inch Dyke would make an interesting jumbo rubber scale subject. What do you think?

Unlike the Dyke, Barnaby's model is a canard (pusher) type. If this airplane hits a wall or low hanging light, the prop will not be damaged, since it is located at the rear.

This indoor beauty is constructed simply and goes together fast. If you are looking for a one-evening project for tomorrow's indoor session, look no further. The fuselage is a rolled tube of 1/32 balsa sheet. The wings are made from 1/8 x 1/16 strip balsa and no airfoil, then covered on both sides. The canard wing at the front, and the vertical fin at the rear are of 1/32 sheet balsa. The prop blades are also 1/32 sheet with a 1/8 round hardwood hub.

You'll be amazed at how smooth this spacey looking model flies. Let me know how long yours flies.

GOOD NEWS FOR FLORIDIANS

The latest word from Doc Martin is that the Goodyear Blimp Hangar at Opa Locka Airport is again available for indoor flying. The old blimp hangar was not open to Florida area fliers for some time. Now again the building is slated for monthly meets. Indoor fliers can also fly the following week at Miami Dade South College. For information on these activities call (305) 858-6363 or write to: Dr. John B. Martin MIAMA, 3227 Darwin St., Miami, Florida 33193.

MIAMI club 1980/1981 indoor season "Hall of Fame" winners are: Open — Walt Everson and Junior — J. Houten Brink, Jr. Congratulations to both happy fliers.

NEW JUNIOR EASY B RECORD

The place was the 1981 Indoor Nats at West Baden, Indiana. Micro-X not only produces superior indoor kits and supplies, it produces national record setters.

Mr. Robert Skrjanc, son of Gerry Skrjanc, of Micro-X Indoor Supplies, flew his Easy B model for a time of 14 minutes and 25 seconds, only a few minutes less than his dad's Easy B model flew.

Danny Shapira looks on with satisfaction as his Easy B model passes overhead. The reward of "staying with it". Warner photo.

Bobby accompanied Vivian and Gerry Skrjanc to my house one night after an evening flying session in Columbus, Ohio. Gerry and I were discussing my designing about 7 indoor kits for Micro-X.

Of course, Bobby wouldn't remember that night, since he was only a few months old. You can see why I'm so proud of his achievement. Bobby Skrjanc is only 10 years old. WOW!

RETRIEVING RUBBER MOTORS FROM INSIDE YOUR MODEL'S FUSELAGE

Has the motor jumped the front hook and formed a ball at the rear pin of your model lately? Has the motor broken just as you had 5 more turns to put on the winder? How do you get that glob of rubber out without tearing your fuselage to bits?

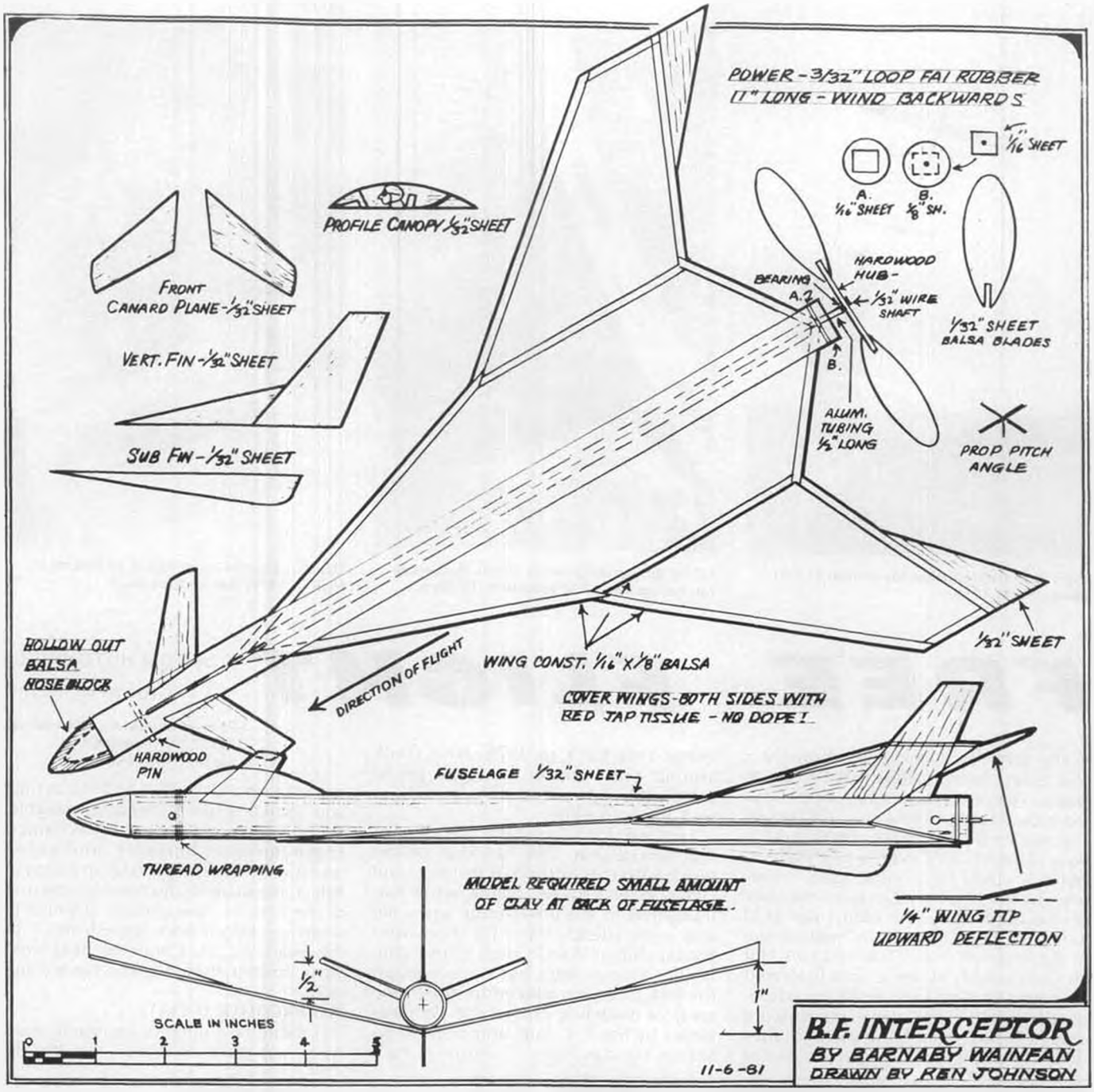
Getting a motor that has jumped the hook is easy. A length of .030 wire slightly longer than your fuselage is a good retrieving tool. Make a right angle bend in the wire 1/4 inchs from the end. This end of the wire will be inserted into the nose end of the fuselage.

Before you begin, look in the front of the fuselage and see if you can see the loop end of the motor. Usually a short length of the loop will be visible. Once this is identified, insert the bent end of the wire into the front of the fuselage. Carefully slip the end of the wire through the rubber loop. Gently pull the wire out of the nose.

After the rubber is pulled out about three inches, stop and let the wire rotate in your fingers. The power of the rubber will rotate the wire and unwind the motor. After the motor has wound off somewhat, pull out more on the wire and so on. You should be able to unwind the entire rubber without damage to the fuselage.

Suppose the rubber breaks near the end you are winding. This is a little tougher. The same glob is evident at the rear pin. But this time, the end is open.

Fort 2AT Peanut by Florida's Doc Martin. Nine gram model has flown 53 seconds indoors. Silver dope over condenser paper. Dave Linstrum photo.



No loop to hook into. What to do?

What you want to do is open up the glob of rubber, so that it begins to unwind. To do this, rotate the rear pin back and forth. Spin it slightly between the thumb and forefinger. The rubber knots will begin to unwind. Continue to spin the pin until you can slide the pin out of the fuselage. When this happens, the glob will thrash around and you can then fish it out through the front with the aforementioned wire hook.

Occasionally, the rubber will be so tightly knotted around the rear pin that it is impossible to rotate the pin. When this occurs, cut the tissue one bay to the front of the rear pin. Using long-nose pliers, pull the broken ends of the motor through this open bay. Carefully unwind the broken motor bit by bit until it is all done. Remove the broken rubber and patch the ruptured tissue. Then you are ready to insert a fresh motor of equal size and length.

If the rubber breaks near the rear pin, it will pull forward, rotating as it comes, tearing wood and tissue all the way along. This type of break usually results in the most damage to the airplane, and most often retires that model for the day's flying.

How do you avoid the motor breaking? Lubricate the rubber before putting it into the airplane. Inspect the rubber after every flight. Most breaks occur near the end at which the rubber is wound. Wait a few minutes between flights. This gives the motor a chance to rest. Lastly, count the flights that you have put in on each motor. Five maximum winds is about all you can expect from any motor. It's better to insert a fresh motor early than to tear up a good fuselage. Better still; wind with a tube inside the fuselage. It's worth the trouble.

Next time, we will review the new peanut size CO2 motor from Brown. It is now available through Peck-Polymers. The cost is a little high, but look at the fun this little gem is going to give you. I think it's worth the money. We'll see if you agree. I'm going to build a Peck Nesmith Cougar and fly it with the CO2 motor installed in it so I can report to you first hand on its performance.

Write your comments, questions, and news to Ken Johnson, 16052 Tulsa Street, Granada Hills, California 91344. Send me your modeling photos. The good ones will be presented in this column. Bye for now! •

Tom Cashman launches for official at FAI Semis, Harts Lake.

NFFS Executive Director Hardy Broderson relaxes between FAI rounds at '81 Nats.

Dan Fung works on model at El Sereno Jr. High in 1976. See text for more.

FREE FLIGHT

by TOM HUTCHINSON

PHOTOS BY AUTHOR

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

• The past few weeks have brought a few letters from readers that I'd like to share. The one I remember most came from Dan Funk, in Berkeley, California. The name may not be familiar to most of you, since he isn't even a free flighter, but it brought back some warm memories to me. You see, Dan was a member of the model airplane club I ran at El Sereno Jr. High, right in the midst of one of the toughest of East L.A.'s *barrios*. Not all the students at the school belonged to gangs, leaving their mark on school property with a spray can . . . there were always a few who hung around after school building models. Dan was one of these kids back in 1976, who stuck around every chance he could get to build rubber-powered scale models, as well as control-line.

I moved up to Oregon at the close of that school year, and had kind of lost touch with that portion of my past until Dan's letter arrived, telling what had transpired in the intervening years. He and some friends started a short-lived model club at Wilson High School (the faculty sponsor left), but it was enough for him to be introduced to more new areas of modeling experience. Dan was bitten by the R/C bug, and became an active Sunday flyer. Currently, he's working on a Dave Platt Spitfire, as time and "building funds" become available.

Dan's currently a junior in Mechanical Engineering at Berkeley, and got in touch with me after picking up a copy of **MB** at a newsstand, discovering a picture of me and my new address. It's nice to know my efforts bore some fruit . . . as the years go on, I hope to hear from more former students who turned out right.

BIG BROTHER UPDATE

It didn't take long for you eagle-eyed types out there to notice that the di-

Former Indoor World Champ Bud Romak at flying session in Kibbie Dome, Univ. of Idaho . . 144 - ft. ceiling. Joe Dvorak photo.

Another after-school modeler at El Sereno Jr. High in 1976. Name forgotten. Can anyone identify?

hedral dimensions had been left off the drawing of my *Big Brother* BC ship in the November issue. Dave Linstrum phoned and Mitch Post wrote to inquire about the missing details. So here they are: each center panel is raised 2-1/4 inches, and each tip 4-1/2 inches (printer left them off . . . they were on my original 3-view). *(Just wanted to see if anyone was paying attention! wcn)*

Mitch's letter also asked for further details, which I'd omitted from the drawing, since it was more of a design sketch than a full construction article. For those of you out there who are trying to scale up the drawing, the wing incidence is 2 degrees, stab at 0 degrees to start with. Warps should be about 1/4 inch washout each tip, left center panel flat, and 1/4 inch wash-in in the right center panel. The fuselage cross-section should match your engine mount at the front end, tapering to 1-1/2 by 1-1/4 inches at the stab leading edge.

PARABOLIC TIP SHAPES

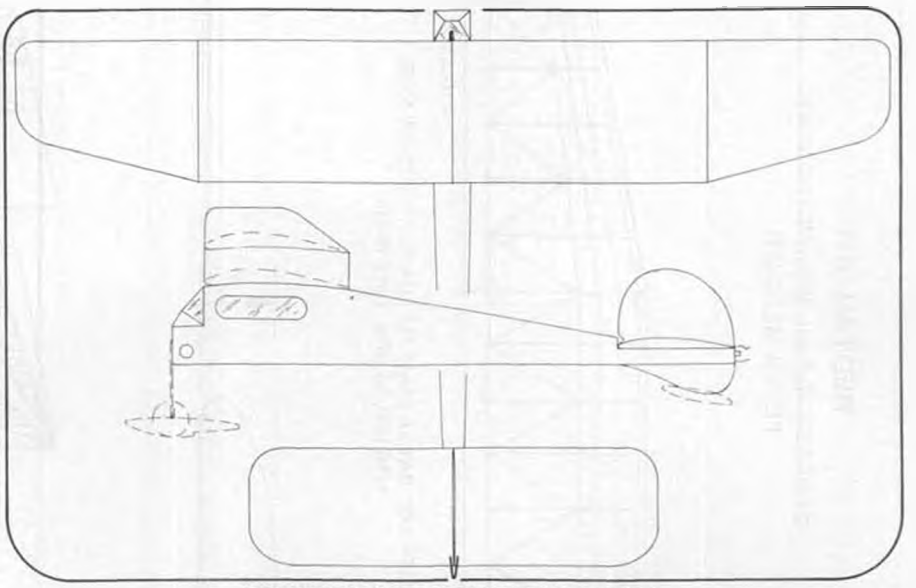
Mitch also asked about the tip shapes used, so I thought I'd write a few words about the tip shapes I use on my most of my recent gas designs. These are parabolic in shape, which I happen to think look better than the classic ellipse. They also give a wider wing chord near the tip, as well as some additional wing area. In addition, they're a lot easier to draw. *(The truth, finally! wcn)* Here's how:

Start out by drawing a spanwise line at the 1/3 chord distance (to make the math easier, any division between 25% and 40% of the chord is OK). Then subdivide the span and each of the two sub-chords into the same number of equal parts (between 4 and 8). Connect each of the subdivisions as shown on the drawing, then use a French curve (or a thin strip of hard balsa) to draw a curve tangent to the inside of the lines. The area of the resulting curve is 5/6 of the rectangular area (span x chord x 5/6).

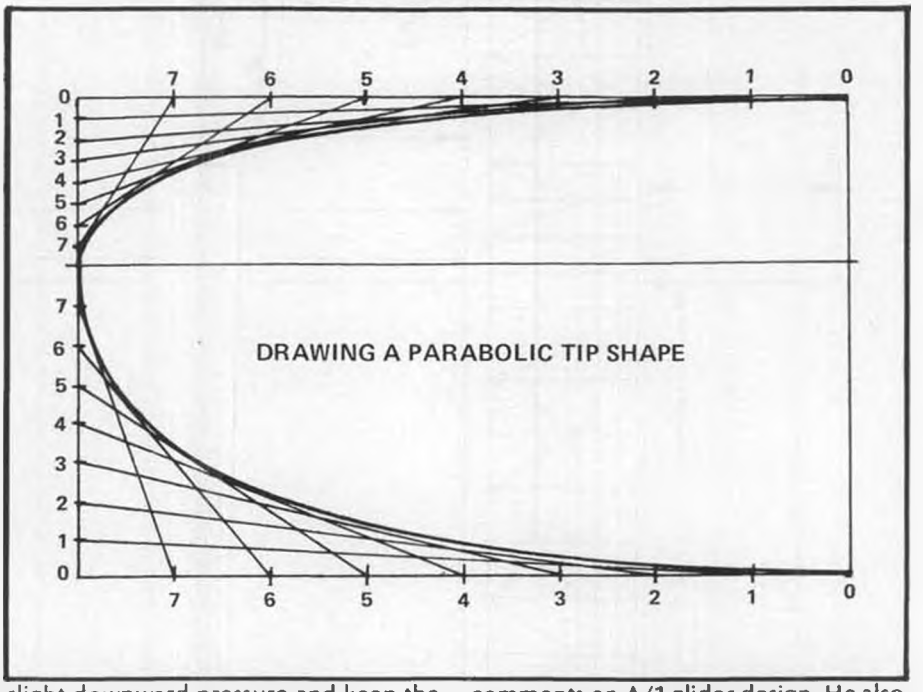
BALSA STRIPPER

Larry Miles noted my comments in the October issue about difficulties in using the X-acto balsa stripper, and shared some hints. He, too, had some difficulty, until he noticed that the slot for the knife blade was not parallel to the alignment marks. So he cocked the bottom slide plate over so it was parallel to the blade rather than the alignment marks . . . this technique worked for him.

He places the sheet of wood on the bench and slides the stripper along the edge . . . finds it easier to maintain a slight downward pressure and keep the edge of stripper aligned with the sheet edge this way. I haven't been able to test out these tips, since I got rid of my stripper years ago, but those of you who have one gathering dust on your workbench might try them.



FEBRUARY MYSTERY MODEL



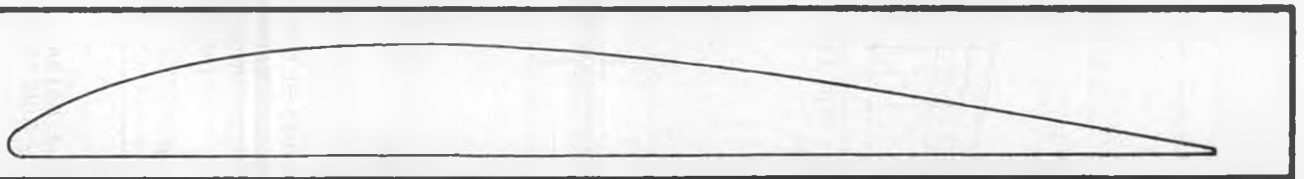
MODEL OF THE MONTH

Redtail A/1 by Peter Meixner

A year or so ago, I received a letter from Peter asking for some ideas and comments on A/1 glider design. He also contacted other towline glide flyers for their ideas, and the 3-view shows the fruits of his efforts. As he says:

I'm sending you a 3-view of my Redtail *A/1 glider, the product, so far, of everyone's advice plus some ideas of my own. I have attempted to compromise the extremes I found in existing designs and have a good all-purpose glider. My first edition had to be ballasted up to 220*

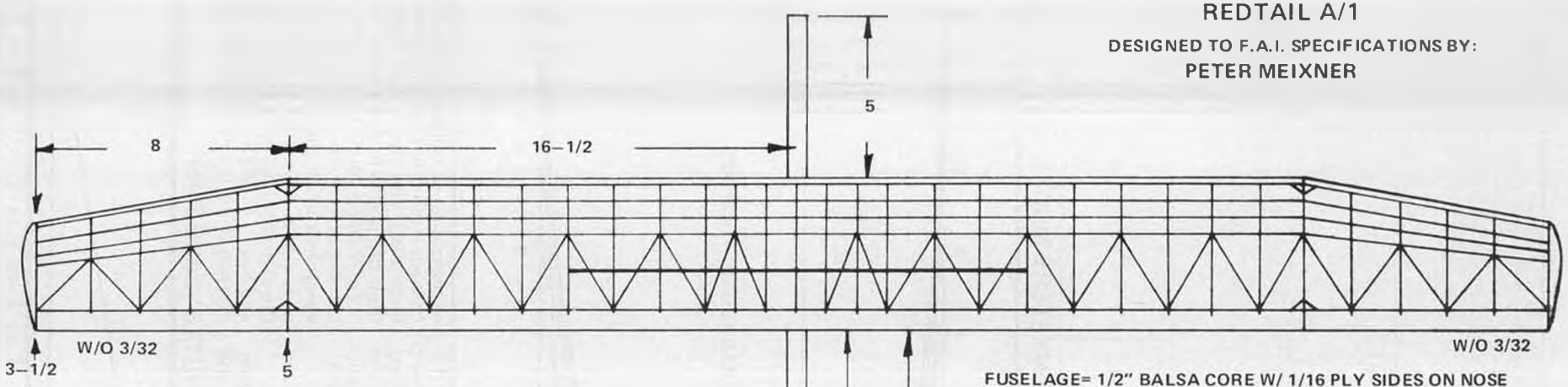
DARNED GOOD AIRFOIL – GOTT. 188 (SCHÜTTE–LANZ 3ulo)



STATION	0	1.25	2.5	5	7.5	10	15	20	30	40	50	60	70	80	90	95	100
UPPER	0.11	2.23	3.24	4.52	5.56	6.42	7.6	8.38	8.94	8.77	8.15	6.98	5.53	3.91	2.35	1.51	0.5
LOWER	0.11	0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

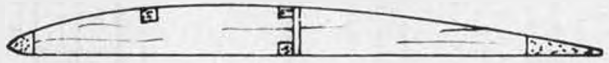
REDTAIL A/1

DESIGNED TO F.A.I. SPECIFICATIONS BY:
PETER MEIXNER



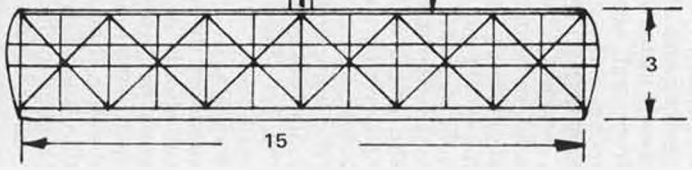
FUSELAGE= 1/2" BALSA CORE W/ 1/16 PLY SIDES ON NOSE
– 1/16 BALSA BOX TAIL BOOM.

