MODEL BUILDER

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☐ **HARRIER**, by Francis Mason. Derided as impractical, the V/STOL concept has been proven by the Harrier, combat-operational in Britain, the U.S. and Spain. This book details the evolution and flight tests from test-bed to Kestral to Harrier, provides a detailed description of the Harrier's structure and discusses the problems inherent in V/STOL operations. Well written and profusely illustrated with 150 photos, drawing and serial number lists of all versions. 7"x9", 185 pgs., hardbound **$18.95**

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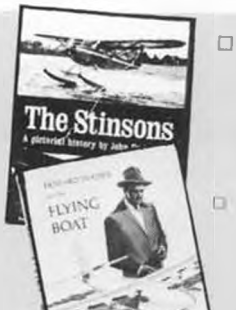

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SEPTEMBER

1982

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CONTENTS

FEATURES

CONSTRUCTION

Cover: Terri C. Cassell, who stands 5'-6" tall, is dwarfed by the awesome wingspan of the Thermic 210. Builder Chris Van Deventer enlarged the plans from Frank Zaic's Thermic 70 to achieve the 17-1/2 foot wingspan. The model took three years to construct. Builder is now awaiting proper conditions (enough nerve) for the Thermic 210's first flight. Complete story begins on page 18. Photo by Van Deventer on 6117 Ektachrome 4x5 film with 81A filter. Normal exposure. In the background . . Knoxville's 1982 World's Fair.

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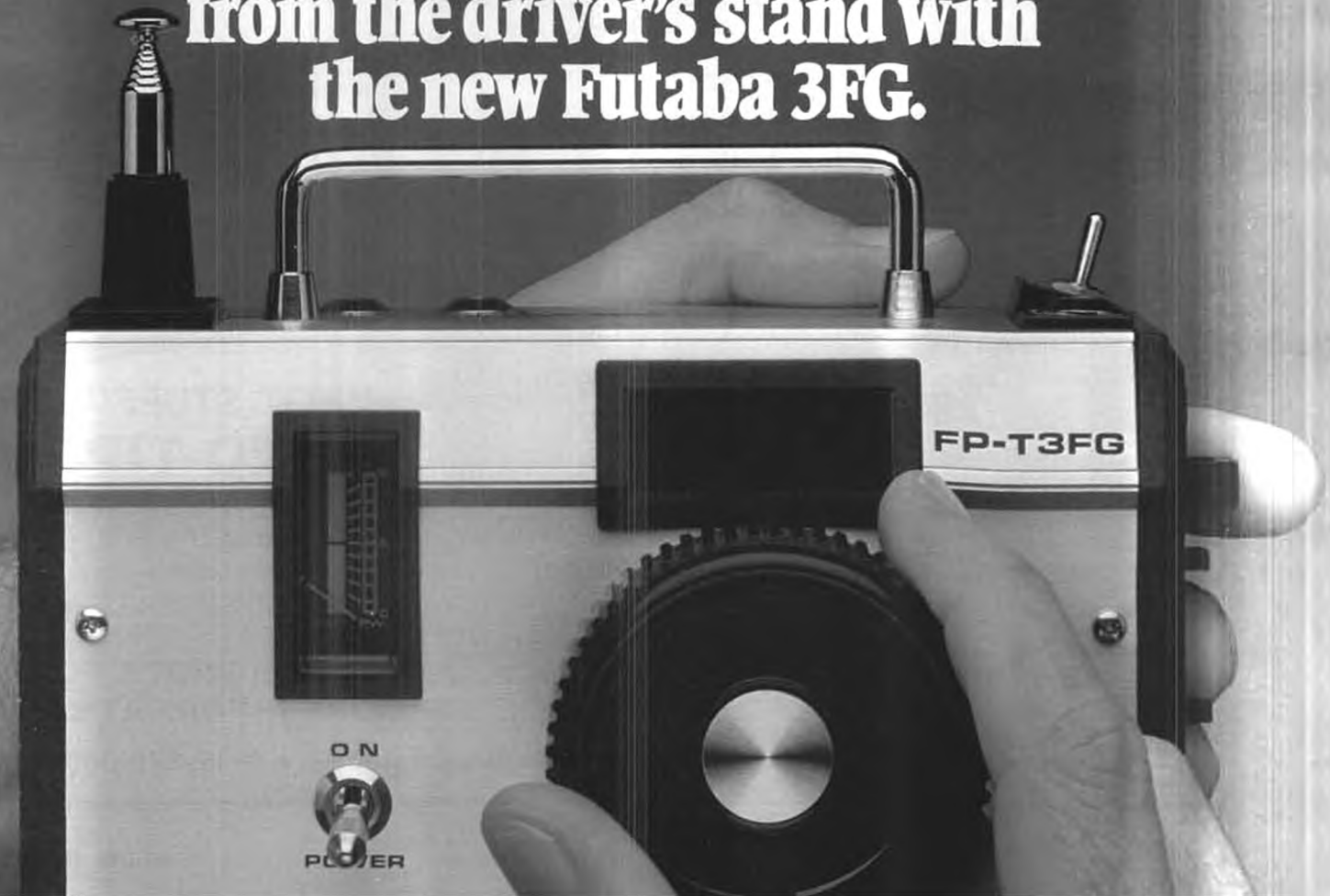

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NEW

Take to the air on the wings of time...

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Reminiscent of days gone by and the original Piper Cub, Top Flite's J3 Cub recalls the grass fields and gentle breezes that spirited thousands of pilots into the sky.

Top Flite's scale, radio control J3 Cub is a faithful replica of the plane that has proven to be an excellent trainer. A large, scale aircraft that flys with .40 engines at scale speeds, it's ideal for the modeler ready to advance to scale aircraft.

The kit offers standard wing configuration or a clipped wing version for more aerobatic response. Outstanding features include: **Exclusive one piece "Cub Yellow" injection molded cowl — Complete, scale, 3 sheet decal package — One piece glass, fibre-filled motor mount.**

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Take off on the wings of time . . . for the time of your life . . . with Top Flite's J3 Cub.

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from Bill Northrop's workbench

• • •

MB's editor built this radio controlled "Bunker Boat" from plans in *Air Trails for Young Men*, Feb, Mar '56. Mechanical switching and electric motors provided reverse, low, medium, high, and stop for the drive motor, full trim left and right rudder, plus on-off lights (that's overkill!), and horn . . . all from a single channel radio! Biggest customer for this full-size fishing boat fleet operating out of Lewes, Delaware, was Revlon!

IT'S ZAIC'S FAULT

Well, he's done it again! If Frank Zaic put out several new books every year, he'd run me out of business. Why? Because he's always kind enough to send me an advance copy of anything he publishes, and when it arrives, I blow hours of deadline time pouring through it page-by-page, unable to put it down until finished, that's why!

The latest Zaic book departs from the norm in two particular ways. One, it is not a yearbook, and two, it is 8-1/2x11 inches in size instead of 5-1/2x8-1/2. This is a compilation of all model airplane articles published in *American Boy* magazines from 1927 to 1934. Appropriately titled "Model Airplanes and the American Boy," it is 160 pages of the beginnings of the model airplane hobby in the United States. For old timer modelers who were just getting their fingers sticky during that period, the carefully reproduced pages from those old magazines pop loose all kinds of memories. For newer modelers, it is like reading a history book of model aircrafting. For modelers of all ages, it is an opportunity to reproduce about 40 model aircraft that made history. Yes, Clyde, model airplanes were flying long before Pirelli rubber, beaded foam, cyanoacrylate glues, four-channel radios, and Schneurle 40s! None of the plans are full size, but enough dimensions are provided for accurate enlargement.

The book should be ready for shipment by the time you read this, and Frank expects it to retail for under $10, though this is not final at the moment. Be on the look-out for his ads, this is a real modeler/collectors' edition.

LIVING HISTORY

Received a nice letter from a modeling buddy dating back to the fabulous Indiantown Gap Labor Day Weekend flying get-togethers of the late 50s and early 60s.

"Dear Bill,

"There are some advantages to living near the east coast.

"As a prime example, we are close geographically to Bill Brown, who is a bit of living history in the model airplane world, as you know.

"I have known Bill personally since about 1962, when I took him on his first glider ride at Penn State and we had a tow rope break at 400 feet on an automobile tow. We were able to get down OK, with safety to spare, but Bill sure remembers that flight!

"Recently, I had the privilege of attending a Regional MECA meeting (Hightstown, PA, April 25) which Bill attended and during which he actually ran his 'one of a kind' first engine, vintage 1931, if I am not badly mistaken.

"Enclosed you will find a picture recording the event. Believe me, the crowd was completely enthralled by the experience!

Yours truly,
Jack S. Conrod"

P.S. The MECA meeting was at Hightstown, New Jersey on April 25, 1982.
P.P.S. Remember Indiantown Gap!

Nice to hear from you, Jack. Some of us were talking at the '82 Toledo show about how great it would be to have a reunion, at the Gap, of the modelers who used to participate in those great Labor Day Weekend affairs.

Bill Brown, running his prototype Brown Jr. at MECA get-together in Hightstown, N.J. Try that with your Schneurle 60! See text.

NOW HEAR THIS!

If internal combustion engines are in any part of your model aircrafting hobby, you **must** read the following, very carefully. It will mean a lot to you.

"Dear Bill,

"This is my bi-yearly soapbox letter.

"April marked my 38th year of playing with toy airplanes, and in the last little while I have run across a sad fact which ties in with my profession (hearing aid specialist): more and more of my buddies are paying the piper for their carelessness.

"In this case, the piper happens to be me . . . I sell them hearing aids. They have done permanent damage to their hearing by listening to our engines without ear protection.

"Exposure to the noise from our engines produces sensori-neural hearing damage. The further nasty fact is that sensori-neural hearing damage is **cumulative** *and* **permanent** *. . . which means that every exposure, no matter how brief, adds to the damage, and once it is*

Continued on page 96

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 Models has recently added Circus Pink and Metallic Brown to its line of 5-inch by 36-inch MonoKote trim sheets. Perfect for field repairs, or making your own decals, too. The back of each trim sheet has various letters, numbers, and patterns printed on it to ease the work of decorating your latest project. Twenty-two different colors, including checkerboard patterns are now available. For the latest catalog and free samples of MonoKote and Fabri-Kote, send your request with $1 to: Top Flight Models, Inc., 2635 S. Wabash Ave., Chicago, IL 60616.

★ ★ ★

Hobby Horn is now handling the complete line of Hal Osborne Scale Plans and Drawings since the untimely passing of Mr. Osborne. Hal's work was well respected by those who just simply collected his drawings or by those who acquired his plans for research and modeling purposes. For a plans list, send 50¢ or better yet, send $2 for the illustrated catalog to: Hobby Horn, P.O. Box 3004, Seal Beach, CA 90740.

★ ★ ★

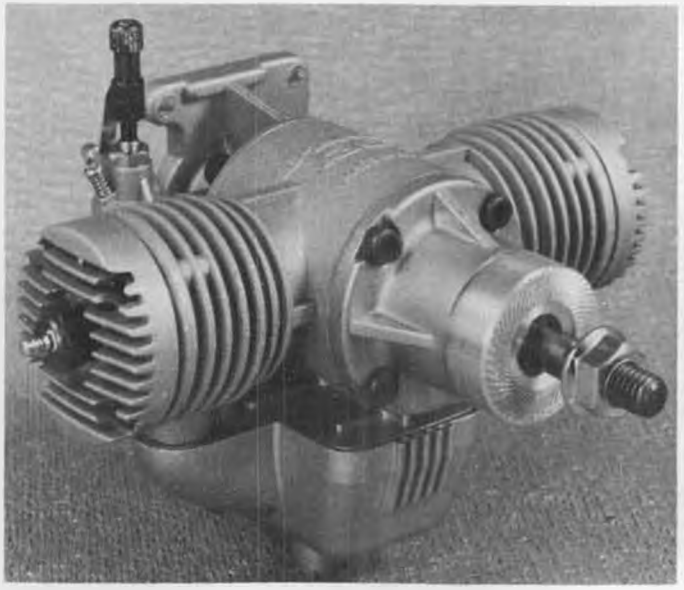
Isensee torque rods from Wilshire Models.

Historic Aviation has just issued its 1982 spring edition catalog, listing many new and interesting books for the aviation buff. *Harrier*, by Francis Mason, derided as impractical, details the evolution and flight tests of this V/STOL concept. Detailing the J-3 Cub? Order the reprint of the original service manual with all the photos and drawings! Books for the Sportplane builder to Antique Plane lovers are all available here. Send $1 for the latest catalog to: Historic Aviation, 3850 Coronation Road, Eagan, MN 55122.

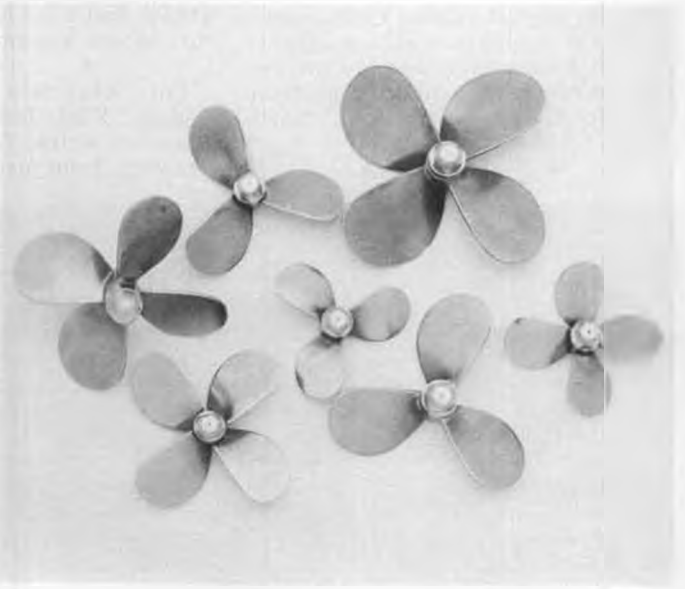
★ ★ ★

Cannon R/C Systems, importers of the G-Mark engine now offers a new .30 R/C opposed twin and a more conventional .15 R/C single. Both engines utilize rotary valve induction, Schneurle

Albritton multifunction valve, from B. B. Brown, Jr.



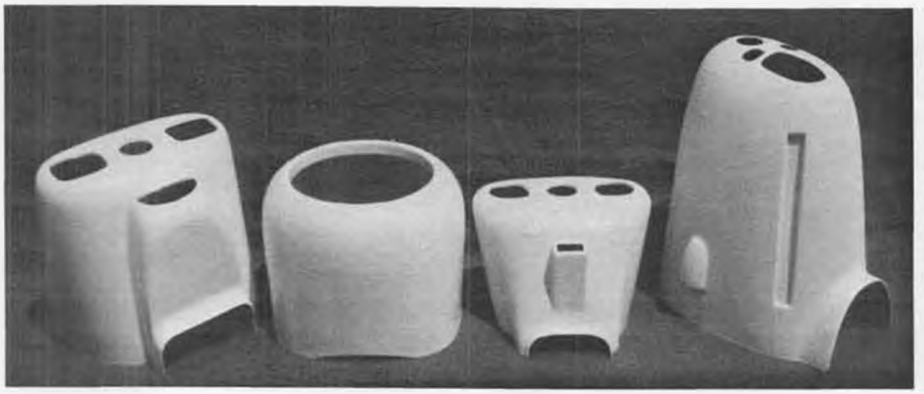
Cannon Electronics' G-Mark .30 twin R/C with integral muffler.



Brass propellers for R/C Scale Boats from Dynamic Models.

Wedge Lock sanding block. Uses sanding belts.

Circus Pink and Metallic Brown Monokote Trim Sheet from Top Flite.



Four more 100% epoxy resin cowls from T&D Fiberglass Specialties.

porting dual ball-bearings, a slide carburetor and integral muffler. The .15 R/C weighs (complete) 6.3 ounces and has a speed range of 2500 to 15,000 rpm. The .30 R/C twin weighs in at a modest 11.5 ounces and will turn a 9x5 prop 2500 to 15,000 rpm. The price is $79.95 and $174.95, respectively. Dealer and Distributor inquiries are invited. Send 75¢ for the complete catalog to: Cannon R/C Systems, 13400-26 Saticoy St., No. Hollywood, CA 91605.

★ ★ ★

Cyro Dyne Specialty Gases has made available a disposable, high pressure steel CO2 cylinder, complete with high pressure valve and appropriate safeties for 'refueling' all existing CO2 engines utilizing loader nozzles available through Brown Junior Motors, Inc. For more information, write to: Cyro Dyne Specialty Gases, 445 State St., North Haven, CT 06473.

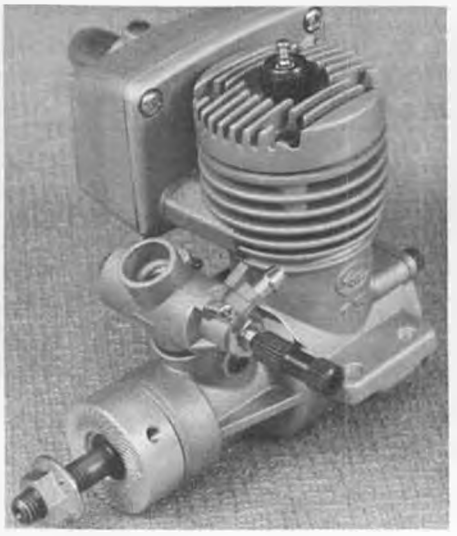
★ ★ ★

If you have ever driven by an excavation or construction site and watched a dragline operator engineer, now you can do so, in miniature! Bud Kahn offers a complete set of plans and instructions on how to build your own, including the console to operate this remote controlled, 1/20 scale model crane and dragline. Power tracks move forward and reverse, the boom raises and lowers and can be swung right and left. The three drum hoist unit is equipped with brakes and it operates just like the real one. Send $1 for brochure, refundable when you purchase the complete set of plans consisting of six sheets of drawings and three sheets of instructions for $19.95. Bud Kahn MB, 1309 Avon Allen Rd., Mount Vernon, WA 98273.

★ ★ ★

For "Replicate Technologium no Endom", Repla-Tech International is the place to write! Available are scale drawings from many sources on many

Quarter-scale Monocoupe 90A, by Ikon N'wst.



Cannon Electronics' G-Mark .15 R/C with integral muffler.

subjects. Drawings, plans, photos, books, and more! The 1982 set of Aircraft catalogs are $2 and a worthwhile addition to any scale modelers library. Available too, are catalogs on ships, sailing vessels, and even tanks and armored vehicles. Send a SASE for prices or telephone (503) 822-3280 for more information. Repla-Tech International, Inc., 48500 McKenzie Hwy., Vida, OR 97488. Dealer and Distributor inquires are invited.

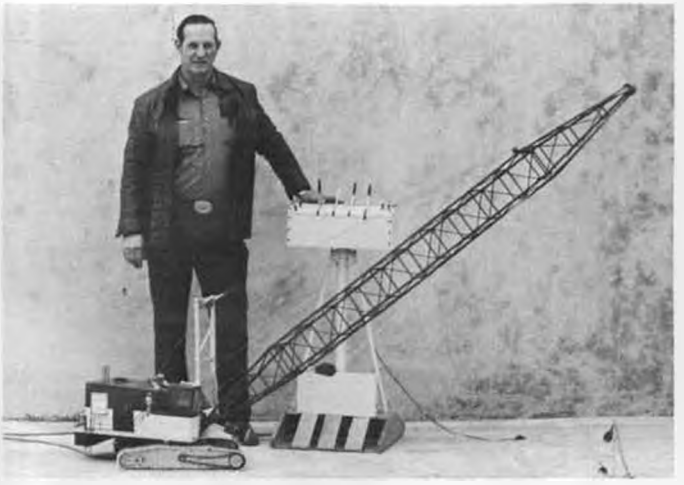
★ ★ ★

A superb multifunction fueling and shutoff valve manufactured in small quantities by J.E. Albritton has now been made available. When refueling under racing conditions, the pressure refueling supply valve depresses the valve stem to: (1) reset the shut-off mechanism, (2) open the tank vent, (3) shut the carburetor fuel feed (to prevent flooding), (4) prime the engine through the exhaust port using an adjustable metering device that gets the prime 'just right,' and (5), the unit contains the carburetor needle valve. Only $60 for a competition proven (2nd place 1980 World Champs in Poland), multifunction valve. B.B. Brown, Jr., 4108 Mason Ridge Dr., Annadale, VA 22003.

★ ★ ★

Art Gross Enterprises has announced the new Wedge Lock super hand sander. Made from high impact styrene, it

Frequency hats from Charlie's Goodies.



Fully operable crane and drag line, from Bud Kahn.

features a press locking "wedge" to release the sanding belt for repositioning or replacement and to lock and retension the belt. Standard 3 inch x 18 inch belts are available in commercial grade cloth belts as well as waterproof belts in different grits. One side is fitted with a cushion pad for that smooth finish while the other side will insure a flat surface or edge. Suggested retail is $4.98, which includes one #80 grit belt and should be at your dealers now. Dealer inquires are invited. Send a SASE for more information to: Art Gross Enterprises, 12516 Maplewood Ave., Edmonds, WA 98020 or call (206) 743-9332.

★ ★ ★

Wilshire Model Center is now importing the well engineered, quick disconnect aileron torque-rod drive units by Gunther Isensee. With more and more high performance sailplane designs incorporating ailerons for more precise control, the two-fold problem of how to actuate them with no flutter and a simple, easy method of driving them while keeping the aileron servo in the fuselage, has been solved. The torsion aileron linkage kit comes with two 38-inch long torque rods, nylon control arms fitted with square, quick-disconnect steel drive pins, plus bushings and clips to complete the installation. Could also be used for ailerons or flaps on large scale models with demountable wings. Suggested retail is $9.95 plus shipping from: Wilshire Model Center, 3006 Wilshire Blvd., Santa Monica, CA 90403. California residents add 6% tax.

★ ★ ★

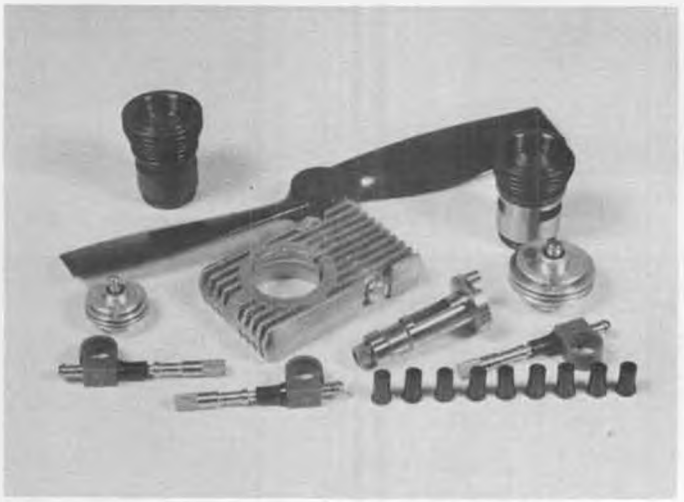
Prevent glitches, wear a hat! 'Charlie' offers a new R/C cap in two high-visibility colors with emblazoned numbers to match your 72 Mhz frequency. One size fits all ('tis adjustable!). Better than flags! Regular $8.95; special $6.50 plus $1.50 shipping, California residents add 6% tax. Specify frequency wanted. Available from: Charlie's R/C Goodies, P.O. Box 192, Van Nuys, CA 91408.

★ ★ ★

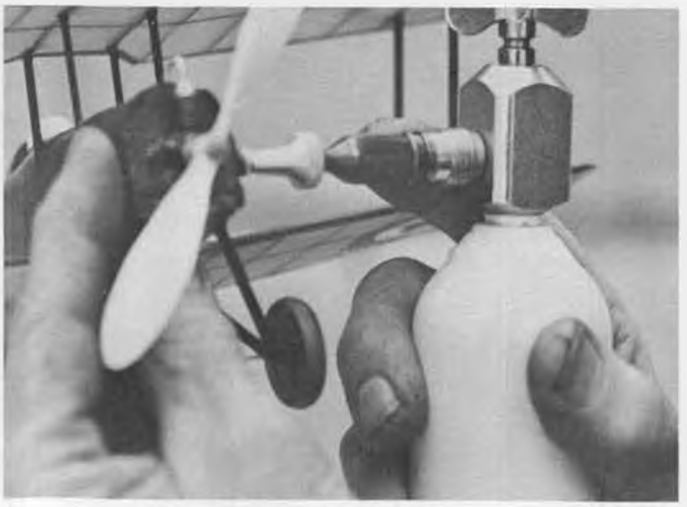
T&D Fiberglass Specialities continues to expand its ever growing line of fiberglass accessory items for the scratch builder. For those who are considering building Roger Stern's big Liberty Sport (Feb 1981 MB) or Bob Upton's Baby Ace (May 1978 MB), T&D has the cowls! Also, cowls for Jim Folline's PT-19 and Dario

Continued on page 64

Hot-wire foam cutting kit, from Bootlegger R/C Products.



Kirn-Kraft Cox engine accessories.



CO_2 charging cylinder from Cryo Dyne Specialty Gases.

Not-yet-finished Andreasson BA-11 by Einar Edland, powered by Tartan Twin on glow.

John Haggard's very attractive quarter-scale Fairchild 22, designed and built by Jerry Heaton. Yes, we're after it!

R/C WORLD

BILL NORTHROP and JOHN ELLIOT

• Would you believe: "Flying is a lot better than talking about it or watching it, practicing *improves* your imperfection!" From the Pioneer Club's *Modulator.*

★ ★ ★

In Dr. Larry Fogel's *R/C Soaring* column in the June issue of MB, an innovative approach to aileron linkage was presented in mock-up form to illustrate how it worked. At a recent QSAA fly-in, Einar Edland of Sweden was showing production samples of this unique "Controlhorn" linkage to be called the 'Swingee' and soon to be marketed in the U.S.A., according to Einar. A super idea for hiding linkage on sailplanes and scale birds, and for enhancing aerodynamic performance and appearance, too. Look for it in hobby shops, soon.

★ ★ ★

The Chapter 3 QSAA fly-in drew approximately 44 quarter-scale birds out for a good airing recently. Talented young John Bashore, Jr. was racking up flight time on his Don's Custom Models 'Scholl Super Chipmunk' and leaving a big, thick trail of white smoke, proving where he had been! A good looking, good flying bird. The boys from Contempo Hobby had a pair of Eagles out spreading their wings under the guidance of Joe Aguilara. Joe later flew Dave New's push-pull Cessna and one high speed pass netted the wildest flutter in the twin booms and stab you ever *saw*, it was that apparent! Why they didn't separate from the aircraft is a good question. Low throttle netted control again of the bird, and back on the ground in one piece . . . Dave? 'Big' Bert Baker had several good flights on his .90 powered P-47 Jug. See page 11, August MB for twin to Bert's. ('tis a tentative MB construction article!)

Was interesting to watch Bob Jones 'arrive' in his converted Greyhound, pulling a trailer (hangar) full of his air force, consisting of a Ryan ST, SE-5, J-3 Cub and Gere Sport, plus an Ercoupe that got lost on the bus, plus a sports car for quick local trips, too.

★ ★ ★

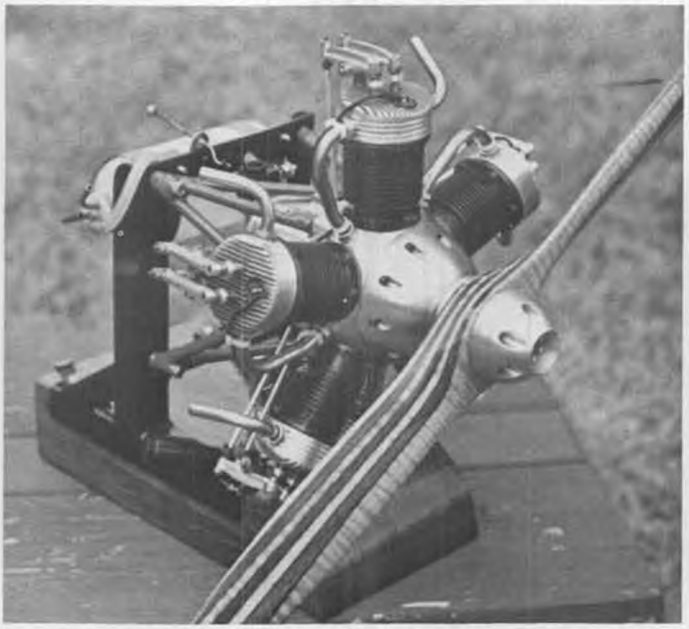
As of late, it's been interesting to note the strong resistance among Expert and Masters class (especially) pattern flyers regarding the current FAI pattern rule proposals . . . One does sometimes wonder where or how some of the FAI's thinking comes about, good or bad. To digress a moment; for years the FAI R/C Scale purist has been saddled with .60 engine limits and 11-pound maximums. This does several negative things, for

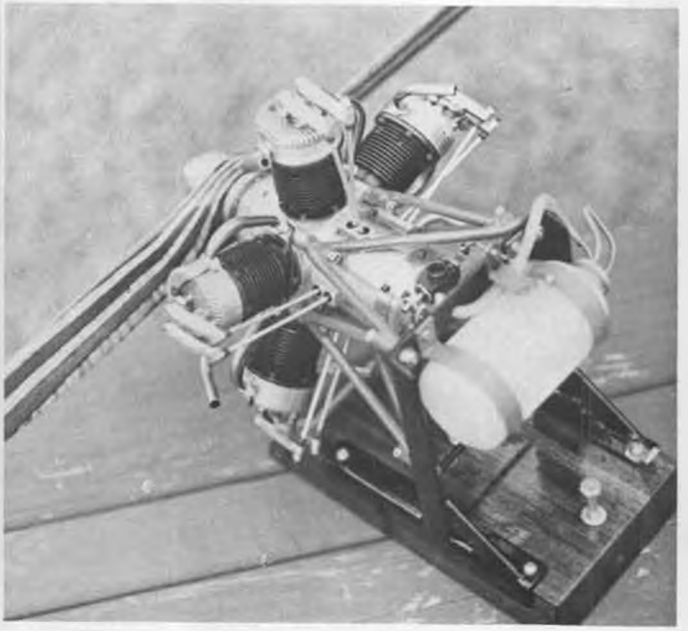
Oh no! A Kawasaki-powered double-size Antic Bipe. Not sure the wheels are big enough. Flies at 20 mph flat out. Weighs 61 pounds! Phillip Kling, Oxnard, CA.

Bashore's 'Munk is 2.4 Kioritz powered, Futaba radio controlled, 26 pounds, smoke.

Pair of Contempo Hobby Eagles, by Dave Henry and Norm Jacobson. Powered by Magnum II's, of course!

John Bashore, Jr., lands his Art Scholl 1/4-scale Chipmunk (with sliding canopy). Looks like tail wheel made it first.





George "Little Toot" Meyer's completely scratch-built 1/4-scale 5-cylinder radial. It's 3 cu. in., weighs 3-1/4 lbs., turns 6,000 with glow fuel. Same valve system as old Kinner, five camshafts and six gears in case, 2:1 gear reduction. Knitting needle push rods with drill rod ends.

Bert Baker's 1/6-scale, Webra 90 powered P-47 "Jug" on a couple of passes. Span is 81 inches. Note tail wheel also retracts.

Yes, it do run! Gets 8 minutes on 6 oz. of fuel. One gallon to completely break it in.

instance, it restricts many interesting and multi-engine aircraft due to small size dictated (two .30's for a twin, as an example) by the rules, which also means a faster than realistic speed. So, we automatically rule out many interesting scale subjects because they can't be made to perform well within these parameters. What's this have to do with pattern? Certain parallels in rule evolution, in most cases, it seems, too slow.

Look at the popularity in Sport Scale; bigger engine displacement allowed, along with higher weights being permissable. Look what has happened to AMA (museum) scale, it's almost dead, and nowhere to go. A good Sport Scale model of today could have won the Nats Scale event eight to ten years ago.

Ten to 14 years ago, slow, thick winged pattern birds were considered as 'it' (mostly in this country) by many pattern types, but the 'Jersey Jim' Martins and the Ted Whites soon proved otherwise with the then faster, smoother styles of flying.

We used to have the arguments about 'C' or 'D' expert, 'D' being the then current FAI pattern routine at the time, and did we need both classes, etc. The troops in the upper classes *generally* have their sights set on the "Masters" and the FAI Champs, but many, even today, wouldn't admit it. If you're going to (or want to) fly international class competition, be prepared for it.

Today, we have pattern birds that spend 60% of their time flying straight and level and performing turnarounds and the other 40% being scored. The new FAI routine, along with being more interesting to watch, does offer shorter flight times, hence possibly more flights per day, and no reason why two flight lines can't be made to work. Would you believe that Mile Square is almost too small for pattern birds, due to the overfly area needed? Another thought for you, and that is that the use of tuned pipe/mufflers gave us a bit more power and helped us through the 'muffler period' of some years ago. The Form I boys still think that black magic is involved, still run open pipes, and don't have too many good sites left to fly from. Several years ago, Quarter-Midget races were held at Mile Square, using mufflers for reasons of maintaining the peace (and a place to fly), and they really weren't that much slower. I often wondered how 'quick' a QM, wearing a pipe, would be . . . Or, a Form 1, for that matter, after all, 'go fast' is the name of that game.

I will agree that the pattern birds of today are fast, smooth, and graceful in flight. Prettner's Dalotel is just smooth and graceful. Speed is impressive in itself, but not really that necessary for precision aerobatics (excuse me, pattern). The current generation of pattern type engines, won't become dust collectors that quick really, but time does

Joe "Zinger Props" Zingali's recently acquired Art Johnson designed P-38L (from MB plans). Kraft single stick radio, retracts, Zinger 3-bladers.

Mr. T&D Fiberglass, Tom Keeling, with his Heath Parasol, from MB plans. Used his Ford Model "A" version of 'glass cowl.

Clean sweep! Daniel Falco, Argentina, won South American, Panamerican, and Argentina championships, all at Cordoba, Argentina.

march on. More modelers would buy the high performance 'torquer' rather than the high performance, high rpm screamer. We hear of long stroke, performance .60's being developed... Handwriting on the wall, perhaps? A high rpm/horsepower engine is usually Schneurle ported, but all Schneurle ported engines are not screamers ... Did the owners of all the Kwik-Fli's cry all that much years ago? Nah, just went ahead built the latest state of the art pattern bird to fly the changing pattern.

An awful lot of emotionalism is being expressed as to why the new proposed FAI thing won't work. Don Lowe has proven that it can and will work. A couple of years ago, Hanno came to 'Vegas' all prepared when the Aresti/Scale-type concept was introduced. Just about everyone else had a scale-type airplane that was sized to pattern bird concepts, but Hanno cleaned everyone's plow, and still is. The boys in this country are still playing catch-up. Wonder what Hanno has up his sleeve for the TOC this year!

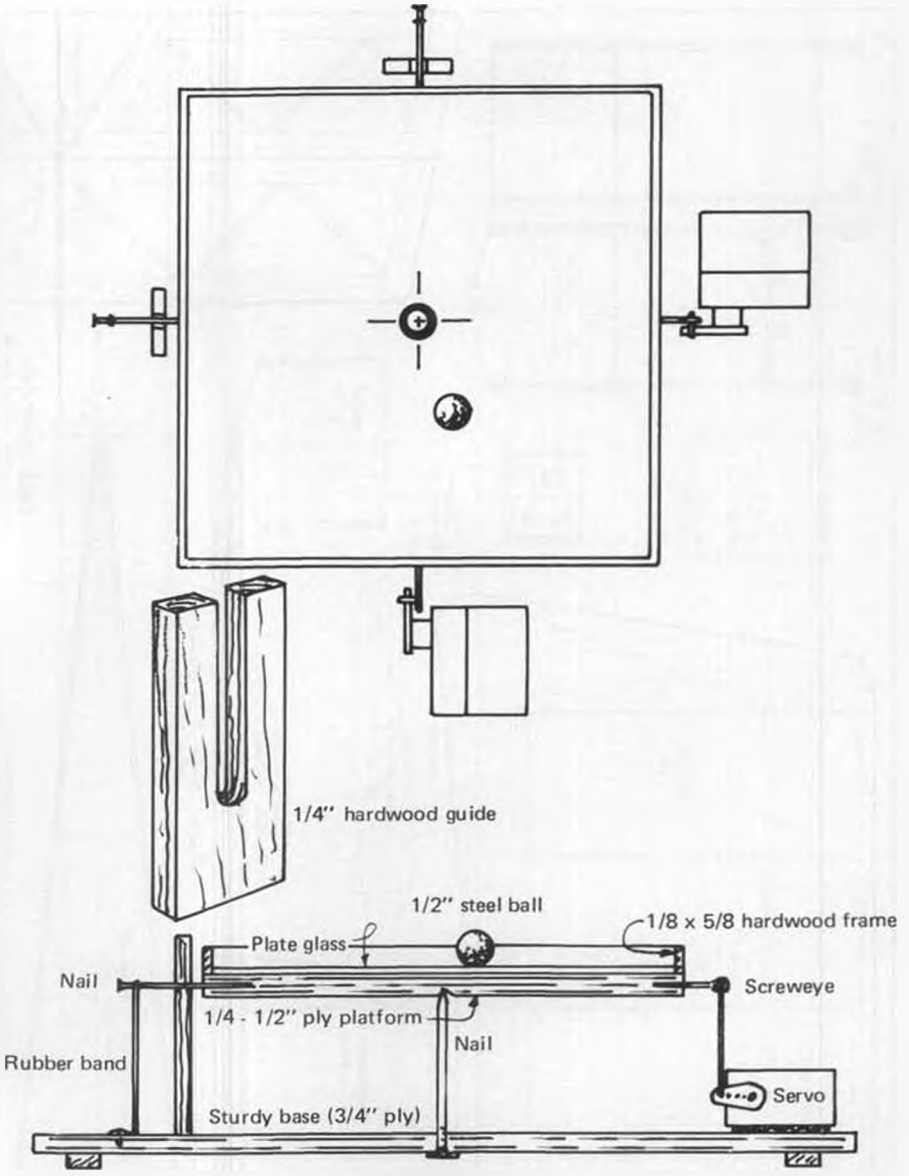
At fly-off in Argentina (l to r) standing: D. Falco, T. Converset, V. Amenduni, R. Ishkanian (all Argentina), S. Pompei (Brazil). Kneeling; M. Watanabe, P. Romano (Brazil).

These thoughts are not meant as a put-down for the design/development process of the current generation of pattern machines as much as they are to expand the thinking process as to where pattern is now, where it may, could, or can, go. Here is an example, and I believe, classic. When the Tournament of Champions was first formulated under the basic sponsorship of Bill 'Circus Circus' Bennett, it was just a gathering of top pattern flyers, with pattern aircraft, flying for some super cash prizes and

Bob Hunter flew his Rossi .65 powered Satellite 1300 at Natl. F/F Champs, Taft, Calif. with R/C cut-off, rudder, and elevator. Had completed over 15 flights, when engine failed to stop. Once nose was down, air loads got too high for control . . . he'll build another.

Angel Maldonado, 2nd in Argentina Nats. Flew on team at Acapulco World Champs.

Marcial Davila, Mexico, and Argentina's Tulieo Converset. More info in text.



Inexpensive servo exerciser! As sketched in HB Model Techniek, from Holland, this balancing game should provide lots of fun while sharpening your touch on the transmitter sticks. If you think you'll get too good at keeping the ball centered, make the glass plate removable by inverting the board, then slip in various diagrams to make the ball travel along various paths. Just corner to diagonal opposite corner in a straight line should keep you busy for a while!

recognition. Some people went to watch. Bill Bennett and Jerry Nelson, in essence, said to hell with the AMA/FAI scale/pattern rules and developed what is now the present 'class' of competition flown at 'Vegas and gaining in popularity around the world. The event has excellent cash prizes, recognition, and tremendous spectator interest, to say the least. The most recent pattern contest at Mile Square had very good contestant numbers, but where were (are) the spectators (yes, spectators are necessary to expand the hobby from a manufacturers standpoint and to help prove, in many cases, the *need* to keep and obtain new fields)? Simply, and unfortunately, pattern flight is interesting only to the contestant and perhaps, another contestant, and quite boring to spectators as there is little or no indentification factor. Witness the crowds of onlookers at a scale contest or uncontest.

★ ★ ★

We hear that the Society of Electric Aircraft Modelers, or SEAM, is growing as more advocates and/or those interested in the world of electric powered flight find out that there is, indeed, an organization dedicated to EMF (electrically motivated flight!). For more information and an application form, send a SASE to: Frank Heacox, c/o SEAM, 11632 Flamingo Dr., Garden Grove, CA 92644.

★ ★ ★

MEANWHILE, IN CORDOBA

Modelers seem to manage to press on regardless of the world situation, even when trouble is almost at their doorstep.

On the 7th through the 11th of April, 1982, Cordoba, Argentina was the site for three concurrent R/C aerobatic championships; the Fourth Annual Panamerican, the 13th Annual South American, and the 36th Argentina National Championships.

Argentina's Daniel Falco, who flew at the World Championships in Acapulco, was first in **all three** competitions. In the Panamerican, Falco was followed by Plinio Romano, Salvatore Pompei, and Mario Watanabe, of Brazil, Angel Maldonado and Mario Somenzini of Argentina, Marcial Davila of Mexico, then Tulio Converset, Vicente Amenduni, and Roberto Ishkanian, all from Argentina . . . to name the first 10 places.

In the South American Championships, the first five places were the same, followed by Tulio Converset of Argentina, Kamoi Tadashi of Peru, R. Galdames of Chili, Tomas Cantore of Uruguay, Jose Luis Rosas of Peru, and Augusto Villar of Uruguay . . . 11 places.

In the Argentine Nationals, the first five places went to Falco, Maldonado, Converset, Amenduni and Ishkanian, followed by Somenzini, Roberto Fornari, Juan Carlos Colombo, Gianluca Fabregues, and Rodolfo Sosa . . . 10 places.

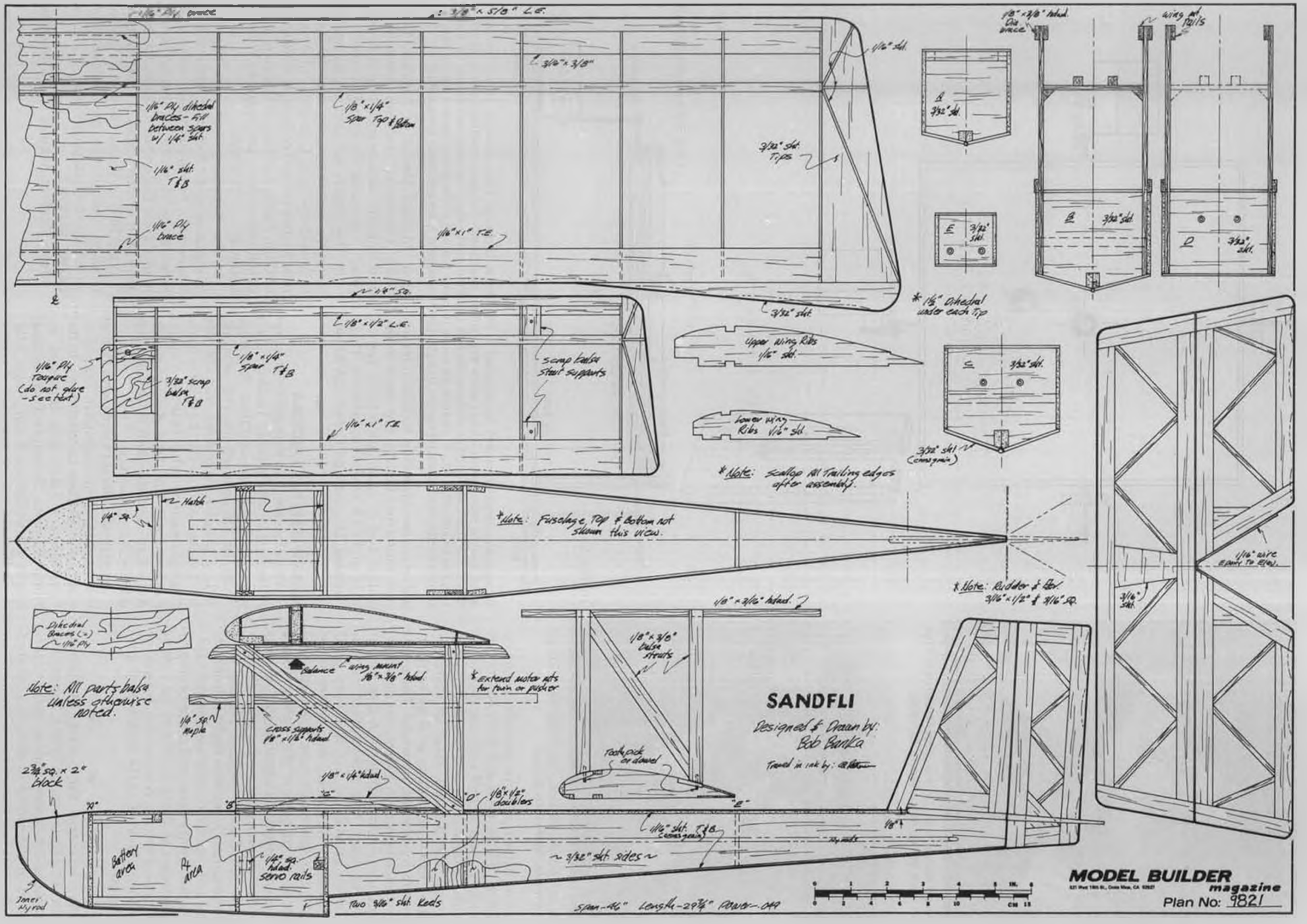
We'd like to thank Hernan Falco for sending the photos and information about these Championships.

COWL REPORT

Tom Keeling, whose T&D Fiberglass

Continued on page 64

FULL SIZE PLANS AVAILABLE — SEE PAGE 96



SAND FLI

By BOB BANKA . . . An entertaining little biplane for one or two 1/2A engines (depending on your flying agility!) that can be built in a relatively short time and requires only two channels of R/C.

Sand-Fli being launched by the author over its natural habitat, the sands of Newport Beach.

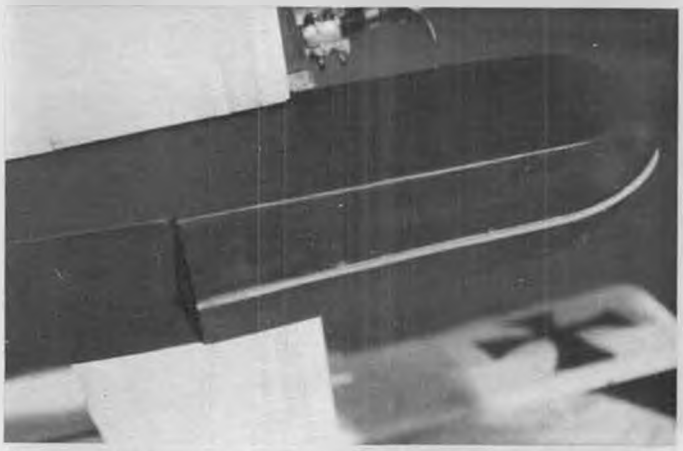
• After living in Canada, Chicago, and Michigan, I finally moved to sunny Southern California and lucked out to end up living on the beach, looking at the Pacific Ocean. Mile Square, one of the state's best known flying sites, is about 20 minutes away, but, being selfish, I wanted to be able to fly in my front yard. VIOLA! the Sandfli came into existence. The motor is out of the sand (dirt, grass, snow, etc. for those of you living away from the beach) its next to impossible to break a prop, and who knows, it might even be at home in the water!

The Sandfli is a highly maneuverable fun plane patterned after the pre-1920s Schneider Cup racers. It is easy to build, and was designed built, and flown within one week. It can fly as well on one wing as with two, with either a tractor, pusher, or twin-engine configuration. Using Cox Tee-Dee(s), it will easily loop, roll, snap, spin, lousy invert, and turn on a dime and give you nine cents change. A young friend, John, who has soloed, did his first snap roll and spins on my Sandfli, and wants to be one of the first to build one.

I like to believe that we build models to fly and not to crash, so keep it light and it increases your enjoyment level; the beefing up comes in the struts supporting the motor and wings as there is very little stress on the balance of the model.

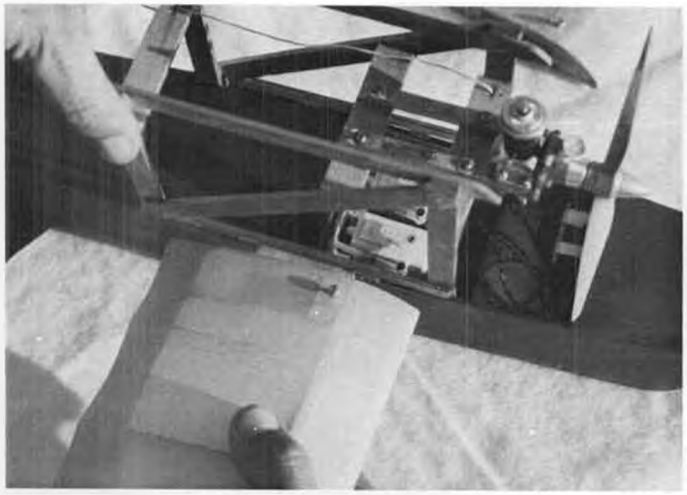
CONSTRUCTION NOTES AND GUIDELINES

Main wing is very straightforward and simple. Trace a rib pattern on stiff cardboard or 1/16 ply. Cut 18 ribs, pin together and stack-sand, clean up notches for leading and trailing edges



A length of inner Nyrod was Hot Stuffed and epoxy resined to "hull" bottom to take the brunt of the sand's abrasive qualities.

Although engine and prop are up and away from the sand, the carpet "pit area" is still a good idea.



Lower wings plug into fuselage, and are supported by top wing and outer struts. Hatch held down by rubber band which holds lower wings in place. Yes, it can be flown without lower wings, but not in front of MB's Editor!

and spars. Cut down two ribs to allow for center sheeting and trim down two more ribs to allow space for dihedral braces in center section.

Lower wing and struts are held in place with bands. Cut 1/16 slot in inboard rib, but do not glue tongue in place until upper wing can be mounted on body. Construct "N" struts so that wings are parallel to upper wing (sand strut bottoms to fit, but don't glue in place until wings are covered. At that point, insert and glue toothpick or dowel alongside of strut to strengthen the joint.) When wing tongues are inserted into body slot and upper wing is in place, all it takes is a couple of bands over the wing to hold it in place. When all is lined up, you can glue the plywood tongue in place on the first and second ribs, beef up the top and bottom at this joint with scrap balsa, and you have a solid attachment for the lower wing. Glue in another scrap of balsa between the two ribs against the ply tongue to receive the screw that will hold the two lower wings to the body with a pair of rubber bands. The screw should be long enough to pass through the balsa into the ply tongue for maximum strength. Leave head exposed about 1/8 inch for band attachment.

Tail surfaces are built up for visual effect and lightness, since they had to be covered anyway (I recommend *not* painting, use iron-on covering). You can make them out of 1/8 sheet of you wish. I used figure-8 thread hinges for ease of installation and freedom of movement. The 1/16 wire elevator joiner was also sewn in place, followed by a drop or two of Hot Stuff and a dusting of baking soda. At any rate, cover the surfaces before hinging.

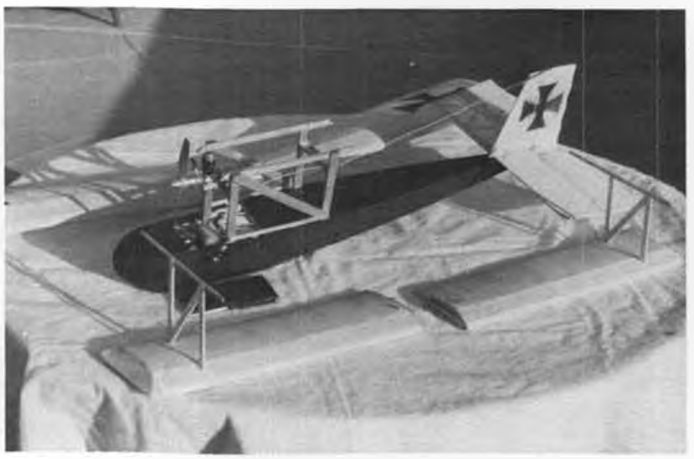
Tank straps to engine rails. Rails may be extended aft for tandem twin power, if you want some wild action.

Body (Hull?): Cut two sides of medium to hard 3/32 sheet. Mark position of formers and particularly the vertical struts. Epoxy struts in place, add doublers and formers. Dimensions are set for a Tee-Dee .049-.051 using a one or two ounce Sullivan tank and a 6 inch prop. If you plan to really go wild with a .10 size, adjust height accordingly to accommodate larger prop and tank. Epoxy the cross supports and diagonal side struts, use triangle supports as indicated, and some good insurance would be to drill holes and insert dowels or toothpicks at junction points to help hold everything together better. Motor mounts of 1/4 square hardwood are bolted in place and tank rests on mounts. If you are adventuresome as I was, you can extend the mounts to the rear to allow for pusher, or twin operation. If you opt for this, recheck balance point, as you will have to add weight to the nose in this configuration. I will warn you that as a twin, the Sandfli goes like a bat out of hell, and maneuvers are quick to say the least.

Ah . . . but what a sweet sound twin Tee-Dee's make, and when one engine

Continued on page 65

Author/designer Bob Banka about to commit a sin . . . flying Sand-Fli with only the top wing. It just doesn't look right!

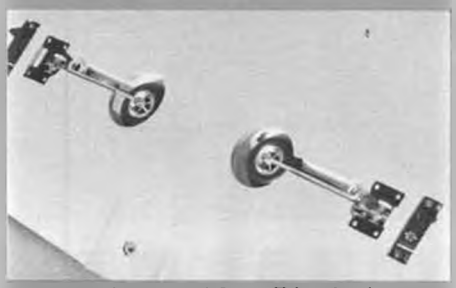


The Sand-Fli broken down for transporting. Construction is simple and rapid.

Pattern Flying

By DICK HANSON

Three setups for retracts and outboard servos, which author favors. This was first attempt. Openings too large.



Changes to improve airflow. Triangle pieces along leg openings, 1/4-inch ply rings added to wheel cut-outs. Also better for Monokoting.

Setup for "tail-dragger". Servos below surface of wing, pushrods exit through large Nyrod tubing. Vinyl tape will seal servos.

• In our last article, we wrote about keeping airframes as light as practical. We would like to continue along this line and share a few more ideas with you concerning lightweight setups.

Also, the future F.A.I. rules dictate changes in airframes to permit rapid speed change and a very broad speed envelope. Here are some of our findings in trying to develop a design which will perform well under the proposed rules.

Photographs 1, 2, and 3 show three methods of setting up a wing for retracts, plus outboard servos. Personally, we are sold on this double servo arrangement.

Photo 1 shows the first arrangement we tried. Photo 2 shows the changes made to smooth up the airflow. These consisted of adding triangular pieces along the gear leg opening, plus inserting a 1/4 inch thick disc of wood in the wheel cutout. The disc was then cut out to provide clearance for the wheel. A secondary benefit is that it provides a deep edge to which the Monokote can be attached.

Photo 3 shows the setup for a "tail dragger." Due to the forward location of the gear, it was necessary to clean things up as much as possible. The servos fit beneath the surface of the wing and the push rods exit through large ny-rod tubing. A piece of vinyl tape will seal the opening over the servo. The openings for the gear mechanism are deep enough to permit mounting the gear at an angle (slanted forward). This allows the wheels to angle forward as they extend.

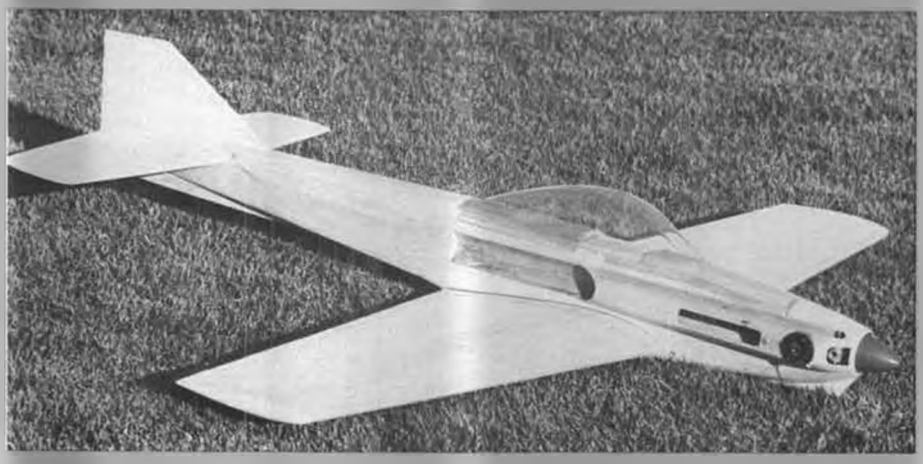
I'm certain the question of gear doors and servo cover doors will be asked, but my findings are that this extra work serves no purpose. If the gear setup is aligned so that the drag is equal on both wings (no sagging wheels) and everything is tucked in as close as possible to the fuselage, the results will be entirely satisfactory.

In Photo 4, we show a comparison of wing planforms. The largest wing spans 73 inches and has 825 sq. inches of area. The next two wings both have 750 sq. inches, but the shapes are very different. The unpainted F.A.I. wing has a fairly thin airfoil by present standards (10%), but we have yet to see any disadvantages or bad characteristics from this shape. The noticeable advantages are extremely low tip weight, which makes for easier recovery of snap maneuvers (no overshoot) and good aileron response at low airspeeds. The latter is also a direct result of the low wing loading on this design (approx. 22 oz. per sq. ft.) An interesting thing about the lightweight/thin wing designs we have noted is that the vertical diving speed does not build up as one might expect. Apparently, the very low weight is the key to controlling diving speed.

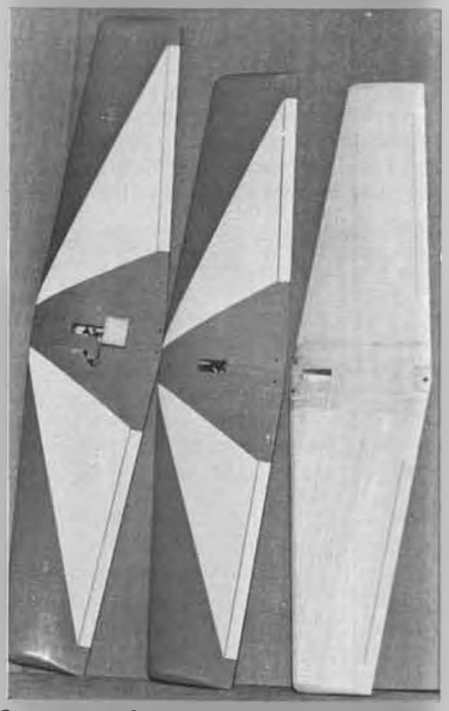
I must again point out that we are working with light wing loadings, and the performance is not the same as we obtained from earlier thin-wing designs which gathered speed rapidly in diving maneuvers.

Photo 5 shows the F.A.I. wing mounted on the fourth fuselage assembly we have tried. The other ones were similar in

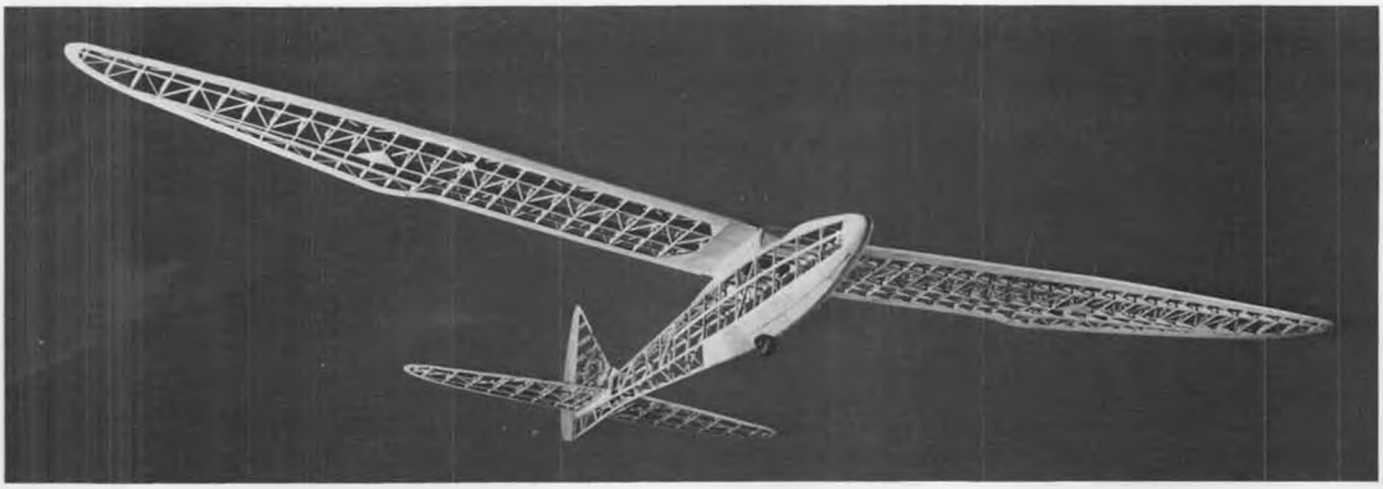
Continued on page 65



Latest complete experimental model appears to be best compromise of desired features, plus looking somewhat like a real aircraft; something lacking in most pattern designs.



Comparison of wing planforms. Largest spans 73 inches, 825 sq. in. Others are 750. Unpainted F.A.I. wing has thin airfoil.



THERMIC 210

By CHRIS VAN DEVENTER . . . The culmination of a 35-year love affair. Take a Frank Zaic-designed Thermic 70, multiply it by three, and you have a Thermic 210. Complete story of the plane on the cover.

• In 1945, the year that World War II ended and the Atomic Age began, I was 17. I had been building model airplanes for seven years and I was becoming more and more addicted to the art.

I had discovered that the best flying, hand-launched gliders were the Jasco Thermic Series. I wanted a larger, built-up towline glider to build and fly; the Jasco Thermic 70 had been on the market a little over a year. It cost $3.50, but I found it on sale at a hobby shop for $1.00. I also purchased a giant tube of Comet Glue for 25¢, for a total investment of $1.25.

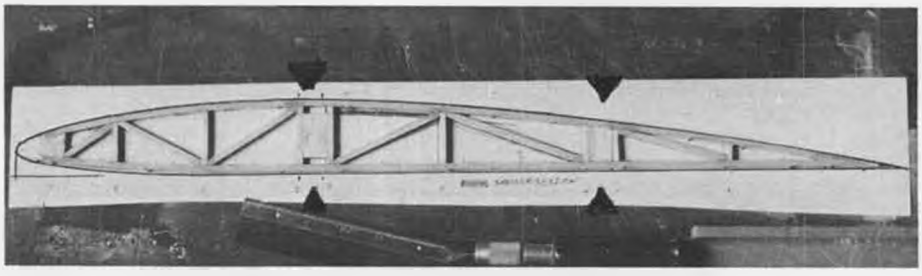
I don't know that any investment has ever given me greater pleasure or more satisfaction. In the next two years, the Thermic 70 logged many hours of flying time. Emergency field repairs were made with toilet tissue and matchsticks.

In 1947, I entered the Thermic 70 in a southeastern air meet in Marietta, Georgia. I put it up with a 75 foot towline and it remained in sight for 8 minutes, 30 seconds before O.O.S. I left the contest feeling bad. I'd missed first place by 5 seconds and also lost a good glider.

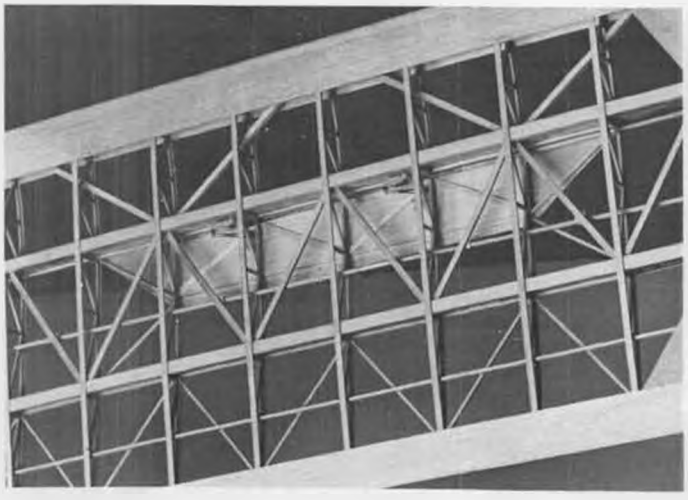
I continued to mourn the lost Thermic 70 until, about two weeks later, I came home from school and found a letter in the mailbox from a farmer who lived about 40 miles away from Marietta. He had found my plane and was mailing it back to me. The crate arrived and I opened it expecting the worst; the remains of the Thermic 70. But the dauntless plane had survived the crash and exposure to weather and was soon aloft again.

In 1948, I put the Thermic in a closet and went away to serve a four-year hitch in the Army Air Corps. In Japan, I discovered photography. It was to be the focus (!) of my life for many years, evolving from a hobby to a career. Model building was more or less shelved, along with the Thermic 70 in the closet (it, by the way, was showing its age and after a trial flight was put back in storage).

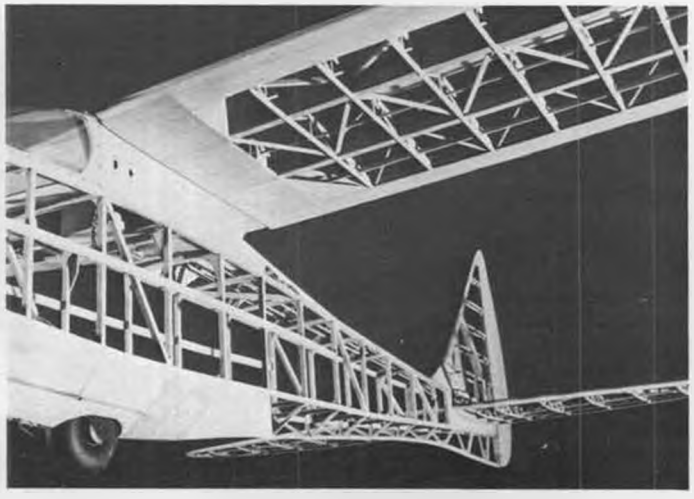
Twenty years passed. One day, rum-



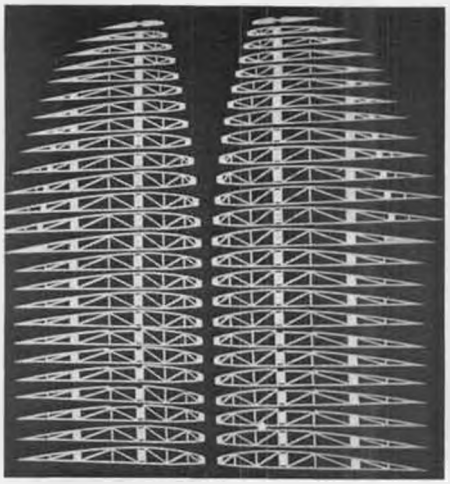
Jig with complete rib. Before gluing in place, notches will be cut to fit spar.



Bottom view of completed wing, showing spoiler section. Very positive, and should not open on tow.

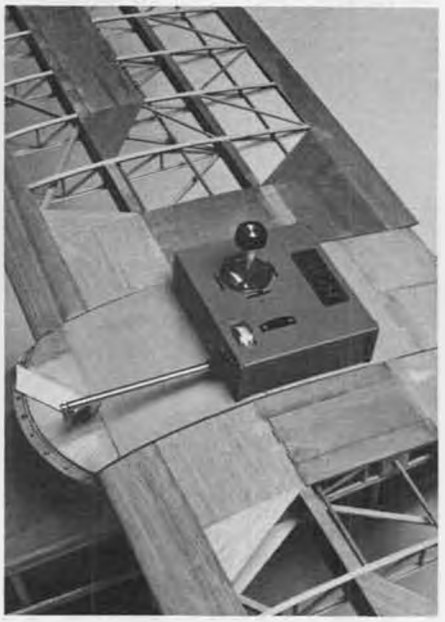


Shot from underside showing multitude of bracing and cross bracing. Keep in mind . . that's a 5-inch wheel.



Completed sets of wing ribs, minus root rib. Nineteen pieces to each rib.

KPS-16H servos on elevator and rudder. KPS-14's on ailerons and spoilers. Count 'em!



Yes, Clyde, that's a full size Kraft series 75 transmitter.

maging in the closet for something else, I came upon the Thermic 70. By now it was ancient, a nostalgia item, with its rotten wood and doped tissue that was cracking and peeling. A sad sight . . . and I had a hunch if I gave it a real goo d look, it would disintegrate before my eyes. But I couldn't let such a beautiful thing die.

I got a large roll of graph paper and, using a photo enlarger, I drew from the original model a set of plans (not knowing I could get them from John Pond) and built an R.C. version of the Thermic 70 with KPS 18 servos, two-channel receiver and battery.

The silk-covered model weighed one pound and flew like a dream.

Then a friend crashed his Thermic 50 and one of the wing ribs was crushed beyond repair. Doc Van Deventer sliced a popsicle stick into 1/16 inch strips and made a built-up rib, and the Thermic 50 was airborne again.

And I got to thinking, what if a glider had all built-up ribs. . .

It was the beginning of a big idea. And I was hooked on model airplane building again.

Building the Thermic 210

Plans for the Thermic 210 were drawn from the plans for the Thermic 70. Everything was enlarged three times. What was 1/8 inch on the Thermic 70 was 3/8 inch on the Thermic 210. Wing ribs were enlarged and reproduced photographically. The new plans had new rib spacing because the spacing on the old plans was too far apart.

I had a lot of work ahead of me and I was looking forward to every minute of it.

Stabilizer

To make sure that I could handle the construction, I built the stabilizer and elevator first. I used an NACA 009 symmetrical airfoil. Litho negs copied from an old *Air Trails* were enlarged to match each station on the stabilizer.

Each print of each rib then had to have lines to indicate the placement of the 1/8 inch balsa diagonals, uprights, top of rib, bottom of rib and spar placement. The construction of the stabilizer ribs went smoothly with two ribs to each pattern.

The stabilizer spars were made by laminating 1/8 inch basswood on each side of the 1/8 x 1/4 balsa. These were fitted into the notches on the top and bottom of the ribs. The tips of the stabilizer wre laminated (see photo). The leading edge of the stab was aligned and glued on. The leading edge of the elevator was planked with 1/16 x 1/8 balsa. A 1/16 inch trailing edge sheet was glued on the top and bottom of the ribs.

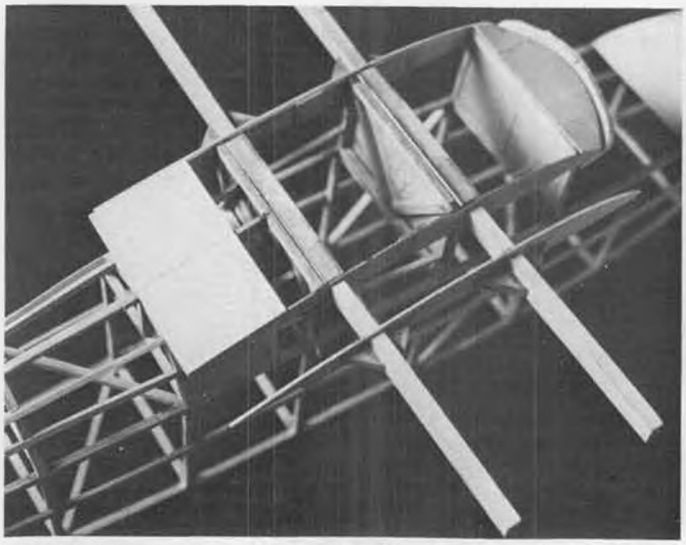
The ribs were cap stripped with 1/16 x 1/4 balsa. Hinges were glued in place and the stab and elevator were ready for sanding and covering.

Fuselage

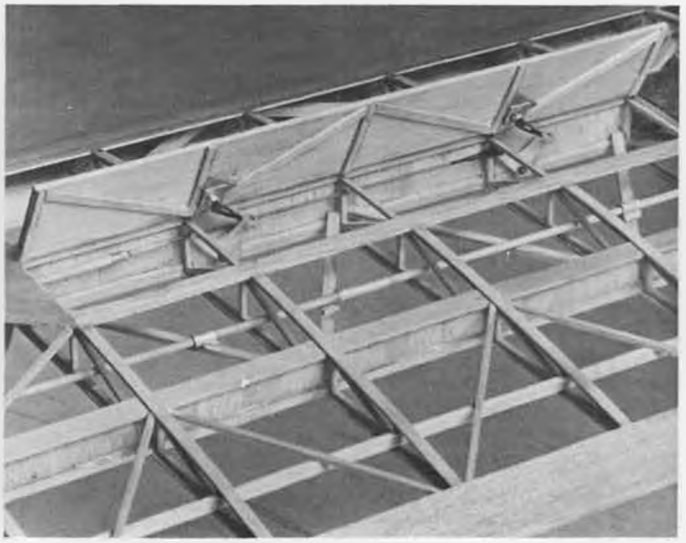
I used basic box type construction out of 3/8 inch square hard balsa. Since the balsa was not long enough and had to be spliced, I used long diagonal cuts to ensure there would be a large enough glue area for strength

After completing and aligning the box, the top formers were glued in, the top of the nose was planked, and the nose block glued on.

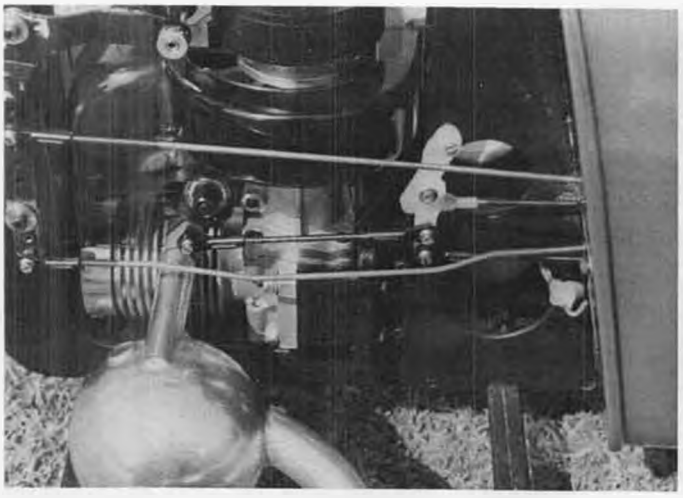
Continued on page 68



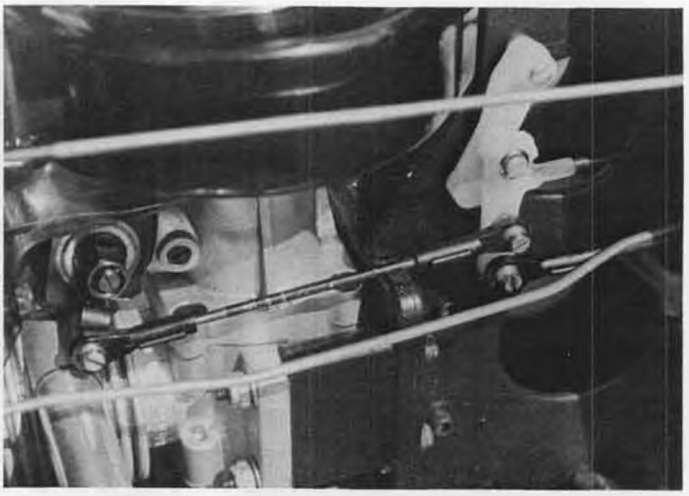
Root rib and spar plugged into fuselage. Note 1/8 plywood bulkheads for wing center section.



Spoiler in open position. Control rod goes direct to servo . . no springs, rubber bands, etc. Well thought out.



Overall setup of Quasi-governor, discussed in text. Modified bell-cranks are key to linkage required. Basically a mixing unit.



Quasi-governor (sounds like a derogatory political term) in idle position (feet on desk?).

CHOPPER CHATTER

By RAY HOSTETLER PHOTOS BY THE AUTHOR

• This month is going to be specifically for advanced intermediate to expert pilots in application, but for everyone in theory.

But before I start I'd like to make some comments on past and future material in the column. First, I'd like to thank those of you who have called or written in response to the previous columns. Your support is appreciated. I must apologize to those of you who felt that some of the articles were too difficult to understand. I try to make you think about it in theory and then apply it to actual modeling. (I think one of the best series illustrating this philosophy was the set of articles on blade balancing.) If something is not clear to you, or you'd like to see a particular subject discussed, please drop me a note and let me know.

Also you are most welcome to send in hints that you have found useful, or black and white photos of your latest helicopter. I'd be happy to expand the column to include more of this general material. Just write to me c/o *Model Builder* Magazine, as my address changes a lot lately and MB should know my current address. I hope to hear from you soon.

This month will be the last of a series of "technical" articles. In the months to come. I hope to cover some of the basics of helicopter flight, set-up, and trimming.

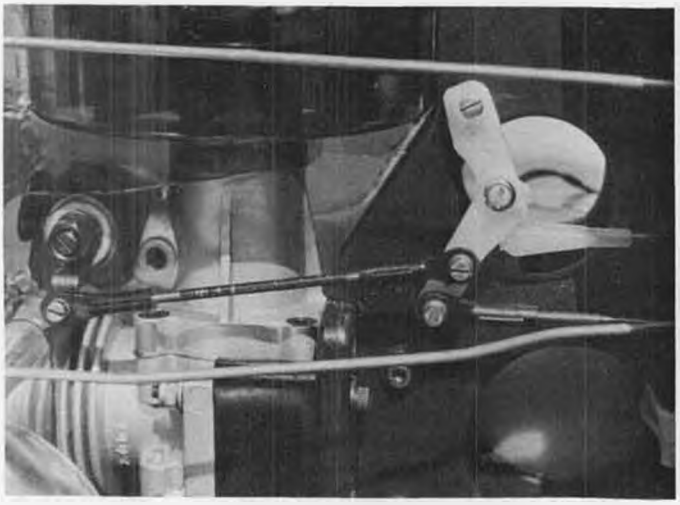
For now, an expose' on governors, and a specific design of a mechanical way to hold your rotor rpm as constant as possible.

The definition of a governor is simple. It is a device used in collective pitch helicopters to maintain a constant rotor speed in all attitudes, ascents, and descents. Flying a governor controlled machine is a pure pleasure. Control feel is the same in all areas during flight. For instance, you don't have to put in extra cyclic control during descending turns as you normally have to when rotor rpm decreases to come down. And collective control is more precise because lift is directly regulated by blade angle.