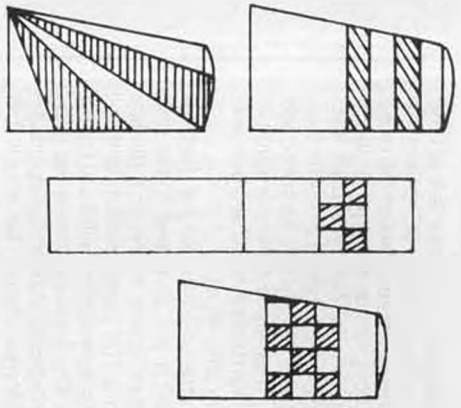
WING = L.E. BALSA – T.E. BALSA – SPARS, SPRUCE IN CENTER,
BALSA IN TIPS – TURBULATORS, BALSA – RIBS, 3/32
IN CENTER, REMAINDER OF RIBS 1/16 BALSA
(INCLUDING DIAGONALS)



SHARP L.E.

STAB.= L.E. BALSA – T.E. BALSA – SPARS 1/16 BALSA
– RIBS 1/32 BALSA (1/16 TIPS)





grams and Jim O'Reilly feels I could put that weight to better use in the wing structure. I agree, and will widen the main spars and extend the rear spars on future ones. I'm also weighing the use of sheeted D-box L.E. top and bottom as an alternative.

I used a 5-inch chord on a long center section to keep the Reynolds number up and tapered the tips to gain some aspect ratio. The wing section is a Benedek that Peter Allnut sent me. I don't know the number, but it's probably a Wakefield section (it looks like a 6405 b. TH). I don't have the ordinates, but it appears to obey the recently enacted Eppler legislation regarding top camber.

Once again the wing section is a compromise between the thicker MVA 439 you recommended and the thinner Wakefield sections like Gott. 804 and E-59. It should perform all right at the 5-inch chord, which is the width of even some A/2 wings.

The moments are also a moderation of the extremes I found; not too long a tail moment and not too short a nose moment, and so on. The fuselage is, I think, a simple one to build. I wanted the lightness of a balsa tail boom, but didn't want to sacrifice strength. It hasn't DT'd over a fence rail yet, but I think it will stand any stresses considered usual in competition. The tail boom is a basic 1/16 balsa box pinched together from the stab L.E. to the end. It averages 5/8 inch square and is tissue covered.

The stabilizer came out to 6 grams as shown and could be even lighter without the diagonal ribs, but I like Union Jack construction, and am happy to trade some extra work/weight for some torsional strength.

So far, I have built only one Redtail *and the contest record so far is 4 official flights (3 of them maxes). I am not able to go to many contests, so the contest record is slowly accumulated.*

So far it looks very pretty in flight. It holds lift nicely, turns tight without spinning in, turns consistently in wind. I use a combination of rudder and stab tilt for turn adjustment . . . just a little of each.

If anyone wants to flatter me by building it or inquiring about it, I would be happy to correspond. (Write to Peter Meixner, 2212 S. Geddes St., Syracuse, NY 13207).

Sara Meixner shows off father Peter's Redtail A/1, this month's 3-view feature.

MYSTERY MODEL

This month's mysterious miniature airplane is a lesser-known brainchild of a very famous designer. Identification features are the fact that it's a cabin-type, yet was a Nats winner in the ROW event. A close look at the wing and stab platforms will reveal a family resemblance to a more famous design of the same designer. If you think you know the name, send in your guess to the **Model Builder** office (621 W. 19th St., Costa Mesa, CA 92627). First correct answer (based on postmark and mail handicap) receives a free subscription.

DARNED GOOD AIRFOIL

Gottingen 188 (Schutte-Lanz 3ulo)

This month's DGA closely resembles the typical French curve flat-bottom airfoil used on most gas models. Yet it belongs to a series of airfoils tested in the Gottingen wind tunnel near the end of World War I. These tests were carried out to a nominal Reynolds number of 74,000, about the same as most gas models. The maximum lift coefficient was a very respectable value of 1.2, with maximum L/D ratio of about 15.

Thickness is about 9% at 30% of the wing chord, which corresponds to most modern gas airfoils. The Gottingen 188 also meets the "Eppler test" for upper surface fall-off. So, instead of relying on your favorite shoe sole or French curve for your next gas model airfoil, you might try plotting up this one.

FREE FLIGHT: SPORT OR HOBBY?

The above topic has been debated off-and-on in the British modeling press for the previous year, with some claiming that "aeromodeling is a competitive hobby with sporting overtones." The opposing view is held by former FAI Power champ Lars G. Olofsson in these remarks:

Free flight modeling is a sport. At least it is once a year . . . at the European Champs and World Champs. It's not a competitive hobby with sporting overtones. The faster we accept this fact, the faster we get better results at these contests; something everybody wants, regardless of their team. To hope to win at the World Championships without preparing yourself properly is gone forever. To win at the World Champs is just hard work for both models and flyers.

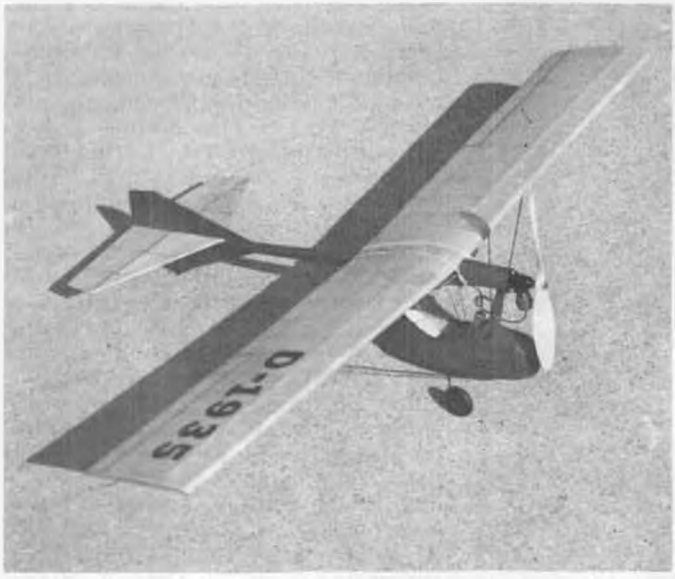
As in all sport, the equipment means something towards the result. But today the development in equipment for all sports has improved to a level where very little can be done. And that's certainly true in free flight modeling. I'd say that 75% of the result depends on the flyer, 23% on the model and 2% on good or bad luck. As there is little we can do on the airplane, we have to improve ourselves to get better overall.

As a flyer at the World Champs, I didn't notice any of the mistakes made, but during the time I've been to the World Champs as a spectator, I observed a lot. It's not funny to see good national free flighters acting like beginners and making horrible mistakes.

Continued on page 74

Adam Tracy winds his Wakefield at 1981 Harts Lake FAI Semis. In top 3 after 5 rounds, then lost model.

Junior Tim Warren winds Mulvihill, watched by Chuck Markos, who brought him to '81 Nats, along with his own son.



M33 FOR CO_2

By JACK HEADLEY . . . This strange little "bathtub" style Messerschmitt makes a perfect project for any of the average size CO_2 power units currently available.

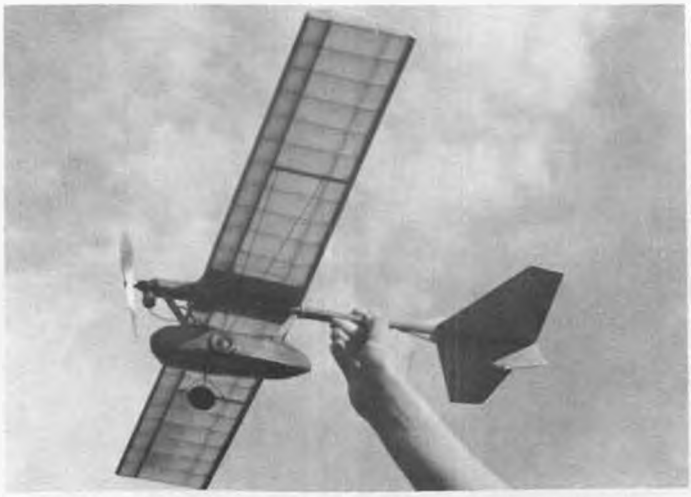
• Every aircraft company seems, at one period in its history, to have strayed from the path of common sense, and committed itself to some outlandish and totally impractical projects. Most of these projects are begun in good faith, but finally end up as just another Edsel of the airways. You can probably think of quite a few of these fiascos for yourself.

Even Messerschmitt, or BFW as it was during the time we're discussing, was no exception. Its products up to this time (the 1930s) had been mainly small transports and trainers, and, like most companies of this era, was existing on a shoestring. In fact, a couple of unfortunate crashes saw the company into bankruptcy shortly after. However, just before this occurred a variety of the most curious projects were considered. For example, the M32, which was to be a flying wing amphibian, powered by two diesel engines, geared to a single pusher propellor, and having a rocket for take-off assistance. All this for "1 Fuhrer and 2 passagiere", as the poster said! Or how about the M34, which was apparently a derivation of the above. This was to have a range of 20,000 km, which is roughly half way around the world, at a speed of 200 mph!

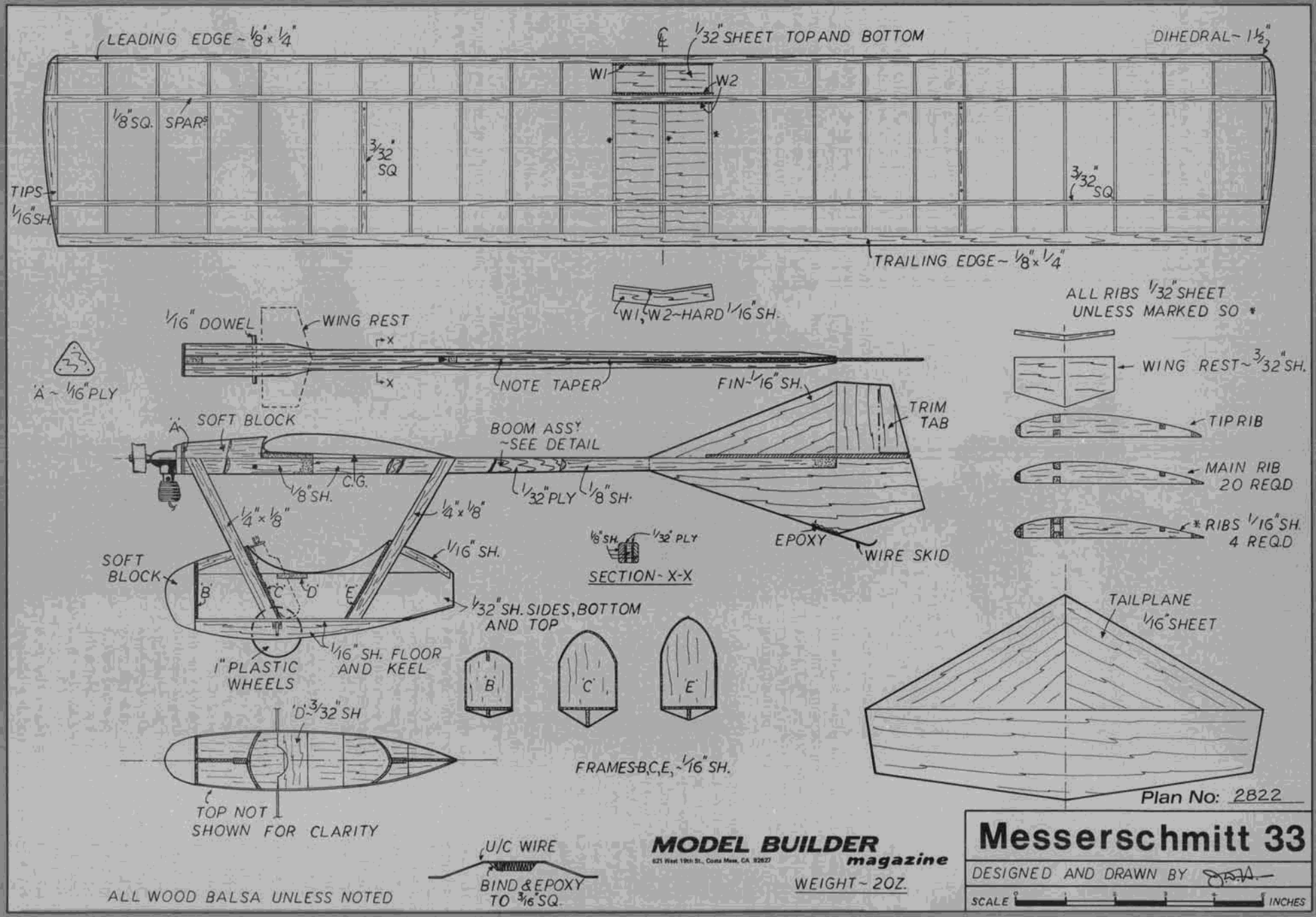
All this expertise after having only built a handful of very conventional short range transports. However, as you will have noticed from the model photos shown here, we didn't make a model of either of these imaginative aircraft. Instead we chose the one in between, the M33. This was a project in a totally different direction from the M's 32 and 34. The M33 was to be a very cheap single seat kit project for the home builder. Powered by a DKW car engine, it fell into the "bathtub" category of lightplanes which spring up occasionally, even nowadays. Only a mock up was ever built, and BFW seems then to have gone dormant until history decided to provide the background for its re-awakening.

But enough of the past, on to our model. As soon as I saw the plans for the M33 I decided that some sort of a model could be made of it, and it seemed the best power plant would be the CO2 motor. A few quick sketches were made to get the rough model dimensions, then a more detailed layout was produced for the final design. As usual, I made a few "improvements" for the sake of modeling convenience, so I can't claim that the design shown is an accurate scale model. However, it flies well, is quite durable, and provides a lot of modeling pleasure, so what more do you want?

Let's start with the wings, as we need these during the construction of the boom. Initially, the wing is made as a single, flat unit, straight on top of the plan. After pinning the leading, trailing edge, and lower main spar down to the building board, the 1/32 sheet ribs can be made and glued into place. The centersection ribs, shown with an * on the plan, are not installed at this time. Add the wing tips next, followed by the 1/8 square top main spar. When dry, the wings are cut in half at the center, then



Full view of diminutive CO_2 powered M33 Messerschmitt. Certainly an out-of-the-rut configuration.



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Cover the centersection top and bottom with 1/32 sheet.

You'll notice on the plans a strip of 3/32 sq. half way along the wing. This is a support for the wing braces. This piece can be added next. A couple of holes in this strip are for the ends of the bracing threads.

Cover the wing with lightweight tissue, water shrink, then apply a couple of coats of clear dope. The wing braces are actually only for effect, and are made from elasticised thread. Make up a couple of U-shaped lengths of thread, and epoxy the ends into the 3/32 support in the wings. The other end of the thread is stretched over the U/C leg to represent a set of wing bracing wires.

The horizontal is made from three pieces of 1/16 sheet, arranged with the grain directions as shown on the plans. I tried this scheme in the hope that a warp-free tail would result, and, so far, it seems to have worked.

The vertical is made in two pieces, top and bottom. The bottom half, with the grain running horizontally, should be made from a tough piece of wood. The top half is made from two pieces of 1/16 sheet, the grain in the aft part running vertically. This back piece serves as a rudder, and can be bent along the grain for trim.

The bottom of the vertical is an integral part of the tail boom, and this will be discussed in the next section. The top vertical is cemented to the boom and tailplane later. Don't glue the "rudder" piece of the vertical onto the tailplane (see plans for details).

A small wire skid is epoxied to the lower corner of the bottom vertical.

The "fuselage" is not really a fuselage in the accepted sense, instead we have the boom, which holds the tail away from the wings, and suspended below this the "bathtub". Start by making the boom, which is basically a sandwich of balsa and ply.

Pin down onto the plans the two 1/4x1/8 angled struts, and the bottom part of the vertical. Make up the central core of the boom from 1/8 sheet, noting that the piece between the aft strut and the vertical is tapered in thickness from 1/8 at the front to 1/16 at the back.

Glue a strip of 1/32 ply over this assembly, followed by a similar strip of hard 1/8 sheet balsa. Remove from the plan when dry, reverse, then add the ply/balsa strips on the other side.

An additional set of 1/8 sheet doublers at the nose thickens out the boom to support the engine mount and the wing platform. Glue these into place now.

Sand the top of the boom flat next, and round off the lower corners and the aft end.

Cement frames C and E to the angled struts, followed by the 1/16 sheet tub floor. Note that this floor piece is cracked, then bent up at the back slightly. Add frame B and then attach the 1/32 sheet sides. Two 1/16 sheet pieces form the top edge of the tub, and after these are installed, the upper 1/32 sheet can be glued in place.

The undercarriage consists of a small bent piece of wire bound and epoxied into a grooved piece of 3/16 square. This is then epoxied under the 1/16 sheet floor, and the 1/16 sheet keel is glued over this.

Carve and attach the nose block (it's supposed to represent an old car radiator), then the lower fuselage sheeting can be glued into place. This is 1/32 thick, and has the grain running sideways. Now sand the bathtub all over, but gently, as 1/32 sheet isn't very thick (about 1/32).

The horizontal can now be cemented to the boom, followed by the wing rest. This latter item is made from hard 3/32 sheet, then cracked to slightly more than the wing dihedral angle, and epoxied into a shallow groove in the top of the boom. Before this epoxy is dry, pop the wing in place, and check that the wing/tailplane alignment is correct.

Add the small block of balsa on top of the boom front next, then make frame A from 1/16 ply and cement it into position. Sand the front end of the boom to the "rounded triangle" shape, and then glue the upper part of the vertical into place. A final sanding all over will prepare the "fuselage" for its paint job.

The paint scheme is, in some respects, up to you. As there never really was a M33 (apart from the show mock-up) probably any finishing scheme is OK. I chose to cover the wings with yellow tissue, and painted the rest red, except for the horizontal, which I clear doped. After all, I used this color scheme on a Spitfire model once, so it really is an authentic scale model finish.

The registration number on the wing is typical of the period. A few inked lines on the bathtub were used to represent the car type radiator, plus a few germanic type callouts and "Rauchen Verboten" signs finished off the decoration.

The final weight of the model plus

Continued on page 97

Thornburg . . . *Continued from page 28*

Ted White himself couldn't explain flight so that Tab could understand it. Ted's that madman from Texas who claims that the Center of Pressure is a little character about two inches high, who balances himself right on top of your wing when your plane's airborne, just like an aerial stuntman. When the nose of your plan pitches upward, the CP starts walking forward, to stop from sliding off the rear of the wing. If the nose goes too far upward, the CP keeps walking until he falls off the leading edge, and this is what causes a plane to stall. Leading edge slots help prevent stalls by giving the little rascal something to hook his toes into and hang-ten like a surfer.

Even such an obvious explanation as this is lost on old Tab. What attracts him to modeling is the Mystery of Flight. "I pull back on the stick to land," he says, "an' sometime she snap left, an' sometime she snap right. I *like* variety."

Tab is the fellow who simply cannot remember to allow for the crosswind when coming off the hi-start. Consequently, the chute always falls across either the phone lines on one side of the field or the Interstate on the other. Once, about two years back, on a bright Sunday morning with the usual devilish crosswind, Tab actually dropped the chute squarely in the middle of the field! Christians everywhere began falling to their knees, but the club atheist quickly called for an examination of the hi-start. Sure enough, the line had broken between tow ring and chute; the ring was still attached to Tab's plane when he landed.

Old Tab is the same fellow who drives over the hi-start twice a weekend: once in the morning when he arrives at the field, once in the evening as he leaves. Don't ever set a model down in front or directly behind Tab's car, not even for long enough to tie your shoelace. And don't buy any radios on Tab's frequency; those funny-colored clothespins are another thing he has a mental block about.

Almost every club has its Al Koholik. Al's on the field every weekend, bright and early. He spends a lot of time setting up his sunshade, assembling his models. This is hot work, and calls for at least a couple of beers. Then it's time to check his radios, and you can't tackle that long hot hike to the frequency clip board without a beer in your hand. Everything checks out A-OK. Good old Santaba radio . . . you just can't beat 'em for reliability. Al will drink to that.

Somebody's calling for the frequency

clip . . . grab a beer and run it over to him. Lord, it sure is hot today! Man needs to take in a lot of liquid if he's gonna spend this much time in the sun. I do believe it's too hot to fly . . . what do you say we knock off a little early and stop by someplace for a drink? I just don't feel up to shagging hi-starts in this heat. . .

Al's a jovial fellow, and he gets more so as the day progresses. Doesn't care much for the building and flying of model airplanes, though; but they do offer an excuse to get together with the fellows and have a drink. Hobby dealers who don't apply for a liquor license are missing a good bet on Al.

The last chap on the club roster is one Mortimer Widget. He's the small fellow with the booming voice, and arms that flap constantly, like an ornithopter. Mortimer's an inventor. Not a professional inventor (he works at the car wash) but a prolific amateur. Got an idea? Check it out with Mortimer . . . chances are he's already tried it. A triplane soarer? Yep, Mortimer built one last summer, using three Oly II wings. How'd it fly, Mort? Not so hot. But it landed good . . . six spoilers, y'know.

Mort's the guy who invented the self-cocking hi-start. A heavy black box the size of a Renault, it took four strong men to set it up. Strings and wires coming out of it like octopus tenacles. Still, it looked like it might work. But then it ate a Sailaire. . .

Mort's inventions you can live with. All you have to do is stay away from them. Mort himself is the problem. He doesn't come to the field to fly, he comes to talk. Talk, and wave his arms. Mort's the type who follows you out to the winch during the big contest of the year, flailing his arms and describing his latest brainstorm. You're trying to watch the air, and keep him from karate-chopping your wing, and he's busy telling you how to install a Cessna-type wheel on your transmitter to replace those old-fashioned sticks. All during your flight his arms flail and his mouth churns. He's holding the official watch, but getting a look at it is as dangerous as oiling a windmill from the front. About all Mort is good for is keeping the frost from settling.

This may not be the entire collection of Characters on the club roster, but they're the ones I've run across most often. Look for them in any club you're thinking about joining. But don't let their presence discourage you. Remember, you can't judge a club by its members. •

1 to 1 Scale . . *Continued from page 23*

and Giant Scale, completing the judging in one day would result in not having to impound models, which requires more personnel and a greater amount of space than which can be secured. Using this system a turn in time of no later than 8 or 9 on Friday would mean that two days could be cut off the present schedule for contestants. There is, of course, a real loss in this plan for the spectator . . . photographers, however, with motels getting $50 a shot it seems unrealistic to require a Wednesday or even Thursday turn-in so the models can be displayed.

A plea was made for additional flying time, but I found myself in a Catch 22 poblem. It's difficult to provide a convincing case because the numbers don't warrant it. However, we know (or many do) that one of the reasons for small numbers is the lack of time devoted to scale. Ah me, *such* a problem! The attempt will be made to provide more hours in some form or another. We'll see, since it could be a big boon to the event.

TORQUE TUBES

Many types of models can utilize a torque tube or rod to actuate ailerons or flaps. The ease of installing these and the fact that they stay inside the wing are two of the benefits. There are some problems, however. If the distance is long, wire is undesirable for two reasons. First, if you use something like 1/8 steel wire, there is a great deal of twist (slop) that can occur over long lengths. If you go to heavier wire, you can eliminate this but you pay a weight penalty.

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type ailerons, I have used aluminum tubing as a torque tube. This tubing can be purchased in 36 inch lengths in various diameters. If you are using strip type ailerons, by using a round file or Dremel tool bit, you can channel the leading edge of the aileron stock to fit the tubing. The aluminum tube is then roughened with sandpaper and glued to the aileron stock. Be certain to use the slower curing epoxy for a secure bond.

It will be necessary to develop a means of attaching something on the end of the tube to actuate the tube. My method is to step down the tubing with two-inch sections of aluminum tubing until you reach 5/32 I.D. At this point, a 2-1/2 inch piece of brass tubing is substituted and allowed to extend about a 1/2 inch beyond the torque tube. Inserted into this brass tubing is a 1-inch section of 1/8 wire to provide a solid base.

In order to assemble this mess, I cut all the necessary sections. I then just start the next smaller size tubing into the torque rod and spread a bit of instant glue on the inserted piece and shove it home. This is repeated until you've gotten down to the brass tubing. Heat it up and shove it home. Then put the brass tubing in place, with the instant glue, in the aluminum tubing. There! Now in order to keep the whole mess from ever turning two holes (little bitty holes) are drilled through the tubing somewhere in the two-inch sections of "stacked" tubing. A piece of wire or very small brass tubing is inserted through the hole, pinning the whole thing together.

The control horns are prepared with small pieces of brass tubing inserted and silver soldered in 5/32 wheel collars. The hole for this tubing must be very carefully drilled in the collar and the coating filed away to get the actual brass collar. (Make certain it is not an aluminum jobby). I generally drill the hole at right angles (90°) to the set screw hole. *Don't* leave the set screw in place when you solder the tubing in the collar. The end

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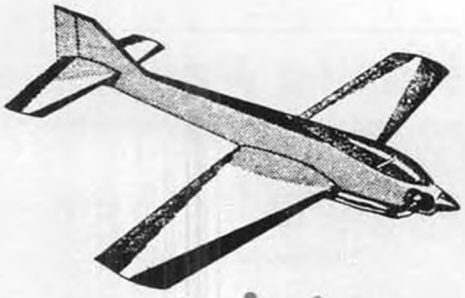

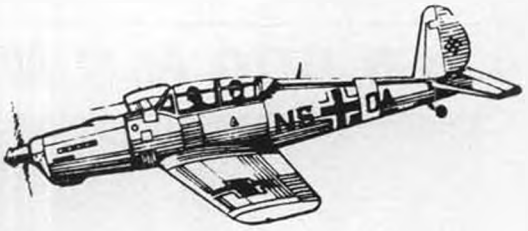

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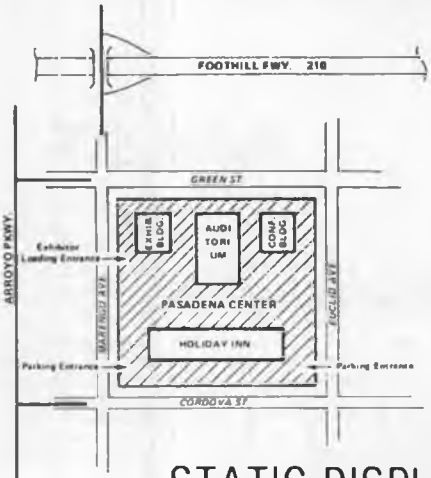

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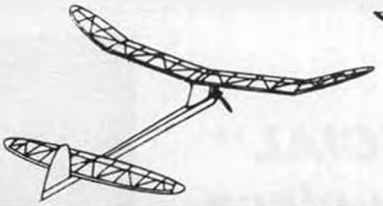

SEE INDOOR R/C SCALE AIRCRAFT AND BLIMP FLYING

GIANT RAFFLE: Radio control systems, kits, engines, etc. will be raffled off Sunday afternoon. Tickets on sale during show. You need not be present to win.

ADMISSION: Adult admission is $3.50 per day, $2.25 for Juniors (under 18). Weekend passes $5.00 adult or $3.00 Junior. Children under 9 admitted free when accompanied by an adult. Discount tickets woth 50¢ available at most hobby shops within 500 mile radius of Pasadena.

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SWAP SHOP: Bring your saleable items to the Swap Shop area. NO DEALERS, PLEASE! Rent a whole table for $5.00 or half a table for $2.50, in addition to general admission. You are responsible for conducting your own sales. IMS not responsible for lost or stolen articles.

*SWAP SHOP!
*GIANT RAFFLE!

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of the tubing is flattened and a 1/16 hole is provided for the clevis. I generally use metal clevises so I don't have to worry about the sharper metal edges of the hole eventually cutting through the pin of the nylon clevises. I know what they say about metal to metal . . . I have a flock of these on my Hiperbipe and no problems.

Be certain to file a little flat on the brass tubing at the torque tube end. When you install the horn for the last time, use a little Locktite or something like that on the little set screw. You might also want to check the local hardware store for a slightly longer set screw to replace the standard one. It helps eliminate that problem of rounded Allen wrenches, etc.

A LAST THOUGHT

I've been interested in watching the development of radio systems over the last several years. The advent of servo switches, buttons, do-dads, and whatchamacallits is intriguing. Not too many of this breed of electronic newness seems to show up in the scale ranks compared to other parts of the hobby. I'm not certain why, but it seems that many of the devices available could be of great value.

In an effort to pass on information to those people who put those magic little boxes together and to serve those of us who are not as electronically versed as some, may I offer the following suggestion. Why not drop me a line and indicate how you've been able to utilize the extra features on newer radios. In addition, include details of what you'd like to see in a radio system to make it better serve scale efforts. For instance, for me, one of the most valuable items the radio system I'm presently using offers is a servo controller. It's invaluable to me in a contest situation or a crowded field condition. Be specific and let your imagination roam free. You never know what we might be able to generate. Send your ideas and whatevers to Bob Underwood, 4109 Concord Oaks Dr., St. Louis, MO 63128. One to One Bob. •

R/C Auto . . . *Continued from page 43*

junction with Delta AAA rears and still had lots of steering on a surface that is medium-good for traction.

So now you guys heavy into 1/12 racing have another choice, a car that will give you just as much steering as you can handle, or with a simple adjustment, can be made into a pussy cat, along with being tough and reliable.

THE REVOLUTION IN 1/8 SCALE. . .

The suspension cars are coming, in one case already here, with the PB car being imported by MRP, and finally we (might) be seeing a wholesale change in 1/8 chassis technology. At least the manufacturers are taking it very seriously; Associated had a couple of prototype cars at the ROAR Nationals and Rick Davis used one to win the presti-

gious Can-Am event. Associated has always been a company to take its time in developing a new product, most of the time going into extensive testing and development, but with these prototype cars, were actually handed cars that were designed in England by the Associated team over there, where suspension cars first caught on big. So my guess is that if Associated has a car that is already pretty well sorted out, all they need to do is figure out how best to mass-produce it and should have a suspension car ready for sale by the first of the '82 season.

Delta has several running prototypes of its suspension car, and although I happen to know what they are doing, have been sworn to absolute secrecy, can't even tell you about a "decoy" suspension car they have taken to a few races, just to give the blabber-mouth factory-spies something to jabber about via long distance. Secretive? You bet.

What isn't so much a secret is the PB car that MRP has had available several months now. There is one sitting back in the shop right now, only needs a carb to be ready to run, so soon I'll be banging it around the track. The PB car is really interesting, what with all of the bits and pieces hanging off a very rigid center section and going sproing over the bumps. Even though there are a jillion pieces to it, everything is really well made, fits just so and appears to be pretty strong. So far, the car is intriguing enough to warrant treatment in more detail, something I'll do just as soon as it has been run and abused.

Regardless of the brand, it is obvious the suspension cars are here to stay, the only real question is, what are the racers going to do about it? Or to state it another way, I'm a little concerned about the coming of suspension cars. You see, although 1/8 racing seems to me to be doing ok, in comparison to 1/12 it also seems to be doing poorly. Regardless, the 1/8 scene needs a shot in the arm, as in more of the racers that got into car racing because of the 1/12 cars, adding a 1/8 car to the stable, something that already happens with fair regularity, but probably should be happening faster. Whether or not these racers will be willing to go the extra expense of a suspension car is open to question, as is how many people who already race 1/8 will want to switch to a completely new car.

It's an interesting situation, full of lots of variables and nobody has all the answers yet. But I can tell you what the club I race with is giving serious consideration to doing, and that is to simply switch over to ROAR Super Stock racing, but with open motors and open fuel. For those who don't know already, SS rules limit carb venturi size to a .200 bore maximum and no-nitro (straight) fuel. The no-nitro fuel is just a pain in the hind end to enforce, so that's out, and most of us here already run small-bore carbs just because it is the setup that works on our tracks, so there is no real need to have a rule that requires checking all the carbs at each race day. The good part of the SS rules is that only flat-pan (non-suspension) chassis are allowed, which would leave us able to race exactly the same equipment we used last year, not having to worry about somebody coming out to the track with a bucks-up race car, blowing us into the weeds, so forcing us to scrap perfectly good race cars just to make the switch to stay competitive. Or worse, to find another leisure time activity because 1/8 racing got to be too expensive.

There is another alternative; that of allowing all the 1/8 cars entered to run together but having separate classes for flat-pan and suspension cars. That is the idea being tossed about within ROAR, and may work in some clubs, but in this area we simply don't have enough racers to split them up into two classes, whether they are racing at the same time or not.

Another consideration is that development of suspension cars will take some time. We would just as soon that somebody else helped with this, when in a year or two development has leveled out we can take another look at the situation and go from there.

No matter how you look at it, the introduction of suspension cars in 1/8 racing is going to bring with it a lot of changes and the pros and cons of going with the new generation of race cars or not deserves some serious discussion within your club. •

F/F . . . . . *Continued from page 63*

Why? Simple . . . they are not properly trained for a hard competition with a lot of pressure. And on top of that, the national magazines write so many words about 'bad luck'. It's a lie for the people back home. People who want free flight modeling to be a competitive hobby have nothing to do with World or

European Champs participation. These contests are sporting events and have nothing to do with the hobby element any more. This is nothing new; Gerry Ritz wrote articles about it before he won the World Champs in Nordic. The Eastern bloc countries have trained without models for a long time now. It's time for us to wake up.

For the free flighters who still want it to be a competitive hobby, there are a lot of contests where he or she can fly and have fun, both at a National and International level. The Pierre Trebod is a good example of such a contest.

Sport or hobby? Is it so important? In some ways, yes. Not so much for we flyers directly, but indirectly. If we are accepted as a sport, it can mean that free flight gets on the most attractive pages in the newspapers, the sports pages, and that means good PR for free flight modeling. And more interest from outside people. And more beginners for the sport. After a while, perhaps TV would show something. So free flight would get even more new faces. That's the big thing in being accepted as a sport.

Look around at contests. All the faces are familiar to you. The average age of a free flighter gets higher and higher. One of the reasons is that old free flighters, 30 kilos overweight, still want to win contests. They hold back improvements by still talking about free flight as a hobby.

The recruitment of new names and faces to this sport is the main challenge facing free flight around the world today. I agree that we need simpler rules; and the rules can be made more simple.

Yes, I still want to be an athlete. In fact, I have been for most of my life. At the same time, I've been a free flighter. That's why I always call free flight a sport.

As for myself, I can see truth in both sides of the argument. And, actually, as far as my own endeavors are concerned, I lean towards the "competitive hobby" viewpoint. Unlike Lars, I have never considered myself an athlete (especially at my roundest "Round Man" stage). But I've probably won more than my share of contests by flying "smarter" rather than flying "harder."

I regard building and flying free flight models as a fascinating, relaxing hobby. For me, the most intriguing part of this hobby is developing and creating a new design, then actually getting them to fly in a competitive manner. The competition is the final means of refining the design concept . . . it's not a life-or-death matter to end up in the winner's circle. (Though I must confess that, at times, I've treated it as such.)

As a matter of fact, the times I've done worst at contests have been when I've taken free flight modeling too seriously, overtrained, and worked myself into a psychological mess at the contest site. My best efforts have come when I've been relaxed, let the "Force be with me" and concentrated on the task at hand without worrying about the seriousness of the event.

I won't deny the importance of proper preparation and training for World Champs team members. (However, I do think our teams would do better in competition if picked the same year as the contest, as close as possible to the contest date. There's too much time in the present system, between our Finals and the World Champs, for team members to mess up the systems they used to earn their team place.) But a fanatic display of masochism is not necessary, unless you are already disposed towards

it. Free flighters all have differing personalities; if you fly better by considering it a sport, so be it. The opposing viewpoint is perfectly valid for others (and I believe that the "hobbyist" types will stick around longer.) •

C/L . . . . . . *Continued from page 49*

of the ply. Then start arranging all the rest of the stuff around it, keeping in mind the width of the dividers for compartments. Also try to keep the weight balanced as much as possible. For instance, you won't need more than a quart container of fuel, and it can be balanced with relocation of the battery or by putting all of the tools opposite the fuel can. There are hundreds of combinations here, keep moving stuff around until the lay out makes sense and will be easy to work with.

Now you get to mark the locations of the compartments on the base piece of ply, plan far enough ahead to get a nice fit of the battery in its section and often it is best to make the left and right walls of this compartment tall enough to accept a dowel set between them, forming a handle.

As long as you're going to the trouble of building an SPB, do it right and install an ammeter, preferrably one that reads from "0" to "5" amps, placing it so it is easily seen when you are in position to start the model. A model railroading shop is a good source for ammeters that work well, by the way.

If you have difficulty coming up with your own design for an SPB, look around at what others are using. In every area there seems to be at least one guy who already has an SPB and you can rip him for good ideas.