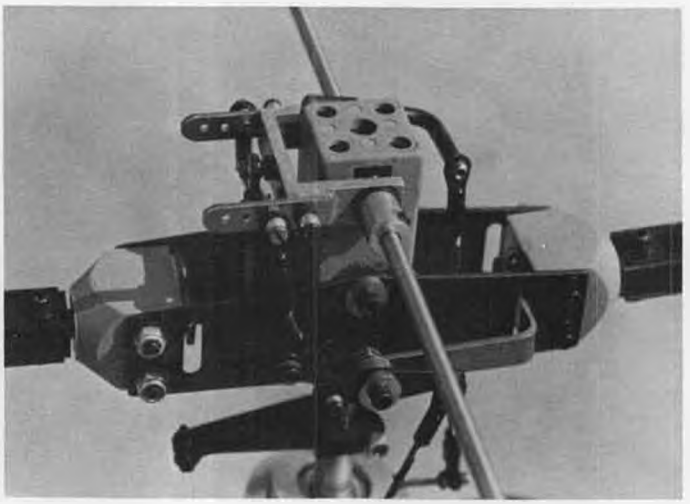
On top of these advantages, I feel the main advantage offered by a governor is the ability to descend quickly and smoothly in any amount of wind.

COLLECTIVE NOT ENOUGH

Even with a collective pitch machine, collective pitch is half the answer. Why? Well, as you start to descend to a typical approach from forward flight, collective pitch comes out, and throttle decreases. This is O.K. for slow, shallow descents



Q-G in lift-off position. Pushrod on inner arm has been pulled forward, adding enough throttle to go from idle to lift-off.



With rotor speed more constant, you'll need more collective throw for crisper response. Extension arms added to author's Super Mantis.

with no wind. When you really want to come down quickly, or come down with a strong wind, you have to come way back on throttle/collective to get the desired response.

Most all of the collective will come out. This is good as it gives loss of lift. Unfortunately, most of the throttle comes out too, and herein lies the problem. As you pull the throttle/collective all the way back, the rotor speed wants to *stay the same*, or maybe even *increase* at times, while the throttle is being pulled back to an *idle*.

To regress a bit, most of you probably think in terms of the engine controlling rotor speed. During the descent period, all of this turns around and now the rotor is trying to control the engine.

And it succeeds in doing so. In other words, during the quick descent, the throttle barrel is nearly closed, yet the rotor demands the engine to run at an rpm which would ordinarily be closer to one quarter to one half throttle.

Because of this condition it becomes a trick to set the idle/midrange adjustment correctly. Tune for a smooth idle and descents may be rough, or vice versa. Therefore the second advantage of a governor is that it allows the engine to stay open as necessary during descents. The rotor speed and the engine no longer fight each other.

GOVERNOR HISTORY

A few years ago, Al Irwin designed and produced an electronic rpm sensing governor, the Tach-Tron. It "read" revolutions of the rotor shaft from a wheel attached on the main shaft itself. As the governor detected increasing or decreasing rpm it would close or open the throttle servo as necessary to hold the specific rpm you had set up.

The unit worked very well but it never really had the popularity it deserved. One of the reasons was that it was a little too sophisticated for the average guy to set up, install, and adjust. And if you weren't careful and set your engine too lean, the governor would open the throttle as the rotor speed dropped off, aggravating the overheating engine.

A powerful engine has always been a necessity for a helicopter, and I would really stress this point for those of you just getting into R/C helicopters. Buy the best engine you can get for your particular helicopter, you won't regret it. (Your local experts will be happy to advise.)

Anyway ... with the Tach-Tron, a powerful engine was definitely needed. For instance: If given a quick vertical ascent, the rotor speed would fall off just slightly until the governor picked up the rpm loss. Then the engine had to have enough power to bring the rotor speed back up, and then continue to keep the rotor speed for the rest of the ascent.

This last example can be compared to driving a car and seeing a steep hill ahead, but not adding gas until you've started to slow down on the hill. Then, unless you have a powerful automobile, it's too late. Even with the pedal "floored" the car will not regain speed. It will continue up the hill at a slower rate. I'm saying that a true governor can't anticipate a climb. It can only compensate once it has started the climb.

AN ALTERNATIVE

What I am showing you is something I'll call a Quasi- (false) governor. It is not a governor in the true sense of the word, but it does everything very similar to a true governor.

The Quasi-Governor even has a few advantages over a governor. Because it is a mechanical unit it has no "lag time" where the engine falls behind blade speed and has to catch up. (As collective is applied throttle opens up at the same time.) And if you should be unfortunate and set your engine too lean, the Quasi-Governor will not open the throttle more and make things worse.

The basic approach to the Quasi-Governor has been developed from my experience and desire to have a relatively simple unit. You need an auxiliary lever or switch on your TX, an extra servo, and two 90 degree nylon bellcranks (Airplane aileron style, I used Kraft. . .).

QUASI-GOVERNOR INSTALLATION

Photo #1 shows the overall set-up as it is installed in my Super Mantis. One arm of each bellcrank is cut off, leaving only the bushed arms that you see. The inner "bellcrank" is screwed to the side-frame, or any solid mounting area you might have on your ship. The pushrod from the auxiliary servo runs to the bottom of this arm.

Then the outer bellcrank is screwed to the upper hole on the inner bellcrank. The throttle pushrod runs to the bottom of the outer bellcrank. The upper hole on the outer bellcrank runs to the throttle barrel itself.

OPERATION

Essentially the whole thing is a little mixing unit. Photo #2 shows the unit at idle. As the auxiliary lever on the TX is advanced to lift-off rpm, (flat pitch-collective full low), you get photo #3. The only thing that has happened is that the pushrod on the inner arm has been pulled forward. This adds enough throttle via the mixer to go from idle to lift-off rpm.

As you increase throttle/collective

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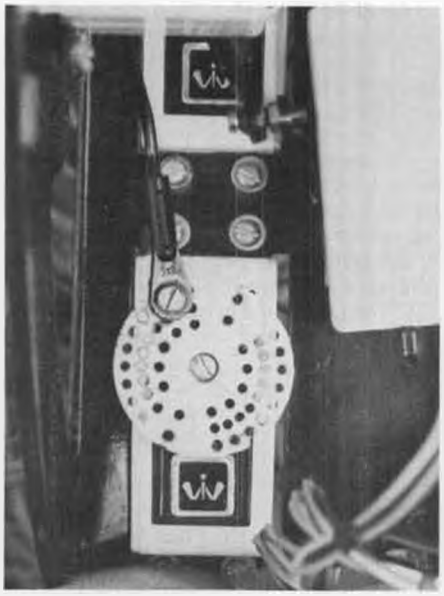
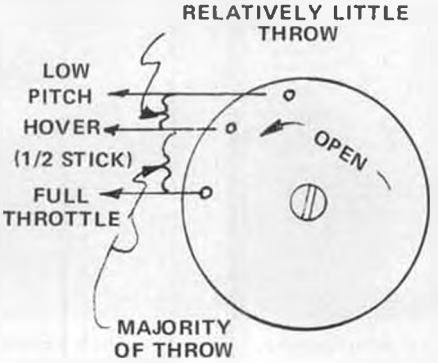
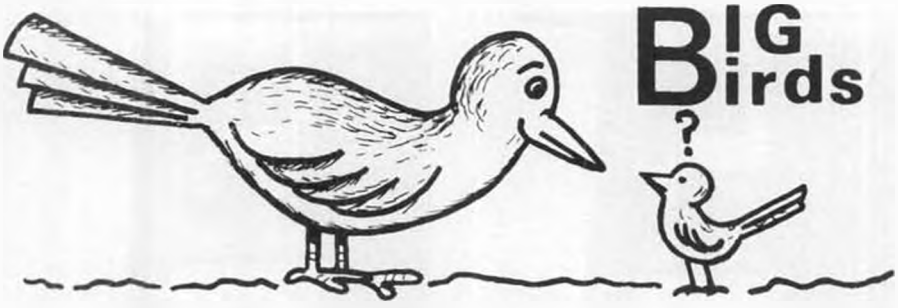


Photo illustration of Fig. 1 below. Throttle arm positions shown for (l to r) idle, hover, and full open. Check this against the sketch.



Interior shot of Bob Hamilton's Decathalon. Note leather seats, charts in side pocket. Flies as good as it looks.

Interior of Randy Getchell's J-3 Cub. Makes you feel right at home. Both photos by Randy Getchell.



• Thought you might be interested in this little collection of stability relationships authored by Gregg Lovick, a member of the legendary 114th R/C Auto Squadron based in Grapevine, Texas. This list should be good for sorting out new BIG Birds, winning bets . . . and wrapping fish.

1) Raising the thrust line with respect to the airplane's CG . . . either by raising the engine or adding downthrust . . . increases pitch stability.

2) High wing airplanes have better pitch stability than low wing planes if you fly at high angles of attack; the reverse is true at low angles of attack. This is why slow trainers use high wings and fast birds use low wings.

3) Changing the angle of the horizontal stab has *no effect* on pitch stability. It *will*, however, change the speed at which the plane tries to fly (don't try to argue this with me until you've checked it out).

4) Moving the balance point forward increases pitch stability, but going too far can cause other problems.

5) Increasing the size of the tail surfaces generally improves stability.

Increasing vertical fin size can cure "Dutch Roll" (tail wagging), but adding too much fin without also increasing the wing dihedral can cause "spiral divergence" . . . a tendency to roll out of straight flight into a tightening spiral dive.

6) Birds with the prop up front are more stable when the engine's stopped.

7) High wings and swept wings have a greater effective dihedral. More dihedral helps roll stability, but watch the fin size (see #5).

Drooped stabs (now popular on pattern birds) decrease the total effective dihedral, unless you fly faster than the speed of sound (this I gotta see).

8) Long, skinny strakes, usually blended into the vertical fin (a la Cessna 172), are effective at high yaw angles and work well as an aid to quicker spin recoveries.

Horizontal strakes *(see Tiger Moth wcn)* aid stall recovery; and not too surprising that strakes will also ruin snap rolling capability.

9) The entire aft fuselage contributes to effective tail area. "Box" fuselages contribute more than rounded ones do. Fuselage area ahead of the balance point is detrimental to stability. Adjusting the relative depth of the fuse at each end can cure roll and knife edge problems.

Well, there you have it . . . the makings for some good arguments. Let's hear how you feel, especially if you're violently opposed . . . and why. And if you don't know enough to ask any questions . . . ask them anyway; that way we can all learn something.

J-5 Enterprises Stinson, Quadra powered, with (l to r) John Pasersky, Bob Palmer, and Charles Bevilacqua, at Philly Navy Yard.

Tony Della Vecchia and his Quadra powered Big Stick, at Philadelphia Navy Yard. Member of Flying Squires club.

Robin McGeorge, Dallas, put a lot of detail into his Cessna Skyhawk from Parker kit; all lights, Fowler flaps, air brake.

Super Sun Ray by Ron Magnum. Plans available. See text for info. This one is Kioritz powered.

RESPONSIBILITY

It's a big word, with an equally big meaning. Unfortunately, too many of us shirk ours . . . or try like hell to ignore it.

Because our BIG Birds can be so lethal, on the ground as well as in the air, ignorance can never be bliss . . . and an uneducated R/C type is bad news for everyone, including himself. And when an accident does happen, everyone in the hobby is adversely affected . . . be he flyer, builder, hobby shop owner, manufacturer or distributor. So, in a sense, we all have a vested interest in seeing to it the SAFETY IS ALWAYS THE PRIME CONSIDERATION.

What got me onto this "safety soapbox" was a situation I ran into a few weeks ago while browsing through a hobby shop and noticing a completely framed-up Balsa USA Cub for sale. This bird had been built stock, which in this case was appalling since it had a 3.7 Roper bolted to the firewall. Like so many of the earlier Nosen kits, this Balsa USA kit was not designed to stand up to the pounding and vibration of a gasoline engine; it needs a lot of reengineering and beefing up before it's suitable for anything else other than a methanol burner. And yet there it was, hanging in all its stock naked glory, just waiting for some unknowing and naive neophyte to make it his entry into our beautiful world of BIG Birds.

Having been into biggies, the hobby shop honcho was well aware that he had a time bomb hanging there. He knew the Cub's airframe was indequate for that big gas engine, which meant that the poor unsuspecting buyer would probably get a face full of running Roper . . . or that innocent spectators and/or other flyers were gonna have to dodge pieces of falling airplane or a whole, uncontrolled BIG Bird shortly after takeoff. But he preferred not to get involved since the Cub belonged to someone else and he was trying to help get it sold by letting it hang in the shop.

By nature I tend to be an emotional gut-reactor, and this particular situation made me about as angry and frustrated as I care to get. I did try to contact the guy who built the bird, but found he was away for a while . . . so in order to feel like I was doing something constructive, and since I felt very strongly that the end fully justified any means, I restored to bad-mouthing that Cub as often as I could. The odds are that even if whoever buys it doesn't hurt himself or anyone else (only by some miracle), the imminent destruction of the plane, engine and radio will convert him into a stamp collector or an inveterate boob-tube watcher pretty damn fast.

There's no taking without some giving back; so those of us who have our heads screwed on right *owe* our hobby whatever time and effort it takes to keep the aforementioned kind of prostitution to a minimum. We can't let a few idiots, or money-hungry hawkers, ruin it for everyone else . . . because whatever ground we lose will be lost forever, and we're liable to find ourselves squeezed out of existence.

ARE WE BLIND?

I just can't believe the kind of idiotic thinking that goes on within the AMA. For an organization that keeps telling us how important safety is . . . *and it is* . . . they come up with rules and standards that are directly opposed to good safety practices. They've set us up for a bad fall, and the incredible part of this is that we're thanking them for it. Are we blind??????

What I'm specifically referring to is the recent change made to AMA standards for BIG Birds. Because of an enviable safety record these past few years (in spite of all the dire predictions by so-called "experts"), which was due largely to the IMAA mandatory airworthiness inspection and insistance upon absolute safety, the AMA made it legal to use engines up to, and including, a displacement of 4.44 cubic inches.

Fine! I applaud that decision because it gives us "a little more room to work in." But I'm also glad that no aircraft weight limit was set because that in itself would mean nothing. What we do need, however, is a maximum allowable wing

Continued on page 69

Another shot by Randy Getchell of his J-3 and Bob Hamilton's Decathalon. Lots of realism there.

The Ultimate ego trip? Read about it in the text.

FUEL LINES

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

PORTING

Following through with one of the closing comments from the August column, the subject this month is porting. In a two-cycle engine, the fundamental purpose of the ports is to enable fresh fuel-air mixture to enter the combustion chamber, and after burning, to let it escape. The intake and the transfer (sometimes called bypass) ports accomplish the former. The exhaust port is the escape door for the burned gases. I'm not trying to be nonchalant by using the term door. Window is another good word to help in understanding ports. Doors, ports, and windows all can be opened to let something in, they can be closed to keep it in and to keep other things out, and they also can be opened to let something out.

Similarly, in four-cycle engines, there are intake and exhaust valves. They perform the same functions as two-cycle transfer and exhaust ports respectively. There is no door or window on a four-cycle engine that corresponds to the intake port of the two-cycle. This is also a logical place to add that I will not deal with two-cycle intake ports in this article. It's simply too much to try to adequately explain all three ports in one column. Although it may seem like putting the so-called cart before the horse, I'll describe transfer and exhaust ports this time. Their operation is controlled similarly, and they are what people usually first think of when ports are mentioned. Next month, it will be the intake system and ports.

BASICS

Why are the ports on a two-cycle engine so important? An oversimplified answer is that they must be about twice as efficient as the valve system of a four-cycle engine. The cycle of a four-stroke engine begins with the piston at the top of the cylinder and the intake valve open. As momentum moves the piston on a down stroke, pressure inside the cylinder is lowered, and a fresh fuel air mixture is pushed past the intake valve by the higher outside pressure. Next, as the piston begins an upward stroke, valves are closed and the fresh fuel/air mixture is compressed. Near the top of the compression stroke, the mixture is ignited and burns. Burning raises the temperature and pressure, and the piston is pressed downward on a power stroke. At the bottom of the stroke, the exhaust valve opens, and the momentum from the power stroke carries the piston upward, thereby forcing the burned gases out through the exhaust valve. At the top, the exhaust valve closes, the intake valve opens, and another four-stroke cycle begins. Thus, burned and fresh gases are physically separated. Since the former cannot contaminate the latter, the effect will be a good burn and power stroke. Unfortunately, this tidy arrangement is at the expense of only one power stroke for every 720 degrees of crankshaft rotation and about three times as many moving parts as the two-cycle engine.

On our two-cycle engines, there is a power stroke every 360 degrees of crankshaft rotation. The movement of the piston opens and closes the transfer and exhaust ports, thereby significantly reducing the number of moving parts. It is simple, lightweight, and produces a lot of power, although it is quite a bit noisier and less fuel efficient.

However, as we shall see, the high performance of the two-cycle is very much dependent upon the efficiency of the ports. During the latter part of a power stroke, the piston uncovers the exhaust port(s) so that the burned gases can escape. Very shortly thereafter, the piston unmasks the transfer port(s) to allow a fresh mixture to enter the cylinder. This exchange is often referred to as scavenging. Technically, clearing the burned gases is scavenging, and introducing fresh gases is charging. However, since the latter aids the former, the single term scavenging is commonly used. The piston then moves upward on a compression stroke, and another cycle is ready to begin. Neat, huh? Unfortunately (again), all of the burned gases don't clear the cylinder, and still worse, some of the fresh incoming gases scoot out through the exhaust. The greater the degree of these two unwanted happenings, the less power the engine will produce. That is concisely the paramount problem for two-cycle design engineers. All they've been trying to do since the later 1800's is design transfer and exhaust systems that would clear out all burnt gases with no loss of fresh mixture! Efficient scavenging!

Would you believe that in all that time, and with all those engineers, today there are only two basic designs in use: the cross-flow and the loop-scavenge system? The cross-flow came first, and essentially consisted of exhaust ports on about one-half of the cylinder wall and transfers on the other half. The shortfall of it was that too much of the fresh mixture tended to go right across the top of the piston and out the exhaust. To prevent this, piston crowns were shaped to direct the incoming mixture up towards the top of the cylinder. In our

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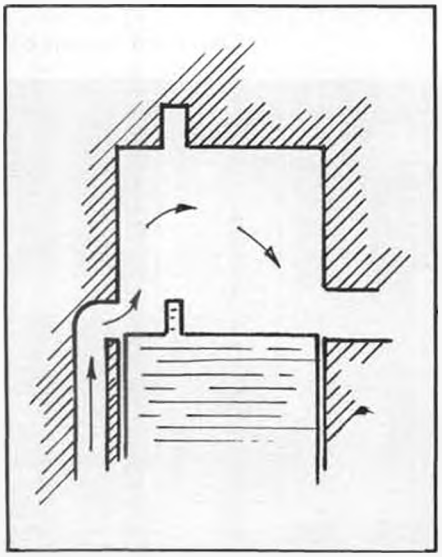
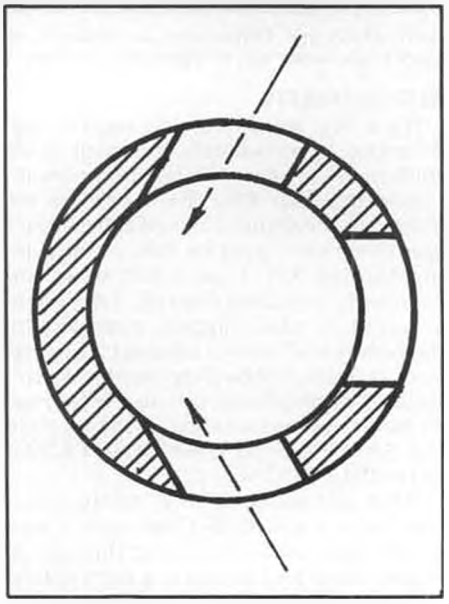
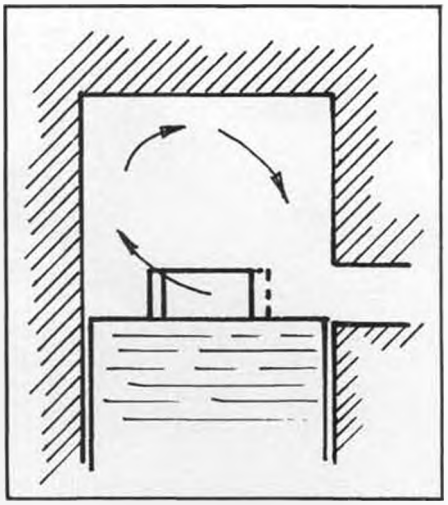


In cross-flow two-cycle designs, incoming gases are deflected upward by a piston baffle.



Vertical cross-section of a sleeve with original twin-style Schneurle transfer ports.



Horizontal cross-section depicting flow of fresh gases through directional transfer port, looping up and over in cylinder.

ELECTRIC BRIGADIER

By MITCH POLING . . . Our "Electric Power" columnist introduces a famous early post WW-II design by Bill Effinger, kitted by Berkeley, that is a perfect match for the latest in model aircraft power . . . electric motors.

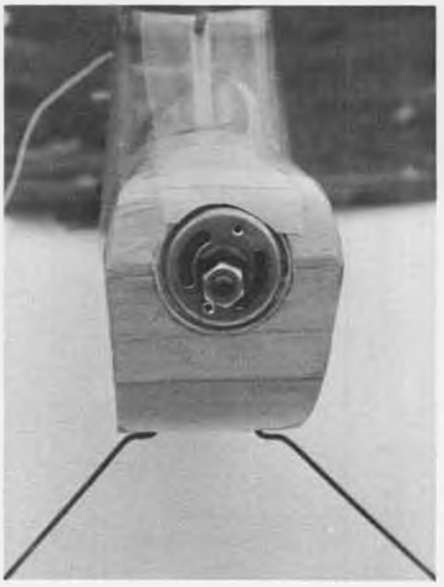
Sandra Smith Poling, M.D., with husband Mitch's electric powered Berkeley Brigadier.

• The sun shines through the covering of the old timer as it cruises by, and then it slowly turns into the field. It gently settles in, almost hovering, like a bird in flight, then touches down in almost dreamlike slow motion. Suddenly there is applause from the field, the fliers and spectators have been captivated by the beauty and the sheer class of the experience! The Berkeley Brigadier does that to you, and does it every time! It can't help it, as the song goes, and it just comes natural, just like anything that is just perfectly right.

The Brigadier has class, and it shows on the ground and in the air, perhaps "charisma" is a better word, for lack of any other. But, its talents don't stop just there. It is competitive, having won first place in every electric old timer contest I have entered. It can fly itself, once a rudder servo failed, and it flew overhead until the motor ran down, then made a perfect landing just at the end of the field! It is a perfect trainer; I taught my 11-year-old nephew to fly R/C on it, and after he had soloed after two flights, he said, "Gee, this is easy!" Right, if you are flying a Brigadier! It loves thermals, it will turn into one and stay there until you insist on it coming back. In fact, at times I feel like I'm interrupting its business, and I'll let it fly free, with just a little rudder trim for gentle circles. So, if you would like to have a plane that has a free spirit of its own, and appeal, and superb flying abilities, try the Brigadier!

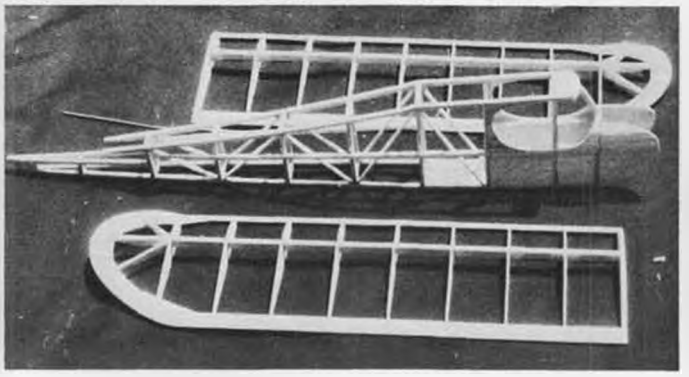
The construction of the Brigadier is a little simpler than the usual old timer, especially the wing, which is very simple indeed, with only a leading edge, solid spar, and trailing edge. Let's start with the wing first, as it is so simple. Cut the ribs from 3/32 sheet. I always keep track of the weight of the balsa; a 3x36 sheet of 3/32 balsa should weigh about 3/4 ounce. After the ribs have been cut, stack them to be sure that the spar notches and the leading edge notches line up, and that the trailing edge is the same length on all of them. Cut the notches in the trailing edge with an Xacto saw. The notches are quite important; they make the wing assembly much easier, and strengthen the rib to trailing edge attachment, which really helps when the covering goes on! The leading edge is just a 1/4 square balsa or spruce length, set on edge, like a baseball diamond. Round the edge that will face forward a little, I use an emery board (for fingernails) for this. A lot of rounding isn't needed, I just take off the sharp edge. The spar is 1/2x1/4 spruce. This size is sometimes hard to find, so you can glue two 1/4x1/4 spruce lengths together to get the same result. Basswood should do as well, but do not use balsa, it could fail under stress.

I use the thick cyanoacrylate throughout construction, except where otherwise noted. Note on the plans that the spars are tapered upward at the tips, use the plans to get the right angle. Cut the tip pieces from 1/8 balsa (about one ounce for a 3x36 piece), then assemble the wing. Once the glue has set, remove

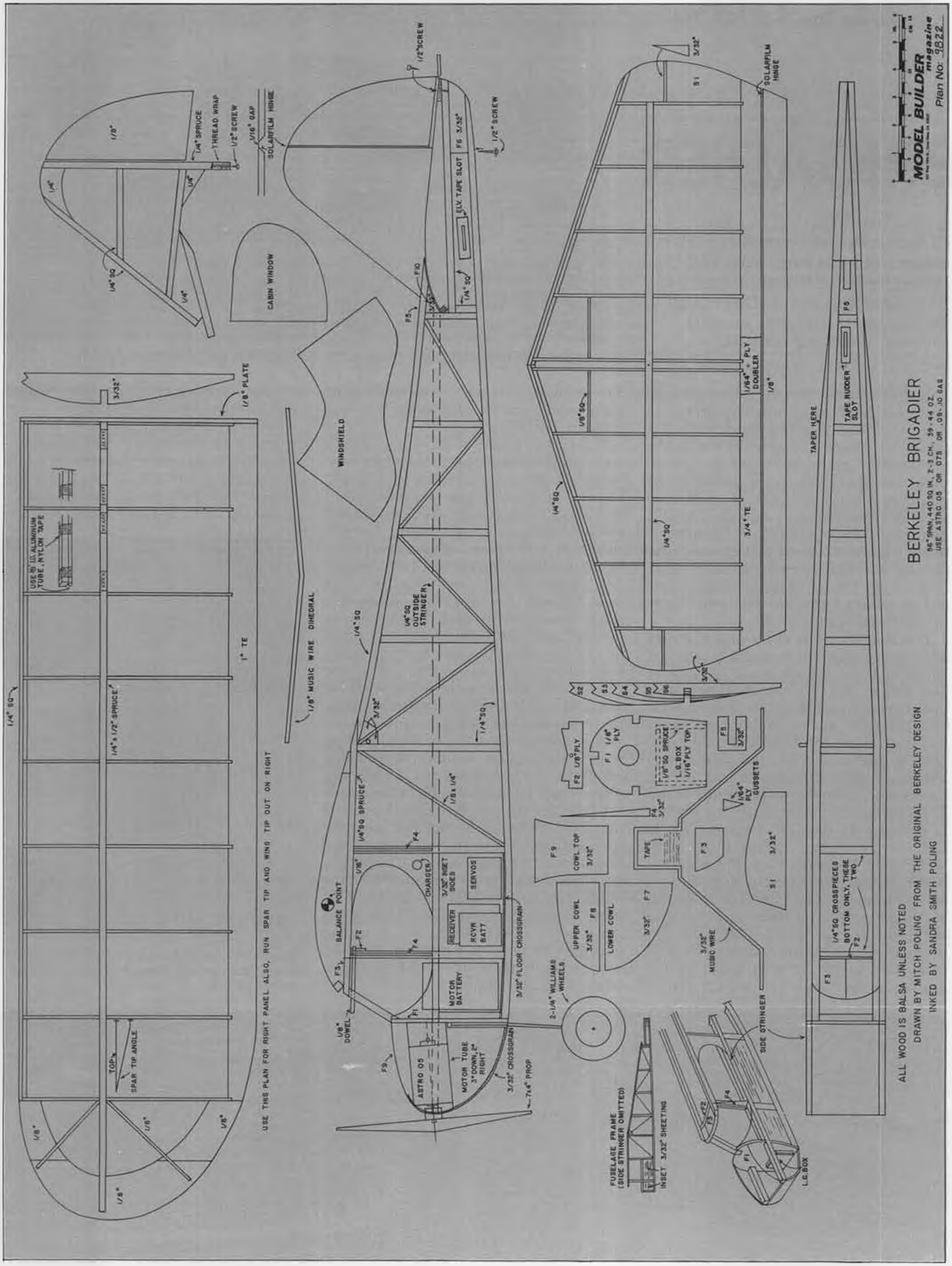


Electric 05 motor blends nicely into Brigadier cowl. Patch on top is result of installing new motor tube.

Brigadier gets "refueled" through Leisure Electronics digital charger, from large battery in field box.

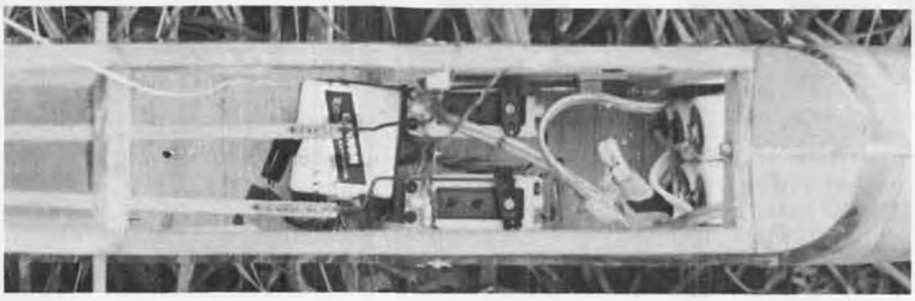


Basic structure of the Brigadier is exceptionally simple. Original was Berkeley free flight gas model kit.

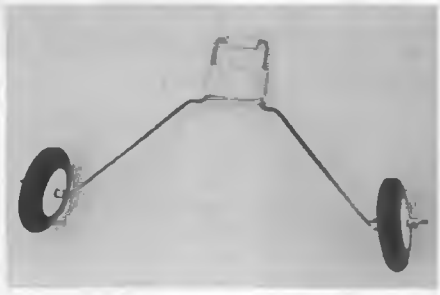

BERKELEY BRIGADIER
56" SPAN, 440 SQ IN, 2-3 CH, 39-44 OZ
USE ASTRO 05 OR 075 OR .09-.10 GAS
ALL WOOD IS BALSA UNLESS NOTED
DRAWN BY MITCH POLING FROM THE ORIGINAL BERKELEY DESIGN
INKED BY SANDRA SMITH POLING
MODEL BUILDER magazine
USE THIS PLAN FOR RIGHT PANEL. ALSO, RUN SPAR TIP AND WING TIP OUT ON RIGHT
1/4" x 1/2" SPRUCE
1" TE
1/8" PLATE
SPAR TIP ANGLE
CABIN WINDOW
WINDSHIELD
1/8" MUSIC WIRE DIHEDRAL
BALANCE POINT
RECEIVER
SERVOS
MOTOR BATTERY
ASTRO 05
7x4" PROP
2-1/4" WILLIAMS WHEELS
3/32" FLOOR CROSSGRAIN
ELV. TAPE SLOT
1/2" SCREW
SOLARFILM HINGE
1/4" SQ
3/4" TE
TAPER HERE
TAPE RUDDER SLOT
1/4" SQ CROSSPIECES BOTTOM ONLY, THESE TWO
UPPER COWL
LOWER COWL
COWL TOP
3/32" MUSIC WIRE
SIDE STRINGER
FUSELAGE FRAME (SIDE STRINGER OMITTED)
INSET 3/32" SHEETING
L.G. BOX

Mitch gives his Brigadier the old heave-ho for another silent powered flight.

Underside showing how landing gear is plugged into slot in fuselage, allowing easy straightening if needed.



Two-channel system is used, with down elevator to operate push-on, push-off switch to electric motor.



Tape keeps gear from spreading, provides snug fit in fuselage slot.

the wing from the plans and glue a 1/8 plate over the root of the wing, and trim it to the outline of the root rib. This will reinforce the root rib against the pull of the covering. Now drill a hole through the first two ribs just under the spar, using 1/8 I.D. aluminum tubing. Sharpen the tubing by running an exacto knife around the inside edge, then put a few nicks in the edge for "bite." Hold a balsa block behind each rib as you drill by hand (not with an electric drill) to take up the stress. Cut a length of the aluminum tubing as long as the first two rib bays, and glue it to the underside of the spar. Put three turns of nylon tape around the tubing at each end of each rib bay, secure the tape with glue through all the wrappings. I use the Carl Goldberg nylon tape, 3/4 inch wide, item 264, and it works very well. Build right wing panel in the same manner, shifting tip to other end.

Cover the wing, the bottom first, then the top. I used transparent red Solarfilm for its dramatic effect. The top and bottom were done with one piece each, including the wingtips, which are easy to do if you pull on the covering while you apply it. Cut and bend the wing dihedral wire from 1/8 music wire. Assemble the wings by sliding the wire into the wing tubes and pushing the wing panels together. Do not glue them, there is no need to, and the take apart feature is very handy. Run a band of tape around the center joint to hold the panels together. I use 3/4 inch vinyl tape for this. The tape can pull quite hard on the covering if you want to take the wings apart later, so I use three bands of tape, one for each wing root, and the one around the center. The tape bands on the wing root are permanent, and save the covering from wear and tear. I do not slant the wing root ribs on my planes, so there is a small gap at the top of the wings where they are pushed together, but the tape hides this perfectly, and it has no effect on flying.

Check the wings for warps, I use about 1/4 inch of washout in each tip, that is, with the wing root flat on the table, the tip rib trailing edge should be about 1/4 inch above the table, and the entire leading edge should be flat on the table. This is not especially critical . . . what is important is that both panels should have the same washout, and that there is

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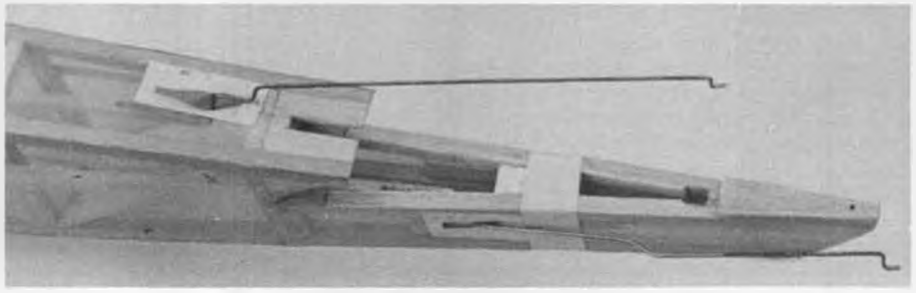
Fin and stab fit into slots in fuselage, for consistent alignment.



Aft end of fuselage showing alignment and mounting slots, and control pushrods. Single screw into fin-post retains tail surfaces, permits demounting for easy transport.

Boeing Hawks 05 Pylon racers (l to r): back; Don Shepard, Bill Warner, Bill Smith, and Dave Katagiri, front; Mitch Poling, Ben Almojuela, and Bernard Cawley.

The Astro 05 Challenger cobalt motor, a super performer with a tremendous amount of power.

ELECTRIC POWER

By MITCH POLING

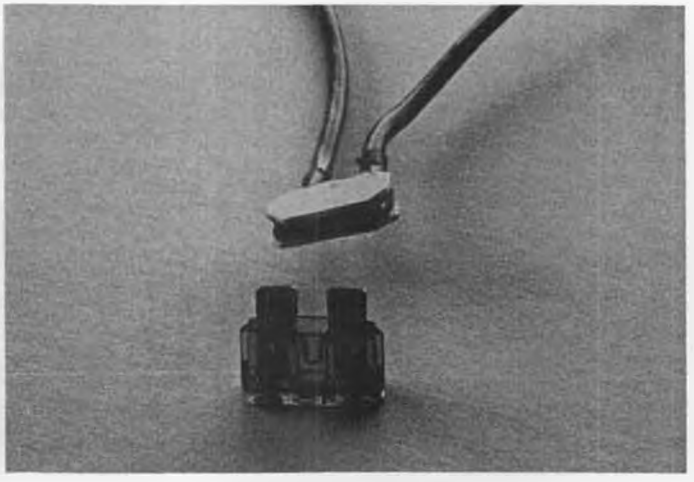
• Recently there was an article on the European electrics in Model Aviation (June, 1982), and since then I have been getting questions about them, mostly on the order of: "Why don't we have anything like this?" The answer, up till now, has been simple, the Europeans have cobalt motors and we don't, period. This has now changed, and how! Astro Flight now has a complete line of cobalt motors, in the 05, 15, 25, and 40 sizes, and at prices below the European motors. IF the Challenger 05 (cobalt) is typical of the Astro line, wow! I have one, and it's so potent that the poor old Cardinal foamie that I'm using it in is pushed to its limit. Would you believe, *climbing* loops, loop after loop? It's neat, I pull back the elevator (level flight, cruising speed), and the Cardinal is yanked through a loop as fast as it can follow. Just keep the elevator stick back, and another loop, but this one is higher, and the next, and the next. If I had a smoke trail, there would be ascending rings, stacked one above the other. Neat! This is on six Sanyo cells, and after about five minutes of flight; *not* hot off the charger. I usually get about nine minutes of flight on the Cardinal with a 6x4 prop, with three offs just to keep the plane from getting too high. A more efficient plane, such as the Astro Sport, should easily fly well over ten minutes with this motor.

Besides the high power-to-weight ratio, the other advantage of cobalt motors is that they can handle a very large variety of props and battery pack, so you can really tailor your power to the plane. The Challenger will deliver super performance on six cells, and it will also take seven or eight-cell packs. I'm chicken to try eight cells; I used seven cells in the Cardinal with a 6x4 prop, and the plane couldn't handle it. The wings started to flutter, in level flight! In order to save the plane, I had to land after a couple of minutes. The poor Cardinal had never been yanked along so fast in its life!

The Boeing Hawks are starting 05 pylon racing here, and I wouldn't be at all surprised if this motor does 70 mph on six cells in a pylon racer. On eight cells, in an unlimited race design, I think it could do 90 mph.

The specifications for the motor are: 13,500 rpm on a Cox gray 6x4 on six Sanyo cells at 14 amperes; 15,000 rpm on the Cox 6x4 gray on seven Sanyo cells at 18 amperes; and 16,500 rpm on the Cox gray on eight Sanyo cells at 22 amperes. You can use up to a 7x4 on eight cells, and up to a 7x6 or 8x4 on six or seven cells. The 8x4 will turn at 12,300 rpm on seven cells, this is as good as the early model Astro 15! The motor itself is a beauty, all finely machined, with very heavy duty brushes, and an armature that has to be seen to be believed. It is seven pole, in fact, it is an Astro 15 armature. This, in a case that is *smaller*

Bernard Cawley with his Ohm-Y-Gosh, designed by Dave Katagiri. We'll have plans in the near future.



John Sczarz uses 20 amp G.M. "spade lug" fuse, with spade lugs soldered to wires. See text for more about this.

than a regular 05! Electrics have come a long way! The motor weighs just under six ounces, and if you build up the diameter with shims or tape, the regular 05 radial mount works just fine. The motor shaft is a hefty 5/32 diameter, much more than a regular 05, which I appreciate, since the motor shaft is usually the most vulnerable part of the motor. I think you would have to hit concrete to bend this one. The motor is also available with the Astro Flight speed reducer; with that and a folding prop, you could take your glider or old timer up at about a 45° angle!

I think the Challenger series is well named, they will challenge a lot of old ideas about electric flight. The prices are $75 for the 05, $100 for the 15, $125 for the 25, and $150 for the 40. These prices are quite a lot lower than the equivalent European motors, and the manufacturing quality is so high that I think a motor will last for years, even if abused. I'm really impressed with mine; the more I fly it the more the possibilities it opens up, and I recommend it very highly. As soon as I get the cash, I'm going to order the 15; that should really be a goer!