This wouldn't be a totally honest bit if I didn't tell you what will eventually happen in your quest for the ultimate pit box. You're going to build one and once finished it'll be bitchen. But then you will go flying with it and discover a couple of things you left off or that aren't real convenient. Before you get it all beat up, sell that camel for whatever you can get and build another one. Every single guy you see with an SPB is on his second, third or fourth one and still has ideas for an improved version. I guarantee it.

MISTAKES. . .

It seem to be in **Model Builder**'s nature to slip in mistakes once in a while, not by design, of course, but this mag is always winging it, hung out in the corners, goin' for it and definitely marching to a different beat than the other, only slightly inferior, modeling publications. I like the approach but omigid they got some of Hannan's stuff in a recent CL colum, right in the area where I was trying to develop a rather outrageous idea *(THAT could be anyplace! wcn)* Bill Hannan is a nice guy and all but his copy has "CONSERVATIVE" in big red letters stamped all over it, so how could it possibly get in the CL column?! *(Came up with three good answers to this, but had to censor all of them. wcn)*

And somebody, I suspect John Elliot, has been slipping in an exclamation mark on me once in a while, where if I wanted it there in the first place I would have done it myself, because I have one of those ! keys on my typer and know how to use it . . . So there.

Anyway, I want you to know that I submit very nearly perfect copy, even if it is all full of xxxx's, used to eradicate mistakes that are subsequently rewritten. Well, maybe it's not all that perfect, but it's close, so if you are reading the CL column and it just seems to flow along logically, demanding another read just for the pleasure, you're probably reading somebody else's stuff, but on the off-chance it is mine, I take full credit. If there is a mistake, like a line or two left out, an emberassing typo of some kind, just blame the folks at **MB**'s offices. That's what I do. *(We left "emberassing" alone just so you wouldn't think we were picking on you, Dan! wcn)* •

Soaring . . . . . *Continued from page 31*

wing when the bottom comes down.

Vic Grist finished his 1:5 scale Pilatus in Japanese decor corresponding with the full-scale sailplane currently being

produced in Japan under license from the Swiss company. That full-scale ship is specified for aerobatics. This provides a wide range of maneuvers for scale competition.

Graham Cox built an immaculate Slingsby T-31 tandem trainer. Built more neatly than the full-scale ships ever were, this model suffers from the high-drag/low-lift syndrome. It needs ideal conditions to fly well, that is, light wind and strong lift!

John Watkins flew his beautiful all built-up Slingsby Eagle at the last West Mendip scale contest . . . a very realistic flier with light blue and white finish.

Ken Merrit's latest creation is a Blanik built to 1:4 scale. The GRP fuselage is Ken's own manufacturing. The complex built-up wings include ailerons, flaps and airbrakes. The all silver finish has thousands of tiny flush rivets impressed into the surface. Although it flies rather fast, it won the West Mendip trophy.

John Fletcher of the West Mendip Club recently finished a 1:4 scale Caproni Calif A-21S. The GRP fuselage is of John's own making. The wings are blue goam with 0.4mm ply skinning. The 12-inch wide canopy is hinged on scale struts. The center strut folds back into the fuselage. This model carries two receivers and ten servos. Its flight is very slow and majestic.

Keith also sent a photo of what the Contest Director looks like when he refuses to allow you a re-launch. Thanks, Keith, for this quickie view from the other side of the pond.

Last month I promised a perspective on the future of R/C soaring. It's taken me a little longer than I expected to get my thoughts together.

See you next month. •

Sport Scene . . *Continued from page 47*

oldie, the Sterling "Lil Roughneck". This model was on display at the 1981 MACS hidden away under much larger aircraft. Power is by the gone and lamented Cox Tee Dee .010. Franklin Dewey built this example and put in two channels of Cannon Super Micro radio on rudder and elevator. Franklin covered the model with tissue and dope to keep the weight down to a total of 7-3/4 oz.

Final presentation this time is a free flight scale model shown at the '81 MACS. Randy Wrisley scratch built this "Alco Sport". The original aircraft was a 1931 homebuilt. The model is scaled at 1" = 1'. Power is by Cox Pee Wee .02 with a second dummy cylinder epoxied on the crankcase. The model was simple, but clean and well built. As you see, it was good enough to capture the second place ribbon at the show. Goes to show: small can be beautiful! •

Boats . . . . . *Continued from page 45*

book to be an interesting blend of both European as well as American ideas about model boating.

For the individual looking for a single source of information about such topics as: types of boats, construction methods, tools, materials, and adhesions, power sources . . . both fuel and electric, exhaust systems, radios and installations, detailing and painting, and tuning a hull for maximum performance, this would certainly meet the need. I consider it very well written and the diagrams and photographs are of excellent quality.

Untaking such a project as the writing of this book had to be quite a challenge. I think David Thomas and Kalmback Books are to be congratulated for making such a book available to model boaters. The book will be especially helpful to those just getting started in the hobby.

AND DIPPING INTO THE OLD MAILBAG

Gosh, I wonder what I did to actually get someone to send along a report and photos of their activities? Whatever it was, I hope it continues.

Ginnie Farber, secretary of the Mutineers R/C Boat Club of Omaha, Nebraska, send along the following information about their Mutineers Fun Race, as well as some photos of the action.

"MUTINEERS FUN RACE"

The Mutineers R/C Boat Club of Omaha, Nebraska held its 6th Annual Fun Race on August 22 and 23. Fourteen competitors from Kansas City, Missouri, Norfolk, Nebraska, and St. Paul, Minnesota and the Omahans enjoyed a sunny, breezy opening day with the temperature in the low 80's. Sunday was not as conducive to enjoyable racing, as the rainfall of two inches ended a three-week drought; however, the fourth round of all races was completed.

The race site at N.P. Dodge Park is a lagoon dredged from the Missouri River with a large campground in the park and overnight parking at the site for self-contained units or tents. The breeze was from the south, into the driver's faces, which added spice to turn two and caused the Class A Hydros nothing but trouble. NAMBA rules were followed (and one IMPBA rule) however, the meet was not sanctioned.

A gala Bar-B-Que was held at Vice-Commodore Bill Jones' home Saturday evening, and the tall tales were really flying. While the competitors, the Mutineers, their wives and guests were enjoying the delicious dinner, scuba teams from Carter Lake and Lewis, Iowa Fire Departments were out in the lagoon with underwater lights, hunting for the Chi Farber's 7-foot, 70-pound R/C Polaris submarine which unexpectedly sank while firing its missiles (Estes 1/2A rockets with nose cones) during the opening ceremonies. They successfully brought it up after about a 15 minute dive. It would appear that the sub needs a larger sump pump in the missle bay. The divers really enjoyed the "practice" and their help was invaluable as the Scott brothers of the host club were unable to locate it using snorkels and fins.

The heats were hotly contested, with ties for second after four rounds in Classes C Hydro and A Mono. C.J. Van Voorhis, of St. Paul, and William Cooley, Sr. of Omaha, were too wet and cold for a tie-breaking race with their C Hydro Wing-Dings, so drawn straws declared Cooley the second place finish. Andy Anderson, Omaha, and Commodore Dave Haggart, perennial rivals, raced for 2nd and 3rd place in A Mono. Haggart's Streaker flipped in the third lap as Anderson's Pro-Glass finished just as the downpour returned.

There was a humerous moment during the Sunday drizzle as Gary Maxon's Modified Hughey B rigger and Jay Putter's Hughey B Hydro disappeared into their rooster-tails in turn one and emerged with the rigger riding on top of the hydro. Together they completed a half lap before they could be shut down. Gary was accused of trying to conserve fuel, but all he wanted was "pick of the litter."

"Togetherness" was the key word during the awards ceremony as the drivers, pit crews, and officials all tried to get under the same canopy. The trophies were lucite desk top picture holders with plaques naming the race and position below the picture of the driver holding his winning boat. Luckily, Bill Jones had taken most of the polaroid pics used in the trophies on Saturday while the contestants were smiling and dry. Non-winners were given their snapshots as mementos of their efforts.

Dave Clark, of the Kansas City R/C Boat Club, was the High Total Points winner with 1st place finishes in the three events he entered. His Coyote rigger burned up the course with a OPS .65. The new rigger by Don Pinkert is a solid winner, taking the turns with little side slip. With Dave's modifications to

Island, Nebraska are working on the latter and have it nearly perfected.

For a fun weekend of racing, with an emphasis on fun, in the Midwest, mark your '82 calendars for August 21 and 22 and write to Ginnie Farber, Sec./Purser; Mutineers R/C Boat Club, 690 N. 69 St., Omaha, NE 68132.

During qualifications, my U-13 came the turn and dagger fins, the boat appeared tethered to the course.

The Pro-Glass Deep Vee hulls, .21 and the new .40-.60 manufactured by Bob Hines Hobbies of Kansas City, are popular winners throughout the Midwest, running well in choppy water. His brightly colored metal flaked decks make the sleek cigarettes real beauties, which run as good as they look.

The Class B and C Deep Vee half-hour enduro was cancelled on Sunday as the hulls were filling with water before they left the starting stands.

Ten Futaba radios were used by the competitors along with four Kraft, and one each of five other brands. The Futaba S-7 waterproof servos seem to be a deciding factor when purchasing a radio primarily for boating. All transmitters in use were dual stick. Many of us were fascinated by Steve Slusher's Proline Tx, set up to his design, with single channel dual sticks set at 45 degree angles and proportional isolated needle valve adjustments, dual rates, turn buttons, etc. About the only things missing on it were a servo-adjustable tuned pipe and an on-board tachometer read out. Several R/C boaters in Grand year with a beautiful new model featuring home-made metal details. The new U-25 turbine Pay 'N Pak by Russ Kominitsky was an interesting sight with its shiny aluminum tail pipe. Another interesting sight was the bikinis around the model yacht pond.

CIRCUS CIRCUS REGATTA RESULTS

Rank	Competitor	Hull	Engine	Prop
CLASS A MONO				
1st	Dave Clark	Pro-Glass .21	K&B .21	JG 3-D-8
2nd	Andy Anderson	Pro-Glass .21	K&B .21	JG 3-D-8
3rd	Dave Haggart	Streaker	K&B .21	Octura 1740
CLASS A HYDRO				
1st	Steve Slusher	Hughey .21	K&B .21	Hughey
2nd	Jay Putters	J.V.S. Sport 20	OPS .21	JG G25
CLASS A ENDURO				
1st	Dave Clark	Pro-Glass .21	K&B .21	JG 3-D-8
2nd	Andy Anderson	Pro-Glass .21	K&B .21	JG 3-D-8
3rd	Ginnie Farber	Wardcraft .21	Stock K&B .21	JG E20
CLASS B & C MONO				
1st	Steve Slusher	Pro-Glass .40-.60	OPS .40	JF 3-I-21
2nd	C.J. Van Voorhis	Wardcraft .40-.60	OS Max .60	Octura 1460
3rd	Jay Putters	Dumas .40 wood	Enya .45	JG 3-I-22
CLASS B HYDRO				
1st	Bill Jones	Wing-Ding	K&B 7.5	Octura 1460
2nd	Gary Maxon	Mod. Hugh ey Rigger	OPS .46	Octura 1460
3rd	Jay Putters	Hughey Hydro	OPS .40	Octura 2.0
CLASS C HYDRO				
1st	Dave Clark	Coyote	OPS .65	Octura 1465
2nd	Wm. Cooley, Sr.	Wing-Ding	OPS .60	Octura 1467
3rd	C.J. Van Voorhis	Wing-Ding	OPS .60	Octura 1465

Lynn Miller, of Los Angeles, sent along the results of the Circus Circus Regatta conducted at San Diego's Mission Bay on September 19. The event was conducted by the San Diego Argonauts and the participants were most appreciative of the efforts of this fine club in hosting the race. Lynn's account is as follows.

Over 40 boats entered the race, with 32 participating in the static judging for Best Looking Boat. The very latest version of the Miss Budweiser, owned by Jack Bishop and built by Roger Newton, won the trophy for this activity. When Pal Jennings won the Best Scratch Built award for his Atlas Van Lines, he announced that the 2-1/2 foot tall trophy would become a perpetual award. Maybe Mike Scale's U-13 Natural Light will win next time as he was a runner-up this within 13 yards of the finish line before breaking a drive cable. Ed Fisher followed that dismal act with a perfect run of the U-31 Circus Circus four-pointer. The real four-pointer (actually called a reversed three-pointer) was based on this model. Any way you looked at it, Ed's model was a fine performing, smooth turning, fast machine. He qualified easily, but ended up on the shore during the consolation race when the Pay 'N Pak spun out directly in front of him. The C.D. complimented Ed for parking the boat and avoiding a head-on collision which was the sportsmanlike and smart thing to do. Nevertheless, Joe Monohan lamented that, "In four tries at racing Ed, we've never gone at it head to head. Something always happens."

Accompanying Ed from Washington was Roger Newton, Bob Bracket, and his wife. Roger brought his Miss Budweiser but had a bad day. Bob raced his U-2 Miss U.S., but sustained damage in a collision with Jim Woodhouse's Radiographics. Jim's hydro was knocked out for the day because the cable drive housing was kinked just in front of the strut during the collision.

Going into the Consolation Race, this was the points earned during the day's heats:

Tom Hockenberry, Miss Thriftway	*1,100*
John Perry, Circus Circus	*1,100*
Wally Stewart, Notre Dame	*1,100*
Frank Canning, Miss Bardahl	*1,025*
G.R. Smith, Squire Shop	*1,000*
Russ Kominitsky, Pay 'N Pak	*869*
David Miller, Olympia Beer	*825*
Ed Fisher, Circus Circus	*800*
Joe Monohan, Van's PX	*725*
Jay Kock, Thriftway Too	*725*
Jack Bishop, Miss Budweiser	*700*
Leonard Feeback, KYYX	*700*

The line was drawn with Jay Kock as the last boat to make it into the run-offs. The Consolation race was made up of Kock, Monohan, Fisher, Miller, and Kominitsky. Things really happened fast at the start. Monohan made a very fast start followed by Kock only two boat lengths behind, and then Miller's Olympia Beer. The Pay 'N Pak was barely leading the Circus Circus around the first turn when it hooked and Fisher put the Circus on the beach. The Pak headed up the course in the wrong direction and then died.

Monohan blasted along side-by-side with Kock for half a lap, then began to pull away. Only later did we learn that Smokin' Joe had been called for jumping the start by about a boat length. Kock thought Monohan had made a good start. "That's why I fought with him so hard," Jay explained, "because Joe makes perfect starts. He looked good to me, but it's just who's judging."

After two laps, the race settle down to

a duel between the Olympia Beer and Thriftway Too. Kock stayed on the inside although Miller (trying to get the inside) almost hit him at one bouy. The Olympia Beer would go faster down the straightaways but the Thriftway would catch up at the turns. Finally, on the last of the fifth lap, Olympia Beer hit the exit buoy and failed to finish the race. It was a good try as he settled for third place. Second place was awarded to Monohan.

By taking first in the Consolation, Jay Koch earned the alternate slot for the winner-take-all final race. When Jay's teammate, Tom Hockenberry, flipped his boat for no apparent reason in the first turn of the mill, the Thriftway Too replaced the Miss Thriftway in the final. Tom Hockenberry wasn't the only one who couldn't handle the prerace mill. John Perry's Circus Circus jumped over the Bardahl in the mill and died on the backstretch. Canning's Bardahl had hooked but it recovered and started the race in third place. Jay Kock was in first place after the first lap with G.R. Smith's Squire Shop giving chase for the second spot.

Wally Stewart's Notre Dame ran well for four laps as the four thunderboat's ripped up lots of water. Noise and excitement thrilled the crowd gathered around the race course. Then everything fell apart. The Notre Dame hooked at turn one and quit. Smith's Squire Shop hit the center buoy of turn two on its fifth lap and stopped. Canning's Bardahl was about to finish in second place when it went out of control and slowly hit the nearby beach. Only one boat was still running at the end of the day, 40 boats later.

Jay Kock has out-lasted and outgunned everyone. He had bested the group twice in the run-offs. He had moved up from tenth place to first, establishing his best showing ever. "I didn't slow for the turns," Jay explained. "I just locked it in full power. The boat slows itself as it turns."

Tight turning was part of the reason for Jay's success, but another was the new Dean Hughey prop he was using. "I can thank Pal Jennings for getting me this itty bitty prop," smiled Kock. "It just screams all the time." Jay's Picco 65 was driving a "B-Blade", which had 3.25 inches of pitch. Kock received lots of cheers from his San Diego friends and relatives. His famous grandfather, Ted Jones, was watching and he had an explanation for what happened to Hockenberry during the mill. "Your body just wanted you to get in, I guess," said Jones. Certainly the Thriftway Too earned the Circus Circus trophy by hanging tough and taking advantage of the breaks. The final results of the Circus Circus Regetta were as follows:

MAIN EVENT

1. *J. Koch, Thriftway Too*
2. *F. Canning, Bardahl*
3. *G.R. Smith, Squire Shop*
4. *W. Stewart, Notre Dame*
5. *J. Perry, Circus Circus*
6. *T. Hockenberry, Miss Thriftway*

I wish to thank both Ginnie and Lynn for sharing their activities with us. After reading my review of the MRP Sport Vee electric boat in the October issue, Charles Hausler of Broken Arrow, Oklahoma wrote a short letter and sent along some photos of his Northwind electric powered model boat. Using a Kroker Sea Wasp 12 electric motor, Charles reports that the boat has been unofficially timed at over 30 mph. I hope a couple of the photos of his boat can be used in this article because it is a nice looking boat. Using 24 battery cells producing 30 volts, the Kroker Sea Wasp 12 produces over 20,000 rpms for a maximum of two minutes. Water cooled bearings and brushes are used on this motor. Charles expressed a willingness to share his information and can be contacted by writing him at: 2911 South Ash Pl., Broken Arrow, OK 74012. That kind of performance from an electric powered boat is rather impressive.

A RACE AT A SPEED TRIALS?

It doesn't happen too often that head-to-head competition develops at a 1/16 mile record trials for model boats. Such, however, was the case during the record trials hosted by the Seattle Model Yacht Club in early October. Sport 40 became an official NAMBA class in 1981 and records for the class were being set all year in both oval competition and straightaway. I witnessed a real battle for the straightaway record at the S.M.Y.C. event conducted at Marysville, Washington on October 3.

Running in the Sport 40 Division II (unrestricted) were Mark Marvin, of Seattle and David Blacksten, of Canby, Oregon. Using an original picklefork hydroplane design, Mark established a new mark of 58.22 mph using 50% fuel, a K&B 7.5 with Mac's tuned pipe, and an Octura X-455 prop. David's boat, a R/C Glass hydro, is the current record holder for the oval competition mark and was running very strong, but unable to make two consistent back-to-back passes for much of the day. After setting the record midway through the afternoon, Mark cleaned up his boat and packed it away.

No sooner had he done that than David finally laid down two beautiful passes with an average of 58.88 mph with his K&B 7.5 powered hull pulling an Octura X-460. Since it was now getting rather late in the afternoon, event director, Ron Erickson, decided that both Mark and David would get one more opportunity with the burden of being first to go placed on Mark. Mark unpacked everything and gave it his best shot. Unfortunately for him, he couldn't exceed the mark set by David. David didn't need to run since his time held up and now holds both the straightaway and oval records with his fine running Sport 40 boat.

Jerry Dunlap, 119 Crestwood Dr. S.W., Tacoma, WA 98498; (206) 584-7131. •

Electric . . . . . *Continued from page 39*

all-up weight ready to fly with the 05XL, a Cannon receiver, two Bantam Midget servos, and a 250 mah receiver pack was 33 ounces. The recommended weight was 28-30 ounces, but the 05XL is two ounces heavier than the standard 05.

Then, to the flying field. The climb was so rapid I was sure I was in thermals, and it wasn't until I had flown several times that I was convinced that it was routine! If you do not have an on-off switch, it takes a lot of stunting to stay in vertical eyeball distance.

The handling characteristics were quick and positive, with easy loops, rolls (barrel), and spins. The aileron version must be really something in the rolls. The plane flies fairly fast, fast enough to have a sport pylon race with it and be exciting. The turns definitely require elevator, or the nose will drop and the speed builds up rapidly. Power-on flight requires a little down trim, power-off requires almost full up-trim. *(It would seem obvious that the motor mounting should be modified to provide down thrust. wcn)* This is not a "hands off" plane. A beginner would find it easy to build, but I would recommend that a beginner have some expert instruction first before a "solo". The 6x4 Cox gray prop was what I used, and it is excellent. I tried a 6x3 Cox black nylon prop to see if that would make the plane slow and docile. It gave more flight time, and the climb was not quite as rapid, but the plane was still lots of fun, and exciting. I strongly recommend the 05XL and the Astro Sport, especially for the pilot with some flying experience. For the beginner, an ideal combination would be a six-foot glider with the 05XL for "hands off" flying and lots of nice safe altitude.

Where I live, there are lots of lakes, so I just had to try the Astro Sport as a float plane. I strapped on a pair of 21-inch floats (my design), which was really easy because of the plywood bottom, and headed for the lake. The flying was a delight, with excellent ROW and handling characteristics in the air. I did put in a 1/8 shim for downthrust in the motor, and a 1/8 shim at the leading edge of the wing. This helped in two ways; it made it easier to rotate off the water (higher angle of attack), and the downthrust made less trim change when the motor was turned off. I use a little downtrim on ROW, and keep the plane low, even when it has broken loose from the water, to build up speed. This guarantees a good climb-out with no "stall and fall". The flying weight was 37 ounces, and even at that weight, the ROW, climb-out, and general flying was crisp and powerful, with power to spare. I am impressed, Astro Flight has done it right! Fly high till next time! •

Plug Sparks . . *Continued from page 36*

wholesaled it to the dealers. With less than seven dollars to play with, one wonders just what the actual cost of the engine was.

In that same line, the writer, who has known Irwin Ohlsson for all these many years, was startled to hear Irwin say (this was in 1947) that he could produce engines for $1.75 each. In retrospect this was not an impossible figure, as the Ohlsson firm had acquired all those automatic machining tools during the war to comply with Federal directives in the manufacture for wartime parts provided by O&R. So it would be with a large manufacturing firm like Supercraft.

The engine we are illustrating this month is the 1941 version, which had the two holes in the exhaust instead of the one oval hole. Basic specifications are bore .0875"; stroke .0875" giving a displacement of .52 cu.in. Base weight was 10 ounces to which you added four ounces for coil, condenser, and batteries. This four-port engine was rated at 1/5 hp at 10,000 rpm, although the manufacturers claimed an rpm rating of 15,000 (probably on a flywheel for a boat engine). Propeller used for the tests was a 13 dia., 7 pitch type.

For those technically minded readers, the Sky Chief featured molydenum iron cylinders and mating piston; the latter being centerless ground and micro-lapped to one ten thousandth. A heat treated crankshaft, made in three pieces, was made of steel, ground and polished, heat treated to proper strength. The timer, greatly resembling the Dennymite timer, was equipped with a so-called "positive firing" cam. A small low cost type plastic tank was provided along with a positive lock for the needle valve.

Also noted was that the Supercraft people provided their own coil called the Sky Chief "Lightning", but a high tension lead apparently was not supplied.

The first model Sky Chief engines were ringless pistons, which were more expensive to manufacture. In 1941-42, rings were added to the piston and the price raised to $7.95. Whether this was due to added machining costs (which should have been less) or whether materials were more costly due to the wartime requirements.

Like many engines of this era, World War II effectively stopped most all model engine productions, with the result that many engines, including the Sky Chief, were not manufactured again. Regardless of what was good or bad about the Sky Chief engine, the important thing was that it was the first Class C engine to be sold under $10.00. This did lead to more competition for price among the manufacturers, which helped out the average model builder's pocketbook.

THIRTY YEARS AGO, I WAS. . .

It was with distinct pleasure, this columnist had the privilege of having Joe Ott stay over at his residence for a day. The best part of the visit was, of course, the bull session with numerous anecdotes.

When Joe first dropped by the shop (John Pond O/T Plan Service), there was nothing to do except to close up and go to lunch, taking Maryann Pond and Dorothy Ott (natch!). Following lunch, the Otts were invited to the Pond mansion (haw!) for a review of the writer's memoribilia of Joe Ott airplane designs, magazine articles, kits, you name it. During dinner, the Ponds were regaled with most interesting reminiscense by Joe. Probably one of the best was as follows:

Joe Ott, as everyone knows, was a profilic designer, not only of model airplanes, but of many non-related items for magazines such as *Popular Mechanics*, *Popular Science*, etc. Always needing capital to get his many projects into productions, Joe formed many alliances.

One of his partnerships was with Donald F. Duncan, who produced many kits under his name with the Joe Ott logo crediting the original designer.

As Joe recalled, Duncan was a true hustler, as he would promise the moon to any prospective department store purchasing agent. Joe would be practically popeyed as Donald would make the statement the merchandise they were purchasing would be "exclusive". One thing for sure, Duncan really made the sales.

During one of these department store sales junkets (Ott does not remember the national chain), Duncan promised a fully built model for every two gross of kits ordered, to act as advertising display. Ott was absolutely flabbergasted when Duncan came in with an order for several hundred thousand kits. How in the world were we ever going to supply all those demonstration models? At least 500 were needed!

Ott in his usual dynamic fashion put an advertisement in the local Chicago paper saying he would pay $2.50 for every model built from one of his kits as supplied by the firm. Joe hoped he would get some answers, but not a great many, as the advertisement was placed on Friday to be run over the weekend.

Upon arriving at the plant Monday morning, Ott and Duncan could barely find a place to park as congestion was so heavy. When he tried to get in the front entrance (a loft on the second and third floors), the stairs were so jammed with people (the line actually went around the whole block!), Duncan and Ott had to go around the back and take the freight elevator.

Once he had all the kits stacked, he then had the doors opened and started by giving each modeler three kits to construct. Joe's reasoning was sound. In giving more than one kit, he knew the $2.50 per plane would induce many modelers to go into mass production.

Some fellows were so fast they could construct a model in three hours or so, actually making a good hourly scale for those days.

Joe likes to tell about Wally Simmers, who also succumbed to the idea of earning $2.50 a model. Joe recalls Wally took six to start with in spite of the fact Joe Ott was only issuing three at most to a prospect. As Wally later said to Ott, "Joe, you really saved me. I didn't have any real direction to my life at that time and you really lined me up." For those who didn't know, Wally went on to found the highly successful Midwest Models. Remember Jabberwork, Gollywock, etc. kits?

As it turned out, Ott and Duncan were able to fill their contract on all kits and display models. This led to the expansion of the company to the point where 600 people were employed turning out 35,000 kits a day!! There has never been a production schedule like that since!

Eventually, the Ott-Duncan partnership dissolved, with Ott settling for a small amount in the neighborhood of several hundred thousand dollars for a multi-million dollar business. This was actually the last hurrah for Ott in the model airplane kit business, as he went in for the packaging and production business, but that's another story. Ott was a true pioneer!

While we are still talking about Joe Ott, Photo No. 6 shows Joe when he was only 38 years of age (Joe is presently 82). Joe believed in big models even in those days, as this nine-foot semi-scale proves. The columnist is a little stumped as to what this design is. Maybe you hot shot flying scale artists out there know.

BRUCE LESTER GOODIE

Photo No. 7 is another gem taken at the Wayne County Airport, site of the 1938 Detroit Nationals. Shown are a portion of the entries in the Berryloid Best Finish Event. Real surprising was the amount of competition for that particular award; some mighty fine craftsmen such as Hal Coovert, Michael Roll, Bill Gough, and a host of others.

Sad to report, Bruce Lester has been on the serious side of things lately. He has been released from the hospital and he welcomes all mail. Write Bruce at 254 Glen Park Avenue, Toronto, Canada M6B 2E3.

George Clapp, one of his very concerned buddies, writes this columnist to say he got a nasty surprise when he visited Toronto and called Bruce only to find he was on the critical list at the hospital.

Bruce told Clapp to pick up his "TORC" (**MB** Plan 34781) and fly it with the other Aurora Model Aircraft Club. A club member, Walter Lawrence, was the first to build a Torc. He did so well at contests that the club members built 13 more! What a surprise!

Photo No. 8 shows a group of the Aurora boys with their Torc models. George Clapp and the rest of the boys surely hope Bruce the best health possible and hope for a quick return to the flying field.

SAM CHATTER

From Everett "Woody" Woodman, Eastern SAM vice president, comes word of a recent meet staged by the Old Timer Eagles, the original O/T R/C Assist Club. This meet was held on October 11 at the Coyle Air Drop Field, New Jersey. All photos are the work of Mike Granieri.

Photo No. 9 shows Woody Woodman weighing in Frank Lashek's Buzzard Bombshell. Notice on the side the neat system of letting every contestant know where he stands. These posters are constantly updated during the day and a contestant can readily find out how he stands at any particular time. One thing for sure, it gets the boys off the recorders desk!

Not very often do we give credit to the distaff side of modeling, but Photo No. 10 tells it as it is. As Woody reported, the contest was held on a fine warm day with no wind and tremendous lift. One airplane was actually destroyed by a violent upcurrent.

Among those who got caught in the updrafts was Joe Beshar's model pictured in the photo. Joe lost the model and spent several hours trying to find it.

Upon returning, the girls said they could find it and in very short time returned with the model. What does Joe do? He gives them all kisses. How about some flowers, huh?

Photo No. 11 shows Mike Granieri's M-G in the foreground, along with George Haley's version. The M-G (initials of the designer) is a creation of Mike who placed fourth in the 1936 Nationals. The model was retired until about six years ago when it was uncovered by the SPOTS club which thought it would be a terrific Antique model. The rest is history. The M-G has been built by the scores on the East Coast and is easily the outstanding performer in the eastern seaboard contests.

Those interested in this model might do well to write Mike Granieri at 3 Dryden Road, Box 78, Pottersville, NJ 07979, telling him you are interested in building this model. Might be well to note, this design now comes in four sizes so some correspondence with Mike

would be necessary.

Woody goes on to say there were actually more planes on the field than entries. Turns out that many modelers come to enjoy the bull sessions, reminisce and put their models on display. In this respect, the Static Scale Event enjoyed an excellent turnout, the models being judged for beauty and construction awards.

Woodman and his Old Time Eagle cohorts have also discovered the 1/2A Texaco event attracts the modelers, as they are quite simple, resistant to big smashups, and just plain fun to fly. Photo No. 12 shows Larry Fry with a very neat Coronet. He was one of the first to discover this fun! Also, the Fuel Allotment event (as originated by SAM 27) has turned out to be a pleaser to modelers, as this event allows any old timer model to fly in the 1/8 ounce of fuel per pound event. To show the fun that was being had, contestants were double over the last contest; 12 to 25. quite a jump! With all the favorable comments, the Eagles figure to stage this kind of meet again next year. Results looked something like this:

1/2A TEXACO

1. Jack Van Dusen	1451
2. Larry Fair	1002
3. Dan Schneider	830

TEXACO

1. Steve Boucher	2723
2. George Haley	1478
3. Fred Quedenfeld	1390

FUEL ALLOTMENT

1. Frank Lashek	2498
2. Dan Schneider	2300
3. Steve Boucher	1905

We didn't get the results on the Static Events but rest assured everyone had a good time!

SAM 3 SCIFS

If it appears this columnist is not appreciative of the fact he receives the "Flightplugs" newsletter from the SCIFS, it is simply because the column runs out of space. As pointed out before, a full column could be written every month just on the activities in California. (There are a minimum of nine SAM Chapters in California!)

Ken Sykora, who appears in Photo No. 13, is not only an active newsletter editor, but also keeps up with the state of the art in Old Timers. Shown in the photo is the little seen "Red Ripper" designed by Peeples as published in *Flying Aces* (**MB** plan 280-OT).

This model comes with very high credentials but so far only one or two of these models have been built on the coast. This one with an Ohlsson 60 is still going through its teething problems. Incidentally, of you fail to recognize Ken Sykora, it is because we caught him with his campaign hat missing.

Ken also reports the SCIF Texaco Annual suffered from a turn out standpoint but did enjoy good competition and beautiful weather. The afternoon wind failed to make its appearance, resulting in many long flights and short runs.

The early morning flights went over

the north hills. Tweedy, peerless retriever without parallel, gave Taibi a wild ride over the hills. Ain't gonna do that anymore!

Ironically, Larry Clark went looking for his Miss Delaware, lost three weeks previous, and found Bruce Chandler's Fokker E-3. Just before Larry returned, Tweedy came cycling in with the model found in a due west direction! Figure that one out!

Sykora also reports that Art Watkins has come up with a very nice sprayed finish of bright orange and dark brown. Watkins said the material was dyed nitrate. He has found a paste dye (like the artist's oil in tubes) at Standard Brands store. You can get some 30 odd shades! How about that if you are looking for a diffrent color scheme?

CHICAGO AERONUTS

It has been quite some time since this columnist has heard from the Chicago area, but thanks to Otto Curth, we have received results of the 19th Annual Fall Old Timers Contest held August 30 at Bong Field, Wisconsin.

The way time has an uncomfortable way of slipping by us is clearly demonstrated when one realizes the first meet was held back in 1962!

We won't publish the results but will comment that Joe Konefes is making himself known again with his Buzzard Bombshell winning Class C. Art Suhr, the inimitable engine collector and publisher, ran off with Class A while Woody Bartelt (your friendly used aircraft dealer) corraled a first in Class B.

Looked for Charlie Sotich to win the rubber events, but alas, Bob Warman beat him in Cabin Rubber and Bob Watson tooks his measure in Rubber Stick. Sometimes it don't pay to get out of bed!

Fast becoming popular, thanks to the pushing by Bob Larsh, Midwest SAM Veep, the Hand Launched Glider Event showed a dozen entries. This event may be for the younger fellows, but Ed Konefes was able to pull a second! Not too shabby for an old goat!

In closing off, Bob McCarthy should be commended for running an excellent contest, both from a social and financial standpoint.

KINGMAN KUT-UPS

Trust Gordon Codding, of 3724 John L. Ave., Kingman, AZ 96401, to come up with another idea on how to modify an Ohlsson Pacemaker. Photo No. 14 shows a Pacemaker with the forward part of the cabin removed to allow a cockpit type enclosure to be installed.

This is not the first idea promoted by Codding. We ran his biplane version of the Pacemaker which turned out to be a beauty if the modeler was considering an "Old Ruler" type model.

At present, this columnist is working on a drawing of a low wing Brown Jr. powered Ohlsson Pacemaker that was so successfully flown in Southern California. This one is a legitimate old timer that should appeal to the true sport flyers.

TEXAS TORNADO

Yep! That's what they call Bruce Norman, who seems to do nothing but win, win, and then win some more. Photo No. 15 shows Norman with a scaled up version of the recently approved "Kerswap". Powered with a Torpedo 29 on ignition, this model should climb practically out of sight under the new 1982 rule which allows 55 seconds for original ignition powered aircraft. Whew!

SAM CHAMPS 1982

We ran an annoucement of the events that will be held at the 1982 SAM Champs. as hosted by SAM 7. According to George Armstead, contest manager, there will be both free flight and R/C electric events as sponsored by Roland and Bob Boucher (Leisure and Astro Flite). Just wanted to make sure you, the contestant, was aware of this item.

THE WRAP UP

As an old timer from way back (1929) this columnist is particularly delighted whenever a deserving person gets a most merited award. In this case, we are referring to Edward Lidgard, who finally received long overdue recognition.

Photo No. 16 shows Lidgard receiving a Hall of Fame Award at the NFFS Symposium from John Grigg AMA president. We're proud of Ed, he didn't blow his acceptance speech!

Next month, this columnist is going to

try to run more photos and less talk. Seems like we are always running out of space, so why not have more pictures? After all, as Confuscious said, "A picture is worth a thousand words".

Meanwhile, get that winter project lined out and send more pictures. We can always use them! •

Fuel Lines . . . *Continued from page 14*

increase the nitro, etc. the curves change.

At this point, you may be saying, "That's fine for racing and speed flyers, but I'm a sport flyer. What good is a BHP curve to me?" Well, it's quite useful. For example, a steeply shaped or abrupt BHP curve is common to very high performance racing engines. A modestly sloped curve is typical of a good sport engine. The lack of radical changes will mean a smooth running engine over a broad RPM range. That usually also means nice throttle response and a smooth idle. The whole point is that you have to ask yourself what you want from an engine. When you've answered that, if performance curves are available, they can be very beneficial in helping you to decide about whether or not a particular engine will be suitable for your type of modeling.

From what's been said, it's easy to conclude that it would be nice to have performance curves for every model engine. Yes, it certainly would. Unfortunately (there's that word again), they aren't all available. In fact, off hand, we can't recall any manufacturer who provides them with each new engine. Those that are available have been included with published engine test reports. Peter Chinn has included quite a few of them in his articles in various model magazines.

Our first published one was mentioned above. Hopefully, we'll be able to provide you with more in forthcoming months. At the moment, we're salivating over a brand new *OS Max .40 four-cycle* engine that our friendly editor has dangled before us. We just might have a test report on it in the very near future. With the ever increasing interest in four-cycle "honkers", it could become a very popular engine . . . particularly considering its displacement.

Guys, that's it for this month. Remember to keep those New Year's resolutions we suggested last month. •

F/F Scale . . . . *Continued from page 55*

If you decide to incorporate this type of structure, here's how it's done. Modify the root rib as shown in the sketch. Notice how it differs from the one on the plan. Only two of these will be cut out and they will be the two ribs that glue onto the wing saddle of the fuselage. The upper curve of this root rib will also be used for cutting out the rest of the ribs.

Before worrying about that step, two wing spars have to be laid out. The front spar was positioned on the plan on the same plane as the plywood "bracket" where the landing gear attaches. The rear spar starts at the rear-most spar location as shown on the plan, except that it angles forward. These spar locations are drawn on the plans. These spars have to be tapered because of the narrowness at the wing tip. This is easy enough to figure out. By using the drawing on the plan of both the root rib and the tip rib, the actual height of the spars can be determined. (See sketch.) Next lay out the spars from some firm 1/16 sheet; measure the required length first, then the height needed at the root and at the tip. Cut out two of these spars.

Making the ribs is a cinch. Again, refer to the sketch. I made a template as shown out of 1/32 plywood with the curve the same as found on the root rib. The little notch on the ends are there to conveniently measure 1/16 inch, the thickness of the upper portion of the spliced rib. All the ribs can be cut from 1/16 sheet, but I prefer to cross-grain-laminate two sheets of 1/32 contest balsa using Super Jet as the bond. This really provides strength with lightness.

Next, lay out the wing's laminated trailing edge and pin it on the plan, followed by the leading edge which was

made out of 1/8 sheet tapered similarly like the spars. It would be a good idea to moisten it a bit since the leading edge is curved quite a bit. Whenever there is a rib shown on the drawing, glue a 1/16 square stick to the leading and trailing edges. This forms the bottom of the rib. Then glue the spars on top of these 1/16 sticks. Let this dry thoroughly before proceeding with the next step. When dry, insert a 3 degree wedge shape piece of wood at the trailing edge of each wing near the tips. This will provide an adequate amount of washout at each tip.