The really neat thing about these motors is the feeling that there are no limits on what you can do with them; up till now motors had to be used just so, with such and such a prop and battery, and nothing else. You get the feeling with the cobalt motors that you can try just about anything, and get away with it (don't tell Astro Flight this!). For more information, write Astro Flight, 13311 Beach Avenue, Venice, CA 90291.

I mentioned that the Boeing Hawks are doing some 05 pylon racing, two demonstration races so far, and a "for real" race on June 27 (this is being written in May). The rules are quite simple, the usual 1/2A pylon course of a triangle with two 300 foot legs, one 60 foot leg, 290 square inch minimum wing area, 7/8 inch minimum wing thickness, minimum fuselage 2-1/4 x 3-1/2 inches, and a six cell power pack. A fuse is required for the motor, and an on-off control.

Dave Katagiri's design, the Ohm-Y-Gosh, is quite popular, in fact, other than an Astro Sport and another original design, all the entries (seven) were Dave's design. Dave drew it up just for this event; it flies well, and the fact that you could talk Dave out of a plan for free didn't hurt either! The best time for the course was 2 minutes, 17 seconds, by Dave, for 10 laps, which comes out to about 50 to 55 mph. Dave was using the Leisure race wind motor and six Sanyo sub-C cells. We tached Dave's motor later, and it turns a Cox 6x4 at 12,800 rpm, quite respectable.

I raced two planes, the Astro Sport with an Astro 05 XL, and the Ohm-Y-Gosh with a Leisure pattern wind, and wound up with a solid last place, I tied myself for last! This goes to show that just maybe I fly the course a *little* bit wide, since the 05 XL turns almost as fast as the race wind, at 12,500 rpm on the

Bill Gilchrist's Franklin Sport is Astro 15 powered, with reduction drive. Plans also coming for this one.

Cox prop. Well, next time. Second was Ben Almojuela with an Ohm-Y-Gosh, Leisure race wind, at 2:50; third was Bernard Cawley, with an Ohm-Y-Gosh, Reedy car motor, at 2:46 for 10 laps, but he had a cut, so went for 11 laps at 3:03. I later tached his motor at 12,000 rpm on the Cox 6x4 gray prop. It all goes to show, at least at this stage of the game, that how you fly matters more than what motor you are flying. This event looks like it's going to be a lot of fun, try it! Hopefully, Dave will publish his design soon, it has an especially designed airfoil that is quite impressive, with lots of lift in the turns, but no ballooning or excess climb in the straights. The name, by the way, was invented by Bernard's wife, Avis, who obviously knows how to turn a pun!

The fuse rule was promoted by John Sczary, with good reason. The purpose is to save spectators, not the motor. If there is a fly away or crash, the fuse will stop the motor, which can be very important, as Ben Almojuela can testify. He got his wrist in the way of his prop, and got several bad slashes. These electrics can bite! The 05s are running near a tenth of a horse, and that can do a lot of damage. John's fuse setup is really good, and has been used by most of the 05 pylon racers here. It uses a spade lug type automotive fuse (I think it is General Motors), which clips nicely into female spade clips. This is quite small, most fliers have it right at one end of the battery pack, directly off the positive or negative lead, and it tucks right into the battery pack. The 20 ampere fuse works best for the six cell packs.

Last month I mentioned how good the Astro Sport is; it is the best, as far as I know, of the sport planes for the 05. Unfortunately, I lost mine this month, and wiped out a motor too, so watch out, there can be a flaw in the wing. I got a balsa spar in the kit I built (I understand that has been changed), and I built it "as is." To make a long story short, the wing folded, in level flight. If you happen to get a kit with the balsa spar, I strongly recommend that you get a spruce spar instead. It could save you a lot of money and frustration! The other "fix" that the KRC club does is to use the balsa spar, but they make the plywood dihedral piece much longer, about two rib bays long on each side (six inches, both sides) to reinforce the spar. This works well, too. The Astro Sport flies so well that there is no way you can resist the urge to "wring it out," so make sure you have a spar that can take it!

Bill Gilchrist (Oskaloosa, Iowa) sent me some more photos of his projects (a few months ago I ran some of his Cub), and the latest are enough to make me go

Continued on page 76

Bill Gilchrist's 1/5-scale Velie Monocoupe from RCM plans, modified. Astro 15 with 3:1 reduction drive.

TOP FLITE J-3 CUB

Top Flite's J-3 CUB, Irvine's R/C .30 engine, and Wings Engineering's "Buzz Box" are reviewed by BOB BANKA.

• I remember the 5¢ Guillow kits that were the first models I built back in 1947-48; extremely simple, solid scale models with about 6-inch wing span. These led to Thermic '18's' and the Dart gliders, the OK Cub .049 that you assembled yourself (to save money) and Scientific 1/2-A control line models that flew, but left a lot to be desired in the way of performance. About 1957, I happened into a Berkeley 'Aerotrol' R/C single channel escapement system, and built the Berkeley J-3 Cub powered by an English E.D. 15 diesel. It was a beautiful free flight, sometimes (rarely!) interrupted by a signal that made my friend and I almost soil our linen with excitement because we actually had affected its flight path!

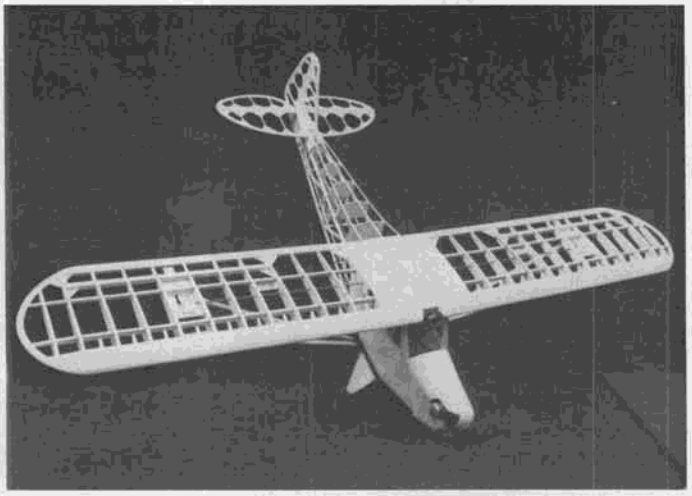
Those days are gone (thank God), the state of the art in our hobby today has improved dramatically; radios, motors, kits, adhesives, covering materials, and tools have made a pleasure out of what many times were next to impossible tasks and sometimes a real drudgery.

Several months ago, Model Builder asked me to do a product review on Top Flite's J-3 Cub, the new to the U.S. market Irvine .30 R/C engine, and Futaba J series radio, along with a Wings Engineering 'Buzz Box' Glo-driver. Wow, what a chance to relive 25-year-old memories with the Cub, and a great opportunity to try something new!

The J-3 Kit. . .

As usual, when you open a kit, you are faced with a mass of wood, parts, and plans; and reviewing these convinced me that this was not a beginner's kit to be thrown together in a week or two. This one would have to be constructed! The instruction booklet and the detailed plans, I have to admit, are the best I've built from in a long time. It would be hard to go wrong in any of the construction phases if you read the instructions and cross-check, as you should, the plans. I would caution you though, that it's possible to build out of sequence if you get carried away. Construction is in a manner that is very sequential and thorough. The kit is quite complete, needing only the usual wheels, covering, engine, fuel tank, adhesives, and of course, radio system. There was no

Leon Shulman with his prototype Top Flite J-3 Cub. He helped in the development of many features in the kit.



The J-3 all framed up and waiting for its yellow FabriKote covering. Structure is light but plenty strong.

The Top Flite J-3 looking very realistic on a fly-by. Pilot just happened to be tieing his shoe at the moment.

About all that's needed in this view are the shock covers on the landing gear to complete the real-life image.

problem with any of the materials (you might want to watch where you use the hard and soft longerons) whatsoever. The ply die-cutting was super and the parts fit quite well to make a very strong and light cabin/fuselage structure. Bear in mind that model construction closely follows the full size Cub's internal layout. The designer of this kit must have been brilliant to develop the cabin section and its related parts, along with a unique wing attachment and adjustment concept. The wings can be adjusted for wash-in/out or to counteract warps that might sneak in and to fine tune dihedral.

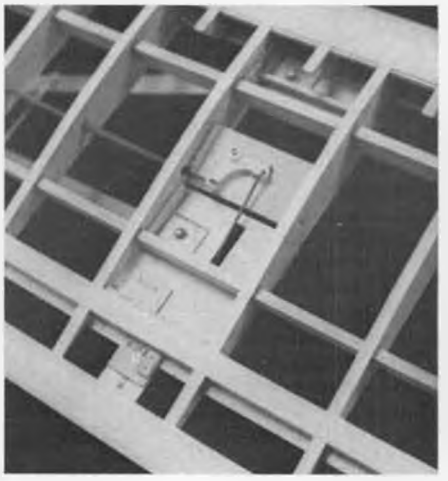
The use of dowels for parts of the fuselage structure adds considerably to its strength and scale appearance after covering. I used a Fourmost 'Miter Master' to good advantage to match the various angles of the parts during fuselage and tail feather construction. Five-minute epoxy, Hot Stuff, and Super-T adhesives speeded up construction. I sure wish they had been invented twenty years ago, as it allowed me to build a rather intricate scale model in only six weeks of spare time.

One of the very few modifications I made was to use Du-Bro's 'Ball-ends' for attaching the aileron pushrods to the aileron servo wheel. This makes assembly and break-down of the model simple and quick. Other than that, the Cub was built right to the plans. The formed cowl presented no problems, other than deciding which muffler to use with the Irvine .30 to minimize cutting up the cowl.

The kit calls for a .35 to .50 engine, and originally, I had some misgivings about installing a .30 in the nose of the Cub. I think the boys at Top Flite were concerned that some of the older .30's around might not have quite enough poop to pull the bird off a grass flying field. The new Irvine .30 R/C engine, imported for distribution by Midwest Model Supply, was side-mounted in the Cub, and I want to tell you there is no lack of power in this workhorse! I ran it first on the bench for about one-half hour, it started on the third flip, had excellent throttle response and was as smooth as anything I have owned, especially for a brand new engine. I used ten percent fuel and found consumption to be about 12 plus minutes on an 8-ounce tank. This engine is powerful enough to allow climb-out at about a 30 degree angle, and for a plane of this size and weight (five pounds all-up), who needs more? If you're a fanatic about scale appearance and want to install dummy cylinders on the cowl, I'd suggest inverting the engine for a cleaner appearance. The Irvine .30 was fitted with a long Du-Bro muffler which is concealed by the cowl, except for the exit out the bottom for a neat and clean installation.

Continued on page 77

The author making an inspection pass at Mile Square Park, Fountain Valley, CA.



Strut attachments and aileron bellcrank all occur in same rib bay.

The author poses for the typical "me and my airplane" shot. Futaba radio is his favorite. Buzz Box described in text.

Irvine .30 R/C engine, from Midwest Model Supply Co., was more than adequate for powering the Top Flite J-3 Cub.

The author coaching Phil Scarborough on his first flight ever, at Torrey Pines.

Phil Scarborough retrieving his Gentle Lady from its first student/instructor landing, obviously a success!

R/C SOARING

By Dr. LARRY FOGEL

• It's great to launch your sailplane into an empty sky . . . and even better to share this pleasure with others. But perhaps the greatest joy grows out of introducing a newcomer to our addiction.

One Sunday afternoon at Torrey Pines, Phil Scarborough approached me. This eleven-year-old lad had just finished building his first sailplane . . . a Gentle Lady. It was a fine job. I checked it out, adjusted the balance, the amount of throw in the control surfaces, gave it a short test glide, then threw it off the cliff.

Hey, what about the required ground training for the new pilot? Well, that was completed in the half minute it took to walk from the test flight area to the edge of the slope. You see, Phil really wanted to *fly* . . . not contemplate what constitutes a stall.

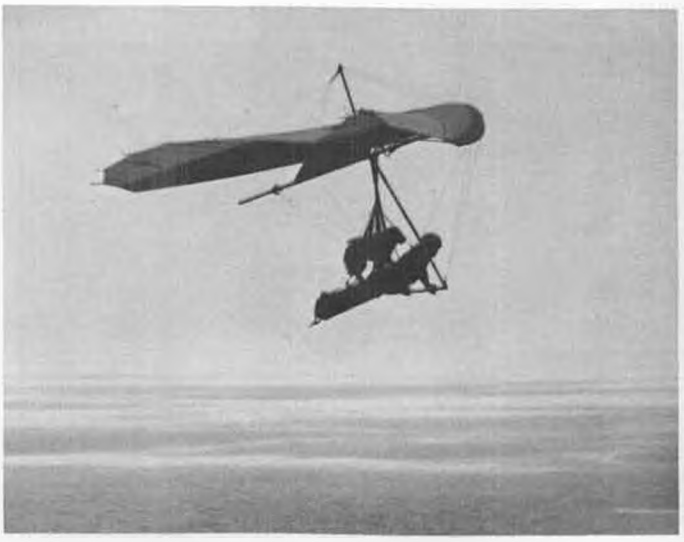
We went through some simple maneuvers with the plane out in the lift and my hand guiding his thumb on the control stick. I pointed out that you initiate turns with rudder and carry through with elevator. To prove this we made a rudder-only turn . . . right into a spiral dive. We then practiced turning in each direction while maintaining constant altitude. First, we made large circles (low bank angles); then we made tighter circles, just to "get the feel of it." My job was to discourage over-control and pulsing the stick.

We then worked on pitch control: stall recovery, and finally, performing circular loops without ballooning. The boy absorbed it all . . . and wanted more action. "Let's fly upside down. Let's make it spin!" I dragged out the old saw about 'crawl before you walk; walk before you run . . . and all that jazz.

In our next flying session we reviewed what he had learned. I then felt confident enough to stand aside while he flew solo. That was my first chance to meet Phil's father. I started to explain why the plane banks even though the rudder directly produces only yaw . . . only to learn that Daddy is a senior American Airlines pilot.

"Do *you* want to try the controls?"

"No," he said. "I'll wait until Phil can teach me."



Man's best friend goes for a hang gliding flight, riding . . . er, doggyback with his master. Is it a first?

John Laycock launches his pulse rudder-only "Feather" at Torrey Pines. Flying rudder-only is a challenge in altitude control.

We then started to practice landing. The trick is to fly the landing pattern so that you "land" about thirty feet above the desired point. You fly in the slope lift, starting the downwind leg about a hundred feet from your point on the edge. Turn on to the base leg as you continue to lose altitude, then turn on to final approach as if you were thirty feet lower. Now fly past the edge so that you're again in the lift. You climb as you proceed back to the point where you initiate another downwind turn. I told Phil to repeat this training pattern until he became proficient or I wore out. He won! Next step . . . a real landing.

Now is the time to get serious. It's important for the student pilot to expect low altitude turbulance and to appreciate the importance of keeping a slightly nose-down attitude to prevent the classic downwind stall. The plane seems to be going too fast on the downwind leg. You're seeing airspeed *plus* ground speed, so it's tempting to haul back on the stick. The plane slows way down, and before you know it, it stalls at too low an altitude to recover.

The final approach seems oh so slow (airspeed *minus* ground speed), especially with time being stretched by the pilot's greater concentration. Here the temptation is to increase the airspeed, but you're so close to the ground that it looks like a short landing. It's like walking a narrow line. And remember, the lower the airspeed, the less sensitive the controls.

Later, I was introduced to Phil's grandfather who's been a full-scale pilot since the early thirties. No wonder the kid is such an apt student.

★ ★ ★

"You've gotta have a challenge." At least that's the view of John Laycock of San Diego. He's put together a superlight rudder-only Galloping Ghost *(Sorry Larry. Gotta disagree with you. Pulse rudder-only is just that . . . pulse rudder. Pulse rudder* and *elevator is Galloping Ghost. Take it from an old East Coast Galloping Ghoster! wcn)* sailplane based on the Zepher wing. The all-up weight is only eight ounces. The fuselage is built-up balsa with the boom being formed of 1/16-inch sheet balsa wrapped while wet around a pool cue. The entire fuselage is then covered with Japanese tissue and two coats of dope. I asked about his plans for this "feather."

"Well, I might convert it to two channels using micro servos, but for the moment, this single-channel rig is a sufficient challenge." From my point of view, it's too much of a challenge.

No, this doesn't belong in Dirty Dan's column! R/C Voodoo slope gliders by (l to r) Don Teason, Bill Slining, and Ron Leon. Please, fellas, don't try Rat Racers!

★ ★ ★

Some things come in two's; others in three's. For example, there's the Voodoo Threesome. Ron Leon, Don Freason, and Bill Slining, of Laguna. Each has made a U-control Voodoo suitable for R/C soaring. The plane then weighs about eighteen ounces. The symmetrical wing spans sixteen inches, with a constant nine-inch chord. The ailerons are one-inch wide. The elevator is two inches wide, and the twin fixed fins make it "groove." You'd be surprised at the stability of these unusual "wing things." It's exciting to see all three in the air at once.

★ ★ ★

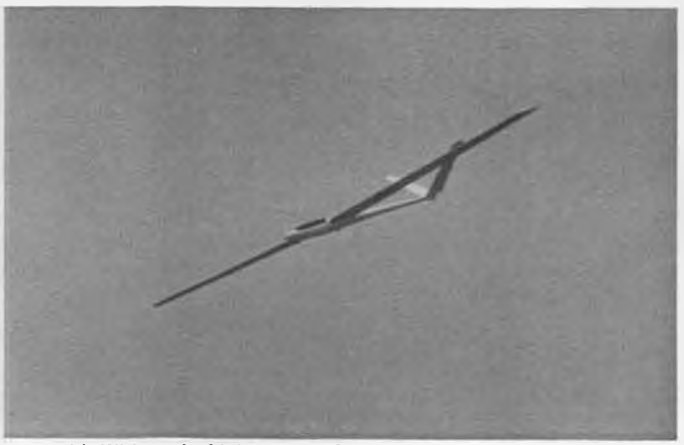
Peter Young, of Garden Grove, California, writes:

"Some time ago I was flying an Aquila when a rotor (dustdevel) passed through. I'm not clear on what causes this condition on flat land. In any case, the circulation was so intense that the other sailplanes left the area. I entered in the hope of rising on this circulating column of air.

"The problem was to maintain a suitable position in the narrow cone of greatest vertical velocity; that is to say, remain in the lift zone. The usual technique of applying trim or back stick produced a dirty configuration with undesirable pitch changes, especially when coming about in a quick circle. Purely by experiment, I found that opening the spoiler a bit adjusted the forward velocity without noticeable pitch change. It was then easy to match the vehicle speed to the wind velocity and remain in the high lift zone.

"I passed this off as a happenstance until I came across a relevant article in the November, 1980 issue of Hang Gliding. *Here the author makes the point that a slight deflection of the spoiler may not cause significant turbulance and instead may provide lift augmentation and speed control. That article goes on to discuss methods for introducing high pressure air behind the*

Rick Schramack, San Diego, with his Whisper and Concept (held by Cory Hellman). Concept uses carbon fibers to reinforce wing.



Rick's Whisper in flight. Looks fast!

Kieth Thomas' Axel in flight.

Kieth Thomas with his Axel slope soarer. More info about it in the text.

spoiler to have it change the airfoil in new ways. This subject is worthy of further exploration."

I agree.

★ ★ ★

Keith Thomas, of England, has been enjoying his Axel, an aerobatic slope ship designed and kitted in France. According to Keith, "It's easy to fly, smooth, but very responsive to all controls." A smooth turn requires roughly equal amounts of aileron, rudder, elevator. "That's much better than a glider that needs a thumbful of aileron but hardly any elevator." I've watched Keith put planes through their paces. I'm sure he's getting every bit of action out of this one.

★ ★ ★

Rick Schramack of San Diego has been experimenting with the Whisper, produced by Baumann Modelbau of West Germany. This V-tail, fiberglassed wings and fuselage plane, operator with flaperons and "elevator" . . . and you could couple-in some "rudder" aspect of control. It's fast, smooth, fully aerobatic, and almost indestructible. We'll see how it does in F3B competition.

In the meantime, Rick has designed and is building the Concept for his own FAI competitive trials. This plane is also fully fiberglassed, with embedded carbon fibers to ensure its strength through Rick's radical zoom launches.

★ ★ ★

According to Dennis Harvey of Detroit, many modelers scratchbuild their own sailplanes. Most designs are take-offs on kitted planes, so the modeler is fairly safe if he copies the structural features of the original. But when there's no precedent to follow, what should you do? For example, how thick should the wing rod be? Too many modelers take a wild guess and end up with a sailplane that flaps its wings in the breeze, or worse yet, fails on launch.

"Before building your new design, why not try my formula for sizing the wing rod:

$$d = \sqrt[3]{\frac{W\ g\ A\ S}{{}^{\circ}max\ \ 2132}}$$

where: d = diameter of wing rod (inches)
w = wing loading (oz./ft.^{2})
g = g-loading on the airplane
A = wing area (inches ^{2})
S = wing span (inches)
°max = maximum working stress of the rod material (psi)

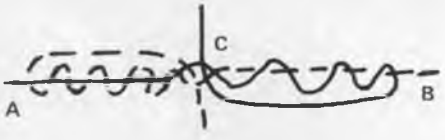
"You need to know only these simple parameters and the kind of flying you intend to perform. If you're a sports flier or take part in the usual thermal contest events, the g-loading should be somewhere between three and six. If you plan to participate in FAI events, you need a higher g-load, say, around seven to ten.

"The wing loading is measured at minimum ballast for contest flying or at the unloaded value for sports flying. The maximum working stress depends on the wing and rod material. If you use steel or aluminum, consult a handbook of physical properties for the exact value in that the alloy and type of heat treat can make a big difference in the stress the metal can withstand. Aluminum is usually about 30,000 psi, while steel drill rod is about 100,000 psi.

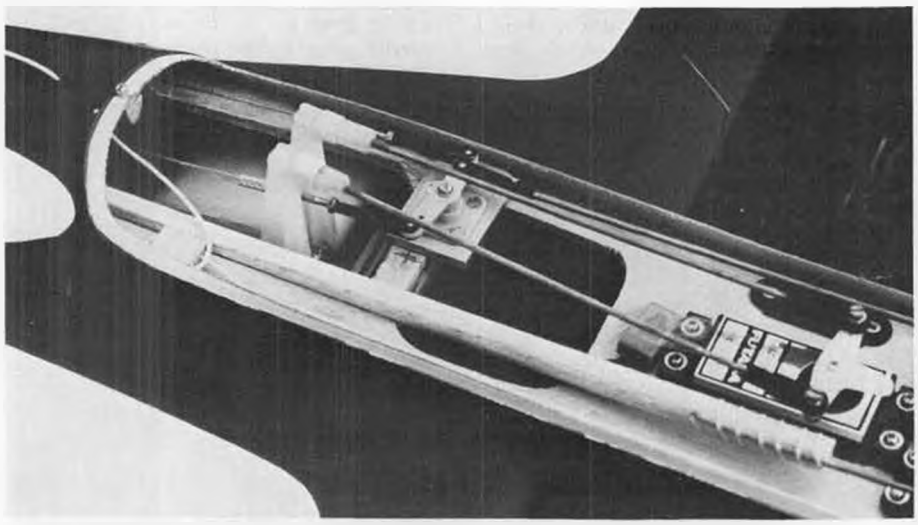
"In deriving the formula, I assumed that the wing carries an elliptical lift distribution and that the wing rod is in a pure binding mode between both wing panels. The distance between wings will not affect the stress level; however, the greater this distance, the greater the amount of dihedral change under load."

★ ★ ★

According to the Wisconsin United Soaring Association Newsletter, the blood knot is useful for repairing broken winch lines. "Find the break and trim the frayed line either side of the break, but first make sure the WINCH IS OFF. Twist line A around line B, then line B around A. Usually 3 or 4 times each direction.



Take both ends and put through the center, one going each direction. Now



Control installation in the Axel. Aileron, elevator and rudder (note use of cables).

Continued on page 78

2. Latest "advance" in Class A or B Ignition Limited Engine Run . . a 1-1/2 scaled Comet Interceptor, by Jack Alten. Merwin Ranch.

5. Don Carll with his Goldberg Gas Bird and McCoy 29 ignition. Really goes!

PLUG SPARKS

By JOHN POND

• Readers of this column are probably struck by this writer's penchant for constantly reporting contests. This is true to the extent that this seems to be where the action is and where the latest developments and variations of old timer flying can be described. The sport flyer (I'm one myself, I can't win either) can quickly find out for himself what particular phase of old timers he wants to enjoy. As an example, look how this new 1/2A Texaco Event took off!!

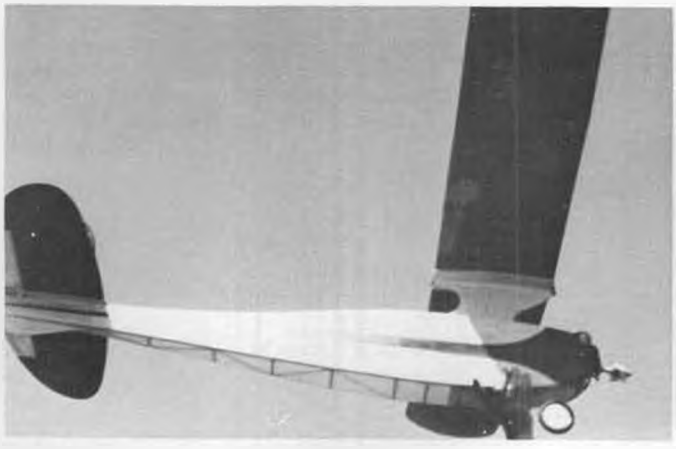
Now that the 1982 SAM rules are in full force, the West Coast SAM Champs, as directed by this writer, is well worth commenting on, as this meet brings out the best. As a reward for the contestants, Photo No. 1 shows C.D. John Pond and his trusty assistant, Maryann, giving out the "goodies". Darn few modelers went home empty handed, as some places ran as high as eight in the more popular events.

Note the background. This is the incredible Merwin Dichondra Ranch . . . 200 acres under direct cultivation for seed, and a surrounding area of "volunteer" grass clear to the road. With grass only an inch high or less, this site is popularly called the "Billiard Table".

In that same line, the off-centered Photo No. 2, of Jack Alten with his scaled Comet Interceptor, is also presented looking northeast whereas No. 1 was taken northwest. Fantastic place!!

Alten, who is an engine tinkerer at heart, is quite interested in ignition engines since the 55 second motor run rule was passed favoring ignition engines. Actually, this is a big overkill for Class C, as a Playboy Senior with a McCoy 60 can be seen in Photo No. 3, but the rule seems to help the Class A

1. Plenty of trophies at the West Coast Champs. Pond on horn with his everlovin' Maryann on prize distribution.



3. Latest ignition fad. A scaled up Playboy Jr. with McCoy 60. Outa sight after 55 second motor run. Ridiculous!

4. Gene Downey, EBRC (East Bay R/C), with hot flying scaled up Strato Streak. W/C Champs.

6. Picture puzzle. See the tree? See the model? Dave Marshall could have stuck it on the nearby power lines!

7. West Coast SAM Champs Sweepstakes winner, Jim Kyncy, with his Dallaire.

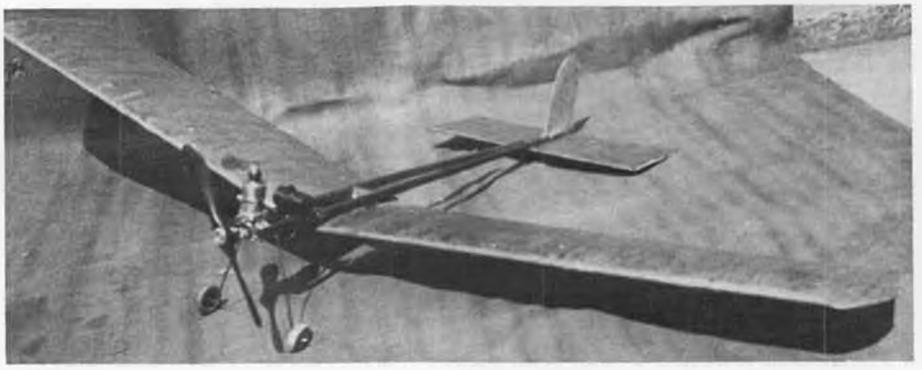
and B designs.

With the added weight of an airborne R/C pack (generally in the 8 oz. range), the small models must be scaled up to a wing area that will give 8 ounces weight per square foot. The foregoing two models indicate this trend. At these weights, an excellent glide can be maintained even with a flat bottomed airfoil!

Had enough of scaling? Well, we're going to slip you another one in the form of Photo No. 4, showing ERBC member, Gene Downey,with a hot flying scaled Garami Strato Streak. Unfortunately, Gene failed to complete all the flights as the strong wind did cause problems.

This particular Strato Streak appeared to be properly stressed, as scaled Strato Streaks in the past have had the unhappy tendency to shed a half wing under the stress of motored flight. When scaling a model, care must be taken to consider the additional stresses imposed on a larger model.

For those who like it straight, Photo No. 5 depicts Don Carll with a Goldberg Diamond Zipper (called the Gas Bird by those who like to differentiate from the Zipper) that is built to exact size. Despite its good climbing qualities derived from the McCoy 29 in the nose, the model has a tendency to literally fall out of the sky. The added 8 ounce R/C airborne pack is just a little too much to carry for a good glide. The wing loading is estimated between 12 to 14 ounces per square foot. Tough to soar with eagles when you weigh like a turkey!!



9. An early stick type gas model produced by Carl Carlson as a kit to supplement the Aero Knight engine.

No contest would be complete unless someone stuck a model in the only row of trees by the roadside. Dave Marshall was quite successful in this. Luckily, he was able to get the model down without incurring too much damage. As can be seen in Photo No. 6, this writer still wants to know how Dave missed the electrical lines paralleling the trees. Some guys are lucky??

In that same pattern, quite a few "zilch" flights were noticed. Flyers from Southern California like Jack Albrecht and Chuck Patterson, who were unfamilar with the wind conditions of the north, ended off the field limit more than once. Big problem here in trying to win is that this kind of flight is an official flight of zero . . . ouch!!

However, the Northern California boys couldn't crow, as Ted Kafer promptly put one off the base and Don Carll let his model go out of sight overhead. All models were retreived later in the day, whew! Kafer's second model loss caused considerable damage to the Mike whereas the big PB-2 suffered only minor breakage in the nose portion.

To back up on the ignition kick again, and to show how the boys have gotten their act together in Class C, a three-way tie forced a sudden death flyoff. Even with the reduced motor runs (50%) and conditions not as favorable, a max flight was required to win!

Probably the most spectacular ignition powered model was the Kerswap of Jack Albrecht, using a Torpedo 29. Man, does that ever climb! Most surprising to this writer is that "Old Weakeyes" Jack Albrecht can see that model at better than 1200 feet going like a shot! Wow! Needless to say that Jack won.

About time to list the results, but before that, Photo No. 7 is presented (Not the best for focus) of Jim Kyncy, directly after the contest, as the Sweepstakes winner of that gorgeous perpetual trophy put up by all California O/T R/C SAM Chapters. Results look like this:

8. "Big Crate" No. 1, designed and built by Carl V. Carlson, using the Wall engine. Plans appeared in the May 1932 *Aero Digest*.

CLASS A	
1. Jack Albrecht	15:14
2. Jack Alten	10:34
3. Loren Schmidt	7:02
CLASS B	
1. Jack Albrecht	21:03
2. Loren Schmidt	13:32
3. Don Carll	10:24
CLASS C	
1. Ed Solenberger	29:20
2. Jim Kyncy	27:01

11. Rare design by Clyde Austin (holding tail boom) called "Dingbat". Webster Hill is tuning the engine. 1935-37 era.

10. Advanced type gas model kit was produced by Carlson to accommodate the Aero Knight engine.

12. John Gomez holds onto his 48 inch Comet Curtiss Robin while Jim Perssons cranks in winds. San Ramon area.

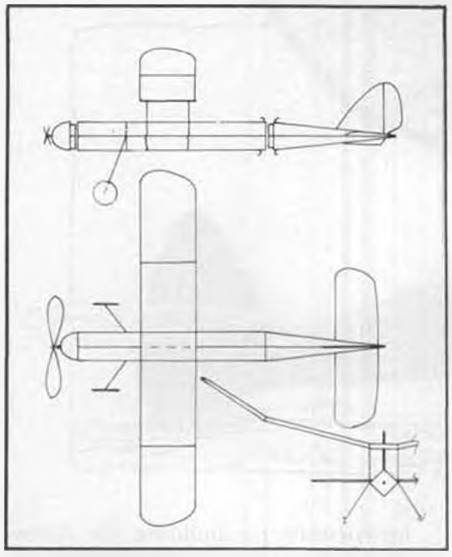
3. Jack Alten	24:55
ANTIQUE	
1. Jim Kyncy	30:40
2. Loren Schmidt	29:31
3. Jim Caughran	28:35
TEXACO	
1. Jim Kyncy	30:27
2. Speed Hughes	22:30
3. Eut Tileston	19:18
1/2A TEXACO	
1. Ed Solenberger	30:00
2. Jim Kyncy	29:33
3. Paul Forrette	28:44
ELECTRIC	
1. Loren Schmidt	5:01
2. Chas. Patterson	4:34
3. Jack Albrecht	2:51
SWEEPSTAKES	
1. Jim Kyncy	55 pts.
2. Jack Albrecht	39 pts.
Ed Solenberger	39 pts.

ENGINE OF THE MONTH

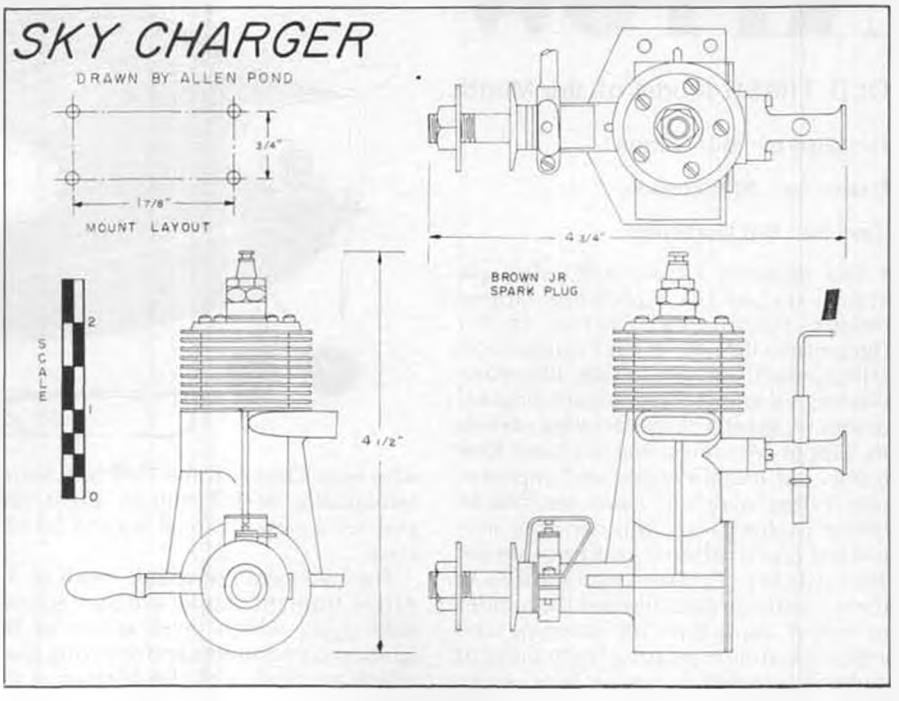
One of the most interesting engines to the engine collectors is the "Sky Charger", as originally announced by the Reginald Denny Co. in *Model Airplane News* from the January to April 1937 issues. Suddenly there was absolutely no news and no full page advertising as had been done in the previous issues. The highly advertised contest using the Denny motor was shelved.

The mystery deepened even more when the Reginald Denny people again took a full page ad in the December issue of *Model Airplane News* extolling the virtues of their new engine, the "Dennymite". What had happened to the "Sky Charger"?

Well, thanks in part to Bob Veir of California Hobby Distributors (successors to Reginald Denny Industries), and to Jim Dunkins who wrote a tremendous article on the line of engines in the



Old Timer Mystery Model! Earliest postmarked correct answer wins a one-year subscription. Don Kress remembers buying a kit in Woolworth's for about 50 cents, about 36-inch span. Sketch is strictly from memory. Circa 1939-40. Pond couldn't identify, so sent it on to MB office.



13. Part of SAM 32 gang (l to r) rear: Watkins, Wrench, unidentified, Rasmussen, Andrade, Emmert; front; Gomez and Perssons.

14. Another beauty by SAM 35 treasurer, Peter Michel, a Houlberg "Isis." Flown at RAF Watton. Second in All Wakefield.

January-February issue, 1969, (#30), of the Engine Collectors Journal, we have been able to piece together a story of what happened.

With most of the kit manufacturers producing models to suit the availability of engines, Brown Jr., Ohlsson, Bunch, etc., Reginald Denny decided he must have an engine to complement his very successful Dennyplane model.

Denny then issue a set of engine specfications to various manufacturers, with the proviso all test engines (generally ten to a dozen) would run trouble-free for fifty hours. This running figure came from real full-size aircraft engine tests. Denny figured if this was good enough for the man carrying aircraft, his engine should be no less in quality.