All that is left is to cut to length the upper part of each rib, by trimming the trailing edge and gluing them in place. This is followed by the dihedral break. I went ahead and used the plywood bracket to reinforce the center section. It also provides a place to attach the landing gear as shown on the plans. When dry, sand the trailing and leading edges, and you are about there!

This ought to hold you for a while . . . next month the finishing of the model. •

Choppers . . . . *Continued from page 21*

its "pivot point" is absolutely critical. Consider figure A, exaggerated for clarity. If the blade's pivot point is too far back and you add pitch, the servo will have to fight to prevent the blade from increasing pitch even more. Given the other extreme shown in figure B, this pivot point will require the servo to work harder for the blade to hold positive (or negative) pitch. It will return quickly to flat pitch once the servo force is released. Keep in mind that improper setting of lead-lag alters this balance, too. I'll expand more on lead-lag in future articles, when we'll set up rotor heads.

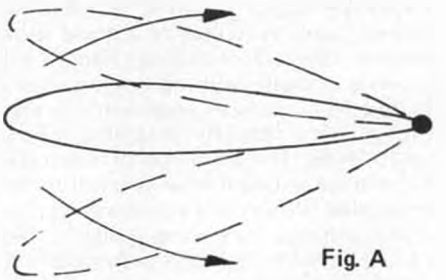

Fig. A

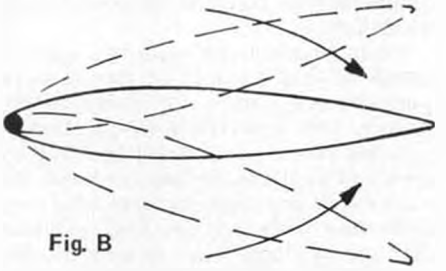

Fig. B

Now there is also a twisting force on the rotor blades due to center of pressure changes with differing angles of attack, and an additional twisting force due to different rotational velocities along the span of the blade. I think of this latter instance as "blowback", similar to an airplane elevator at different speeds. In the case of a helicopter rotor blade, this blowback is least at the root and greatest at the tip. When you consider all of these forces along with the airfoil section, there is a feathering axis of the blade which will require the least amount of servo torque to move the blade through various angles of attack. For two full size examples of where this pivot point came out, refer to figure C.

What I'm wondering is how this point is found in model helicopter designs. Trial and error? Educated guesses?

Mathematical calculations by the designers? If anybody out there is knowledgeable in this area, I'd like to hear how you determine this rather important point. I would say that all full size locations would be done through mathematical calculations and wind tunnel tests. Now if I only had my own low speed wind tunnel. . .

I've also thought about practical ways to figure this out. One would be a whirl stand, where a rotor head is mounted on a shaft driven by an electric motor at selected rpm's. The servo forces needed on cyclic and collective could then be measured for a particular design of rotor blade. The set which needed the least power for changing pitch should be the best location for the feathering axis on that particular airfoil. Unfortunately, I do not have the time to erect such a stand, try various blades, and determine the difference between different feathering axis points. And I am not a mathematical genius who would care to run through all the equations to figure out the center of pressure for a given rotor blade.

I realize that I have asked many more questions than I have answered. These thoughts were meant to stimulate your thinking as well and make you aware that there are many very "minor" points to consider on a helicopter. Each of these is critical to the chopper's flying behavior.

A good example using the feathering axis location is the difference between pre-drilled rotor blades and those that you must drill yourself. I shudder to think of the times I drilled that blade attachment hole in my Jet Ranger blades by measuring, and then using a hand drill. It just is not good enough! You've got to use a drill press and appropriate jigs to hold the blades in precise position. If one blade is out from another, you will still be able to statically balance the rotor head, but you'll find yourself with a vibration that can't be worked out of the ship. Hopefully the pre-drilled blades you get are both from the same batch and are right to start with.

To offer you something of benefit in conclusion, I'd like to give my evaluation of the servo torque in oz. inches needed to properly fly the wide spectrum of model helicopters. These have come from experience, and are offered to give you an idea of what kind of servo forces are required, and where.

The small .19 to .25 powered helicopters with the Hiller system (Cricket) seem happy with the small servos and fly fine on 14 to 22 oz. in. of torque. The .40 size Hiller system (Rev I and Heli-Baby types), and Bell-Hiller combinations (Kavan Alouette), obtain best performance on the 22-28 oz. in. servos. I believe that 28 oz. in. will handle all maneuvers on these .40 ships, but the 20-22 oz. in. servo can be pushed to its limit in some high speed forward flight regimes. Some of the newer helicopters utilize .50 engines, which are really nice in size, and should be popular as more get out in the field. Hirobo is one manufacturer who has several ships for this displacement. The minimum for the .50 birds using the Bell-Hiller combination is 28 oz. in., but preferably more, somewhere in the 30 oz. in. range.

Stepping up to the .60 size choppers, servo torque depends on the control system being utilized. Bell-Hiller systems can get away with less torque than Bell only (flybarless) designs. First the Bell-Hiller arrangements: 28 to 32 oz. in. servos will fly these choppers satisfactorily, but 40 oz. in. of torque is needed to really put effectiveness into the system. This is more applicable to the 12 to 15 lb. 'copters (Jet Ranger) than the lighter 9 lb. Heli-Boy, mostly due to size, weight, and differing proportions of Bell vs. Hiller control. The Heli-Boy has greater Hiller travel and more control over the Bell system than the Jet Ranger.

Moving to the flybarless helicopter, the Horizon, it demands a minimum of 40 oz. inches, and will feel best with 50 to 60 oz. in. of torque from the servos. The flybarless design does not have the benefit of levering the rotor disc through the flybar. As a result of this, the rotor blade loads are imposed directly to the servos, and it simply takes a lot of power to handle the stresses. Sure, a Horizon or flybarless Jet Ranger will fly on 28 oz. in. servos, but not very well. Certainly not as well as a flybar equipped counterpart. The servo will stall in a reasonably banked turn in forward flight, charac-

terized by a "mushy" feel on the stick. It has only been recently that servos in the 50-60 oz. in. range have been available, and this had been one of the drawbacks of a flybarless helicopter for quite some time. If you have, or are contemplating the purchase of a Horizon, do it right and get servos for it that will do the job. If you don't, you'll never realize the full potential and capability of the flybarless concept.

If you don't believe what I've just said, I'd challenge you to obtain more powerful servos and see for yourself. Three are necessary, one for fore-aft cyclic, one for right-left cyclic, and one for collective. "Standard" 28 oz. in. servos will be fine for throttle and tail rotor control.

That's about it for this month concerning feathering axis-servo power controversies. Join me next month, we'll start a review on the newly imported Hughes 300, pictured at the beginning of this article. It is a .50 powered semi-scale ship manufactured by the Kobe-Kiko Co., Japan, and distributed by Orange Coast Hobbies, Fountain Valley, California. See you then. •

Counter ..... *Continued from page 9*

ciency, two ball bearings each in the motor and reduction drive units, and temperature stability up to 200 degrees C (392 degrees F). The Geist information booklet is chock full of performance charts relating prop sizes to numbers of cells, ie; volts, amperes, watts, and motor rpm. Very easy to tailor motor, prop, required batteries to performance required. Price list is included. Send $1 for the Geist 'Das Komplette Electro-Programm' booklet, or $10 for the large, 216 page catalog by Carrera. Either amount is refunded on your first order. Other quality lines available are: Robers, Graupner, Eismann, Manitschek, along with Geist and Carrera. Send to: Wilshire Model Center, 3006 Wilshire Blvd., Santa Monica, CA 90403; or call Hans at (213) 828-9362.

★ ★ ★

Scale Model Research offers its Foto Paak Listing service, perfect for documentation of that new Precision scale, Sport scale, or Giant scale model being planned. SMR offers color pictures of many interesting subjects, in packs of from 13 pictures of an Aeronca Champ to as high as 50 of a Stinson Tri-motor. Photos are 3-1/2 by 5 inches, however, enlargements are available, too. The Foto Paak Listing catalog is available for $1. A list of restored aircraft and aircraft under restoration is maintained, send SASE and $1 for search service to determine availability and location. Many scale 3-views are available and many match the photo packs . . . Scale Model Research hopes to have the Koku-Fan books again soon, drop a note listing the ones you would like to see available first. Scale Model Research, P.O. Box 675, Orange, CA 92666. California residents add 6% Tax.

★ ★ ★

Astro Flight has just released its brand new electric flight system, the '035.' This tiny system weighs only 9 ounces, but can turn a Top Flite white nylon 5 x 4 prop at over 16,000 rpm!! Perfect for those 1/2A kits that were really too small for the Astro 05 Flight System and too big for the Astro 020 system. Gary Pruesse of G & M Models has one in a Micro-X Taylorcraft and reports that it flies great. Tony Naccarato has one in his indoor quarter-scale Farman (that will be seen flying indoors at the IMS Show in Pasadena, Jan. 9 and 10, 1982). He used an Astro 020 belt drive which fit this motor. Many of the old timer 1/2A scale kits of the Flyline scale models are perfect candidates for the Astro 035 system. For more information on the 035 system and other Astro Flight electric motor systems, kits, and chargers, send a SASE to: Astro Flight, Inc., 13311 Beach Ave., Venice, CA 90291.

★ ★ ★

Ultralight Publications announces its WW II warplane series of six colorfully illustrated books about the Spitfire, Hellcat, Focke-Wulf FW 190, Zero, Messerschmitt Bf-109, and the P-51 Mustang. History, variants, modifications, and flight performance are a few of the topics reviewed about each aircraft. Aviation artist Rikyu Watanabe has illustrated the test with approximately 40 drawings and photographs in black and white and color, including two huge four-panel, full color fold-outs. Editorial content was prepared by an authority on each aircraft from Jane's Publishing Co. Each book is 10 x 13 inches, Deluxe Hardbound with dust jacket. Price is $15.95, plus $1.95 postage and handling direct from: Ultralight Publications, P.O. Box 234, Hummelstown, PA 17036.

★ ★ ★

Airplane Scale Views by B.C.F.K. Publications has published its first offering of 10 aircraft containing 5-view drawings, including cross sections and some data on each aircraft. In Vol. 1, some of the rare aircraft are, MAI Kvant, Curtiss

XP-37, Messerschmitt Me 109 TL, Hispano HA-1112-MIL and SAAB 19. A good way to develop something unusual to take to the flying field instead of the 'usual' p-51! Send $2 to: B.C.F.K. Publications, P.O. Box 128, Midland Park, NJ 07432-0128.

★ ★ ★

Condor Hobbies introduces a 'bolt-on' header for the #4060 "Magic Muffler" from Australia. Designed to give the proper 4-inch mounting distance with no cutting, fitting, or measuring required . . . just bolt it on and plug it in! Available for most popular .40 to .60 side exhaust engines. This new header should be available as you read this. For more information on the 'Magic Muffler' system, send a SASE for descriptive literature and an engine application chart to: Condor Hobbies, 17835 Sky Park Circle, #F, Irvine, CA 92714. Dealer inquiries invited. •

Control ..... *Continued from page 27*

same. Buena Suerte; Hals und Beinbruch, or whatever... •

PARTS LIST*
Triac 276-1001
Diac 276-1649
Pot, 100K Ohms 271-1722
Capacitor .22 mfd 200 volts 272-1058
Fuse Holder, Clip-In 270-739
Fuse, 5 Amp, Slow-Blow 270-1287
Switch, SPST 6 Amp 275-651
Heat Sink 276-1363
Knob 274-413
Strain Relief 278-1636
Case, 6-1/4 x 3-5/8 x 1-5/8 inches
Power Cord, see text
Power Socket, see text
*All numbers are Radio Shack Parts Numbers.

Douglas ..... *Continued from page 41*

later, this problem disappeared when the amphibian requirement was deleted.

After the Douglas Company test flights were completed, the plane was flown to the Naval Air Station, Anacostia, for evaluation. On an early Naval test flight the aircraft nosed over in a water landing, sustaining some damage. Failure of a stop on a landing gear part allowed the gear to drop, breaking the hydraulic line, resulting in oil loss during retracting tries. The gear then could not be retracted nor landed upon. Hence it tripped and nosed over in the subsequent water landing. The plane was disassembled, washed down, and shipped to Brewster Aeronautical Corp. in New York for clean-up, repair, and reassembly. New parts came from Douglas, and a new engine and instruments from the Navy.

In the meanwhile, and with no connection to the accident, the Navy decided to procure all battleship and crusier airplanes as convertible seaplanes *without* the amphibian feature. Therefore, the three competing aircraft were outfitted with plane floats for the sea trials, with the proviso that the first production airplane would by submitted for full trials as a straight landplane.

The XO2D-1 was plagued with hydraulic and other problems during subsequent flight tests. To remain in the Naval inventory as even an experimental type, a number of changes would have to be made. The plane was flown back to the Douglas factory for rework. It was found upon disassembly that there were evidences of general corrosion (probably from the dunking), and a rather complete overhaul would have to be done. Since it turned out from the grapevine that the airplane was slated to be surveyed (the Curtiss meanwhile being chosen winner) it was decided by Douglas and the Navy to truck the plane to NAS, San Diego for dismantling. The engine and usable equipment were removed and the bare airplane was sent to the Naval Aircraft Factory in Philadelphia for structural testing. The XO2D-1 was then struck from the Navy List a year and four months after its first flight. •

Hannan . . . . . *Continued from page 56*

Belgium, France, Great Britain, Germany and Switzerland. Model variety can be gauged from this random sampling: Gossamer "Mojave", Hirondelle, Castaibert, SK 1 Trompik, Fokker F VIIa, 1911 Voisin, Loening M8, and scads of more common designs.

But it was in the duration department where the greatest strides have been made. Over-one-minute flights were common among the top seven placers, and Mark Hinton's winning Santos-Dumont canard posted one time of 92 seconds.

AND SPEAKING OF INTERNATIONAL PEANUT CONTESTS

Word has been received of another major Peanut Proxy contest under consideration, this time in Australia. More details will be published as they become known.

NOW THAT'S DEDICATION!

Dave Gibson sent in an article about 17-year-old Ross Jahnke's first Nationals contest experience. It seems Ross had lost his P-30 rubber-powered model to a Texas thermal during practice. Determined to fly, he spent some 10 hours constructing a new one, *working on the front seat of a camper.* No, we don't mean sitting on it, but working on it! He literally taped the model components to the seat cushion while they were being glued together. But in spite of the unlikely "workbench" and doubtless uncomfortable working posture, his persistence paid off . . . to the tune of a second place trophy!

UNSUNG OLD TIMERS?

Thanks to "Wink" Peck, we've had the opportunity to read the book *John Joseph Montgomery, Father of Basic Flying*, by Arthur D. Spearman. In common with some other pioneers, Montgomery seems never to have received his proper share of credit, having been overshadowed by the publicity accorded better-known aviators. Certainly his achievements deserve greater attention than they have received in the past from aviation historians.

Montgomery conducted many of his early experiments with models and had great faith in their importance as learning tools. And evidently his influence in that direction inspired others as well. Witness this 1962 quote from Cleve T. Shaffer: "Tell them that I give top place in aviation to John J. Montgomery. I knew him well as a real scientist and experimenter, and as a kindly friend who helped me plan and begin the first factory in the world at San Francisco, 1909, to make toy model aeroplanes for sale to young Americans and future avaiators." Does anyone in our audience know of this factory and its products? Certainly we would be happy to share details of such information with our readers.

One of John J. Montgomery's original full-size gliders has been reconstructed by model builder Frank Allen and a crew of volunteers, and is currently on display in the San Diego Aero-Space Museum.

FEEDBACK

A letter from Vern Clements describes reaction to our publication of his circa 1941 photo showing him, his sister and Bell P-39 model: *Didn't think it would be good enough (to print). My mom took it with an old non-adjustable box-camera that "she dropped down a hillside in Oklahoma when she was a kid"!*

I bought a copy of that September '81 **Model Builder** *and dropped it off at her house hurriedly, with a note on the cover, "Mom your kids on page 56". She tried to pay me for the magazine, but I said "no, you paid for the film". . . left her aghast. So she showed it to all of her neighbors, and, figured out that she did pay for the film used . . . back in '41.*

I then wrote my sis, Corrina, in Yakima, and told her which magazine had a picture of her in it . . . nothing more. Doubt that she had ever had her picture in a magazine. She immediately wrote back and said that she used up a tank of gas running all over Yakima, but couldn't find that magazine. She was all hyped up . . . sent me a few bucks to buy her three copies, which I did. She really got a charge out of it, and sounded like she showed it to everyone who would look at it, ha! Seriously, I found it hard to believe that she could not find the magazine in Yakima. She works at a drug store there, and has charge of their magazine stocks, and says "model magazines don't sell here", but I found it hard to believe that there would not be a hobby shop with **MB** *in stock!"*

O.K. you Yakima model builders, where are your dealers?

(Stationed at Pasco Naval Air Station back in 1943, we took liberties to Yakima occasionally, and there was a small hole-in-the-wall hobby shop back then. If there's a shop there now . . . please check in! wcn)

THOUGHT FOR THE DAY

Politicians and Phillips screws have a lot in common. It is much easier to install them than to remove them.

FINE PUBLICATION

Editor Gordon Riley favored us with review copies of the remarkable non-profit British magazine *Vintage Aircraft*. Published four times per year, it caters to a wide variety of aircraft interests. A sampling of subjects found in our issues include a progress report on the D.H. 88 Comet being restored by the Shuttleworth Trust in England; a comprehensive examination of an Avro Sports Avian; ditto a Westland Lysander; coverage of the Gee Bee Z; excerpts from Frank Courtney's book; and a fine review of the British Schneider Trophy races. All are accompanied by sparkling photos printed on first-rate paper.

Remember Walt Mooney's "Speed Spitfire" Peanut model featured in **Model Builder** some time ago? Well the full-size version of that esoteric machine is also examined in detail. Equipped with an amazingly high-pitch, four-blade wooden prop, the machine was topped off by a 16-coat paint job applied by Rolls-Royce! If interesting tidbits such as this strike your fancy, you may wish to subscribe to: *Vintage Aircraft*, 16 Church End, Weston, Colville, Cambridgeshire, CB1 5PE England. Rates are £5.50, by surface mail or £6.50 by air.

POINTS TO PONDER

Model Builder John Blagg, of England reflects: "The month of August, and so far September, have been very good weather wise, in fact we have been enjoying an Indian Summer. However, the mornings are quite cold, and the evenings are drawing in. Our summer bird visitors are collecting in large flocks, preparing for their long journey to North Africa and even further south. Swallows, House Martins, can be seen gathering on telegraph wires; by next weekend most of the summer birds will have left our shores. Those too young, or the weaker, will not make the journey, and they will not survive our winter. Natures' way may seem hard, but not any way near as hard to understand as man's attitude to his fellow man."

NON CONTEST?

French model builder/writer/humorist Georges Chaulet, noting the spread of lowest-common-denominator approach to competition, predicts this eventual result:

RULES:

1. All contestants may have or not a model airplane.
2. The model may fly or not.
3. The contestant may stay home.
4. The contest may happen or not.

(5. **Model Builder** *will definitely sponsor the first such contest in the U.S. . . . maybe. wcn)* •

Mini-Bird . . . . *Continued from page 32*

My husband says I flutter my rudder enough. I also dropped the lower hinge down where it would be contained within the body side pieces.

The fuselage assembles very quickly. When gluing the front and rear portions of the side pieces, I used the wing saddle and the bottom outline to align everything. The front side portion is of 1/8-inch lite ply while the rear portion is of 1/8-inch balsa. In this kit, the rear portion of 1/.8-inch balsa was of a heavy weight wood. After I finished this part, my husband suggested that the next time it would be better to make the two side pieces out of solid lite ply. This would have made the plane just a little bit lighter than it is.