One of the companies that responded to the Denny request was Aircraft Industries of the Curtiss Wright Technical Institute, Grand Central Airport, Glendale, California. President C.C. Moseley

15. Australian Norm Garrett, of the Victoria R/C Club, with his R/C assisted Powerhouse.

Continued on page 79

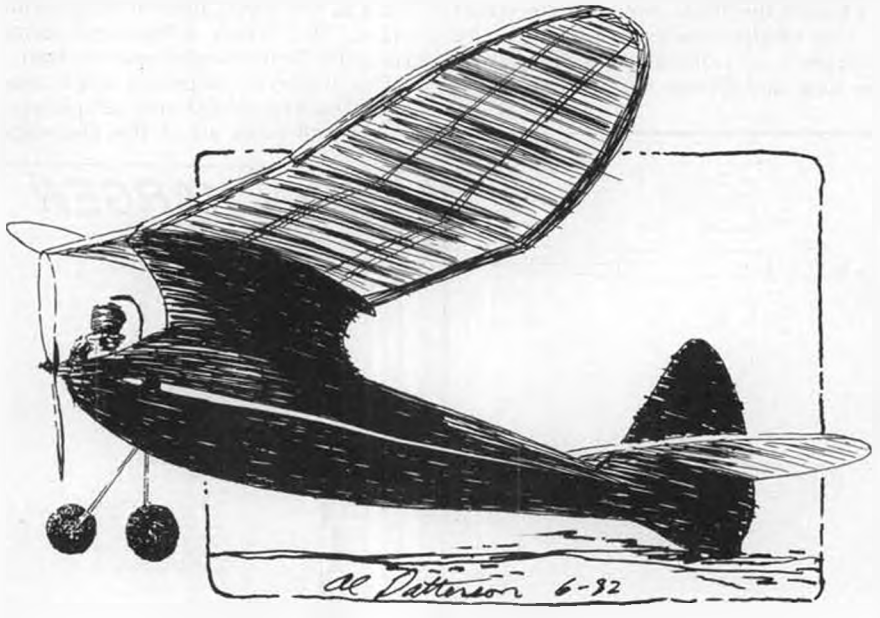
The Arrow

OLD TIMER Model of the Month

Designed by: Bill Gibson

Drawn by: Al Patterson

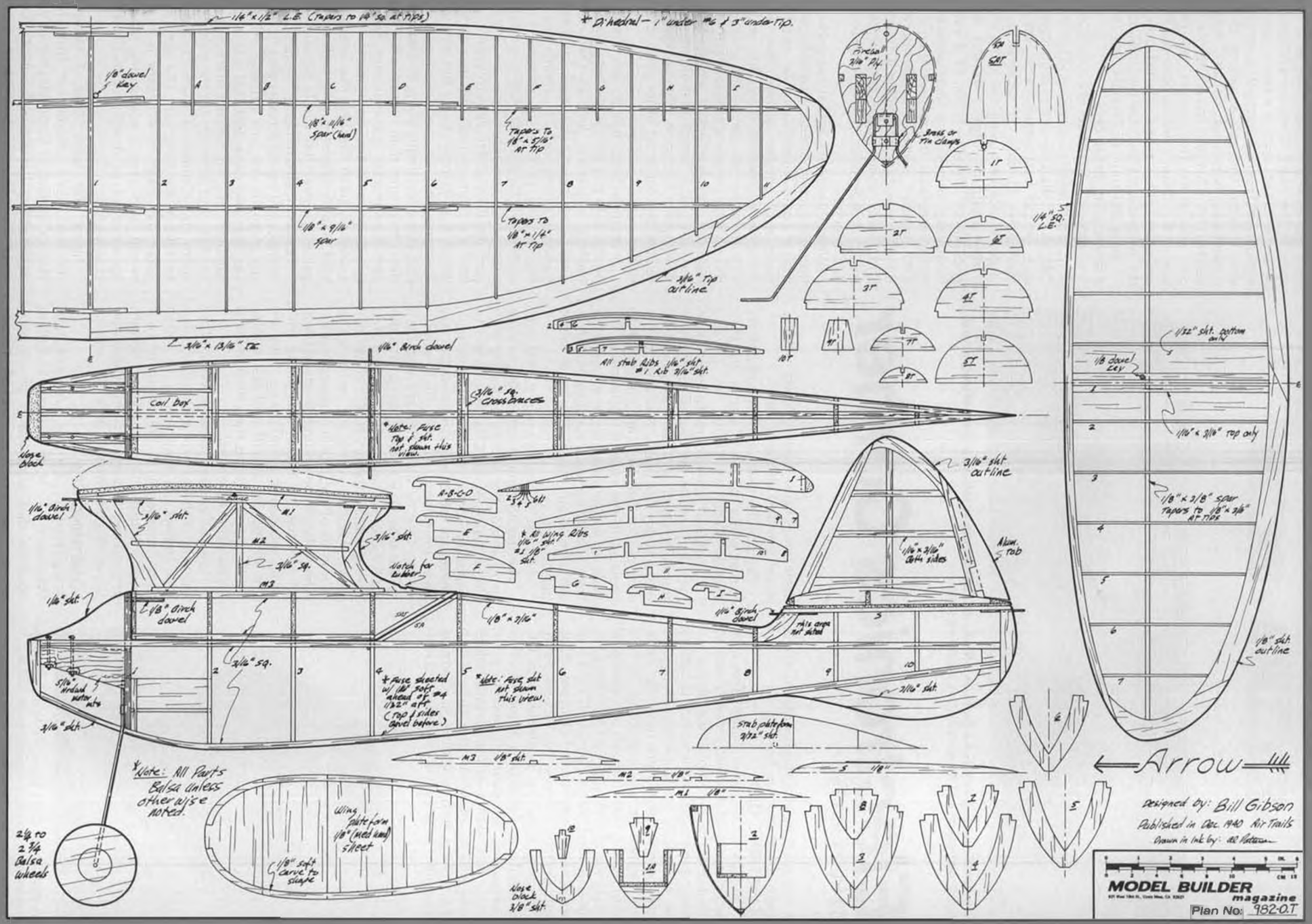
Text by: Bill Northrop

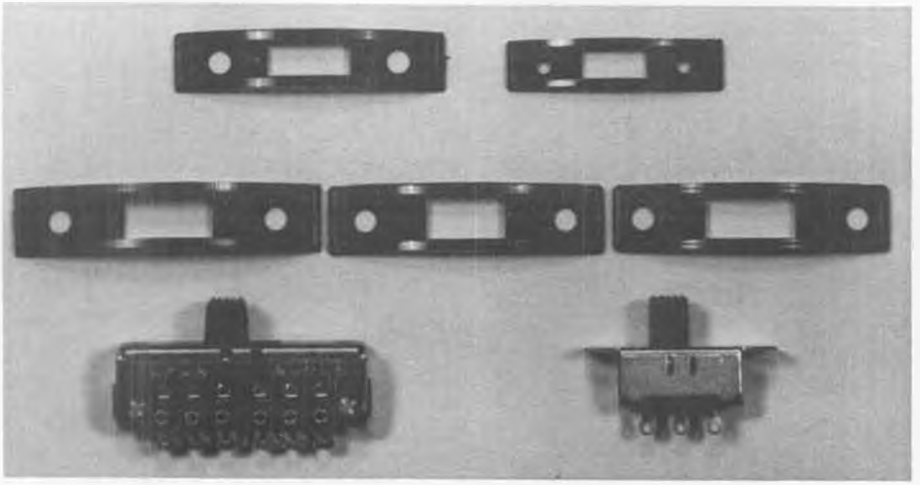


• The Arrow is a Class A/B pylon gas model out of the Goldberg Zipper Design School. Bill Gibson, in his December, 1940, Air Trails Construction article, readily admitted that, like many planes, it was not a completely original design. A glance at the drawing reveals its Zipper-like lines, but a closer look brings out modifications and improvements that may not have resulted in better preformance, but certainly simplified construction and equipment accessibility. Perhaps you could say these improvements allowed the builder to spend more time on trimming and adjusting, thus increasing flight times. It certainly seemed to pay off for Gibson, who won Class A at the 1940 Nats with a remarkable 47-1/2 minute flight that also set a new national record for the class.

The two most noticeable mods in the Arrow from the Zipper are the removeable pylon which gives access to the ignition components and the wing spars which are flush with the bottom of the ribs.

Instructions for building the Arrow are unusually detailed, and consequently quite long. Rather than reproduce them entirely herein, we'll copy and include a set with each full-size plan. Incidentally, note how well the fuselage/tail platform lends itself to modification for dethermalizing. •


1/16" x 1/2" L.E. (tapers to 1/8" sq. at tips)
* Dihedral – 1" under #6 & 3" under tip.
1/8" dowel key
1/8" x 11/16" spar (used)
Tapers to 1/8" x 5/16" at tip
1/8" x 9/16" spar
Tapers to 1/8" x 1/4" at tip
3/16" Tip outline
3/16" x 13/16" TE
1/16" Birch dowel
All stab ribs 1/16" sht. #1 Rib 3/16" sht.
Cowl Box
3/16" sq. cross braces
*Note: Fuse Top & sht. not shown this view.
Wing Block
1/16" Birch dowel
3/16" sht.
3/16" sq.
Notch for rubber
1/16" sht.
1/8" Birch dowel
1/8" x 7/16"
5/16" Ardun motor mts
3/16" sht.
3/16" sq.
* Fuse sheeted w/ 1/8" soft ahead of #4 1/32" aft. (Top & sides doubl before.)
*Note: Fuse sht not shown this view.
* All wing ribs 1/16" sht. #1 1/8" sht.
1/16" x 3/16" Cabin sides
Alum. rod
1/16" Birch dowel
Rib's cross not shown
3/16" sht.
Fireball 3/16" Ply.
Brass or Tin clamp
1/16" sq. L.E.
1/32" sht. bottom only
1/8 dowel Key
1/16" x 3/16" Top only
1/8" x 3/8" spar tapers to 1/8" x 3/16" at tips
3/16" sht. outline
1/8" sht. outline
Stab plate from 3/32" sht.
Arrow
*Note: All Parts Balsa Unless other wise noted.
2 1/4 to 2 3/4 Balsa wheels
Wing plate from 1/8" (used and) sheet
1/8" soft curve to shape
Wing block 3/8" sht.
Designed by: Bill Gibson
Published in Dec. 1940 Air Trails
Drawn in Ink by: Bob Hatcher
MODEL BUILDER magazine
Plan No: 982-0.T



Neat little switch guards from Dunham's R&R, do double-duty as safety to prevent inadvertent switch operation, and dress up switch mounting slots.

Electronics Corner

By ELOY MAREZ

• It is early June as this is written, so it is appropriate that we have.

SOMETHING OLD

Ni-Cds . . . one more time! This subject came up at the field recently; one of my friends was complaining about not getting the expected time from a battery he had made up to power an electric fuel pump. These were new "D" cells, from which he was expecting 3.5 to 4 amp hours, requiring only an occasional charging in this application. However, he had used those "bargain" cells that are now so common in hardware, drug, and electronic stores. You've seen them, I'm sure, they are available from GE, Eveready, and probably a host of other companies, are generally sold in pairs, and come with a spring-loaded holder into which you insert the cells, which then plugs into a wall type charging module. These cells are not marked with their amp hour rating; only with a recommended charging rate.

The problem with this type of battery is that while the "AA" size is just that, with a 450-500 mil rating, the "C" and "D" types are something else entirely. In fact, they are merely a sub-C, of the type normally rated at 1200 MAH, inserted into a larger size plastic container, of the size of the cell they are supposed to replace. In the case of my friend's "D" cells, he was getting only one-quarter of the capacity he was expecting, which in addition to air, was all there was in the plastic case.

The true "C" cell is rated at 1800 mils.

There is nothing in either the package or in any of the literature dealing with these types of Ni-Cds that refers to capacity, either normal or reduced. There are other good reasons to stay away from them for R/C flight equipment. One is that they do not have solder tabs, so you either have to solder directly to the case, or use some sort of spring contact battery box . . . both bad news! Another is that the resistance to vibration of these cells is questionable, which should be enough to divert them all to what my friend was doing with them, powering a fuel pump. They are OK for other support and test equipment uses, as long as their limited life is known and accepted.

How can you tell for sure? Well, other than the well-known capacity discharge instruments, an easy way is to weigh them, or merely to heft them in your hand. A true "D", at 4 amps, weighs around five ounces . . . one of these sub-C's in disguise weighs only 1.5 ounce.

Ex-Californian Chris Blum, VP of Kavan Model Aircraft Co., during its operation in U.S.A., now returned to native Germany.

SOMETHING NEW

A watch/radio! Or is it a radio/watch? Whatever . . . it tells time, including seconds, days, date, alarm, plus it plays music! True, it only receives AM broadcast, but I would guess that in a few months the Mark II model will appear as an AM/FM, with a nano-cassette option yet! This one plays with a remarkable quality, through a pair of those lightweight "samarium cobalt?" headsets that have become so common in the past year or so. The current consumption of the radio, which is powered by a cell different from the one which powers the watch, is a miniscule *two milliamps* . . . over 100 hours of Crystal Gayle from a single silver oxide cell!

Imagine . . . 100 hours of Crystal Gayle . . . I forgot what I was going to tell you! Oh yes . . . the size of this little jewel is one of the best examples of micro-electronics to date. A receiver is, in large, a receiver, using the same electronic building blocks as our R/C receivers; some version of a radio frequency amplifier, a local oscillator, more complex in this receiver than in an R/C receiver, a mixer, some intermediate frequency amplification, a detector and finally some audio amplification. Add only a decoder IC, and you have an R/C receiver.

What this means is that somewhere, there are components available now, which could conceivably be used to build even smaller systems than anything we've seen to date. But, wait a minute before you get on the phone to Bill Cannon, there are other factors to consider, mainly quantity, which I feel is the governing factor in holding back developments in our hobby, not only for radios, but for most other products as well.

A manufacturer has to sell enough products to pay for the developing and tooling, materials, and all that nasty overhead before he ever makes a penny's profit, which means that a market has to exist or otherwise be created for his product. Any new item is a gamble, though some are bigger gambles than others. Now this particular little electronic miracle sells for only $50, which is extremely cheap, but let's face it, there are a lot more teenagers out there who are simply going to die if they don't have one, than there are R/C'ers! The mass market is the answer. Something similar in R/C equipment, in the extremely small numbers that would be sold, would require such a high asking price that even less would be sold.

However, all is not lost! The electronic component manufacturers also depend on quantity for low pricing. All the resistors and capacitors that our manufacturers buy for pennies are not made for R/C, but primarily for the entertainment and commercial markets, but we benefit in the long run. The same will some day apply to whatever is in this watch, and what is now in the laboratories, a lot of it will eventually drift down to us.

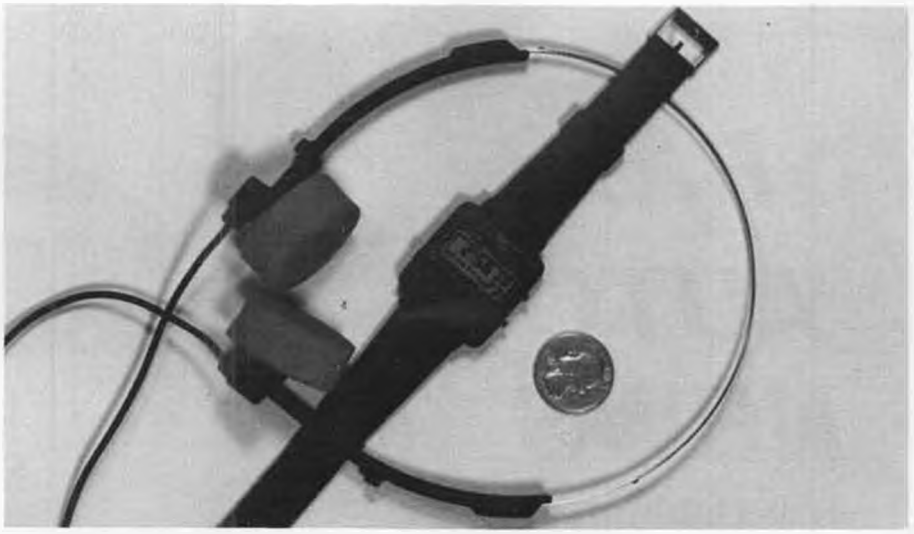
Along the same lines, I recently received some information from Mr. Harry Gebhart, of Cadyville, New York, to the effect that one of R/C-land's best friends in the electronics industry,

Signetics, is making its IC's available to manufacturers in a microminiature DIP (Dual In-Line Package), the multi-pin flat pack in which most integrated circuits now appear. Designated as "SO" package, this new IC is only one-fourth the size of the standard 8-pin DIP. Amongst the IC types initially available in this smaller package are the NE-5044 encoder and NE-5045 decoder chips. Why the servo chip, the NE-544 is not on the list would be interesting to know, but we can assume that if enough interest, or orders, were displayed by R/C makers, Signetics would add it to the list. However, I don't think we should forget that probably the greatest problem in the future development in smaller servos exists not with the electronics, but with the motor, and gear train.

Frankly, I am of the opinion that by far the largest percentage of today's R/C'ers don't need or ever want smaller or lighter radios. Just look at the size of the average airplane, and the power available to vertically roll it out of sight. Having been around since the "good old days" of tube and relays, I am well aware of the capabilities and reliability of today's systems, but that is not to say that they can't be improved. These smaller components would allow manufacturers to take some further steps in that direction. For one thing, less mass and weight mean less susceptibility to vibration and crash damage, and smaller size would allow for changes in component mounting that would in turn lead to greater mechanical integrity. For example, in an effort to reduce the size of a receiver board down to a competitive level, you'll find most resistors, capacitors, and crystals mounted upright. At the right frequency and amplitude, they will vibrate, especially if you don't believe in proper padding. In a crash, especially in a horizontally mounted receiver, these components tend to keep traveling even after the PC board has stopped, and sometimes pull themselves right off the board. Worse, they will sometimes pull a lead loose, without any visible sign, or malfunction . . . until the next takeoff. By saving some board space, these now vertically mounted components can be mounted horizontally and even secured to the board with an adhesive for far greater mechanical rigidity with subsequent resistance to vibration and shock. Eventually, we will see fully encapsulated, maintenance free R/C components which will survive most things we do to them . . . except for forgetting to charge or to turn on before launch!

SOMETHING BORROWED

And translated, from the pages of the British *Radio Control Models & Electronics* magazine, written by Tony Dowdeswell, who admits to borrowing the idea from an unnamed Italian modeler, and being helped by a Dr. John Evans. He doesn't say so, but those of us in the know are aware of the fact that they were all closely supervised by Ron Moulton.



The latest in micro-electronics technology; a wrist watch that gives the usual chronograph information . . . and plays music through the companion headset.

Anyway, this is a very clear method of wiring two servos to sequentially operate retract gears and wheel well doors. Such a chore is often done with a tricky and difficult-to-keep-adjusted arrangement of linkages and springs or rubber bands. This method requires an extra servo, but not an extra channel, and is completely automatic in operation.

Figure 1 shows the micro-switches in the gear down position. When the gear is retracted, one of the struts hits a micro-switch actuating arm, just before the fully retracted position, bringing the second servo into the circuit, to close the doors. The second servo also closes another micro-switch, which sets up the circuit for the next operation, which will begin with the doors opening, followed by the gear being extended.

As noted, this ties up only one channel, and there is no sequence that the flier has to remember . . . just flip the switch. The fact that you have a full servo's power available just for door operation means that weight is not quite as critical, and you can close them just as tightly as the big bird did. Notice I didn't say the "real" one, I don't agree with the use of the term. Anything that costs as much to build and campaign as a modern scale R/C model is very definitely "real".

Though not mentioned in the "RCM & E" article, a version of the system could be used with gas operated retracts, naturally using only one servo and one micro-switch. In such a case, the switch would be operated by the gear strut, which would then actuate the servo, which is plugged in series with one that triggers the gear valve.

In any such servo operated gear system, it is important that the servo be allowed to operate it's full range, and not be stalled before it reaches the end of it's travel. Doing so causes it to draw a tremendous amount of current, rapidly draining your battery. If your receiver and gear are both operating off a single source, the fact that there is not enough current left to lower the gear is not going to be important at all! For safety's sake, a battery separate from the one which powers the receiver and flight control servos is recommended; the hookup for such an auxiliary battery appeared in our January 1982 column.

AND SOMETHING BLUE

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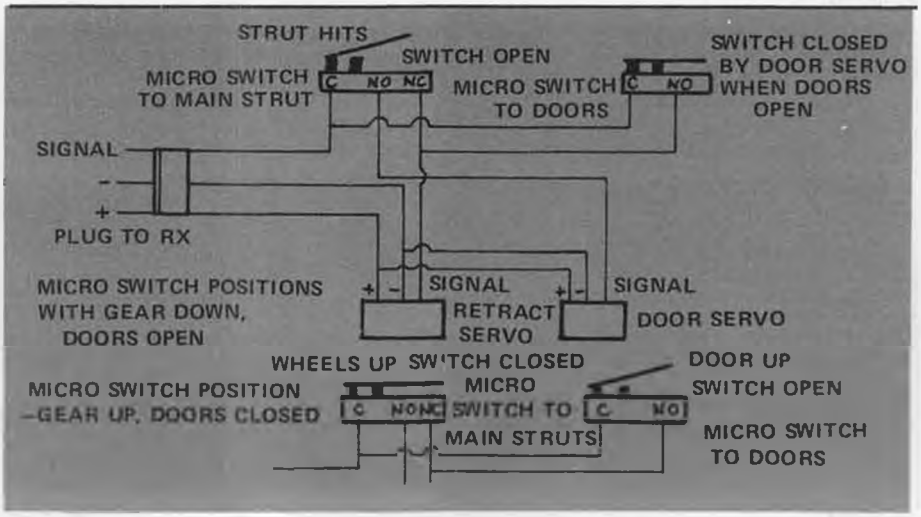
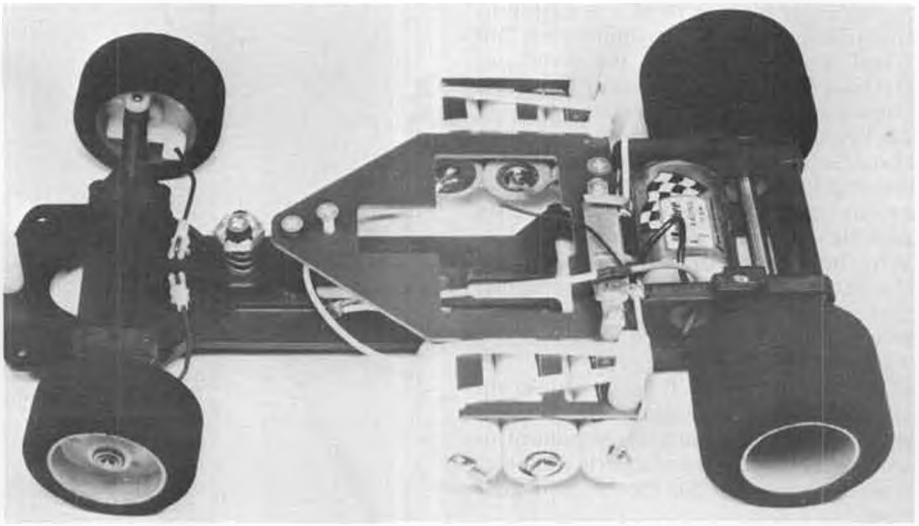


Switching for automatic extra servo operation of retract gear doors without use of additional channel. Explained further in text.

R/C AUTO NEWS

By DAN RUTHERFORD

PHOTOS BY AUTHOR



Latest version of JoMac Lightening 2000, complete with new lightweight parts, Sanyo batteries, improved diff, rollover antenna, etc.

• A couple of months ago I was made to endure a bit of flak in this column, courtesy of Chris Chan. One of his big points was that there are no "speed secrets" that are only available to the Factory Teams. Ok, that is his viewpoint, but I am not prone to writing things that I can't back up, so I just bit on a bullet for the past couple of months. And will continue to do so for one more month. You see, I now have permission to publish a speed secret that will blow your mind, and that is the property of one team, although this same team suspects that one, possibly two, members of another team have also discovered it. The interesting part here seems to be that this hot tip is not shared with other members of their team! Competition is *very* fierce at the top. . .

The reason for waiting another month is to warn you of what is coming up, and the deal is that I cannot write about it until after the upcoming 1/12 scale World Champs. As this issue will probably be out before then, it is too early.

And if you were to ever wonder about my ability to keep a secret . . . as I was told about this new trick I asked if I had an exclusive in trade for secrecy, the response was that I was the only one in writer/racer land who could be trusted to keep quiet, so of course it was an exclusive. Damn, I could sell this one for plenty of bucks, too!

AIRTRONICS' NEW RADIO. . .

Actually, I started on a look at this new radio last month in the article about the Delta Eagle, deciding to hit it only lightly, as the text was way back in the latter part of the article, and the radio is so good it deserves "up-front" coverage. Besides, I have used it for another month now, time to really wring it out.

The receiver probably has some wondrous doodads in it, I really don't know . . . And I don't know any car racers who would care. But it works, which is the bottom line, isn't it? In addition to racing, a group of us gather every Wednesday evening for a few hours of practice, and the Aitronics receiver has been in almost constant use, just to see if there are any reliability or range problems. When not in the Eagle, it has been transferred to a JoMac Lightning 2000, just to keep it going all the time. It works every time, all of the time. Range is very good, even though I followed my usual practice of routing the antenna up the antenna tube and then just whacking off the excess antenna. No glitches of any kind.

The servos are also great, in fact one of the best features of the system. I don't take servos apart unless they quit working, so haven't seen the insides, but they tell me there are ball bearings on the output shafts, a combination of metal and plastic gears for a bulletproof gear train, and a coreless motor for power and speed. In operation, the servos are very smooth and quick. Quick enough that I actually used the supplied four-cell battery pack the first time racing the system. I have since gone to a five-cell pack, just because I want the servos to be as fast as possible, but you guys out to save weight wherever possible can use a four-cell pack and still have plenty of speed in the servos.

Mounting ears on the servos are beefy and a molded rubber piece serves to shock-mount the servos effectively. The output shafts are splined, which on the throttle/brake servo helps a lot in getting the leverage set properly on the linkage when settings things up for fast, slow, or medium response from idle.

The transmitter has enough trick stuff on it to keep you busy figuring it all out for an hour or two. Throttle control is on the right side of the case, the off position

Airtronics XL series radio system, installed in last month's test car, the Delta Eagle.

Covered front panel console contains reversing switches and adjusting pots.

can be set anywhere in its travel with a positionable lever. Below that there is a throttle trim switch that is easily operated with an extra finger, even when racing. And further down is the third channel control, which we have no use for in car racing. On the top right corner of the case there is an adjustable pot and a switch. In one position the switch gives high rate response at the steering servo. Flip the switch and you get a low rate, the amount of which is adjusted at the pot. This can be an emergency feature to get reduced steering, although I don't see much chance of actually being able to dial in the low rate while racing. In 1/12 scale, I have seen a very few racers use a low rate during the early laps of a race when the car is quick, switching to a high rate when the car isn't driving out of the corners quite so hard, due to the voltage in the pack dropping. It's worth trying, I did and didn't like it . . .

Underneath the panel on the face of the transmitter is where most of the real trick stuff lies. Reversing switches on all three channels; just install the servos, and if they go the wrong way, flip a switch. Starting from the left, there is an adjustable pot that allows you to adjust the amount of throttle servo throw very precisely. Not a big deal with a 1/8 car, but very handy on a twelfther, however.

In the middle are two more pots, these adjust the amount of exponential control for the steering servo, one each for high and low rate (remember the rate switch on the top of the case?) If you don't want expo control, dial it out and you've got linear response. And I'm not sure about the expo option. Some like it, some don't. What I have been doing is to dial in quite a lot of expo on the low rate side, along with the low rate giving quite a lot less steering than high rate. I normally race with linear control on the high rate switch, figuring that if I guess real badly on tires I can always flip the rate switch to the low position, having reduced steering throw, as well as a very soft center around neutral, which should tame the car enough to at least be raceable. Is this getting confusing?

The last two pots can be real handy, as they adjust the left and right throw of the steering servo. I don't care how carefully the steering linkage is designed or how many hours are spent getting everything just perf or how precise the servo is, it is only very rarely that when all of the monkey-motion finally gets to the front wheels they deflect left and right exactly equal amounts. No problem here, just dial in the amount of travel left and right, each separate of the other, to get an easy solution to a previously difficult problem.

The steering wheel is real smooth in action, mainly because somebody thought enough to slip in a ball bearing, and the return springs look high quality. Ever have a steering wheel return spring break in the middle of a race? Yeah, me too. . .

Crystal access is on the left of the mostly metal transmitter case. On the right side is a jack for plugging in the charger for the Ni-Cd Tx pack. Next to the jack is a plug that, when connected to the proper adapter cords furnished with the system, allows you to check the car-mounted battery pack's voltage, a feature that won't work on 1/12 cars, or at least wouldn't tell you much, and that may work on five-cell packs commonly used in 1/8 cars. I've never used this feature, as the cord was cut up for the plugs. On the back of the case is another plug. Proper hookup here lets you work the servos without turning the transmitter on, so if you can talk the race director into letting you have your Tx while a race is on, you can fiddle without fiddling somebody else into the wall. Wait, wait! I made a mistake . . . if you hook the Tx up to the Rx with the cord, you can indeed run the radio system, *but* you must turn the Tx on to do this. With everything patched in properly, the signal is not going out the antenna, but direct to the Rx. However, if you unplug the cord before turning the Tx off, whoever is racing on your frequency will be crashing. Not good enough. I doubt seriously if any race director will let your radio out of impound, it is just too easy to make a mistake here.

Outlaw sprinters in 1/12 scale, MRP's new sprinter bodies, mounted on their own GP-12 series.

Enough! To the race track . . . the transmitter is a little large, although not particularly heavy. Still, it isn't the most comfortable to hold onto, so I made up a strap of Kydex that lets the Tx hang on my hand, attaching the strap to the case with servo tape. This works well enough and first time out with the Eagle, I used the Airtronics transmitter. But previous to this I had tried racing my Super J with the new Kraft "staple-gun" transmitter and decided that it was the way to go. So it was hard going back to a big-box transmitter, as it just doesn't feel natural anymore (if it ever did). Even though I have to give up a couple of adjustable features, I am now settled on using the Airtronics car-pack, but controlling it with the Kraft transmitter, a combination that works very well after a bit of linkage adjustment, along with recentering the steering servo.

The only problem I had with the system was that the switch got hit by a small rock, or something, once, and the car went sailing down the straightaway

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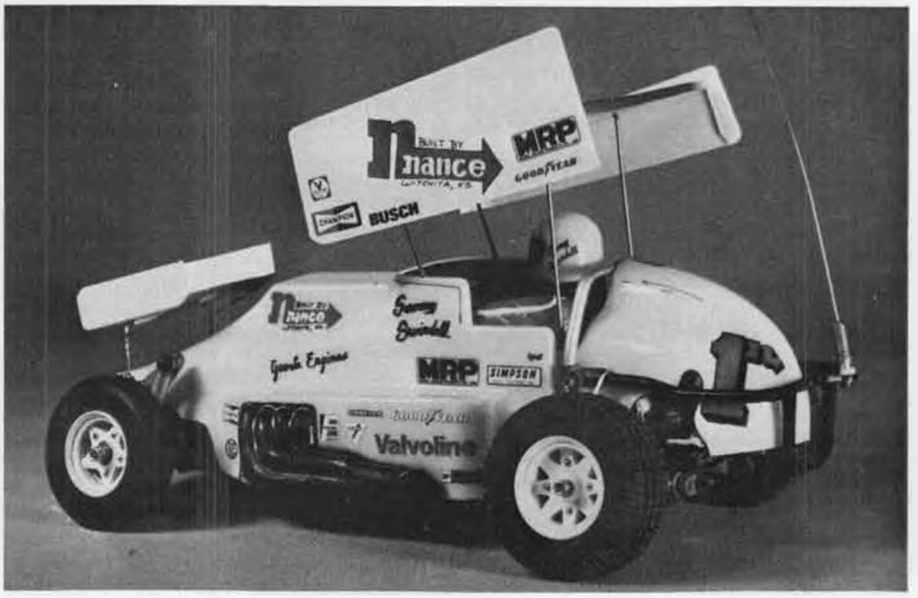


Another Outlaw-type sprinter, this time in 1/10-scale and mounted on MRC/Tamiya's off-road chassis. Body from MRP.

Three 3D boats from Baltimore club.

Mike Whitley's Dumas .60.

R/C POWER BOATS

By JERRY DUNLAP

WE'LL PRINT ALL THE NEWS . . . EVEN STUFF ABOUT WIND POWERED BOATS

Richard Palmer, coordinator of the Mini-America's Cup provided the following information on a sailing event that has been going on since 1974.

CARTER CAIN COPS "MINI-AMERICA'S CUP U.S. TRIALS" FOR 1982

During the off years of the "Mini-America's Cup" races, annual trials are held to tune up United States skippers. Keeping pace with his 1980 "DEFENSE" title, when the Mini-America's Cup races were held in Newport, Rhode Island, Carter Cain of Hilton Head, South Carolina, won out over Charlie Lalor, of Florida, in three days of intense EC-12 model yacht competition.

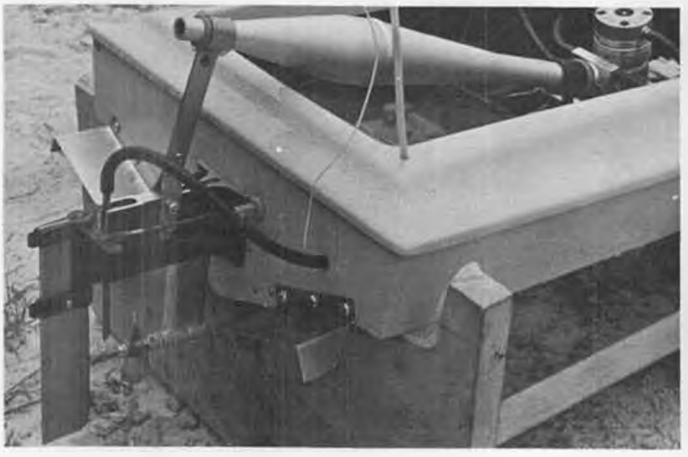
As was the case in the 1980 Cup series, Carter Cain wound up in a tie for first place, after three days of racing. This time Charlie Lalor was the other skipper. A 3-out-of-5 race series was established. Carter won the first race easily. Charlie Lalor bounced back with the next two, and things looked dim at the start of the 4th race, when Lalor took an immediate lead at the starting line. A key tacking error by Lalor allowed Cain to tie the series at 2 all. The final race, Cain took the lead at the starting line and never looked back.

Thirteen skippers came from five states, and from as far away as Plattsburgh, New York and Itasca, Illinois.

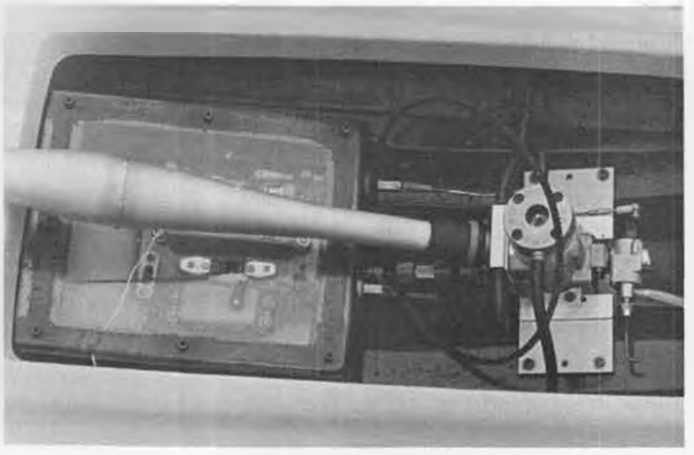
SEA WORLD, the famous park in Orlando, Florida, hosted the events adjacent to their giant water show stadium. Thousands of spectators had the opportunity to watch model sailboating in action as they passed into and out of the stadium. Temperatures were in the high 80s and it took 200 races to determine the winner.

The annual "Silver Bucket" was awarded to Carter Cain at the end of the program by Rich Palmer, Mini-America's Cup Coordinator. Mr. Cain also received a permanent plaque on behalf of the Hobby Industry of America along with a custom-made plaque presented by the Orlando RC Model Yacht Club co-sponsored the event with SEA WORLD and was responsible for all

Dave Field's .60 Sightler leaving pits at Stone Mountain, Atlanta Deep V race. All photos this month by Dan Vincent.



Business end of Sightler .40 boat.



Interior of Sightler .40. Radio box and inner liner standard from Sightler.

Fred Gimbel's 3D boat, .60 powered.

Mike Whitley's Dumas .60. Uses sliding coupling on pipe to keep engine on power curve, connected to throttle.

of the racing procedures. John Reynolds was liaison to the Mini-America's Cup Committee.

FINAL RACE RESULTS

1.	*Carter Cain*, Hilton Head, S.C.	20+3
2.	*Charles Lalor*, Miami, Fl.	20+2
3.	*Dick Finlay*, Miami Lakes, Fl.	19
4.	*Don Biggins*, Dunedin, Fl.	18
5.	*Chris Jensen*, Itasca, Ill.	15
6.	*Bill Crump*, Mount Dora, Fl.	13
6.	*Ed Zeone*, St. Petersburg, Fl.	13
8.	*Ricky Biggins*, Dunedin, Fl.	12
9.	*Albert Saar*, Holly Hill, Fl.	8
10.	*Karen Lack*, St. Petersburg, Fl.	6
10.	*Bill Gale*, Orlando, Fl.	6
12.	*Jim Carter*, Plattsburgh AFB, N.Y.	5

AH, I REMEMBER THE LAST SAILBOAT REGATTA I ENTERED

I actually used to participate in sailboat type races. You notice I used the word 'participate.' I'm not sure I ever figured out how to actually race a sailboat. If you want to create a real fuss, just try racing a sailboat like you do a powerboat. That, my friends, will get you into one big fracas.

The last sailboat race I participated in was the 50/800 class at the 1973 N.A.M.B.A. Nationals held on Green Lake, in Seattle. For those not into the sail scene, the boats are 50 inches in length and carry 800 square inches of sail. I had a Vortex Soling . . . a neat craft that sailed well. I had done some sailing at the local level but this was my first experience at a national type event. I will point out that sailing at N.A.M.B.A. Nationals has never really been the highest level of national sailboat competition. I personally can't even see the value of N.A.M.B.A. continuing to include a sailboating section in its rulebook. *(AMYA, American Model Yacht Association, conducts many class sailing regattas. wcn)* But that's a personal opinion and I'm willing to print a rebuttal.

Anyway, here I am with a little Soling entered in the 50/800 class. The one neat thing about sailing is you almost always finish your heat. However, it can sometimes be an embarrassment when you manage to finally cross the finish line and everyone else is packed up and ready for cocktails. I managed two rather dubious distinctions during the contesting of the 50/800 class. I placed absolutely last . . . by a big margin. I was the absolute, undisputed, last place finisher. This is significant because in many sailing contests there is a very close point spread between the top finishing boats. Well, I didn't make it difficult for them to figure out who was last. My other arena of distinction was for penalties assessed during a race. In one heat, I managed to accumulate three violations . . . before the race even started.

Sailboaters have a term called "sea lawyers." In power boat racing, you do a lot of reacting instantly to what's happening around you. You also react in sailboat racing. However, the boats are not going nearly as fast as a powerboat, and there's no noise. So everyone is talking and shouting at each other. In that heat where I got three violations prior to the start, I had three guys yelling at me. When one of them hollered, "Do something right, Dunlap." I countered with, "I'm open for suggestions." It didn't seem like his suggestion, "Put it away," was all that positive an answer.

Actually, model sailing can be a real fun experience. I did enjoy the beauty of the boats gliding across the water. Although I never became adept at the competition spectrum, it was mostly my failure to seriously learn the rules.

SO WHERE SHOULD YOU STICK THAT RUDDER?

Vern Schmidt from JVS Boats provided me with some thoughts about rudder location that is certainly worth sharing. "We receive two or three inquiries a week asking why JVS recommends installing the rudder on the left side of the propeller strut when viewing the transom. At least 50% of the people who purchase a JVS boat do not follow our instructions and set the rudder on the right side of the strut. I would like to explain why we recommend this left side installation.

"In full-size hydroplanes, almost all the boats have the rudder on the right hand side of the strut. However, you must remember that these hydros make only left hand turns.

"Model boats, on the other hand, almost always make right hand turns. You would think this would be enough to make one wonder where the proper place for the rudder should be.

"Let's think about it for a minute. First, the propeller digs a hole in front of itself in its demand for water. When the rudder is mounted on the right side of the strut the rudder turns into this hole the prop has or is digging. When making a right turn, the rudder is operating in this hole or void of water. The rudder must turn more than normal to make the right turn and steering can be erratic.

"Now, if you mount the rudder on the left side of the strut, your rudder will not have to turn as much since it is operating in solid, undisturbed water. Secondly, most hydros must angle the strut, shaft, or bend the fin to make the hydro go straight when the rudder is pointed

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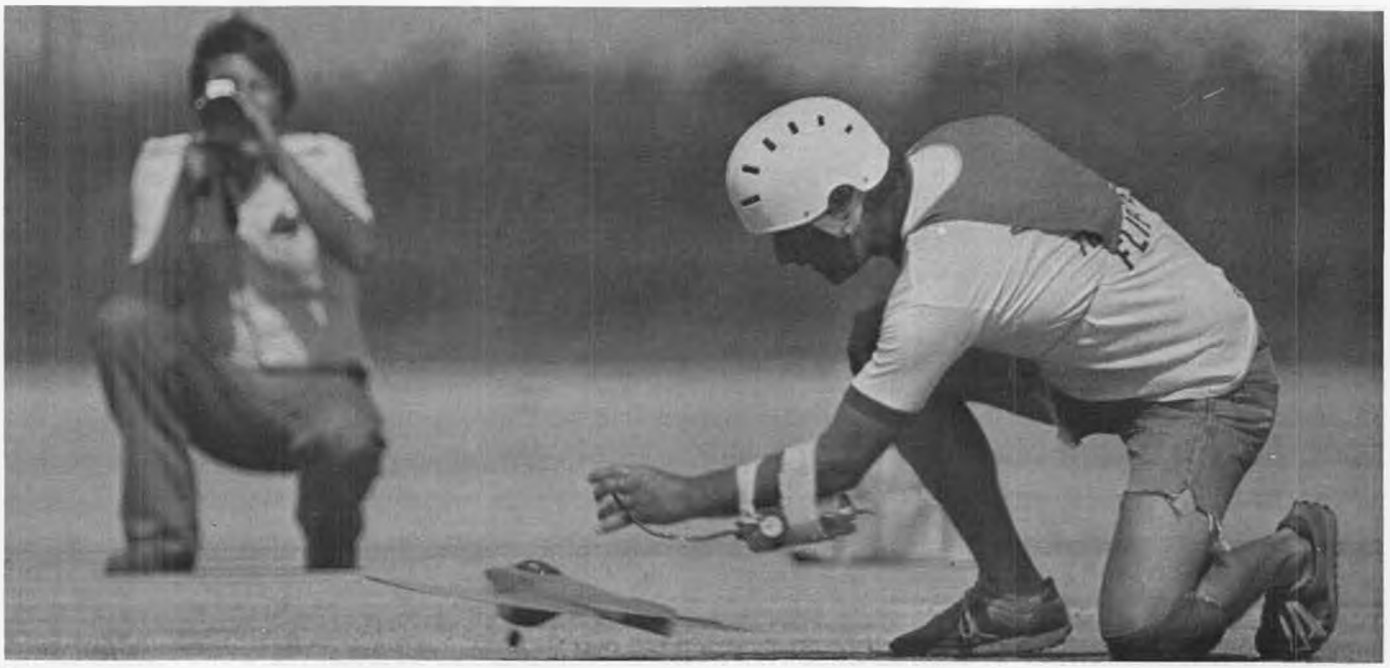
Fred Gimbel drains his "Ding a Ling" on Herb Stewart!



"Flipper" Les Pardue, as filmed by Bob Hawk, in background.

Control line

By "DIRTY DAN" RUTHERFORD

PHOTOS BY CHARLIE JOHNSON

• When sitting down to do the monthly CL Column, I either have just tons of stuff on my mind to write about, or there is a small void . . . not where my mind should be, but where the CL thoughts generally knock around. Not too much there this time around, so the column will take the scatter gun approach.

RACING ADVISORY COMMITTEE (RAC)

Even though he never has mentioned it in the *Fuel Lines* column, MB's Joe Klause has been serving as chairman of the RAC for some time, finally retiring from this position, with Jim Ricketts taking over the job.

Quoting Ron McNally, CLCB chairman, "It is appropriate to write a few words to try and express my appreciation for the fine job Joe Klause has done as RAC chairman during the past three-and-a-half rules cycles. During that time, the RAC has always been active, effective and on time. Joe has said, 'The work involved is minimal.' If so, it can only be so because of effective leadership organization and scheduling."

And as the CLCB rep from this district, I will have to agree with that completely, as any questions about Racing rules proposals were easily answered by a look at the input Joe and the RAC furnished. Without looking through my records. I am also quite sure that whatever the RAC wanted, in the way of votes on rules proposals, they got at least 95% of the time.

In case you are looking for a CL item to cheer about or just flaunt in the faces of

Larry Jolly with a headlock on J.E. Albritton, as Robert Theobald looks for Larry's funnybone.

Now we have Phil Shew, in for Theobald. Remember the Marx Brothers and their famous closet scene?

Steve DeBord about to launch at Buckeye, gives fuel line a little squeeze for good luck.

Don Gutscher (Denver Threat) with Steve Mills (Tucson) about to go at it in Fast Combat at Buckeye.

your RC buddies, the CLCB (Control Line Contest Board) and its attendent advisory committee is a good one to pick up on. In this area, CL truly leads the way, the CLCB handles many complex rules proposals, dealing with widely varying events and at the completion of every rules cycle, it is always one of the other boards that holds up the rule book, with the RC guys being the champs in this category, they can't seem to get less work done in more time, for some reason.

Ron McNally has to get a lot of the credit for the CLCB running so smoothly, he took it over right after another of the typically hectic cycles that generated so many interesting pieces of correspondence that were complete with name calling, circular logic and veiled threats. All of a sudden, we, meaning those on the CLCB mailing list, were getting simply worded messages that were to the point, instead of long, rambling letters that had to have worn out at least two or three of the AMA copying machines over the years. Of equal importance was that advisory committees, then just getting started, instead of being constantly reminded that they were advisory only, were asked for more input and assured that said input would be put to good use by the CLCB when it came time to vote.

Today, any advisory committee generated proposal automatically passes on the initial ballot, the CLCB acknowledges its existence, but does not vote on it. From there, these same proposals get hashed out in the committees, in addition the committees deal with individual's proposals that have passed the initial ballot. And in the end, if any of the advisory committees can reach a unanimous decision on the proposals affecting their specialized events, the CLCB goes along with their wishes. It is all nice, neat and effective.

Thanks Ron, for an (almost) thankless job well done. . .

MORE ON COVERINGS. . .

Robert McLinden, of Eastern Soaring Supplies, P.O. Box 437, LeMont, Pennsylvania, 16851, writes: "In response to your request in the June issue as to anyone who uses Quik-Stik. I use it for a lot of things . . . or did. In my early experiments with FabriKote I found its ability to stick to be poor. I first tried Balsarite but this cannot be reheated, I then tried Quick-Stik.

"This was an excellent method of holding FabriKote down (including the edges). It never raised even after exposure in a hot car for many hours. Since then it has been used to put down silk, Koverall, tissue, and pieces of wood, all using heat from my Sealector iron (medium setting).

"Lately we have been cutting cores for the sailplane boys. In building these wings up, the problem of bonding the balsa to the core has arisen. I do not like epoxy (too heavy and too strong) and contact cement is just too much trouble. While experimenting with Ron St. Jean's all-foam construction method, I was unable to get some Scotch Products number 77 cement. He uses this to bond Saran Wrap to tissue covered foam. I was, however, able to get some 3M MultiPurpose Spray Adhesive (numbers 6081 and 6082); this is great stuff.

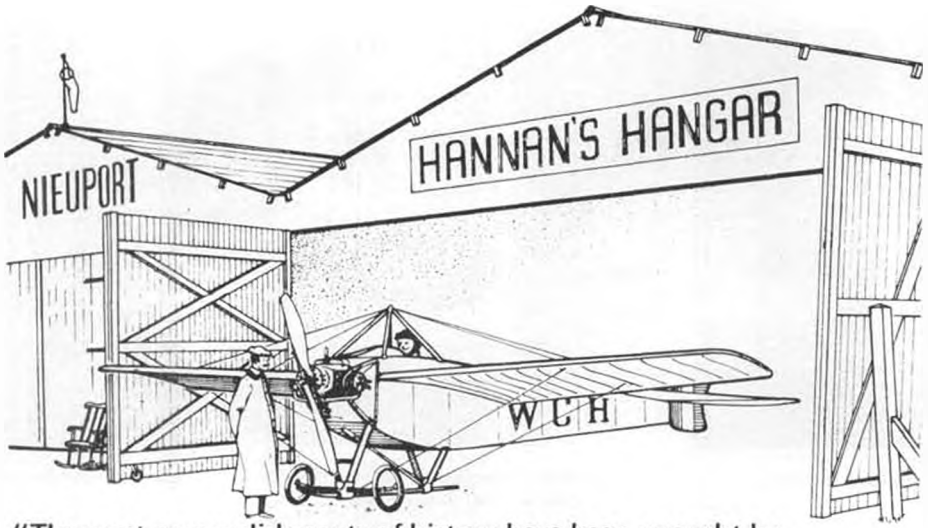
"First you spray the areas you wish to have your covering adhere to with the 3M spray. Allow this to dry thoroughly, it takes a fair amount of time. Then, using the low setting on your iron, simply iron on your covering. I have used silk, tissue, Saran Wrap, Mica-Film, Koverall, and silkspan. I have also bonded balsa to my foam cores using this method. Now for the real thrill, *it does not attack foam!* You can bond your covering right to the foam using low heat."

Well now, that sounds very interesting, especially to me, as I am totally committed to foam Combat models and have everything concerning their construction figured out to my satisfaction. All that is, except for the actual covering process. If this 3M stuff actually works, the problems are solved, as there are lots of films available that will shrink, are light, and easy to get. Sticking them to bare foam has always been the big hang-up.

The 3M adhesive ought to be widely available, for films you need only to look. An uncoated version would be the lightest, of course. How about the stuff they use in meat markets for shrink-wrapping meats? Bob mentions Saran Wrap, that is available everywhere. I work for a hobby and toy distributorship. We have a huge roll of shrink plastic for rewrapping merchandise; it is very light, shrinks well and is very cheap, although

Continued on page 86

Myles Lawrence (Mission Viejo) flipping while Jarl Boles (Salt Lake City) holds, at Buckeye.



"The great accomplishments of history have been wrought by individuals, not by the mass."

• This month's point-to-ponder, by Tom Anderson, seems particularly applicable to our favorite hobby.

EARL STAHL

And certainly one of those accomplished individuals would be Earl Stahl, famed for his rubber-driven flying scale designs. *Max-Fax*, the Washington, D.C. Maxecuters club newsletter, featured the fascinating reminiscences of Stahl, entitled "Looking Back," from which we abstracted the following: "It is probably unwise to spend much time reflecting on the past. I believe we should keep looking and moving towards the horizon. My exception to that philosophy involves the aircraft and model planes of the period between the two great wars.

"Among my earliest recollections are the visit of the Gates Flying Circus to my home town, and then, later, the excitement and awe imparted by the exploits of Lindbergh, Chamberlin, Goeble, Byrd, Earhart, and their comtemporaries. Lindbergh's daring conquest of the Atlantic had the greatest impact on the populous. I was almost nine at the time, adn I first heard of his success from an exuberant policeman as I was making the long trek, on foot, from a local farm being used as a flying field. Even before the 'Spirit of St. Louis,' I had been hooked!

"The dreadful depression of the thirties permeated all activities. I don't remember many of the hardships, but, rather, I identified with the promise of the future as exemplified by the feats of dashing aviators flying ever better aircraft. Model building, at that time, was an excellent activity to pursue. Unlike kids of today, we didn't have to be sent to camp or summer school to keep us occupied. With some pine, balsa, Ambroid, and periodicals, we never had to ask 'What can I do?' to keep from being bored. For me, it was a great period.

"One can't be absolutely certain, but I believe competition in those days was every bit as stiff as I observe today. To be a viable competitor, one had to build good models, be able to analyze and correct flight characteristics, and then to practice, practice, practice to be able to deal with all kinds of environmental conditions.

Stahl then discused his great series of published flying scale designs, and continued: "For several decades after I stopped submitting the articles, I supposed the various models had been forgotten. Then, in recent years, letters, phone calls, and visitors to my NASA office made me aware that many folks had built and enjoyed the models. It is still a source of pleasure to be aware that some of the designs are still being built and flown."

Earl elaborated further upon his model building experiences, then signed off with this thought: "Those were enjoyable times. I look forward to one day stepping back from the busy routine that has occupied my working years, so I may again participate in the great activity of building and flying scale model planes."

NORTHROP WING EVENT

Carl Hatrak, perennial Contest Director of the Northrop Flying Wing Contest, has announced the forthcoming 16th Annual. Scheduled for Sunday, Novem-

Continued on page 88

Charles A. Lindbergh, perhaps aviation's greatest booster, also supported modeling. Seen here during 1928 at Mines Field, L.A., with Mulvihill contestants. Note expression second from right!

F6F Hellcat, built from Flying Scale Models plans reduced to 1/30 scale by Milan Kacha, Czechoslovakia, uses Brown Jr. A-23 CO_2 engine.

Don "The Wiz" Assel tries on his White Canard Peanut for size. See text. Photo by Dave Gibson.

PEANUT SCALE

Sorrell Guppy

By HOBY CLAY . . . Tropical fish fanciers, such as Don Dewey, will understand the logic of this little staggerwing biplane's name. It flies well as an unusual homebuilt, and just as well as a rubber scale model.

• The Guppy is an ultra-light single-place home-built airplane. It was designed and built by Hobie Sorrell of Hiperbipe fame, one of the best designers, builders and restorers of airplanes around. The prototype is powered by an 18 h.p. Cushman engine and is one of the few truly successful airplanes to fly on less than twenty horsepower.

Hobie sold the original N2180 to Mike Kimbrel, a Western Airlines captain, who has recently talked him into marketing the plans for home-builders. He wrote an article on the design which was published in the October, 1977, issue of "Sport Aviation," the EAA publication. It has a color shot and several black and whites. He will send you the sales brochure for two bucks, which has a half-inch scale drawing, photos and a lot of description. Write M.G. Kimbrel, 1333 Garrand Creek Road, Oakville, WA 98568.

The model was designed, like the prototype, as an ultra-light for indoor flying. It's light and tough enough to bounce off the gym walls and bleachers but too flimsy and under-powered to do well among the tree branches, weeds, and gusty air outside. If you plan to fly it outdoors, I would recommend slightly larger wood sizes and lightly-doped tissue to withstand the rigors.

Construction is ultra-simple and duplicates the original with the exception of the fuselage covering, which is 1/8-inch luan mahogany door skin plywood. Hobie used sawed 1/4-inch balsa ribs (spruce cap strips) and 1.7 ounce Dacron covering material, lightly-doped.

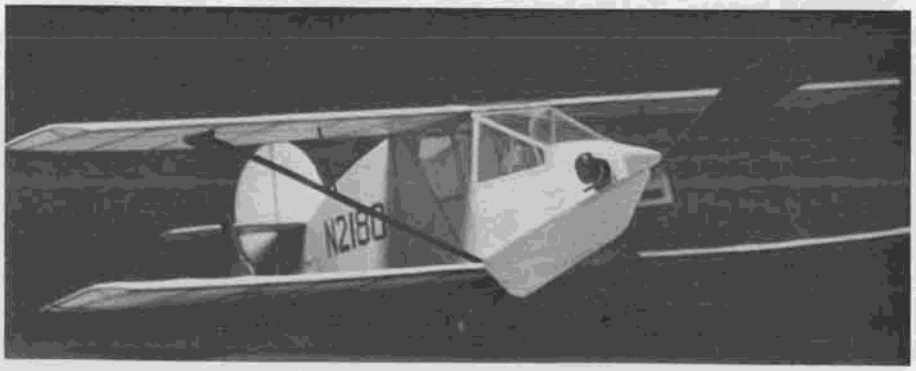
For the model, wing tips and tail surface outlines are laminated up from two or more thin strips of balsa, wet-shaped over a waxed cardboard form and tied together with thinned white glue. After the wing tip bows are taped to their form, bend it to match the top wing rib shape. The top cowl and nose block are shaped from soft balsa. I like to fit a frame of 1/32x3/16 strip inside the nose opening to hold the nose block. Cover the sides and bottom of the cowl with 1/64 sheet to simulate the plywood and add a little nose weight.

The light-weight but tough prop has blades soaked in ammonia water and twisted by strapping on a can or bottle about 2-1/2 inches in diameter at about 15 degrees forward skew. The .020 wire shaft is passed through a hole drilled in the round birch toothpick hub, bent over and cemented. The blades, after drying and standing, are jigged to pitch and spot-glued to the hub with Ambroid. When this has set, the blades and shaft are lightly epoxied to the hub and the assembly is sanded with an emery board to blend it all together and to balance.

The engine cylinders can be constructed quite realistically from bendable sections of 1/4-inch flexible drinking straws, with balsa heads and insulated wire exhaust stacks. Pull the wire about 1/8 inch back into the insulation to get the hole in the end of the stack. Leave the wire in the remainder to help hold the shape. Wheels are an odd diameter and should be turned from styrofoam or light balsa.

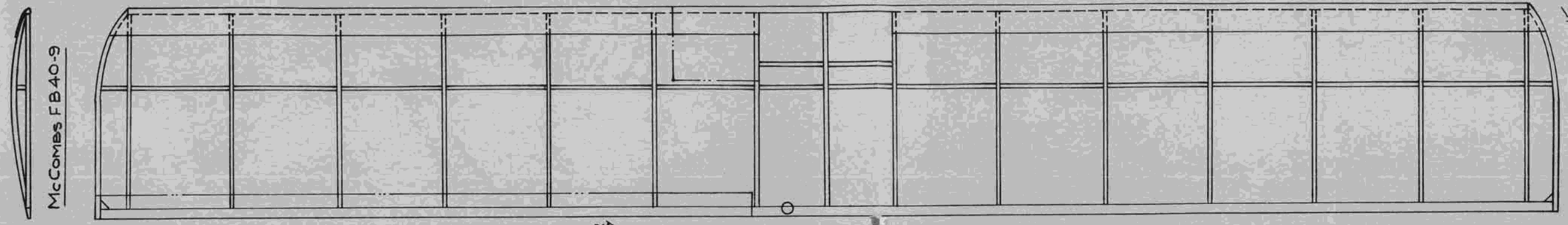
The model was built to scale with no dihedral. My model flies fine indoors that way, as do the Fikes and Laceys. About a 1/4-inch dihedral under each lower wing tip will give a little more stability. If you go that way, don't forget to adjust the length of the interplane struts.

Mike Kimbrel's plane is all white, with red struts and registration numbers. The letters and numbers for the model are 1/2-inch high cut from red tissue. They are standard aircraft type rectangular with diagonal corner cuts. Fasten to the



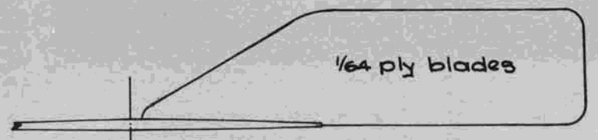
Here's a Peanut that, like its full-size counterpart, is easy to build. Struts eliminate need for landing and flying wires.

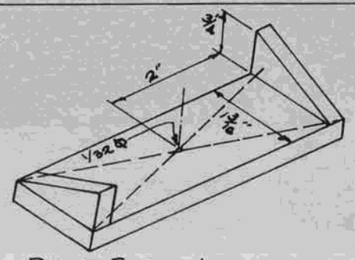
Continued on page 89



WING L.E. 1/20 sq.
T.E. 1/32 x 3/32.
Ribs 1/32 sq.
Spar 1/32 x 7/32.
Tips 3 laminations
1/64 x 1/20.
L.E. sheet 1/64.

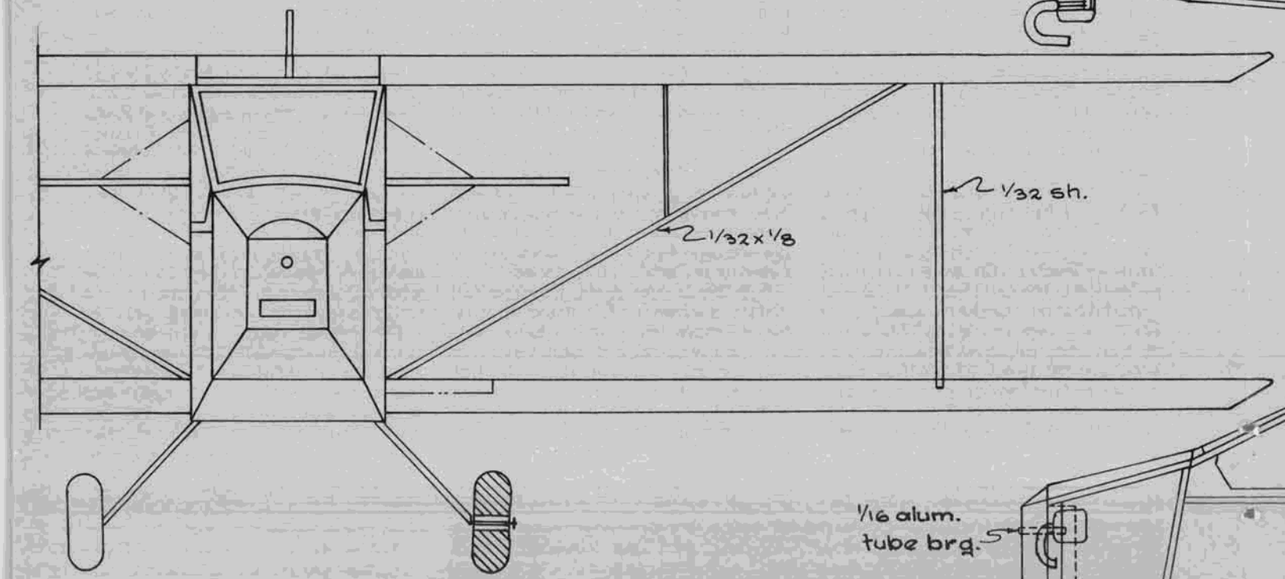
Strip ailerons lower wing.

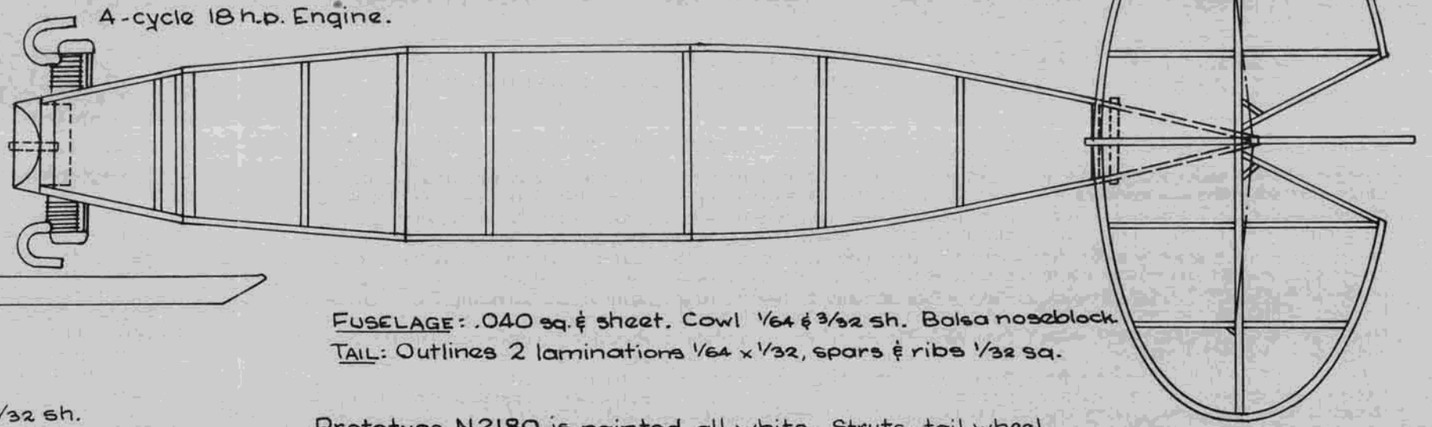




PROP PITCH JIG
P=8, any dia.
All 1/4 balsa

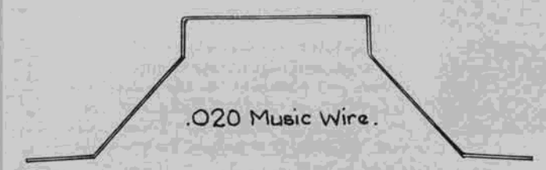
OMC Cushman Model 200
4-cycle 18 h.p. Engine.

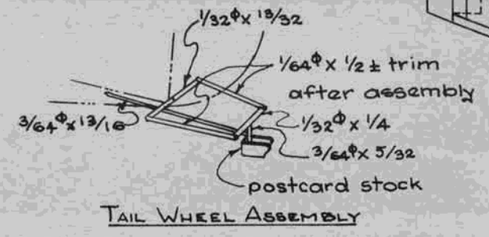




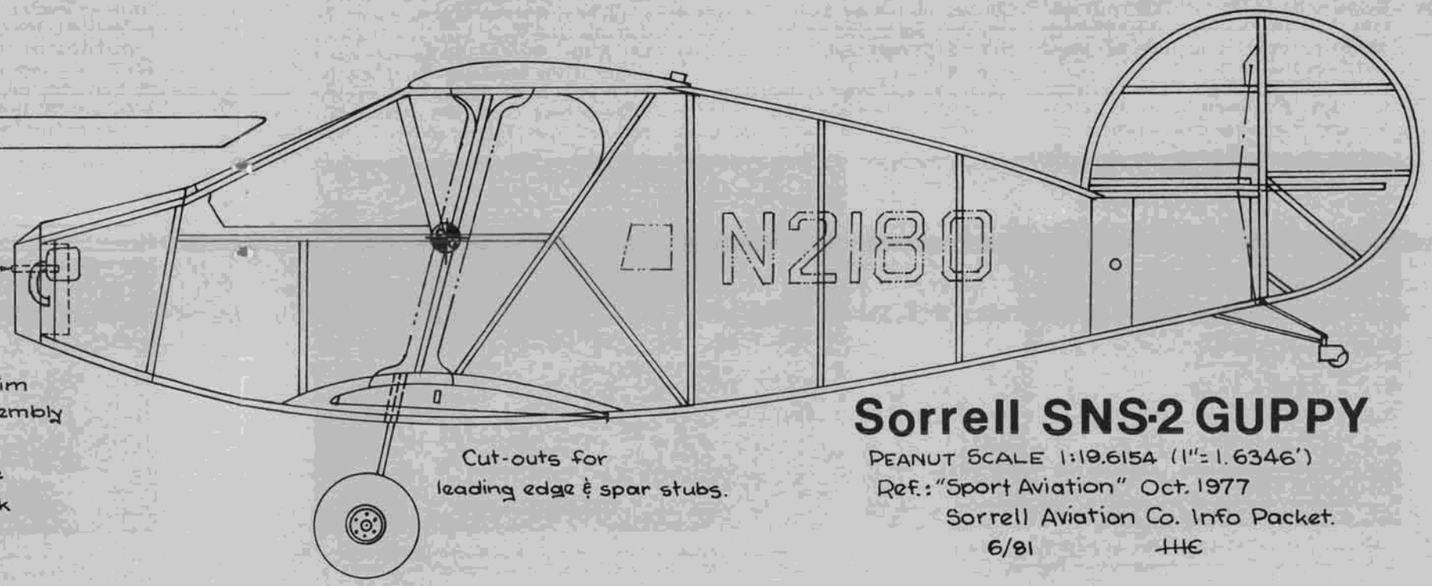
FUSELAGE: .040 sq. & sheet. Cowl 1/64 & 3/32 sh. Balsa noseblock.
TAIL: Outlines 2 laminations 1/64 x 1/32, spars & ribs 1/32 sq.

Prototype N2180 is painted all white. Struts, tail wheel assembly and lettering is red.





TAIL WHEEL ASSEMBLY



Cut-outs for
leading edge & spar stubs.

Sorrell SNS-2 GUPPY

PEANUT SCALE 1:19.6154 (1"=1.6346')
Ref.: "Sport Aviation" Oct. 1977
Sorrell Aviation Co. Info Packet.
6/81 HHE

Bill McConachie, Palo Alto, launches his 14 oz., one-inch scale 0-38, built from Aeromodeler plans. Scene is '82 National F/F Champs.

And Chuck Conover comes right back with his Aeronca Chief. Chuck's first "biggie" after specializing in Peanuts. Very nice!

FREE FLIGHT SCALE

By FERNANDO RAMOS

• I would like to start off this month by thanking all of you who sent in suggestions on different topics you would like to see covered in this column. I will try my best to get to each and every one of the great ideas sent in. For a while, I will not have too much space to cover the usual topics, until the magnificent article on World War I Aircraft, Colorful Notes, by Wally Batter, is concluded. In the meantime, I'll be covering several odds and ends regarding F/F Scale.

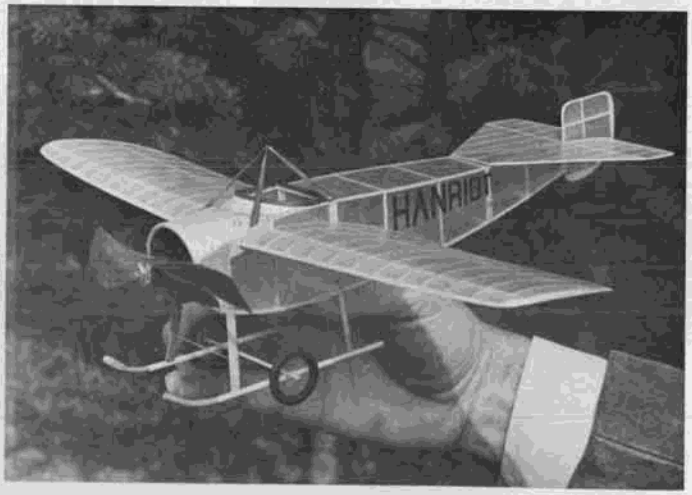
The first item, is that the well known English engine manuracturer, P.A.W. (Progress Aero Works) has a fairly new .75 cc diesel engine, that some of you may be interested in. I bought mine from HOBBY HIDEAWAY, RR2, Box 19, Delavan, ILL 61734, for $28.00. Incidentally, HH also handles most English diesels, plus all of *Aeromodeller's* plans and three views.

Next, R.E.T. Flying Aces Plan Service, P.O. Box 7893, Midfield, AL 35238 has just gotten into the plan business. For those of you who are familiar with the Flying Aces magazine, and its Trail Blazer series of plans, R.E.T. has had the plans enlarged so that the 3-view drawing is now the same size as the full-size templates for parts. Normally, these 3-views were half size making it necessary to enlarge them. Well, for some people that's simply too much trouble. Now there are no excuses! Also included in their plans are several stick and profile plans for planes that would attract the newcomer to modeling, particularly the youngster.

Here is a sampling of some of the plans available: Wright Flyer biplane, Bleriot Channel flyer, Curtiss Tripod, Deperdussin Racer, Rumpler Taube, Vickers Gunbus, plus many more. The cost is very reasonable. The Trail Blazer plans go for $2.25 post paid, and the quickies go for $1.35.

In the past, I have mentioned the use of a small wooden frame to be used for covering flat stabilizers and rudders. In other words, cover the frame with tissue, water shrink, and when dry and taut, white glue the tail surface onto the frame. When this last step has dried, remove from the frame, and repeat for the other side. The object of this procedure is to eliminate warping of the flat surfaces, and also to provide a taut, wrinkle-free covering job. If a non-tautening dope is used, the tail surface should still remain perfectly flat. However, I have found that if the dope you're using has lost some of its plasticizing properties, warping could result. Therefore, I have added an additional step. First off, the tissue is white-glued onto the frame upside down, that is dull side up. The reason should be obvious, since you'll be gluing the tail surface onto the dull side. The glossy side should always be on the outside. The tissue is water shrunk in the usual manner. When this has dried, I brush on two coats of clear dope letting them dry thoroughly between coats. The tail surface is glued

Czech army Mig-21 jet fighter pilot, Ladislav Kunert, with sons Lubes (left) and Ladislav Jr., and a flock of Peanuts.



Close-up of Ladislav Kunert's Hanriot, built from plans of photographer Lubomir Koutny, of Brno, Czechoslovakia.

onto the pre-doped surface and left to dry.

Since I usually finish my models with Floquil, I'll remove the excess tissue around the tail with sandpaper, leaving an exposed edge of the framework. Then the bare wood is given a couple of coats of dope to seal it. If on the other hand, you are covering with colored tissue, leave enough excess tissue on one side to lap over the framework. By doing it this way, you are reducing the chances of warping, plus you will always have a wrinkle free surface.

I'll admit, that on occasion, a wrinkle will occur. How come? Well, it isn't because of the method used. If a structure has an unsupported area, say, like the bottom of the fin usually is, it can give slightly, producing an unwanted wrinkle. So, on any area that you may suspect a weakness, reinforce with a gusset or a diagonal brace, which should take care of it.

COLOR FULL NOTES (CONT.)

This is a continuation of the article started last month, on WW-I military aircraft finishes, as authored by Wally Batter, and first published in the February, 1982 issue of *World War I Aeroplanes*. For further information about this publication, see last month's column.

UNBLEACHED LINEN

Second in mystery to the color of PC-10 is the color of natural linen after being doped. Its natural color is about that of a grain of wheat. Four or five coats of clear dope would not make much change in this color. However, clear varnishes would take it to a Methuen (3-4) (A-B) 2. There is a light honey-gold-tending-to-orange tinge when the varnish is viewed in depth (as in the can) which would slightly modify anything which it over coated. A basis for reproducing this color (failing the ability to dye a natural fabric such as silk), would be the application of an orange yellow that was very much cut by clear to produce a transparent tint. Alternatively, a similar process cut with white would give an opaque tint which might serve as a fabric dye for the first and second coats — finish with clear.

Ing. Charles Ludvik built this real nice Avia BH-21, to 1/20 scale. Bet it flies real well.

The linens manufactured by Britain, France and the United States were nearly identical — certainly so for the purposes of this article. Some of the aircraft used by the British and American air arms were of French manufacture, and this introduces another factor into the color of undersurfaces.

French practice for the treatment of unbleached linen was much the same as that of the British up to about mid-1915. Seeking to provide better protection from the deleterious actinic rays of the sun, the French devised a pigmented hue that was a near match for the natural fabric. Within this coating, which was not, of itself, all that much protection, they added powdered aluminum as an effective sun-screen. When the French went to deliberate camouflage patterns during 1916, these undersurface coatings took on a somewhat deeper hue. Although the experience on the German side was similar for a while, they did have a different approach.

During the early days of the war, German aircraft were often covered with bleached linen fabric. Tony Fokker made use of it up to the advent of his monoplanes. The color of this fabric is best described as an off-white (for which no Methuen equivalent can be stated). A white which is gently modified by greying and a hint of yellow might serve as a match.

It didn't take long for the weakness of bleached linen to make itself apparent and it was withdrawn from use. The replacement fabric was a good linen, the material shortages which were to plague all of the combatants hit Germany more severely than the others. It became necessary to add other fibers to the linen used for aircraft. The color resulting from the use of these "foreign" fibres gave the fabric a distinctly different coloration compared to that of Germany's enemies: about Methuen 4(C-D)4.

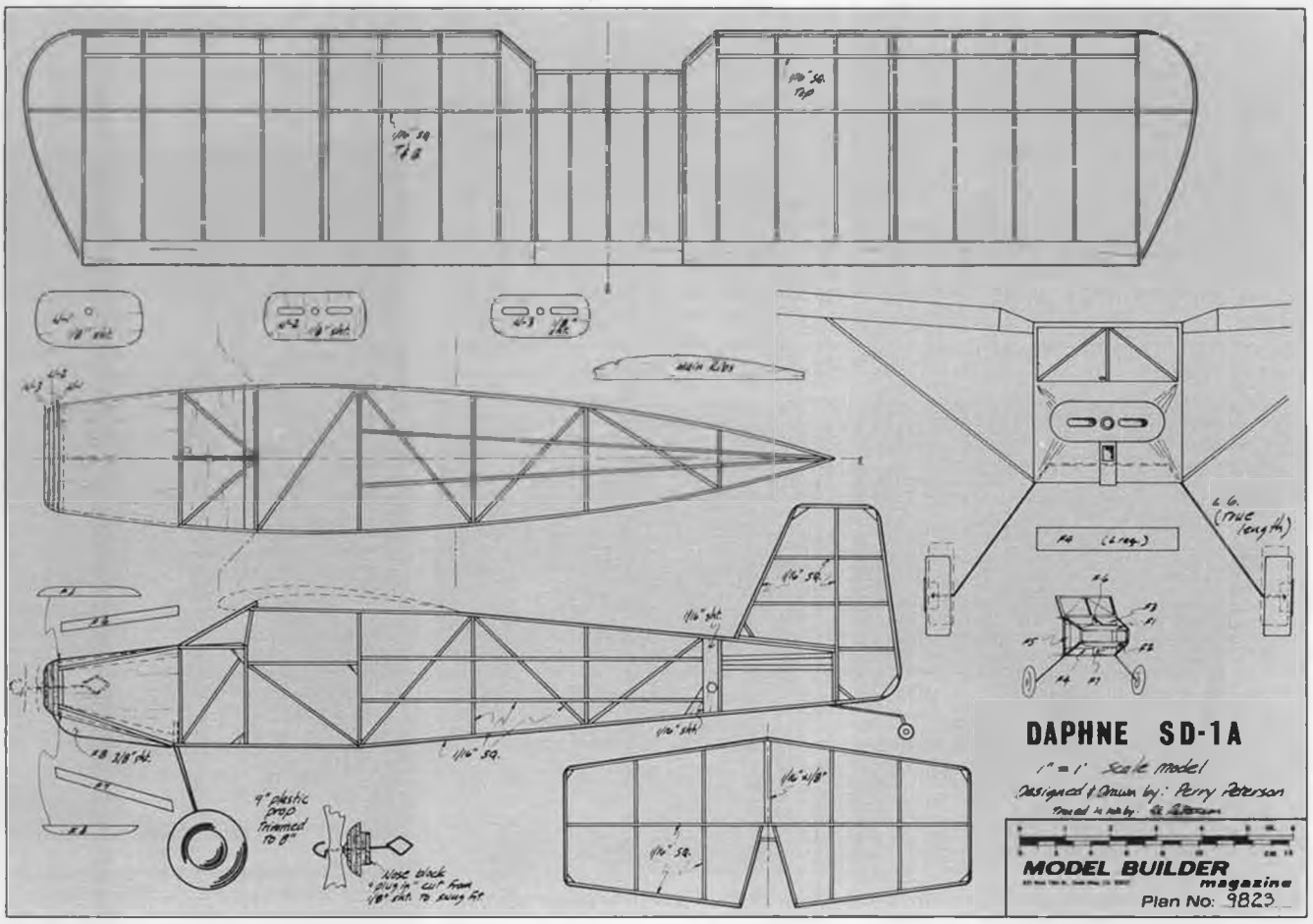
When Germany took to printing

Continued on page 90

Lubomir Koutny, who took the Czech model photos herein, built this Beta-51 powered by a Modela CO_2 engine. Spans 27-1/2 inches, weighs 70 grams.

Interesting trophy idea from Czechoslovakia. Avia B-534 the winner. Caption indicates Czech/Soviet competition.


N9612


DAPHNE SD-1A
1" = 1' Scale model
Designed & Drawn by: Perry Peterson
MODEL BUILDER magazine
Plan No: 9823

DAPHNE

By PERRY PETERSON . . . The designer of this homebuilt appears to have been strongly influenced by Wittman's "Tailwind". In any case, this 20-inch span version makes an excellent flying scale model.

• The Daphne SD-1A is an excellent small homebuilt aircraft. This attractive side-by-side two-seater, designed by Art Szaraz of Bedford, Ohio took second place in the 1970 Oshkosh aircraft flight efficiency test. A Vidervol VS-1, designed by James Vidervol in conjunction with Art Szaraz, placed third in the same test and was the prototype for the Daphne. A photo and a good three-view of the Daphne SD-1A can be found in *Build Your Own Sport Plane*, by Don Dwiggins.

As a model, the Daphne is quite easy to build and is a superb flyer. If you decorate yours like the model in the photos, it will be one of the sharpest looking planes at the flying field and will draw many favorable comments.

This model was my third Daphne. The first was a 13-inch span peanut that was not very successful, but the second was a 20-inch wing span version that was a top notch flyer. It was the only scale model I ever lost in a thermal (sob!). On it's eighth flight it slowly circled higher and higher until it was lost from sight after eight minutes and ten seconds. The seventh flight was timed at three minutes and eight seconds.