The instructions call for putting fiberglass on the nose area. The method I used consists of silk, glued on with Super-T Hot Stuff. This is then doped with 2 or 3 coats to completely fill in the weave. I also used this same method on the wing center section.

The canopy was cut up just enough to hold the battery, then this was glued to the fuselage. The rest of the canopy is attached using a tongue and vinyl tape to hold it in place.

I covered the complete Mini Bird with Super Monokote for maximum structural strength. I really liked the color design of the Mini Bird on the cover of **Model Builder** August 1981, so I used the same design, but with different colors. I naturally chose Circus Circus Pink as the main color and outlined it with the white. I also put on some real cute little piggy decals and called it "Oink Airlines", since I have a Piggy Collection of over 100 different shape and size pigs. When I picked these colors, my husband

said "Yuck", and Dave, from Dave's Custom Models shop just laughed. They are the only two rolls of Circus Circus Pink he has sold.

I am using my husband's R/S Radio that Bob Novak built. Over the years, Bob has also maintained the radio in top notch form. When Ed volunteered his R/S Radio, I knew he trusted my flying ability. With the 500 MAH battery, 5-channel receiver, and 2 older Bantam servos, my Mini Bird is 24 ounces.

One other note at this stage, the instructions have a suggestions in regards to the stab fairing on the rudder. I took a piece of 5/16 square balsa, glued it, and flew the plane. When we got home after the first flight, I sanded this to match the elevator.

The one day that my husband and I could get away together without our five children turned out to be really goofy to get any flying time in. We got to Malibu around noon and waited because the whole afternoon the winds were from the East, blowing out to the ocean. Around five o'clock in the evening, the winds shifted, coming out of the Northwest. After a few test glides we walked to the cliff. Ten feet out of my launch, the wind died. The rest of the afternoon the winds came from the East again. My Mini Bird had more time gliding from the road than in the air over the cliffs, on its first flight.

We have since flown the Mini Bird. It flys very smooth, graceful, easy and gentle on the 11% wing. I can hardly wait until I have enough experience to try the 8% wing. I think the Mini Bird is an excellent glider. The offering of the choice of wing thickness, two or one-piece wing, and two-meter wing span, makes for an exciting choice for "Bird" lovers. I am very happy with my Mini Bird. And even my husband is happy that I never listened to him "this" time. I love flying my Oink Airlines. •

Electronics . . . *Continued from page 24*

customers who are looking for a switch for a particular application is to test possibilities under the exact in-use conditions to determine the safe ratings.

Won't do as a solution for us, will it guys? Our rule of thumb, unless we are lucky enough to get a rated switch, will have to be that if big is good, bigger is better. Just don't expect that super-small neat looking switch that weighs milligrams to handle the current required by Astro-Flite's biggest. If any information is available on switches at your disposal, use the one that is rated at the highest current at a DC voltage. Even better would be to use a multipole switch wired in parallel to spread the load between more contacts.

WHAT'S WATT?

Those of you who might have pored over some of the German engine data, written in German, were probably able to decipher it all, with one possible exception, which might have read something like "Leistung - 1,90 KW" Leistung is the word for power, or power output, and the rest means a claimed power of 1.9 kilowatts. Right, kilowatts, which in this country we normally use as a measure for electrical power; meaning thousands of watts.

Whatever their reason for stating it in these terms, all is not lost. There is a simple conversion, the magic figure being 746, which is the number of watts that one horsepower is equivalent to. Thus, the 1.90 KW above (they also use a comma as a decimal in figures) is 1900 watts; divided by 746, to give us a claimed power of 2.55 HP for this particular engine.

SAY WHAT?

One of the new competition type

transmitters, along with its many bells and whistles, also has servo reversal, that so many flyers now seem to think they can't live without. In addition, the system is also furnished with two normal rotation and two reverse rotation servos. Don't ask me why, it appears somewhat redundant, as proper servo rotation is simply a matter of placing the switch in the right position. However, it does give you more options. Just think about it. By the proper servo selection and switch positioning, you can now have normal servos that can run either normal normal, or reversed normal. Or, if you prefer, you can run reverse servos as normal reversed, or reversed reversed.

In addition, those helicopter flyers whose transmitters are equipped with the front panel servo reversing required for inverted flying can run their normal servos in a normal normal normal rotation, or as normal normal reversed, or reverse servos as reverse reverse normal, or reverse reverse reverse.

(Mr. Marez will be back next month, after a week at a nearby rest home! wcn)

On the subject of the new trend in transmitters, there will soon be another one available for the flyer who has everything. This one has a digital readout to replace the familiar analog meter, which in addition to telling you things about the transmitter's inner workings, and some timing functions, will also tell you engine RPM. Wow! I hope to do a full bore review for you as soon as it becomes available, but right now I can say no more.

Talking about hearing about it, remember that we are interested in your R/C or related equipment ideas, problems, solutions, criticisms, praises, etc. Drop us a line. •

M33 . . . . *Continued from page 59*

glued back together with the aid of the wing joiners W1 and W2. The center ribs, cut from 1/16 sheet, can now be put in place, followed by the 3/32 sq. aft spar. engine, but with an empty fuel tank, was around 2 ounces, and at this weight, a good rate of climb was observed, and a reasonably flat glide. I wouldn't increase this weight by adding too much decoration.

The engine is attached to frame A with small sheet metal screws, and you may have to enlarge the mounting holes on the engine for these screws. I prefer to use this type of screw as it permits easy changes in down and side thrust, without any loss of "holdability". The gas tank fits inside the bathtub as shown on the photos, and with phantom lines on the plan. Frame D actually holds it in place, so don't install this frame until all the power unit is in position. The filler is left loose, but points backwards just under the boom. The tank can be filled by grasping the model around the

engine with the left hand, and holding the filler nozzle, then pushing the charger from behind, under the wing.

I find that CO2 models take a little more trimming than other types, due mainly to the variations in charge levels obtained from the main cylinder (I expect that this problem might go away if I bought one of those monster chargers). However, after a few exploratory flights, and struggling with my charger, which leaks most of the gas before I get the chance to use it, I ended up with a good flight pattern for my prototype. This was a climb to the right, not too tight, and an open right glide. This was accomplished with the following trims.

A small amount of down and right thrust.

A tiny nose weight.

Packing under the trailing edge of the wing (1/16 shim).

A small amount of right rudder.

With these offsets, consistent flights were obtained. I'm not suggesting that you start your test flying with all these changes already built in, as the small differences in model construction will probably require other changes. What I'm trying to say is that the model as built is almost in flying trim, so it shouldn't take you long to get to a satisfactory flight pattern, without wasting too much gas. (I expect if the environmentalists found out we were discharging raw CO2 into the atmosphere there would be the usual uproar!). So, happy flying with your M33. •

R/C World . . . *Continued from page 13*

A "B" model Quadra supplied the power, twirling an 18-10 Zinger. Gas/oil mix was 40:1 using Bel Ray GK-1 racing oil. Airborne batteries consisted of two 1800 mah battery packs in parallel. After 228 miles of flying, approximately 1 gallon of fuel remained. That's just about 115 mpg, without the benefit of an EPA rating. . . The team for this effort consisted of pilots Ron Meyer and Calvin Orr, drivers Harry Dickinson, Herb Kile, and Ralph Perkins, and observers Bill Comstock, Jeff Dickinson, and Lyle Hill. Bear in mind this was 228 miles of cross-country driving and flying through mountain passes, very windy at times, and across open desert. Now lessee, where did we put those plans for the DeHavilland DH 88 Comet. . . •

Champ . . . . . *Continued from page 36*

lows, that's the score we're filling this month! What's more, this sky buggy is not only a local tourney-taker, but it's also a state champion!"

Finally, near the end of the first paragraph, we get the first hint, when we're told that Richard E. Little, of the Hampton Roads Model Association, won the Virginia State Gas Model Championships and the Edward R. Sharp perpetual trophy last year (that would have made it 1939) with a three-flight average of 3 minutes, 13.4 seconds. In the next paragraph, the "Virginia Champ" and Bob Little are at last put together as model and designer, when we're told that he designed it in Washington (D.C. or state of?) over two years ago, and brought the plans with him when he came to work at famed Langley Field as a model builder for NACA. Incidentally, we're also told that on its first test flight, on the evening before the contest (sounds typical), the ship flew out of sight over some trees and was not found until Bob happened to see a man walk from his house into the garage, and emerge moments later with the model, where it had glided without getting a scratch!

As we said earlier, some building instructions can get lost between the original idea and the second-hand words of a different author than the original designer. With ignition equipment storage in mind, the designer built a 1-1/2 x 2-1/2 inch box (inside dimensions!) long enough to serve as a crutch for the first three bulkheads. We would assume he closed off the back end to prevent the loss into the back end of the fuselage shell of any miscellaneous nuts, bolts, clips, wire pieces, etc. Bulkheads No. 1 through No. 8 are built up of 1/8 sheet with the top and bottom horizontal grain portions overlapping the side vertical grain portions. After No. 3, the size of the hole left in the above building procedure is up for grabs.

We now assume that you would cut two 1/8 sheet side sheets and carefully align and glue these to Bulkheads 1, 2, and 3, which have been previously built on to the 1-1/2 x 2-1/2 starting box. If you were lucky enough to have previouslyy marked the locations of bulkheads No. 4 through No. 8 on the inside of the sides, you can glue these in place, with nothing more than eyeball to assist you in keeping the fuselage equally curved on each side. There is no explanation for what would *appear* to be a 1/8 x 1/4 side stringer that would have to be notched into the bulkheads before

INDEX TO ADVERTISERS

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HIGH PERFORMANCE RUBBER POWER PLANS — New list — Grapenut, Sainte Formula, more. Send SASE. David Aronstein, 50 Pasture Lane, Poughkeepsie, NY 12603.

WANTED — OLD MODEL ignition engines, cars, etc. Paying top dollar. Bill Simpson, 7413 Via Lorado, Rancho Palos Verdes, CA 90274 (213) 377-3532

GREAT GOLDEN AGE, WW1, WW2 built up flying models. World's largest (1400) authentic plans line. 7" to quarter-size. Master list SASE. Catalog 60¢. Cleveland Models, 10307X4 Detroit Ave., Cleveland, OH 44102

DECALS — 50 sheets assorted from discontinued U/C, rubber kit line. $3 ppd. T. Crouss, 100 Smyrna, West Springfield, MA 01089

WANTED: Old model airplane engines, gas model race cars, related items 1935-55. Arthur Suhr, W218 N5866 Maclynn Court, Menomonee Falls, WI 53051

PEANUT SCALE. New plan available. Brewster Buffalo $1.50 plus 40¢ postage. SAE for list or $1 for sample plan and list. David Diels, Box 101, Woodville, OH 43469

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ENGINES — New and used. Original Atom castings, Vivell parts, balsa kits. List 30¢. T. Crouss, 100 Smyrna St., West Springfield, MA 01089

adding the sheet sides.

One more head-shaker is that *apparently* three 1/8 x 1/4 stringers are installed at top and bottom center, butted side-be-side, planking fashion, with the 1/4-inch side laying down. These plank/stringers would actually be quite helpful in obtaining that straight fuselage during this "in the air" structureal period! The four remaining spaces between these triple planks at top and bottom, and the slightly curved side sheets, is taken up by three equally spaced 1/8 x 1/4 stringers *on edge*, notched into the bulkheads.

Actually, once you get the sequence all untangled, the result should be a nicely contoured and rugged fuselage . . . however, one thing still bugs us. There seems to be no structural integrity between the main fuselage and that which goes aft of Station 9. Only the bottom triple plank stringers and maybe one notched stringer continue on to the rear of the tail saddle. Oh well . . . model builders have ways of working that out.

In spite of our implied confusion about the fuselage construction, the model has very pleasing proportions, and the force set-up is very Zipper-like. Interesting when you consider that both were apparently in the development stage about the same time in modeling history. •

Workbench . . *Continued from page 6*

proaching times of the early Glow powered pylon models, and lightweight units that can fly small sport models and stand-off scale ships for upwards of six to eight minutes of full power.

And now, not a moment too soon, electric powered aircraft modelers and experimenters are organizing and concentrating their efforts through a single source . . . SEAM, the Society of Electric Aircraft Modelers. The person who has agreed to act as the focal point to get this organization fully charged up (Oh, Lordy!) is Frank Heacox, 11632 Flamingo Dr., Garden Grove, CA 92644. We'll let Frank take it from here.

ELECTRIC POWERED MODEL FLIERS TO ORGANIZE

Electric power for model aircraft has been proven to be efficient and practical. With this in mind, a group of electric power enthusiasts have decided to form the Society of Electric Aircraft Modelers (SEAM), as a national organization dedicated to the advancement of all forms of electric powered model aircraft.

SEAM is to be chartered by the Academy of Model Aeronautics (AMA) and will serve in an advisory capacity to the AMA in all matters relating to electric powered model aircraft.

The ultimate goal of SEAM will be to form an organization which will provide the following services to all members.

Information Exchange — *Quarterly Newsletter. Reprints of technical and experimental data sheets. Direct member-to-member information exchange. Product information brochures.*

Contest Rules Forum *for all types and classes of free flight, control line, and radio controlled electric powered model aircraft.*

Promotion of regional *electric powered aircraft activities of all kinds through local SEAM clubs.*

Business directory *for dealers who stock electric motors, batteries, chargers and suitable aircraft kits.*

If you are interested in any form of electric powered model aircraft, send your name, address and telephone number, plus a stamped, *self-addressed #10 (business size) envelope to SEAM c/o Frank Heacox, as addressed above.*

The Fifth Annual IMS Model Trade Show in Pasadena will be showing various live demonstrations of electric powered, radio controlled model aircraft and blimps. This is scheduled for January 9 and 10 in the Exhibition Building at the Pasadena Center. Hobby Shops within a 500 mile radius of Pasadena have further information as well as discount tickets.

On the same weekend, unfortunately, the Leisure Grand Championship Electric Sailplane contest is also taking place. And the weekend following, on January 17, the Eighth Annual Astro Flight Electric Championships will take place. Representatives of SEAM will be present at all of these affairs to discuss the society and register you as SEAM members.

THINGS TO DO

The Sixth Annual Symposium of the Central New York Model Aircraft Association will take place on Saturday, February 6, 1982, at the New York State Fairgrounds' Art & Home Center, 9 a.m. to 6 p.m., Syracuse, New York. Emphasizing radio control models, there will be programs given by experts in R/C, movies, club booths, swap shop, dealer booths, live helicopter demonstrations (weather permitting) and competitive static display. For further information, contact Walt Throne, 4300 W. Genesee St., Syracuse, NY 13219; (315) 468-6544.

★ ★ ★

To mark its Tenth Anniversary, the British Association of Radio Control Soarers will hold a World Thermal Soaring Contest at the ancient English medieval town of Warwick, on the weekend of August 7 and 8, 1982. Contest is open to any competent radio control thermal soaring pilot, but entry is limited to 100, with preference given to overseas fliers. (Better contact Freddie Laker and see if he'll let you bring your R/C birdy on board!)

R/C MODEL BUILDER's

40 BEST SELLERS !

SEE PAGE 100 FOR ORDERING INSTRUCTIONS. COMPLETE PLANS LIST SENT WITH EACH ORDER.

No. 6781 LOCKHEED P-38L $12.00
R/C Sport Scale, balsa and ply const., a trophy winner, big, 8' span. Art Johnson.

No. 3771 WACO UPF-7 $5.00
Stand-off R/C scale (1 8"-1') of one of the prettiest Waco biplanes. Span 54". R. Steely

No. 12711 CURTISS WRIGHT JR. $4.50
Two inch scale model of famous pusher light plane R/C By Ralph Fidance

No. 6771 GIPSY MOTH $12.00
Exact quarter-scale (7-1/2 ft. span) R/C of famous D H bipe. By Bill Northrop.

No. 1722 PUSS MOTH $4.00
Chet Lanzo's famous rubber F/F scale Puss Moth returns! By Hal Cover

No. 680-C.P. GRUMMAN F3F-1 $4.00
Reprint of Miniature Aircraft Corp. plans plus ribs and bulkheads from printwood.

NO. 4742 CESSNA AW $3.50
Jumbo scale rubber powered model of a 1928 classic. Span 48". By Jim Adams

No. 1731 SPROOSE GOOSE $5.00
EAA type R/C sport biplane, mostly spruce, for 60 engines By Bill Northrop

No. 11781 TRAVEL AIR D4D $8.00
Accurate 2-inch R/C scale model of famous Golden Era biplane. By Bill Seidler.

No. 11731 BIG JOHN the FIRST $7.50
Modified prototype of editor's notorious monster R/C biplane. By Bill Northrop.

No. 1080-C.P. STINSON RELIANT $4.00
A 3/4" scale model from 1934 Ideal kit. Excellent plans for F/F rubber, R/C, etc.

No. 1723 WHITE TRASH $4.00
A proven, trophy winning R/C sailplane with 7 and 10 ft span By Rick Walters

No. 7801 APPRENTICE $5.00
Continually popular genuine R/C trainer for .19-.35 eng., 72" span. Bill Northrop.

No. 175-O.T. FLYING QUAKER $5.00
First gas model kit by Megow, 1937 Span 7 ft Redrawn by Phil Bernhardt.

No. 9783 R/C STEAM LAUNCH $6.00
Natural finish mahogany planked 40" OA "African Queen" type. Kilburn Adams.

No. 2761 DRAGONFLY $4.50
R/C funship, looks like giant rubber stick model Superb trainer By Tex Newman

No. 8741 WOODY PUSHER $4.00
Easy to build & fly semi-scale R/C home-built, like C.W. Jr, .09-.15. Chris Moes.

No. 9781 GREAT LAKES TRAINER $4.00
Sport scale biplane for 3-4 channels and .19 engines, 40" span. By Bill Northrop.

No. 4801 BRUSHFIRE $6.00
Contemporary design being used by several top pattern fliers. By Ken Bonnema.

No. 2801 TIPORARE $6.50
Top pattern ship in 1979. Flown by Dave Brown at World Champs. Dick Hanson.

No. 4751 R/C AUTOGYRO $4.00
Semi-scale twin rotor R/C autogyro for 35 engines. Very stable By Skip Ruff

No. 9792 CRICKET $3.00
Balsa profile fuse, Ace foam wing 1/2A quickie for 1 or 2-ch. radio J. Headley.

No. 1174-O.T. LANZO STICK $3.50
Rubber stick winner, '40 Nats. Span 4½'. Still good in Unlim. By Phil Bernhardt.

No. 574-O.T. The T-D COUPE $5.00
Classic high wing 1936 'C' cabin gas job Span 64". Redrawn by Phil Bernhardt.

No. 773-OT LANZO 8' GAS MODEL $6.00
Chet Lanzo's famous "Record Breaker" Two large plan sheets By Phil Bernhardt.

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Taibi's famous design for Forster 99 ign. Great for R/C O T By Phil Bernhardt

No. 174-OT EHLING '37 GAS JOB $5.00
Frank Ehling's 8 ft. span 1937 gas model. Still winning! Drawn by Phil Bernhardt.

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This 30" span stick job from 1938 MAN is OT, FF trainer, Unlim Bruno Marchi.

No. 12792 EXCALIBER II $5.00
R/C tunnel-hull outboard constructed of plywood, for K&B .21. By Jerry Dunlap.

No. 12741 85' HARBOR TUG $8.00
Complete plans (3 sheets) for R/C tug. All wood, 37" LOA. By Francis Smith.