CONSTRUCTION

Lay the plans down on a piece of fiber insulation board and cover with Saran or similar kitchen wrap. Make two identical fuselage side frames over the plan. The plane in the photos was built using alaphatic resin glue except when noted otherwise in this article. Double-glue each joint by applying one thin coat of glue to each joint then pull apart and let dry while the next piece is measured and cut, then apply another coat of glue sparingly and pin in place.

The 1/16 square fuselage side frames will make a good light structure that is adequately strong if you select firm wood for the longerons and medium for the rest of the structure. Remove the side frames from the plan and join at the tail post. Cut the 1/16 square crosspieces to length, using the top plan view as a guide, and glue in place, starting at the rear and working forward.

Form the .030 music wire landing gear using the front plan view as a guide, and sandwich between two F-4's. Glue this sandwich with epoxy and clamp while drying. Snap clothes pins work great for this. When dry, remove clamps and install in fuselage. At this point it is advisable to apply masking tape to the landing gear leg ends for safety. They can be removed just prior to installing the wheels. Install F-3 under the windshield area and trim two F-5's to exact length by test fitting, and glue in place.

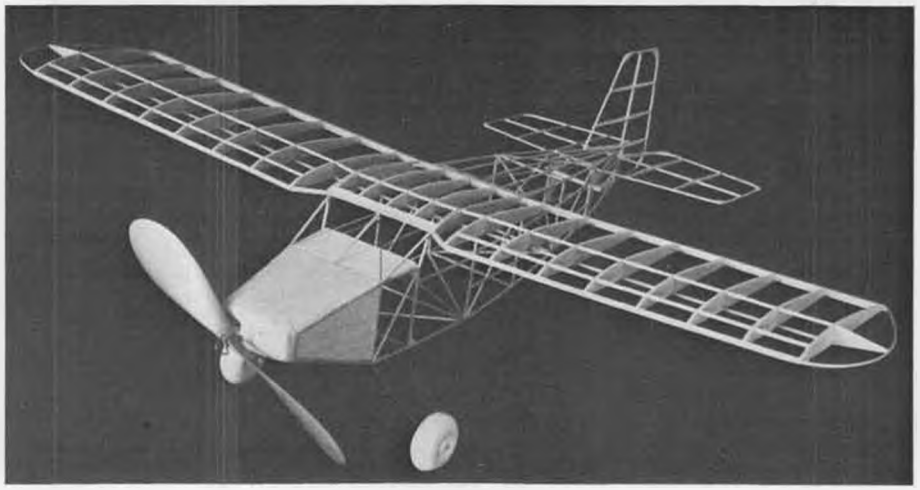
Add F-1 and F-6 to the top of the cowl and F-2 and F-7 to the lower portion of the cowl. When dry, sheet the cowl areas with 1/32 balsa. Use four pieces, one each for top, bottom, and sides trimming each one to fit as you go.

Build the tail flying surfaces over the plan with 1/16 stripwood. The wings are also built in the conventional manner. Note that there are two top wing spars. The forward spar is used mainly as an aid to covering. Using the color pattern shown in the photos, this allows covering with white tissue from the trailing edge forward to the front spar and blue tissue from front spar forward to the leading edge. Laminate the wing tips using four strips of 1/16 x .020 basswood.

FINISHING

Sand everything carefully and seal the front sheeted areas, wheels, and nose block with three coats of sanding sealer, sanding between each coat. Now it is time to cover. Use thinned white glue as a tissue adhesive. Paint a solution of about 55% white glue to 45% water, around the outside edges of the framework to be covered by one piece of

Continued on page 86



The author/designer's third Daphne before covering. No.1 was a not-too-great Peanut. No.2 was same as featured herein. Disappeared overhead after 8 minutes.

Free flight Mecca in the U.S., Taft, California, this the 1982 National Free Flight Championships. Hmmm, wonder why we can't get some motorcycle advertisers?

FREE FLIGHT

By TOM HUTCHINSON

• This past month has made me acutely aware of how many people other than free flighters read this column. First, I got a phone call from Dave Johnson, a top RC Sailplane flyer from the Portland area, taking me to task for describing Woody Blanchard's *Gawn* design as "gawky looking". He'd built one, and it was still in his mother's attic. (He also mentioned that he'd gotten to know Woody very well at sailplane contests . . . Blanchard even has a boat he's named *Gawn III*.) Then, a few nights later, I got another phone call from John Oian, MAN's Boating editor. He'd discovered a free flight field near where he was living in Florida, and was planning to return to his original interest, but needed some information on Wakefield thrust bearings.

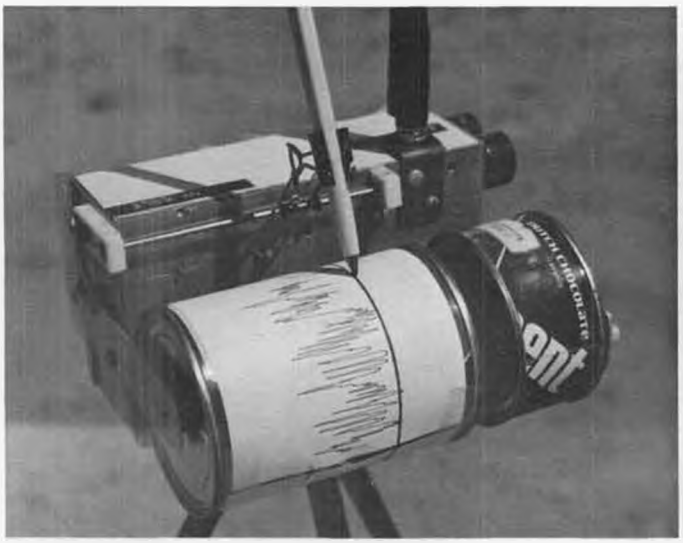
So, bolstered by the ecumenical nature of my readership, I hope I don't lose too many of you out there by confessing that I've spent some time for the past couple of years attempting to learn the art of flying RC sailplanes. (There will be a slight pause while all the diehards turn to Dirty Dan's column.)

Now that I've come out of the closet and admitted my weakness, you might wonder what charms the electronic branch of the hobby would have for a long time free flighter. *(Boy! Am I enjoying this! wcn)*

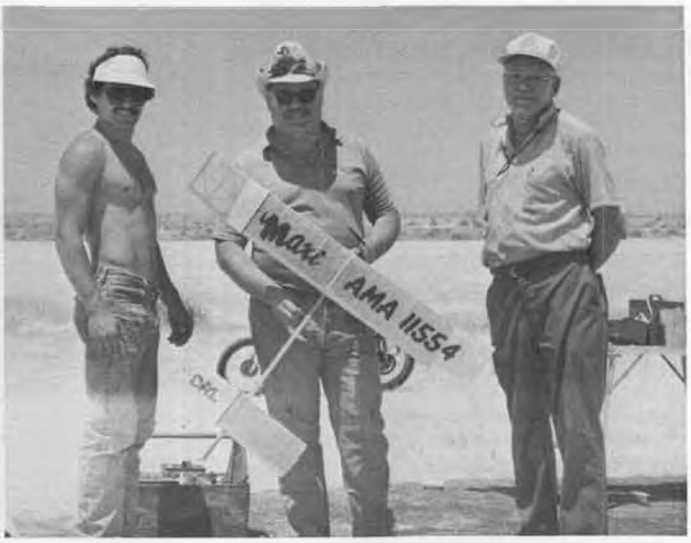
In my case, practicality was a major consideration. Our Oregon weather is usually wet and a bit breezy in the spring, and during the summer months, most of the usual flying sites are planted in crops. The chances of finding a decent flying weekend for free flight are pretty slim, except for our Indian Summer and late winter months. On the other hand, RC gliders aren't as finicky about the weather and can be flown on smaller sites (I have two sites within a couple of blocks of my house, plus the athletic field at the high school where I teach). It's a relatively simple matter, then, to find a time and place to fly RC, as compared to finding a spell of calm weather for test flying.

Another attraction is the fact that learning to fly is a real challenge for me . . . it's not easy as the good flyers make it look! At first, my major goal was to pick up the airplane in one piece. Then, it was attempting to land the ship somewhere on the field (when I first began, even Taft wasn't big enough a landing spot!). Now I'm trying to find out how to stay in thermals . . . I can recognize when the glider's in lift, but I'm too clumsy on the sticks to take full advantage of the situation. (It's a little different from free flight, where the models tend to stay in lift once they find it . . . the difficult part is realizing that you have to do something to keep an RC ship in the thermal.) For me, this sort of learning experience is fun.

Even more fun is watching the models fly. Here, I believe, is the crux of a sailplane's charm . . . THEY LOOK AND FLY LIKE A FREE FLIGHT!! The resemblance starts out when you begin building the kit. Most gliders look like they were designed by somebody with a free flight background . . . twin I-beam webbed spars like a Nordic, D-box or turbulator spars, polyhedral, and tail surfaces constructed like an Old Timer. And they have just about the same size and weight (a Drifter II has 600 sq. in. of wing and weighs 18-20 oz., which are good numbers for an AB free flight; a Wanderer 99 has the same wing loading as a Starduster 900). As a result, they look the same in the glide, which is what I let the model do mostly . . . just let it drift around the sky and watch it fly, which is one of the main attractions of free flight. The only difference is that I have the ability to bring the model down close to me.



Hank Cole's Dutch chocolate flavored thermal detector. Knowing how is nice, but knowing when is better.



Three generations of Cunnyngham; Jeff, Vic, and Vic Sr. Over 100 years of modeling in one family!

AMA Dist. X Veep, Jim Scarborough, launching his Nostalgia Ram Rod 600. Famed Taft kitty litter plant over Jim's head.

I guess the point I want to make is that my hobby is *model airplanes*, not just free flight, and that it's fun to step out of your rut for a while and sample some of the other phases. A lot of my fellow club members in the Norwesters feel the same way, since we have flyers with interest ranging from RC Pylon racing, to control line stunt, to indoors, who also fly outdoor free flight. I'm going to continue doing it also. *(Model Builder's philosophy scores again! wcn)*

DARNED GOOD AIRFOIL

Davis #2 (A = .6; B = .1)

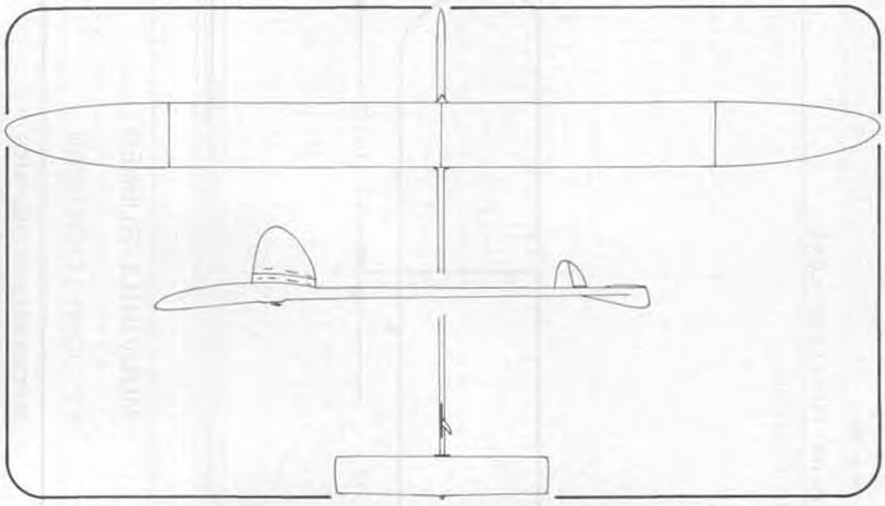
This is another of the Davis series of airfoils as drawn up by Hank Cole in the 40's for *Air Trails*. The Davis #2 is a very thin (less than 6%) low cambered airfoil suited best for fast flying models. It bears more than a passing resemblance to the airfoil used on Eugen Verbitski's latest F1C ships. He solved the problem of obtaining sufficient torsional rigidity in such a thin section by using aluminum sheet covering over balsa. It could also be carved from solid sheet. It might also make a good airfoil for small, lightly loaded models such as Coupes or P-30, or Rocket models.

MYSTERY MODEL

This month's mystery model should be familiar to most Nordic flyers, even though it never won a World Championship. It was widely flown in all parts of the world, and should be recognizable by the long nose, elliptical wing tips and rectangular stab. If you think you recognize the design, send in your identification to the **Model Builder** office (621 W. 19th St., Costa Mesa, CA 92627) to see if you've won the free subscription.

MODEL OF THE MONTH

John Lenderman's Mulvihill



SEPTEMBER MYSTERY MODEL

Lee and Contest Manager Joe Norcross ponder over *some* of the trophies handed out at the '82 NFFC. Flag was reminder that it was Memorial Day Weekend.

With the resurgence of interest in rubber-powered events, it's about time I published a genuine Mulvihill model. The model selected is not one of your exotic, lightweight, state-of-the-art Unlimiteds, but a very practical contest design by John Lenderman. John is one of the most consistent winners among our Northwest rubber contingent, and models like this one are part of the reason. John's ship is reminiscent of the Oakland Cloud Duster school of thought, but beefed up a bit to take our normal non-California contest conditions. Since we fly all of our contests to three-minute maxes, pure performance isn't as important a factor as consistency and the ability to absorb a bit of rough weather and landing in unexpected places.

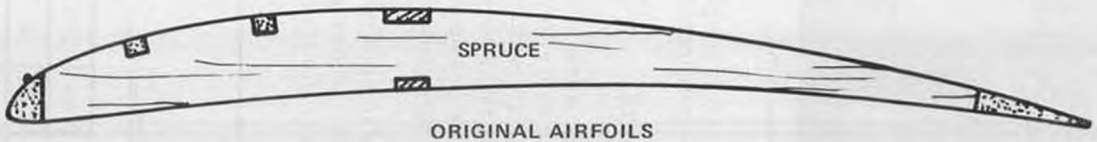
NOTES ON POWER MODELS
by George Fuller

I recently ran across this article in *FF News*, by one of Great Britain's foremost power flyers. Although written nearly 20 years ago (1962/3), I think they shed considerable light on the problems of designing and flying high performance gas models.

The present availability of very powerful, lightweight glow motors, allowing the construction of power duration

DARNED GOOD AIRFOIL – DAVIS no. 2 (A=.6,B=.1)

STATION	0	1.25	2.5	5	7.5	10	15	20	25	30	40	50	60	70	80	90	95	100
UPPER	0	1.29	1.88	2.78	3.54	4.07	4.99	5.6	6.02	6.28	6.36	6.08	5.42	4.45	3.18	1.69	0.86	0
LOWER	0	−0.57	−0.7	−0.72	−0.8	−0.49	−0.26	0	0.26	0.43	0.72	0.89	0.92	0.86	0.65	0.33	0.14	0



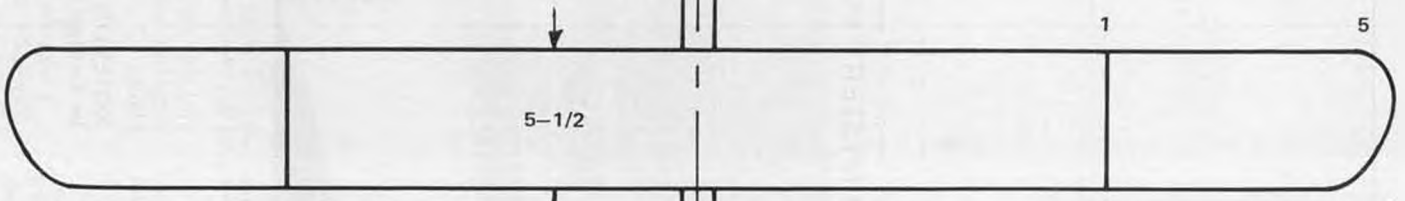
ORIGINAL AIRFOILS

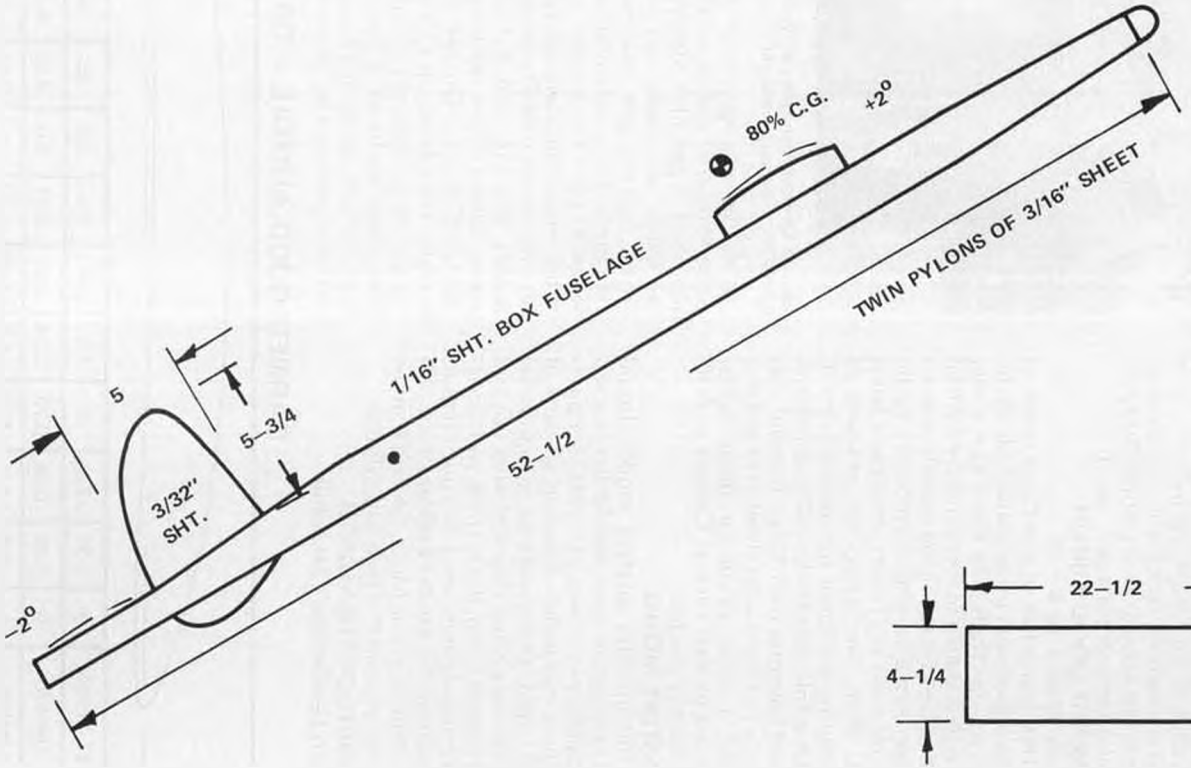
TIP PLATES ON STAB

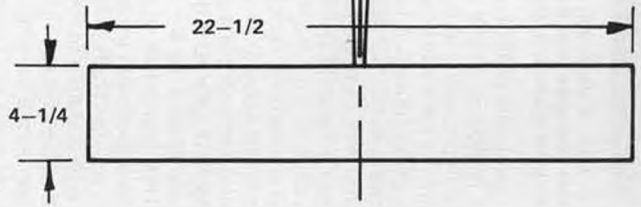
PROP 24 x 26

16 STRANDS 1/4" PIRELLI 32" LONG

RT – RT PATTERN







MULVIHILL RUBBER

BY: JOHN LENDERMAN

DEPENDABLE MODEL WITH MANY CONTEST WINS

BEST TIME: 14:32 29 SEP. 68

Yes, folks, the legendary Russian modeler Eugene Verbitsky is just another reader of Model Builder Magazine.

Verbitsky's model box contained four FAI models like the one below, each one a true masterpiece of workmanship. He's teaching Cuban modelers how to fly FAI.

Eugene Verbitsky with one of his metal covered F1C ships. Straight up, kick-down elevator into glide. Scoop: Watch for lithographed metal covering next year!

models with a much higher power/weight ratio than was previously possible, has obviously increased the performance potential of these models. As many of us have found out (picking up the pieces), the actual attainment of this increased potential performance, is not quite as simple as putting a hotter motor up front.

Besides demanding more careful handling of the model, I believe a somewhat modified approach to model design and rigging is called for. As a direct result of my personal experiences with a model, the power of which was increased by about 30%, I have reached conclusions which I offer in the hope that they may be of some help to others struggling with the same problem.

After flying an Oliver Tiger powered model for a year or so, I replaced the Oliver with a Cox TD .15. With the Oliver, the model had been fairly docile and performance quite good. My object in increasing power was obviously to increase performance. This eventually came about, but not without considerable effort.

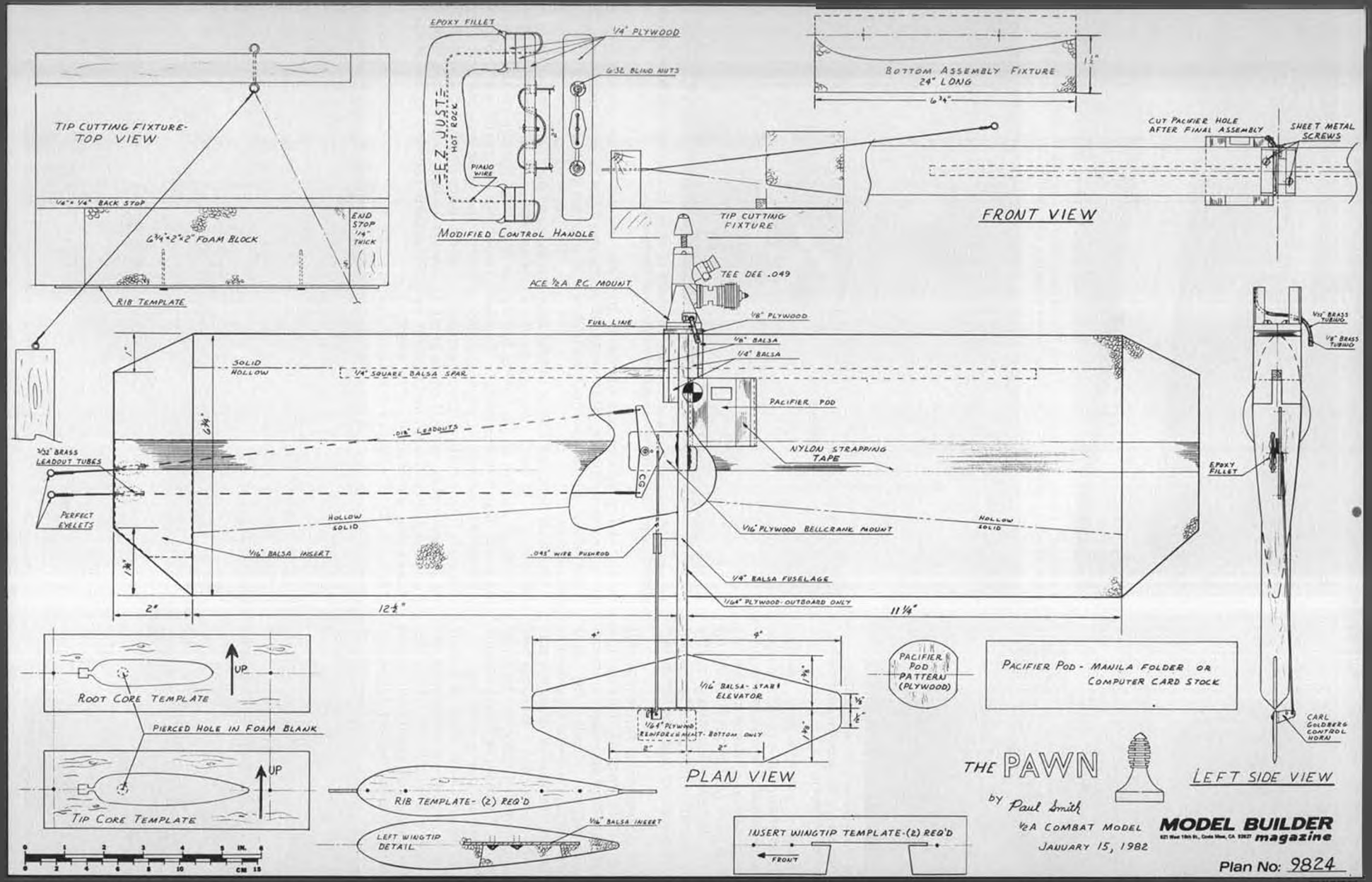
The well behaved Oliver model now became a wild bird, refusing to do a consistent pattern at all, having lost its sense of direction completely. Rudder adjustment seemed strangely ineffective and I finally realized that the rudder no longer had its normal effect at all. I turned my attention to the tailplane. By increasing its incidence in gradual stages, the loop tendency decreased and the model began responding almost normally to rudder adjustment, though in a rather critical manner.

This seemed to prove that the initial wayward pattern, sometimes right, sometimes left, sometimes straight with a loop, was not the rudder's fault, and could not be cured with rudder, because the basic trouble was over-elevation (too much incidence-TH), *not always an easy fault to diagnose, I find. Direction seemed to be at fault, so*

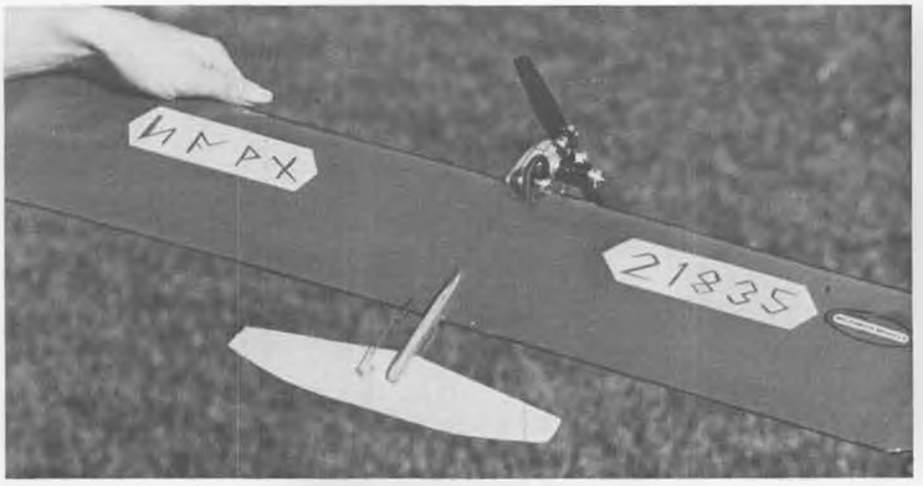
Continued on page 92

Les DeWitt, Rowland Hts, CA., with "flapper" Wake. Wing flaps up during power run, dropped for glide. Skinny wing a problem!

Ralph Prey. Model provides its own caption. He's an advocate of radio recovery for gas-powered F/F.



FULL SIZE PLANS AVAILABLE – SEE PAGE 96



Moira Smith with original Pawn at Wilmington, Ohio Nats site.

PAWN

By PAUL SMITH . . . Developed as a result of the introduction of 1/2A combat at the Nationals, this little foam and wood fighter has all the performance needed to make it a winner at any contest.

• Half-A combat has been around as a local event for many years. I got started in combat with 1/2A's in 1959 at the nearest schoolyard. In 1977, the custom of having 1/2A combat at the Nats as an unofficial event began. To many people's surprise, the event was taken seriously by many of the established combat winners. It has grown in acceptance and this year AMA's contest board has made it a supplemental event.

The Pawn was originally designed and built for the 1980 Nats in Wilmington, Ohio. The name was chosen because I feel that the airframe is only one of many factors in winning a combat event. Also, the typical tough-guy names usually applied to combat models are a little exaggerated for a 1/2A. As in chess, with the proper strategy, the Pawn can defeat a more spectacular opponent. The '80 Nats was the first contest appearance for the Pawn, and my first 1/2A contest in five years. The result was a 2nd place finish with a 5-1 record, including four kills. In addition, the 1/2A practice made a noticeable improvement in my reflexes, and helped me get out of a slump in fast combat.

This is a simple model to build if you are already into foam. Building your first two models in one week should be no problem. If you haven't cut any foam yet, why not start out with the Pawn? It's a fun plane for aerobatics and sport flying in addition to contest combat.

MATERIALS

Foam is bought from a lumber yard in two-inch thick, 2 x 8 foot slabs. The density is about one pound per cubic foot. You won't have much choice in quality from this source, but a fine grain foam is better than coarse grain. Better foam can be obtained from professional plastic suppliers, but you will pay a premium price and may not be welcome because of the small size of the order. The lumber yard foam has always been adequate for me. Avoid the light blue, genuine Dow Styrofoam. It's twice as strong, expensive, and heavy as the regular white stuff.

White glue or aliphatic resin such as Titebond is used for most foam and wood joints.

Hot Stuff and similar instant glues, with baking powder as filler, are used only on non-foam joints. These glues dissolve foam.

"Hot epoxy" is my term for Hobbypoxy Formula 2 heated with a heat gun to lower the viscosity. You mix a small batch of epoxy in a pot and stir while heating. When it is so hot you can just barely touch it with your fingers, apply it to the model. This method makes the glue penetrate deeper and spread on thinner and lighter.

Balsa: Small amounts of 1/16, 1/8, and 1/4 inch sheet are required. The spar is 1/4 x 1/4.

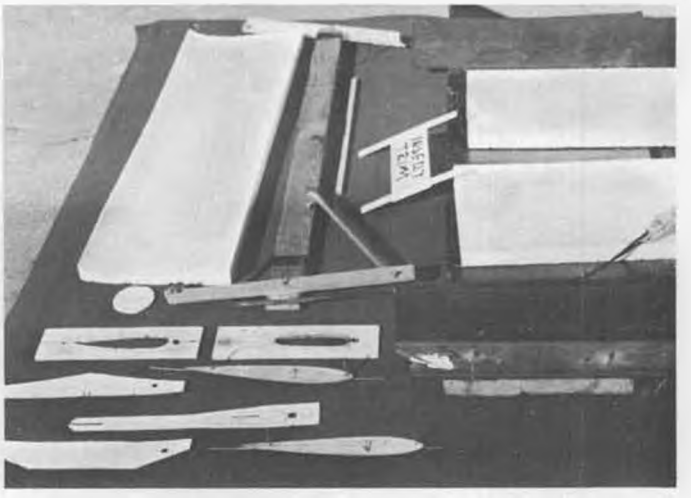
Plywood: A few scraps of 1/64, 1/16, and 1/8 will do the job.

Hardware: Carl Goldberg 1/2A controls (45¢), Ace RC 1/2A motor mount ($1.29), .045 piano wire, .018 leadout wire, 2 sheet metal screws (1/2"), and 3/32" brass tubing.

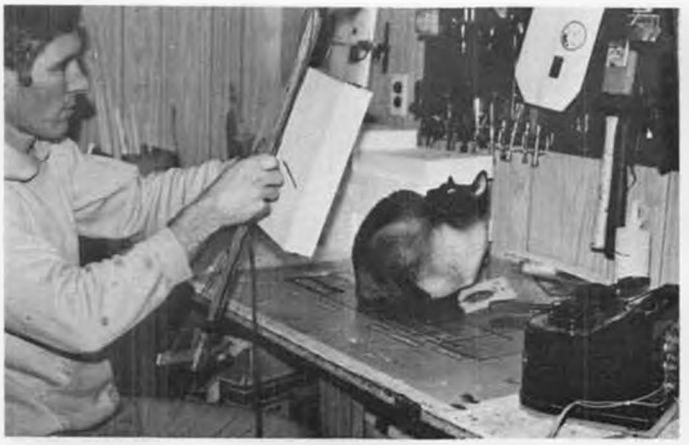
FABRICATION AND SUBASSEMBLY

Cut the fuselage from 1/4 inch balsa,

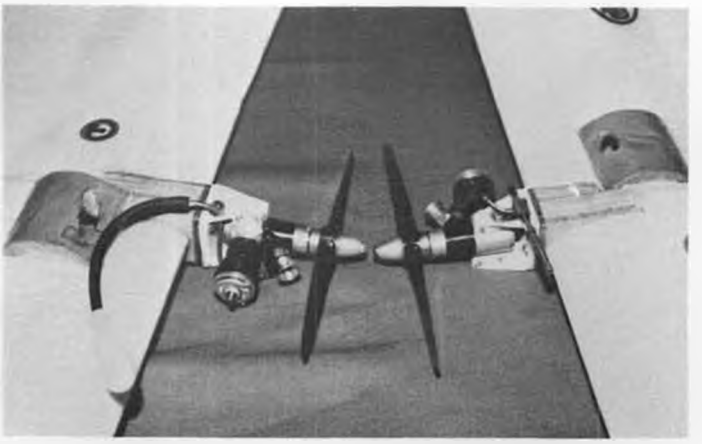
Classic "little big plane" approach to 1/2A. It works, but not as well as plastic mount and pacifier system.



Tools and ingredients for producing Pawns: foam, cutting bow, templates, mitre box, fuselage and tail patterns.



Who can build models without proper supervision? Paul cuts foam cores using American Flyer transformer.



Front ends of two Pawns. Either stock Cox needle valve or Kirn-Kraft fine-thread remote unit will work.

the fuse doubler and elevator reinforcement from 1/64 plywood, and the tail pieces from 1/16 balsa. Glue the doubler and nose blocks to the fuselage with Titebond. When these are dry, sand the joints, making sure the front end is perfectly square. Glue on the 1/8 plywood motor mount and 1/16 bellcrank mount with hot epoxy. Insert a scrap of 1/4-square through the spar hole and wrap rubber bands around the motor mount while drying.

While this dries you can start on the foam cores. The first step is to make all the required templates. Next cut the following blanks from the foam block: 6.75 x 12.25 inches (inboard wing), 6.75 x 11.25 inches (outboard wing), 6.75 x 2 inches (2 required, wingtips).

With the drop-wire fixture, pierce a hole through each wing panel on the centerline, 2 inches back from the leading edge.

Attach the core template to the blocks with nails, aligning them on a flat surface. Detach the wire from your cutter and thread it through the hole. Cut toward the trailing edge, then follow the top of the core up to the spar slot. Be careful to have the wire parallel as it enters the slot. Cut the bottom back to the trailing edge and you're done.

Use the same nail holes to attach the airfoil templates. One airfoil template should be labeled "root" and the other "tip". Also, draw an "up" arrow on each tip. By consistently using these markings you can cancel out any variation in the templates. Cut the airfoil surfaces starting from the trailing edge. Be careful not to squeeze the cores as this will distort the airfoil.

Tips are cut with the special fixture shown on the plans. The "tip" airfoil template is used. Cut the top surface first, starting from the trailing edge. Then, without removing the scrap, cut the bottom surface, also starting from the trailing edge. Glue one tip to the outboard wing with Titebond. The inboard tip is notched out using the two "insert wingtip templates". Save the piece that is cut out, it will be glued back in after the leadouts are installed. Glue the 1/16 balsa insert into the tip and glue the tip to the inboard wing. When installing the tip, assure that the tips are glued to the thin end of the wing core.

While the foam cutter is still handy, make an assembly fixture. The foam blank is 6.75 x 24 x 2 inches. Nail the airfoil templates to the blank with the centerlines 1.5 inches up from the bottom. Cut only the bottom surface of the airfoil. This cradle forms the bottom of the fixture. The top is made from two pieces of scrap from the wing cores.

CONTROL SYSTEM

The Goldberg 1/2A system is used because it is so inexpensive and light, and it does the job. The leadouts are made from scrap .018 flying line. Lead-out guides are cut from 3/32 brass tubing with an X-acto knife. The pushrod is .045 piano wire. Bend only the bellcrank end now and do the horn end after final assembly. Bolt the bellcrank to the mount with a 2-56 bolt and nut rather than the wood screw supplied.

Be sure the handle you fly the Pawn with has line spacing of about 2 inches. Some very adequate 2 inch handles are supplied with ready-to-fly planes. A crossbar handle can be set at 2 inches or a crossbar can be added to an existing handle. A 4 inch handle as used with the bigger models will make the Pawn completely unstable.

Standard 1/2A lines are .012 x 35 feet from centerline of handle to centerline of the engine.

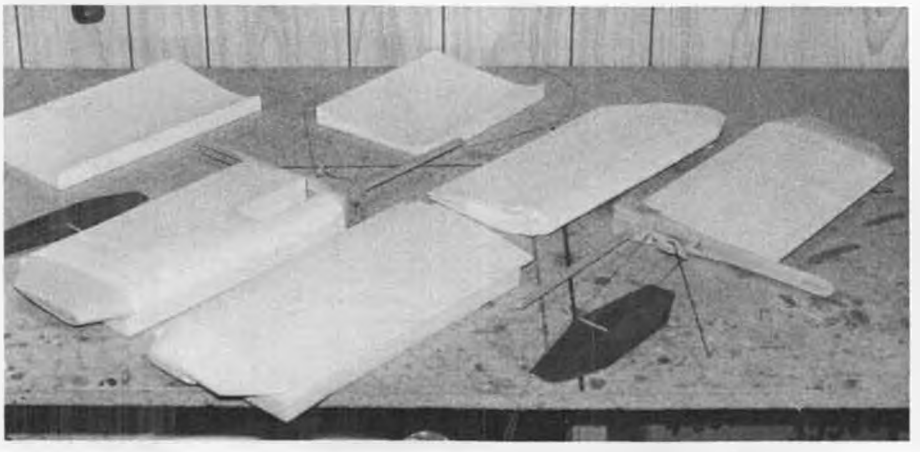
The Tail Assembly is cut from 1/16 balsa and sanded smooth with the trailing edge of the elevator sharp and all other edges round. The 1/64 plywood reinforcement is Hot-Stuffed in place. Cover the tail with Fascal or Monokote before installation. The hinges are also made of covering material. Be sure to leave the gluing surface uncovered. The hinges are made by the method described in the article, "iron-on hinges" in the April 1979 *Model Aviation*.

FINAL ASSEMBLY

When the motor mount is dry, sand the fuselage assembly smooth. The wing spar is only 18 inches long, not a full 24. This is to save weight and cost. Who ever heard of a wing folding 3 inches from the tip anyway? Dry-fit the spar into the outboard wing and notch the wing to fit the fuselage. When the fit is correct, glue it with Titebond and bind the outboard wing to the fuse with a chain of rubber bands.

While the outboard wing is drying, cover the rear of the fuselage with Fascal, install the tail, and hook up the pushrod and control horn.

Remove the rubber bands and dry-fit the inboard wing, notching out for the engine brace and pushrod. Make sure the wing fits the "bottom assembly fixture". Glue the inboard on with Titebond, lay the wing on the bottom fixture, stack on the top fixture, and add weights. Press together from the wing-



Three Pawns in various stages of assembly. Scrap foam is used for assembly fixture.

tips to assure a good glue joint.

Pacifier pod — The recommended fuel system for the Pawn is a pacifier. Bladders generally give too much pressure for the TeeDee, even with a fine thread needle valve. Hard tanks don't give a smooth enough run for such a tight-turning plane. The pacifiers used on the Pawn are interchangeable with those used in fast and FAI combat. A fine thread needle valve is not needed.

Cut two pod ends from 1/16 balsa. Use these as templates to cut a dummy pod from foam. Cover one side of each end with Fascal. The tube part of the pod is cut from manila folder or computer card stock. Wrap the tube around the foam pod, glue the seam, and bind around the center with one rubber band. Wrap the tube with two continuous bands of nylon strapping tape, one on each side of the rubber band. Remove the rubber band, push out the foam pod, and glue in the end caps, with the covered side in. Cover the exposed surfaces of the pod and leave the gluing areas uncovered.

Leadout Guides are installed after the wing has been removed from the fixture. Pin them to the balsa insert with wire wickets (two per line) and glue with Hot Stuff and soda. Trim the foam insert to fit and glue in with white glue. While this is drying, you can also glue some little foam fillers in any cracks or bad fits in the model.