No. 7724 TRAVELAIR 2000' $5.00
Two inch full scale Classic R/C biplane Proven flier, 60 power By Bill Northrop

No. 7721 FAIRCHILD 51 $3.50
One inch scale Classic for R/C, also F/F gas or rubber By Hurst Bowers

No. 879-C.P. CURTISS F-11C-4 $4.00
Reprint of Miniature Aircraft Corp. plans plus ribs and bulkheads from printwood

No. 8723 TAYLORCRAFT, F/F $1.50
Rubber powered, 24-inch scale seaplane. An excellent flyer By Walt Mooney

No. 579-O.T. TAYLORCRAFT $12.00
Quarter-scale in 1941! Famous 9-foot design kitted by Miniature Aircraft Corp.

No. 10753 SUPER PUP $3.00
Profile C/L stunt ship for .29 to .36 power, 42" span. Easy-built. Mike Parenteau.

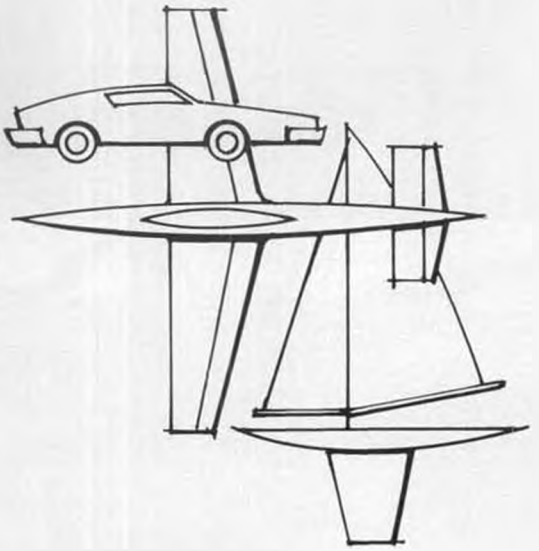
No. 8781 R/C VELIE MONOCOUPE $9.50
Light-weight 1/4-scale for belt reduction electric power, 90" span. Bob Boucher.

No. 4733 PEA POD $4.50
A 36" long R/C sailboat easily made of 1/8" Luan mahogany Clever sail control Full size patterns By Tom Protheroe.

No 5761 ALBATROS $5.50
R/C sport scale post-war German lightplane Span 74", .36 eng. By Jeff Breece.

No. 176 O.T. KORDA WAKEFIELD $2.50
The classic of all rubber powered competition free flights By Phil Bernhardt

WRAM SHOW '82



Don't miss the greatest Radio Control Show in the East at the Westchester County Center, White Plains, N.Y. It's our 14th annual show and it's sure to be the biggest and best ever!

Keep the next to the last weekend in February open ... the 1982 WRAM's Show is going to be the largest yet. Well over 150 manufacturers and other exhibitors have already signed up to bring you everything that's new in the hobby ... kits, engines, radios, accessories and everything in between. And, our famous Swap Shop will be in full operation with thousands of items, including built-up planes, almost new radios, engines and on and on and on with something for just about everyone.

Static Competition

Make sure your latest creation is finished up and polished so you'll have a chance to take home one of the dozens of trophies to be offered in these events:

- WWI
- POST WW I (Military)
- POST WW I (Non-Mil)
- PATTERN
- SPORT BIPLANE
- OLD TIMERS
- SPORT
- PYLON
- GLIDERS
- HELICOPTERS
- SCALE R/C BOATS
- RACING R/C BOATS
- STAND-OFF SCALE
- JUNIOR EVENTS
- RC CARS up to 1/8" scale
- RC CARS 1/8" scale and up
- BEST-IN-SHOW

Judging takes place Sunday afternoon. Entries accepted until 12 Noon Sunday.

Special admission area will be provided on both days for static display contestants with built-up models. Registration of models will start at 8:30 a.m. each morning.

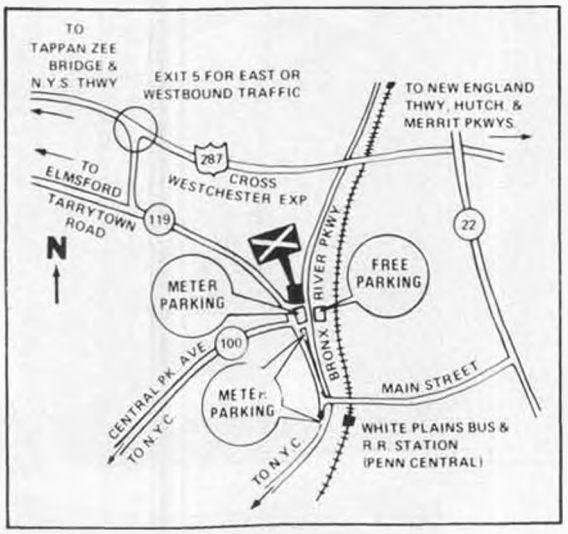
SWAP SHOP

The WRAM's Swap Shop has become one of the major show attractions with thousands of individual items changing hands. To help eliminate "registration crush," the 1982 Swap Shop will provide for pre-registration forms. To receive these forms send a self-addressed stamped envelope to: John Isbister, 4 Devon Rd., Larchmont, N.Y. 10538.

SPECIAL NOTE

This year there will be no restrictions in the number of built-up models a registrant may place in the Swap Shop.

For further information, write to: Hank Nielsen, 56 Chadwick Rd., White Plains, N.Y. 10604 (914) 761-5998.



The Westchester County Center is centrally located in the city of White Plains, N.Y., at the intersection of Rt 119, Central Park Ave., and the Bronx River Parkway White Plains is just 22 miles north of N.Y.C

WESTCHESTER RADIO AEROMODELERS, INC.

February 20/21

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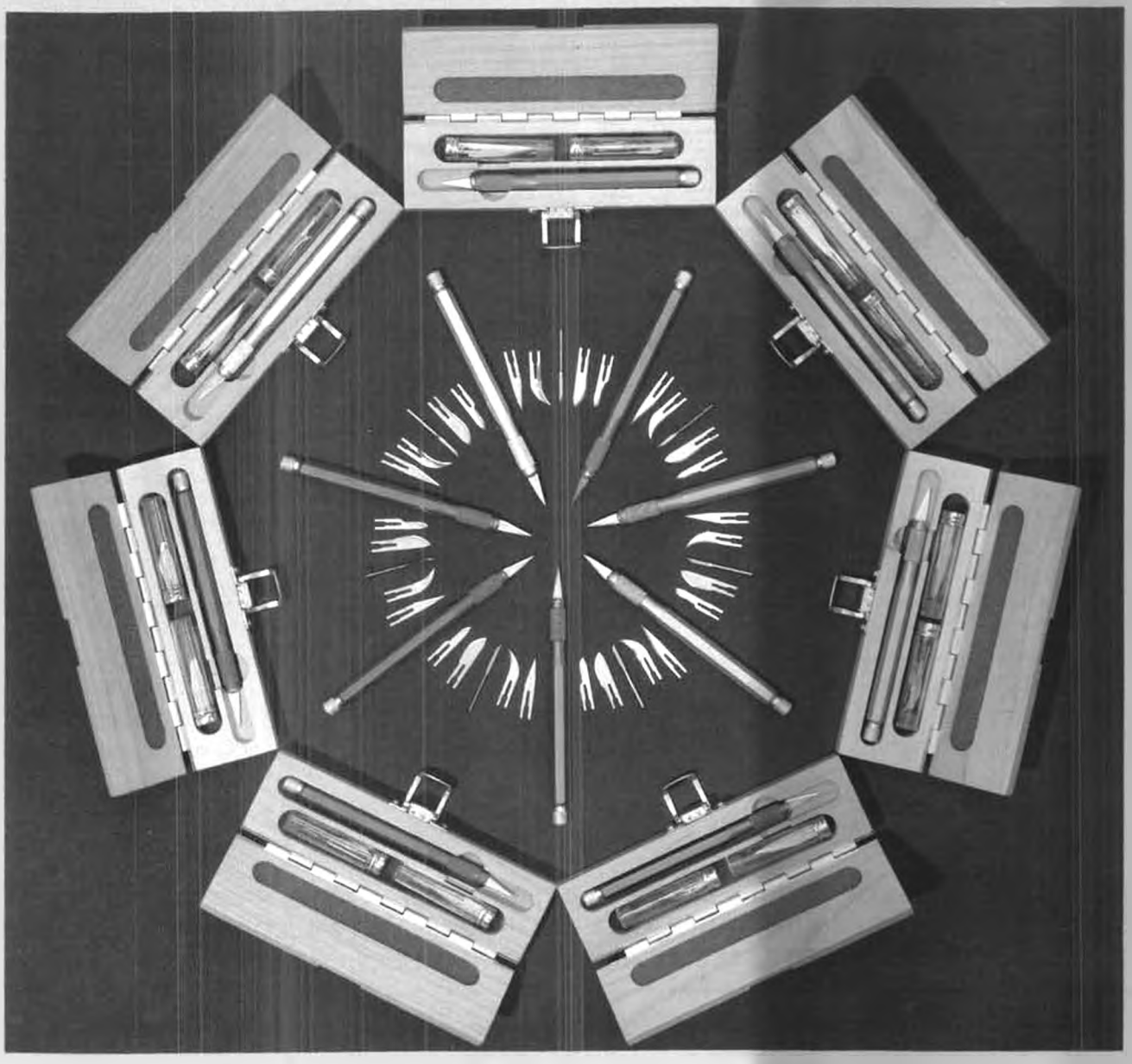
IN THE BEST CIRCLES, IT'S **über skiver**



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Available in seven satin anodized handle colors: silver, blue, red, green, gold, copper, violet. Complete set in fitted hardwood case; includes uber Skiver, together with two vials containing four No. 11, and one each of Nos. 10, 12, 15, and 20 . . . . . $14.95
Individual handles (specify color) $5.95
Vial of 6 blades (No. 10, 11, or 15) $2.10
(No. 12 or 20) $3.30

See your dealer, or order direct.
Dealer inquiries are invited.
All direct orders sent postpaid in U.S.
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MODEL BUILDER PRODUCTS
621 West Nineteenth St., Costa Mesa, California 92627

The contest will be flown to British Thermal Soaring Rules, which unlike F3E, is purely based on thermal soaring. Contact A.F. Wisher, 21 Williams Terrace, Daventry, Northants, NN11 SER, England for further info and a copy of the rules.

★ ★ ★

If the travel bug really bites you, take a trip to Australia for the 1982 Vintage Air Pageant and Races.

Here's an outline of the events and requirements, and also a source of further details and information on what appears to be one heck of a wild vintage model aircraft show!

Application is invited from experienced pilots to take part in the GREATEST event ever held in Australia, under the auspices of the Radio Control Aircraft Society of N.S.W.

The applicant must be able to demonstrate a high level of building and flying ability although the builder of the model rule will not be applied. All aircraft entered must be a stand off scale model of an aircraft flown between 1903-1930 with monoplanes to have a wingspan of not less than 80" and biplanes and triplanes not less than 65".

The pageant will take place in Sydney on 12th and 13th June, 1982, and will comprise of a concourse D'Elegance and flight display to be followed on the second day by circuit races to the pattern of early European events.

The event will take place before a large audience and will be conducted entirely in the environment and dress of the period.

First prize in both categories, pre 1914 and post 1914-1930 will be a flight to England to attend the aeromodeller Vintage Scale Day at the Shuttleworth Trust and including a flight in one of the Trust's Aircraft.

For further information and application form please write to: Dan Reece, Chairman 1982 Vintage Air Pageant & Races, Suite 1 Worth House, 686 New South Head Road, ROSE BAY, N.S.W. 2029, Australia.

HAZEL AND MAXEY HITCH

On December 11, 1981, Hazel Sigafoose and Maxey Hester were (by the time you read this) married in a local Montezuma, Iowa church and then returned to the Sig Mfg. Inc. offices for a combination wedding reception and company Christmas party. The couple will then take off for a honeymoon in the Hawaiian Islands.

We, as well as the thousands of friends, modelers, dealers and others who have known them over the years wish them all the best in the future years and are all probably secretly relieved that the great company started by Hazel and the late Glen Sigafoose will continue under the same familiar guidance.

IMS LAST CALL

This issue will be out just in time to remind its readers that the Fifth Annual IMS Model Trade Show will take place in the Exhibition Building at the Pasadena Center, Pasadena, California, on January 9 and 10, 1982.

Some last-minute information. Added to the usual model manufacturers display booths, the static model competition, and the live indoor demonstrations of electric powered radio controlled aircraft, blimps, and cars, electric powered control line scale and aircraft carrier action, and free flight models, there will be a Swap Shop set up in the room adjoining the Exhibition Hall. Tables in the Swap Shop will rent for $5, half-tables for $2.50, or share a table with several buddies if you only have a few items. Personal admission will also be required.

Additional displays include a full-size, climb-in-and-try-it-on ultralight (powered hang glider), and several parts of the original English Channel crossing Gossamer Albatross. There is also a good possibility that live outdoor demonstrations of R/C off-road cars, R/C helicopters, and C/L combat will be featured. Part of the latter is in conjunction with a hoped-for TV taping on Friday that would publicize the show prior to its opening on Saturday morning at 10 a.m.

Although primarily radio control, free flighters and control liners should come on by to say hello to modelers in the SCCA and San Valeers booths, and also meet one of the aeromodeling manufacturing giants of years ago, Joe Ott, who will be there in his own booth, with new products! •

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Hank Iltzsch's precision scale Briston Scout.
This beautiful ¼ scale model is from original Bristol factory drawings.

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FAST, STRONG, LIGHT,
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For all that the New R/C Sand Rover offers, you should be paying lots more.

Introducing The 1/10 Scale Sand Rover Kit

If you've been intrigued by the excitement and fun of off-road, and you're ready to make your move . . . the Sand Rover is a sensational buy.

As the leader in quality engineered off-road R/C, with the broadest selection in the market, MRC-Tamiya knows what makes a sound value. And we've put it all into this thrill machine. You'll find the handling you need, the power options you can use and the performance that makes off-road R/C running the fastest growing radio control category. And the best part, is that it's irresistibly priced to be your first, or second off-road vehicle.

More Mileage Per Outing . . . Plus The Power Option
First off, the Rover comes with a minimum drain Mabuchi RS380S electric motor, that means you can get up to 20 minutes and sometimes more on a single charge. That's quite a run. At the same time, we equipped this baby with a big motor bracket . . . we call it the power option. And it means that when you're ready, you can soup up your Rover by attaching the bracket, and then putting in an RS540 motor for competition power, and speed. In addition, ball bearings can be added for still higher performance.

Body Beautiful . . . Then we took a cue from the big boys, the full size off-roaders who love to customize their beasts. That's why the Sand Rover's body comes to you ready for painting . . . to any specs you want. Personalize the color, the stripping, the decals to your whims and talents.

Of course, being an MRC-Tamiya car, we took care of the engineering as only we can. This includes:
- 4 wheel independent suspension with two single trailing arm reinforced nylon units in front with two coil springs, and two rugged, fiberglass supported swing arms in the rear.
- A unique motor and geartrain combination provide for superior ease of handling and control
- A shock absorbing, equipment protecting, ABS box frame.
- Variable forward and reverse speed control.
- A protective roll bar guards the body against damage in case of spills.

Price Perfect . . . The Sand Rover is a sport machine you can sink your teeth into. Soup it up, paint it up, run it up just about anywhere. To get this kind of sophisticated engineering, versatility and quality, you might expect to pay more . . . lots more . . . but not this time. We've priced the Sand Rover to move off the shelves and off-the-road. Now at your hobby dealer for $75 or less.

To Get The Most Out Of Your R/C Cars, Use An MRC-Tamiya Nickel Cadmium Battery Pack and Charger. Specially designed to deliver more power and offer more running time between charges.

RC-13 5-Cell, 6 Volts 1200 MAH with charger.
RC-14 6-Cell, 7.2 Volts 1200 MAH with charger.
RB0002 5-Cell, 6 Volts 1200 MAH without charger.
RB0008 6-Cell, 7.2 Volts 1200 MAH without charger.
RB0010 Quick Charger . . . plugs into your auto's cigarette lighter to recharge your batteries within 15 minutes.

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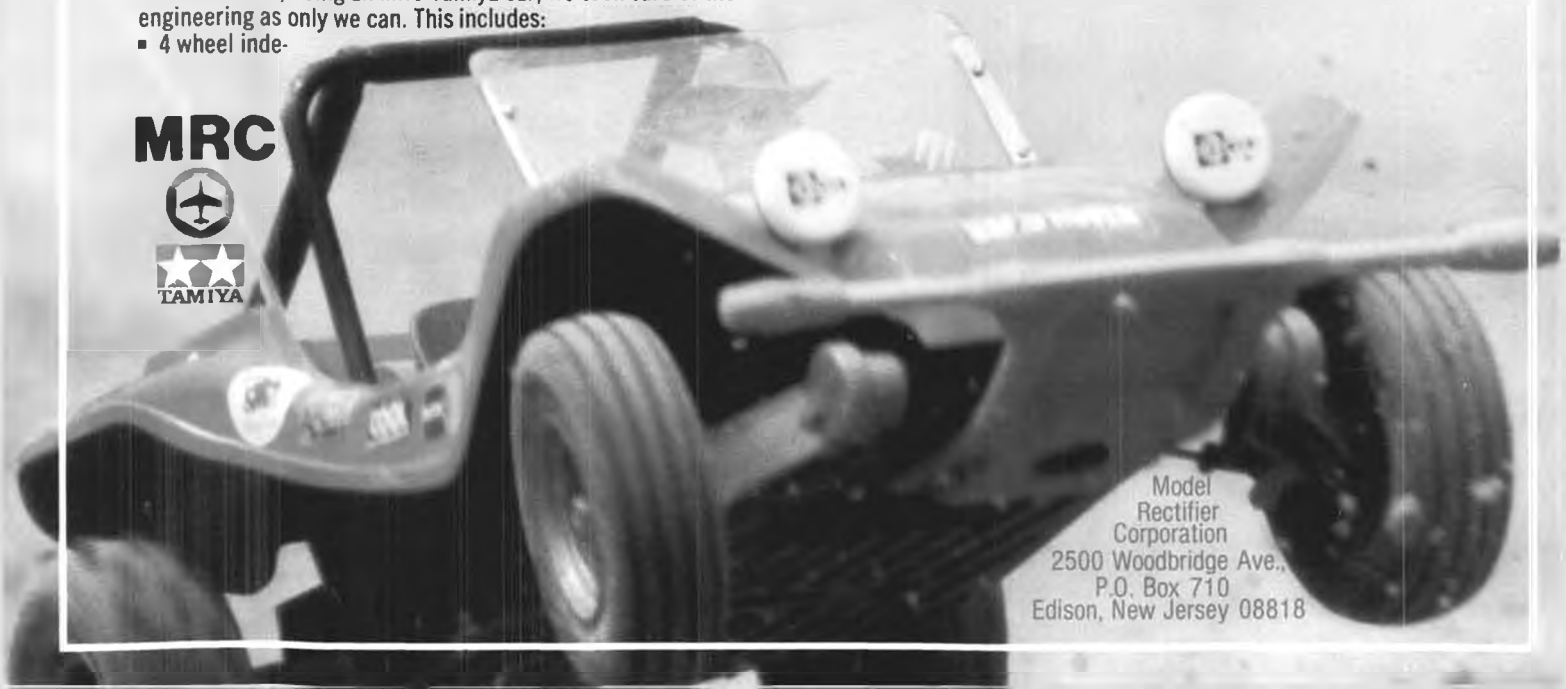

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