Covering: Sand the model smooth with sanding block. Vacuum clean with a soft brush. Apply a continuous wrap of nylon strapping tape around the wing. This is very important to prevent flexing. Flexing breaks the glue joints in foam wings. Apply the AMA numbers and any other trim to the wing before covering (if you plan to use clear covering).

The material should be a low-temperature type such as Solarfilm, Econocote, or GBC laminating film. Use two separate pieces, top and bottom.

Cut the hole for the pod after the wing is covered, glue in the pod with white glue, and (after the glue is thoroughly dry) cover the cracks around the pod.

Mix a small batch of hot epoxy and seal the firewall area and the edge of the covering.

Motor Mount is an ACE RC 1/2A Mount cut down as shown on the plan. This is far better and less work than the conventional beam mounts as used on fast combat jobs. One prototype was built with wood mounts and I definitely recommend the plastic. Install the mount with two wood or sheet metal screws, about a 1/2 inch long. A brass *fuel filler tube* is also added to the mount. This tube is made from 3/32 brass, annealed with a blow torch and bent to shape. A 1/8 brass tube adapter allows the same pacifiers to be used in the 1/2A as in fast and FAI models. Clear neoprene is used to connect the tube to the engine, thus eliminating the common problem of the fuel line popping off the engine. Finally, the filler tube permits the model to be fueled from the top.

The completed model should weigh 5 ounces, give or take a 1/4 ounce. The balance point is 25% of the chord and slightly outside the centerline. Outthrust is not required and wing tip weight is a last resort. Remember, the fuel and engine are already outboard and the lines are very light.

Engine department. There are already numerous 1/2A engine articles in print so I'll keep this part brief. Machine work or grinding is not needed to get good performance out of the TeeDee .049. Keep the engine clean and reset the conrod with the KirnKraft tool when it starts acting up. Use at least 30% nitro, more is better. Let it wind up on a 5/3 prop. I recommend a Master Airscrew 6/3 cut down and well balanced. Oversize props don't let the engine put out full power and they cause too much variation in RPM between level flight and maneuvering.

Flying is no different than any other combat job. I have never needed nose or tail weight on the Pawn. Any adjustments have been made at the control horn. If everything works as it should, you might even think you're flying an FAI.

I don't plan to enter the kit business, but if you wish to sample the Pawn without making all the templates and fixtures, I will supply one set of cores. Paul Smith, 11112 Dill Drive, Sterling Hts., MI 48077, (313) 939-1076. •

Counter . . . . . *Continued from page 9*

Brisighella's latest, the Waco ARE, are now ready. Wheel pants, molded in one piece, for the 'Sport, 'Ace, and 'ARE, are available too.

All of the white fiberglass items produced by T&D are 100% epoxy resin materials and fiberglass cloth, no jelcoat resin is used in producing these parts. For a current list and information on all of their fiberglass parts, send a SASE to: T&D Fiberglass Specialities, 30925 Block, Garden City, MI 48135.

★ ★ ★

Dynamic Models now has a full range of brass propellers for the large scale R/C model boat builder. These brass propellers, in three and four-blade configurations, range in size from 2-1/2 inches to four inches in diameter, and all are available in right and left-hand versions. The hubs have been threaded with a 10-32 tap to fit 3/16 diameter shafts. Ranging in price from $9.95 for the 2-1/2 inch three-blade, to $24.95 for the 4-inch four-blade, these may be the best values in brass propellers offered today. For more information on these propellers and over 275 other accessory items and fiberglass hulls, send $3 for Dynamic's new 56 page catalog, which is refundable on your first order to: Dynamic Models, Drawer 'C', Port Jefferson Station, NY 11776.

★ ★ ★

Ikon Northwest announces the availability of its quarter-scale Monocoupe 90A. It is said that it flies as well as the 1934 version, and is just as aerobatic and will perform the Aresti full size routine. The flier quickly realizes the Aresti routine can be flown almost within the confines of the runway.

Construction is of balsa and spruce, the cowl is formed and the landing gear is bent to shape. The plans are very accurate and factory decals are provided. Designed for Quadra power and with a design weight of 15 pounds, it should be quite a performer. Send $1 for the complete catalog to: Ikon Northwest, P.O. Box 566, Auburn, WA 98002.

★ ★ ★

Bootlegger R C Products has put together a foam cutting kit to enable the hobbiest or club, to easily turn out foam wing cores (good for cutting turtle decks and floats, too). Consisting of a transformer isolated power supply, a set of power leads that plug into the unit, a lightweight, two-piece aluminum bow, and two sets of cutting wires, you now have a complete foam cutting setup. And, other foam cutting accessories by the 'Bootlegger,' such as its 48-inch bow and the 'Jig Melt,' a foam cutting jig saw operate perfectly from the power supply. For a catalog on the complete product line, send $2 to: The Bootlegger R.C. Products, 3232 San Mateo, N.E., Suite 105, Albuquerque, NM 87110.

★ ★ ★

Old Timers take note! Kirn-Kraft is back! This will be good news for users of .020 and .049 Cox engines. For a list of 'Obsolete' and other hard-to-find parts, such as LH Tee Dee cranks, double bypass .049 cylinders with no freeporting, heat sinks, glow heads (new and slightly used!), Kirn-Kraft front needle valve assemblies and other items, send a SASE to: Kirn-Kraft, P.O. Box 785, Anaheim, CA 92805. •

R/C World . . . *Continued from page 13*

Specialties seems to be able to turn out new cowls faster than rabbits can turn out new rabbits, is now offering cowls for the Pilot line of kits, including the Pitts S-2-A, Decathalon (slightly modified to cover the Quadra), Christen

Eagle, and both the Hirth and Lycoming powered versions of the Bucker Jungmann. Fenders and pants also available for the Pitts, Decathalon and Jungmann.

Tom somehow found time to build the Heath Parasol (October '81 MB) using his own Model "A" style cowl. Says it flies like a dream at 11-1/2 pounds, which includes two pounds of nose ballast. Tom also found a couple of drawing goofs which we've corrected on the originals. The motor mount holes are correct as shown on Former #2, but not as shown on the firewall. Also, former #6 is now included, though it wasn't too tough to fudge one as you went along. •

Sand Fli . . . . . *Continued from page 16*

kills, you can still fly without interesting changes in direction, since both are on the same thrust line. For twins, you can modify a two or three ounce tank by cutting a round hole in the rear of the tank to accommodate a typical Sullivan tank stopper, but instead of using a clunk on the rear stopper, make a tube with a bend downwards to pick up the fuel and leave the front end stock to feed the front engine. To finish the body (hull), measure servos to find out where they will be mounted with about a 1/4 inch clearance above servo wheels to top of body sides. The balance of your gear should easily fit in space provided, unless equipment is unusually large.

Glue two 3/16 keels together (see, maybe it is a hull) and glue into place, sand bottom to achieve flat surface to glue hard 3/32 sheet cross grained to bottom. Glue nose block into place and shape body. I covered body with Fabri-Kote so I could resin a piece of nyrod onto the hull after cutting a V-groove and tacking it into place with Hot Stuff. I then masked off a line about a 1/4 inch high around bottom sides of hull and resined the whole front bottom area to help resist abrasion from landings. After over 40 flights with essentially no damage (including landing on concrete), I feel this is a smart move.

Remember the ply tongue on the lower wing? Now is the time to epoxy the horizontal strut 1/16 above the body line and add balsa scrap fill to establish where the tongue will fit in the body. The tongue also serves the purpose of holding down the hatch cover when the lower wings are inserted. Hold the wings in place by attaching at least two bands between the screws in the lower wing. Over 40 flights have been made using this method and it has created no problems, as there is little stress in this area. Install pushrods, cover top, and bottom of body with 1/16 crossgrained, and glue on tail feathers after covering and hinging. Complete the hatch cover and brace on bottom to strengthen and resist warping. Watch to allow clearance of servo and pushrod action. Fuelproof struts and motor mounts. Charge your batteries and let's go fly after attaching pushrods to outside holes in the control horns! (The Sandfli tends to be RESPONSIVE!)

I'd suggest using the tractor configuration only for the first flight if you have opted for the twins. If you build light, it should weigh in about 27-30 oz., and balanced well, it will amaze you at its ability to tear up the sky in a very small space. When you hand launch keep the nose level and it should climb out with ease. It looks funky up there with two wings, and lands like a dream when you run out of gas. When you fly it on just the top wing (yup it does) the Sandfli will raise your excitement level. Just remember to hold down the hatch with a scrap of 1/16 and be prepared. With less resistance and area, things get peppy. Good luck and give me your reactions. •

Pattern ..... *Continued from page 17*

force arrangement, thrust line, stab placement, etc., but the width varied from a slim, inline, inverted engine shape to a square box shape that enclosed pipe and all. The inverted engine setup was a pain-in-the-neck and the totally enclosed setup made it awkward to get at parts for servicing. The model shown appears to be the best compromise so far in that everything is easily accessible and the lines are rather scale-like.

Now then, if you want to experiment

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with the new manuevers and an airframe which will work fairly well, I suggest the following based on this year's experimenting.

1. Design around a wing loading of 25 oz. per sq. ft. *or less.*
2. Useable engine thrust should easily exceed total model weight.
3. Flaperons definitely help but require a little tinkering.
4. Retracts are not mandatory, but large wheels cause a drag problem on fixed gear.
5. Try to concentrate all weight as close to the C.G. as possible. This goes for lateral direction also.

One more point which may be of interest is that the horsepower per pound of some of the new .40-.46 size engines is as good or better than current .60 size engines. This makes them an excellent choice for this type of aircraft.

I hope that we have generated some enthusiasm in you to experiment with the new F.A.I. pattern. If we accept it as a challenge in precision flying rather than a threat to pattern flying we may all find that it's really fun! •

Thermic . . . . . *Continued from page 19*

Next, the vertical stabilizer was glued on, and the wing root rib with hard rock maple spars was aligned and glued while in position in the fuselage, and then removed.

The fuselage was then turned upside down and the bottom bulkheads were glued in place. All bulkheads and formers were built up out of 3/8 inch balsa and reinforced with 1/16 or 1/8 inch plywood.

Top and bottom stringers were made of 5/16 inch hard balsa. The keel is 1/2 x 1/4 spruce laminated to 1/2 x 1/2 and capped with 1/2 x 1/8 balsa.

The bottom of the front fuselage was covered with 1/16 inch plywood and fiberglassed. The nose block was carved and sanded to shape.

WINGS

After the jig was made, the total number of ribs to be made up for both wings were as follows; 12 ribs standard, 10 ribs spoiler recess, 28 taper ribs (two from each pattern).

The wing spars were made by laminating two pieces of 1/8 x 1/2 straight-grained spruce, to make a 1/4 x 1/2 spar section, being careful not to have any joints in proximity. This was especially true when positioning forward and aft spars.

The forward and aft spars were positioned on the plans. The basswood root rib with maple spars was glued on the built-up spars. The built-up ribs were then cut and glued on the spars and shear webbing was glued in place. The top forward and aft spars were glued in place. The leading edge, 1/2 x 5/8, was glued in place. The trailing edge, 1/16 x 2, was glued to the trailing edge of the ribs, overlapping them and ensuring a good glue joint.

All ribs were then capstripped with 1/16 x 1/4 medium soft balsa. The wing root section was covered with 1/16 plywood.

Covering materials and cements: 3-25 foot rolls clear Monokote; 3-6 foot rolls transparent blue Monokote; 1-6 foot roll transparent red Monokote; Hot Stuff (ribs, planking, and capstripping); Formula II Hobbypoxy; (joints, fuselage, shear webbing, plywood covering, wing center section, laminations).

Thanks to Frank

I started the project in the fall of 1977 and finished it in the fall of 1980. During the three years the plane was under construction, I thought about a name.

As the plane was directly descended from Frank Zaic's Thermic 70, it seemed to me that the appropriate name would be Thermic 210 . . . if Frank approved.

I wrote to Frank and told him about my project. I asked him if I could use the word "Thermic." He wrote back, giving me the go-ahead. In fact, he said any other name would cause raised eyebrows. He also said "Don't kit it." I assured him I didn't think any other builder would attempt a model on such a large scale!

Frank and I still correspond . . . anyone who's ever corresponded with Frank and read his books, knows he is as great a writer as he is a designer and aeronautical engineer.

He frequently asks, "Have you flown it yet?"

Not yet, but soon, when the time is right.

Without Frank Zaic there would be no Thermic 70 and there would never have been the Thermic 210. •

Choppers . . . . *Continued from page 21*

pitch to lift off, the outer arm (hooked to throttle) gradually swings forward to give enough throttle to overcome the increased drag generated by increased pitch. The unit is adjusted so that at full collective pitch the throttle is full open.

Now when you make a rapid descent the pitch comes out and the engine rpm stays up where is should be. The engine and rotor do not fight each other as before.

About the only disadvantage of this system that I can think of is that you need one servo for collective "Y" connected to one servo for throttle. (Of course the aux. servo is separate.) This really isn't a

disadvantage to me as I've been flying one servo on each function for years. It's worth it because the throttle throws can easily be adjusted without affecting collective settings. And if one servo should fail, you've got a backup that will enable you to get down.

To be a bit more specific about the separate throttle servo: Once you open the aux. function to go from idle up to lift-off rpm, you need just a little throttle as you advance throttle/collective from flat pitch to near hover pitch. (Light on the skids.) But as you go from hover to full collective you need much more throttle, enough to fully open the carburetor.

So the separate throttle servo is set to add a little throttle from low to hover, and the rest of throttle from hover to a full collective climb. The throws are set up as shown in Figure #1.

FINAL SET-UP AND FLIGHT TESTING

With aux. retarded the engine should not run. Crack open aux. function slightly to start up. With aux. function full open (and collective/throttle full low) set the throttle at approximately 3/8th open. As collective/throttle is advanced from full low to 1/2 stick (lift off), the throttle barrel should open slightly more, up to 1/2 or 5/8th: Lift off power for hover. As collective/throttle is advanced to full, the throttle barrel must open to full also. Set you linkages to achieve these baselines.

Final adjustments must be made from flight tests, and this is very simple to do. But let me throw in this "caution": Since rotor speed will now be much more constant in all areas of flight, you will need *more* collective throw to give crisp response. For instance, you'll probably have to run a few degrees of negative pitch at low collective if you really want a quick descent. Otherwise the collective feel will be rather soft and too smooth. On my Super Mantis I had to increase collective throw to give crisper response. These extension arms are shown in photo #4. This will vary depending on what type of helicopter you have, and how much collective it can deliver. Just make sure you have the collective "feel" set before you make these final adjustments.

If you make a rapid descent from forward flight and the rotor over-speeds, you have too much aux. throw. (At full aux., low collective, reduce the throttle barrel opening slightly.) If the rotor speed drops off on descents you don't have enough aux. throw. (Open the throttle a bit more at full aux., low collective.)

Once this is set, full collective travel limitations can be set as normal. Start a full power vertical ascent. If rotor speed drops off, reduce top end collective throw. If rotor speed increases, increase top end collective throw.

That should about cover it. It's a fairly simple concept that gives excellent results. If you're a competent pilot looking for a little extra, I'd urge you to try the Quasi-Governor. Then send some photos and let me know how you like it. See you next month. •

Big Birds . . . . . *Continued from page 23*

loading to supplement the new 4.44 cid ruling and help keep us on the safe side.

We know that an excessively high wing loading results in a higher stall speed and narrower speed envelope for any given aircraft . . . which makes for a bird that's neither safe nor enjoyable to fly since it'll have to takeoff, fly and crash all at .9 Mach. We also know that because our BIG Birds closely approach the efficiency of their full-size counterparts, wing loadings in the 35 to 40 ounce per square foot region are okay . . . and that anything less usually results in too much of a floater with the attendant lousy penetration. As a matter of fact, most aircraft with close to 2000 squares or more can usually handle a W/L that closely approaches 50 ounces per square foot without any real problems.

But without some reasonable parameters or guidelines, too many guys are going to build a "lead sled," and then try to fly the damned thing. What we certainly don't need are any more grossly overweight birds with sickeningly high wing loadings like the Grumman Goose that crashed at Clearlake, California, in June of '81. This 156 pound monster only had a span of 13-1/2 feet, and according to the specs, its W/L had

to be breathing hard on 100 ounces per square foot; hardly a recommended W/L for anyone, regardless of the amount of power crammed into the two nacelles. That's playing Russian Roulette with all the chambers loaded.

If AMA can't, or won't, change their BIG Bird standards, then the IMAA should establish reasonable engine and wing loading parameters . . . because if we aren't vigilant and police ourselves, we're going to wake up one morning and find that non-modelers are doing it for us . . . and that, friends, will be the beginning of the end!

★ ★ ★

"Estimate this BIG Bird to be *the* best performing giant in the world . . . bar NONE!!!" Them is mighty big words, but Clancy Lintner, of Ohio Superstar Products, Inc. sure makes it sound convincing.

This scale Shrike Aero Commander was designed by Clancy and built by Larry Stillo . . . and according to Clancy, if it doesn't stop the show at Ida Grove, at least it's gonna slow it down one helluva lot. Here are the specs: Span, 14'-9"; Length, 10'-6"; Weight 80 pounds; Covering (donated), Top Flite FabriKote (lite); Radio (donated), Kraft (three receivers and packs); Wheels (donated), ANNCO; Retracts, Hand Made, Rotate 90 degrees (scale); Power, RM Titans (13 HP); Weight Per HP, About 6 . . . no sweat; Construction, Foam wing and tail covered with ply; fuselage planked over lite ply formers and filled with foam. Fuse weighs about ten pounds and Clancy says he can stand on it.

Have no idea whether or not Clancy plans to kit this Aero Commander . . . (along with his Super Fli and the Zlin). I know one thing: I'm gonna be there at Ida Grove to watch this beast fly and "ooh and ahh" along with everyone else.

FLY WHERE?

At the Philadelphia Navy Yard, of course, where there's plenty of room for BIG Birds. . .

At first I thought Tony Della Vecchia was trying to "green" this country boy; after all, I've been to a number of Navy Yards, and, in fact, have seen the one at Philly, also. But I guess I hadn't been given the complete tour because the Flying Squires R/C Club does in fact tear up the sky there at least once a week. From the pix, it seems that the "pit and runway" areas are kinda rough . . . but Tony swears that no one has had any real problems.

Tony's been flying his Nosen Big Stick for about two years now (it was his first BIG Bird), and thinks it's a terrific flying machine. "It flies good, and it flies gentle," according to Tony, who uses an 18x6 on the Quadra. You might want to try both a 16x7 and an 18x8, Tony; either or both of those props will probably make the plane fly even better.

And by the way, Tony's tickled pink about the way his Gold'N Rod push-pull control system works (BIG Birds, May '82).

IMAA CHAPTER 58

Otherwise known as the Montgomery County Barnstormers R/C Club, Chapter 58 operates out of Conroe, Texas (you mean to say that you never heard of Conroe?), and had a great "Boss Bird" Fly-In back in April. I plumb ran out of time and didn't get to make B&W prints from the color negs that "The Barnstormer Journal" editor Randy Getchell sent; however, he also included a few B&W prints that I am using this month...

Randy's Cub is from a Balsa USA kit, powered by an O.S. .91 and finished with Coverite and K&B Superpoxy; nice flying airplane. The fine looking Decathalon was built by Bob Hamilton, who decided on an Evra 190 for propulsion. Like Randy, Bob went the Coverite/K&B Superpoxy route and ended up with a great flying machine. Randy mentioned that he was "really surprised at the performance that Evra put out. The Decathalon is most realistic in the air as well as on the ground . . . and I don't suppose I need to say anything about those fantastic Pilot kits."

As you can see from the two interior shots, both Bob and Randy spent some time getting their cockpits to look like the real thing. Randy put it very well: ". . . a light plane model just doesn't seem to capture the mood without some kind of inside."

The Cub, especially, got me feeling very nostalgic since I racked up quite a few hundred hours in that bird back in the late forties . . . which was just before I started flying for Uncle Sam.

Hey, you two!!!! Sure hope you don't fly those BIG Birds without people in the cockpits. . .

MEANWHILE. . .

Back at the ranch, our very own Robin McGeorge did an outstanding job on Parker R/C Planes' fiberglass Cessna 172 Skyhawk (which to the best of my knowledge is no longer in production).

A Quadra swinging a 19x8, and an Eastcraft Starter help keep the balance point up forward where it belongs. This BIG Bird features RAM strobe, nav and landing lights, an air operated nose brake (on the down side of the elevator), Fowler flaps and a full cockpit interior. As I've mentioned many times before, I'm not a scale nut, but I can sure appreciate the kind of craftsmanship Robin put into that Cessna. It's a very impressive bird . . . on the ground and in the air.

REWORKED QUADRAS

If you need more power than the standard Quadra can deliver, but don't want to mess around changing to another make, and/or don't want to spend any more than you have to . . . then consider having your present Quadra reworked by US Quadra. You're really gonna be surprised. . .

I've got two of these "Dario-ized" engines, and both of them are putting out a healthy 22 pounds of thrust, which is four pounds more than an out-of-the-box Quad can manage. Powerwise, my

"Super" Quads are just about on a par with the 2.44 Kioritz . . . and weigh almost two pounds less. Neither of my engines have too much time on them (yet!); they're both taking turns in a Big Stick, and really make the Stick perform much like the sixty powered version.

And for those who've been waiting for the 50cc Quadra to make its appearance . . . take heart. USQ hopes to start shipping the engine by late September or early October. When this BIG Quadra does appear at your front door, it'll have a new style carb, a better piston . . . and gobs of power. And according to Dario, it'll be priced under $200. Nice, huh?

THE FLYING BATHTUB

It seems that I'm not the only one who's got a "thing" for the Aeronca C-3. I keep getting letters and calls for more info about my airplane, so I figured I'd do it the easy way and include all the poop in this month's column.

Mine was built from a Balsa USA kit about three years ago, and appeared as a F&B in *MAN* (Oct. '80) . . . which was just about the time that Balsa USA discontinued the kit. There was a lot of interest in the C-3 at the time, and I thought it was going to be put into production again . . . but no soap.

I meant to keep the plans, but accidentally threw them out when I got carried away with spring cleaning my workshop. Quite honestly, the plans were not that good . . . but you might try Balsa USA and see if they'll accommodate you with a set.

The kit was not designed for anything else but a sixty, which, by the way, does an admirable job of powering the Aeronca. I seriously contemplated using a Quadra at first, but just couldn't see how the airframe would stand the gaff without being strengthened to the point of becoming severely obese. So she flew for over two years with a vintage '68 Enya sixty pulling all 15 pounds around with relative ease . . . even during our hot Texas summers.

If you really want to make yours scale, or if you want to scratch build from scaled down factory drawings, write to Historical Aviation Album, P.O. Box 33, Temple City, CA 91780, and ask about the All American Series, Volume X. It contains a wealth of information, pictures and drawings about the C-2, C-3 "Collegian" (that's what mine is), and the C-3 "Master." And by the way, she flies just like her full-size counterpart: ailerons are not too effective and you gotta coordinate to make her look good in the turns. The big rudder allows cross-controlling and she'll slip into a landing with ease.

My C-3, started over 12 years ago, is still in the works. It's the razorback, flat-top rudder version, and plans just need updating for building modifications made during construction. Plans were made from prints of original water-stained (Johnstown Flood of 1937) drawings, and are accurate. Gonna finish it up

one of these days, and will make plans available. wcn

My flying bathtub is now being used for testing diesel conversions, ignition conversions (more next month) and four strokers . . . which reminds me to remind you that you've got a lot of different kinds of engines to chose from for that next "special" BIG Bird, starting with that sixty and/or ninety that you already have. Swinging a 14x4 or a 14x6, your present big methanol burner will easily power a 13 to 15 pound Cub, Champ or Citabria. Of course if you've got money to spend, you might want to consider the Tartan, or any of the four strokers that seem to have popped up within the last year or so. You might even want to shoot for the Gemini Twin, which is a dandy piece of machinery and lends itself well to giving a number of scale birds that extra bit of "frosting" . . . Whatever you do decide on for an engine, put some effort into keeping your wing loading down; you won't be sorry. A BIG Bird with a low stall speed and wide speed range is gonna be a whole lot safer and more enjoyable to fly than the same machine with a higher wing loading.

And in case you've forgotten how, or are just getting into R/C, here's how to figure your W/L:

1) Multiply chord by span to get your wing area in square inches (for a rectangular wing platform); for a tapered wing, multiply the average chord times the span.

2) Then divide the wing area by 144 which will get you down to square feet.

3) Figure out your aircraft's gross weight in ounces, and divide that number by whatever number you arrived at in step #2 . . . and that'll be your W/L in ounces per square foot. As I mentioned earlier, I consider any BIG Bird W/L that falls between 35 and 40 to be right in the ball park; anything lower than 30 and you're prone to have a real floater on your hands, and anything over 50 is a bound to be a "lead sled" with an extremely high stall speed that makes it an accident looking for a place to happen . . . None of these numbers are hard and fast because aircraft vary so much . . . but using these parameters makes it easier for me to know when to take a second look so that I don't get caught short.

LAST CALL FOR THE IMAA FLY-IN

In fact you may have run out of time if your reservations haven't been made up in the Ida Grove area by now. And are you gonna be sorry if you don't get to take part in *the biggest and best fly-in ever!* This is really gonna be the "Gathering Of Eagles," and is bound to set the standard for years to come.

To find out if you can still make it, send your query and SASE to . . . Don Godfrey, 254 Washington Street, Binghamton, NY 13901. And if you're not an IMAA member yet, don't worry; all you'll need (in addition to your BIG Bird) will be a current AMA and FCC license.

LIKE 'EM FAST AND GROOVY?

Then the Super Sun Ray may be just the ticket for you. She comes in at about 20 pounds, and even with a Quadra, performance is impressive. I've seen one fly (powered by a reworked Quadra) and she moved around the sky like a large pattern ship. She's a guaranteed eyecatcher on the ground, also, due to her lower inverted gull-wing.

Ron Magnum, P.O. Box 8244, Greensboro, NC 27410, has got the plans and all the information you need. This is an all-wood aircraft (no foam), and according to a buddy of mine, it builds surprisingly fast. And like most bipes, she's a rather compact package which makes for easy transporting . . . and there are *no* wires or braces to fuss with.

CHOMPIN' AT THE BIT!

It's the tail end of May as I'm writing this, and already I've got ants in my pants just thinking about the IMAA Fly-In Festival at Ida Grove. I feel like a high school kid about to go out on his first real date; I'm anxious and can't wait . . . but I'm gonna have to 'cause there are three whole months to go yet.

It's gonna be great saying hi to so many old friends, and I'm sure looking forward to meeting all you guys who've been writing and calling. I wonder how many of you are gonna turn out to look anything like you sound over the phone. You know how it is sometimes; the deepest, heaviest voice often belongs to the smallest guy . . . Anyhoooo, be seeing you at Ida Grove!

TIP OF THE MONTH

Well, not really . . . Instead, I've got an interesting bit of information to pass on. . .

Betcha didn't know that virtually *all* R/C folks are bilingual. Yup, it's true . . . and that includes you. It seems this all came to pass when a Jewish astronomical observer noticed an unexpected change in the rotation period of a neutron star; it appeared as though there had been a sudden slip. In referring to this colloquially, he used the Yiddish word for "slip," which became part of the scientific vocabulary. Then, the next thing you know, we adopted it and, in no time at all, made it a very common, everyday word.

So next time you start screaming about a "glitch," do it with your best

Yiddish accent; even if you don't look Jewish, you might as well sound authentic.

Keep those letters coming, guys; and don't forget about sending some pix. Preferably B&W prints, but I *can* make decent B&W prints from good color negs (I promise to take good care of your negs . . . like they were mine). Al Alman, 2609 Burningtree Ct., Arlington, TX 76014. ●

Fuel Lines . . . . *Continued from page 24*

model engines, this is usually just a baffle on the top of the piston. Take a look at the first drawing. It's an ultra simple depiction of a cross-flow system. This works reasonably well, and provides nice broad range throttle response, but at the expense of degrading the shape of the combustion chamber and piston crown. Realizing this, the engine designers who wanted really high power, tried many porting variations which used essentially flat crown pistons. None were eminently successful until the mid-1920's.

SCHNEURLE PORTING

In 1925, a German by the name of Schneurle devised and patented his loop scavenge system of ports. The second and third drawings show this basic design. As you can see, the facing transfer ports direct the incoming gases against and up the rear cylinder wall opposite the exhaust port. The fresh charge then loops over at the top of the cylinder, and then down and out the exhaust. This flow pushes residual burned gases ahead of it, and if the timing is right, relatively little of the fresh gases escape.

Today, variations of the basic Schneurle porting are universally used in high performance two-cycle engines. The most popular version employs a third transfer port usually referred to as a boost port. It's located on the rear wall between the two main transfers, and it directs gases upward directly at the top of the cylinder. Of course, there are other variations, but the basic loop theme is still the same.

I suppose one could facetiously say we've come a long way in 55 or so years. Actually we have. Although the two basic designs haven't been changed radically, there have been tremendous improvements in cylinder heads, fuels, lubricants, metallurgy, induction, and exhaust management to mention only a few. Today's high performance two-cycle engine is extraordinary compared to those of Dr. Schneurle's heyday.

As you can well imagine, I've related very little of the complete story of porting, but hopefully my brief descriptions have been broadly informative.

Guys, next month, it'll be the third port of three-port, two-cycle engines . . . the intake. ●

Brigadier . . . . . *Continued from page 27*

no wash-in, the opposite type of twist (root rib trailing edge higher than the tip rib trailing edge). I put in the washout by twisting the panel in the direction that I want it to go, then I iron out the wrinkles in the covering. Then check that you have the twist that you want. The covering will hold the wing washout pretty well, but it should be checked occasionally, especially if the sun heats up the covering, which can cause it to loosen or tighten.

Now for the rudder, fin, and stabilizer. The rudder is just a simple sheet of 1/8 balsa (check the weight). The fin is built up from 1/4 square balsa and 1/4 inch sheet. The 1/4 square balsa should weigh about 1/4 ounce for a 36 inch long piece, the 1/4 inch sheet should weigh about 2 ounces for a 3x36 sheet. A small diet or postal scale is handy for this, or just compare sheets by holding them at one end and flap them a little, like a diving board. The heavy sheets will feel heavy!

The vertical fin post is 1/4 inch spruce (or basswood). Cut out the pieces and assemble. Bevel the rudder leading edge and the trailing edge of the fin down as far as the height of the rudder. Lightly sand all edges with the emery board, a lot of rounding is not needed, just take the edge off. Cover the fin and rudder together with one piece per side, with about a 1/16 inch gap between, so that the covering is the hinge as well. This makes a very free hinge, seals the hinge gap, and it is easy to repair with scrap

covering or tape (I have never needed to, the Brigadier has four years of service). Wrap thread around the bottom 1/2 inch of the fin post, and drill a 1/16 hole vertically up in the center about 1/2 inch. This hole will be for a wood screw which holds the fin down.

Now for the stabilizer. Cut the ribs from 3/32 sheet, and check that when the spar notches line up that the trailing edges are all the same length. Notch the trailing edge stock for the ribs. Cut out the tip pieces, and assemble the stabilizer. The 1/4 inch spar will have to be cracked a little in the center so it can slope from the root rib to the tip ribs on both sides. Sand the leading edge lightly with an emery board. Put in the 1/8 square braces from the root rib to the second rib, these help keep the ribs from bending from the pull of the covering. Cut the elevator strip, and bevel its leading edge. Cover the bottom and top of the stabilizer and elevator with one piece each, leaving about a 1/16 inch gap between the stabilizer and the elevator. The covering forms the hinge, as in the rudder and fin. Trim the covering off the gap between the two root ribs. Now check the fit of the fin with the stabilizer. The notch in the front of the fin should evenly engage the front spar of the stabilizer when the fin rests squarely on the stabilizer. Check this and cut or fill the fin until it does. Drill a 1/16 hole in the center of the stabilizer trailing edge. This hole is for a wood screw that will hold the stabilizer to the fuselage.

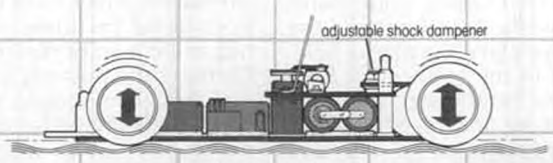
Last, the fuselage. Most of the fuselage is built from 1/4 square balsa, use the weight guidelines, about 1/4 ounce for a 36 inch long piece. The top longeron of the cabin is spruce or basswood, since that is where you usually pick up the plane when the wing is off, and balsa will crunch! Build the sides over the plan, and check the small detail drawing. There is a side stringer that will go on later, which makes the plans a little harder to read, so the detail drawing should help. Lay the two sides over one another when they are done to see that they are identical. I then added small 1/64 plywood gussets at all the glue joints for extra strength. These are easily cut from 1/64 inch plywood with scissors. I built my Brigadier before the days of thick cyanoacrylate, so it may not be necessary now.

Cut the firewall, F-1, from 1/8 plywood. I prefer Sig Lite Ply, it is quite light and strong. Now bend the landing gear, and build up the landing gear box on the front of F-1. Before you put the front of the landing gear box on, check that the landing gear slips into it easily. Now assemble the fuselage with 1/4 square cross pieces from the nose to the rear of the cabin. Check that the sides are square to each other, a triangle is best for this. Once this is done, lay in the cabin floor, using 3/32 balsa crosswise in the fuselage, on the top of the lower fuselage longerons. Leave 1/8 inch space on the top of the longerons for the fuselage side insets. Inset the 3/32 side panels, just flush with the outside of the longerons. Now pull the tail ends together, and tape or clamp them. Lay the fuselage flat on the table and measure the distance from the table to the fuselage end. Turn the fuselage over and lay it flat again, and measure the distance again. If the two measurements are the same, the fuselage is straight and true, so glue the ends together as is. If the measurements are not the same, adjust the ends and repeat until the measurements agree.

Install F-1 with five-minute epoxy, making sure that the notches in the sides line up with the cabin pieces, and that the notch in the top is centered. Cut the side stringers to length, and taper the ends. Glue on the side stringers, then add the four F-4 pieces. Cut out the cabin window balsa pieces, and glue them flush with the F-4 pieces and the outside edge of the side stringers. Install the F-3 pieces and the F-2 piece, and glue in the 1/4 square balsa piece for the notch at the top of F-1. Install the front windshield balsa cowl pieces. Glue in the front wing dowel and the rear wing dowel. Install the front cowl pieces F-7, F-8, and F-9 next. These are glued to F-1 and the side stringer. The top pieces will keep them from cracking. Grooving the undersides will also make bending easier. Plank the bottom of the cowl up to F-9 with 3/32 balsa crosswise.

Now the nose is all closed in, so you are wondering how to mount the motor! Have patience! Cover the fuselage, the sides first, then the top and bottom. I used transparent yellow Solarfilm for the dramatic effect. Cut the cabin windows and windshield from thin celluloid, and glue them in place with RC 56 glue or cyanoacrylate. The RC 56 glue does a very neat and clean job, since it is water soluble and can be cleaned off.

Now to mount the motor. You have a couple of choices. I used a motor tube, which I made by rolling file card stock (from a drafting materials store) around an Astro 05. The turns were secured with five minute epoxy. Be sure to wrap Saran Wrap around the motor first, or it will become a permanent part of the tube! The tube was 4 inches long. Bevel one end of the tube, mark one side 3/16 shorter than the other, run masking tape around to serve as a guide, and cut with scissors or an Xacto saw. This bevel is necessary for the motor down thrust and side thrust. Now use the other end of the tube as a guide and draw the cut out on the nose for it. Cut out the hole with a #11 Exacto blade, and push in the tube for a trial fit. Put the motor in the tube with a propeller, and rotate the tube until the motor shows about 3° down thrust and 2° right thrust. This is an eyeball measurement, an exact value is not necessary. Mark the tube and the nose with about four marks that match up as a guide for gluing. Run a bead of five minute epoxy just inside the beveled end and on the beveled end edge, and



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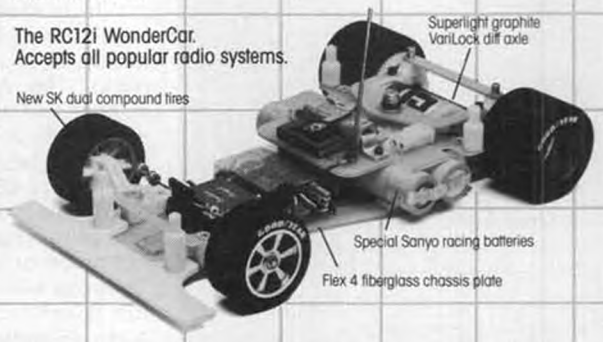

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1981 ROAR Nationals! Boston – Mike Lavacot/Team Associated wins Indoor Modified. Reedy motors win All modified classes for 4th year in a row.

on the tube where it comes out of the nose. Slip the tube in, and let the fuselage stand vertically (nose straight up) so the epoxy will spread out on the firewall, and let it set. Trim the excess tube sticking out the nose with an Xacto saw. That's it, all done!

The other choice is to use the excellent radial mount sold by Astro Flight. If you use an .09 or .10 glow engine, install an .09/.10 radial mount.) For this, again, use the front of the radial mount tube as a guide, draw the cut out on the nose for it, and cut the hole with a #11 blade. Now cut the entire cowl free of F-1. Mount the motor in the radial mount, and place it on F-1, then push the cowl back on. Mark where the mount sits so the motor will go through the hole in the front of the cowl. Drill holes for screws for the motor mount, and fasten on the mount with 3° down and 2° right, using shims (spruce works well). A 3/16 shim in the upper right (as you face the plane) hole, and a 1/8 shim in the lower right hole should be close. Now check the cowl fits, glue in a couple of spruce blocks for cowl mounting screws to go into, and hold the cowl on with screws, or with tape if you prefer.

Which motor to use? I prefer the regular Astro 05 motor or the Astro 05 XL motor, both with six sub-C cell battery packs. The Astro 075, the Leisure 05 motor, and the regular Astro 05 with eight cells are all quite satisfactory as well. The best prop for the Astrl 05 XL, the Leisure 05, and the regular 05 with eight cells is the Cox 7x3-1/2 gray prop. This prop is hard to get, so the Top Flight 7x4 nylon or wood prop, or the Rev Up 7x4 prop will do quite satisfactorily. My top favorite combination is the regular Astro 05 motor with six sub-C cells, it turns a 9x4 Cox prop, and it is perfect in the air. In general, the sub-C cell systems give the longest run time, you can easily get six minutes of flight, and usually you'll do better than that. The battery pack fits in the front of the cabin, long side vertical.

Which radio? Any two or three-channel radio will do, I perfer to keep it light for the best climb, so I use a Cannon receiver, two Bantam Midget servos, and an Astro Flight 250 mah receiver pack. I use a push-push switch available from Astro Flight, activated by full down elevator, for on and off. The servos are mounted by servo tape to the cabin sides, as is the switch. The push-rods are 1/4 square balsa, with 1/16 music wire ends. The pushrod exits in the tail are cut out in the covering, then tape around the cutouts to keep the covering from tearing. The control horns are the Carl Goldberg mini horns. The elevator horn is on the right side (as you face the aircraft) below the elevator, the rudder horn is on the left side as you face the nose of the aircraft. A threaded clevis at the rudder and elevator end simplifies neutral adjustment tremendously, I recommend it (I didn't!).

Now for final assembly. Fit the landing gear in, if it is loose, wrap some masking tape around the wire until it is a snug fit in the landing gear box. The landing gear is removable, for a special reason. The landing gear is a little underweight for the plane, on purpose. It will bend in a hard landing, and take up all the abuse that otherwise would be transmitted to the frame. Since it is removable, you can pull it out, bend it back into shape, and pop it back in. This feature has been a real life saver, the front end has never been mashed in a hard landing, though the landing gear has been many times, in the four year life of my Brigadier.

Slip the stabilizer into place in the back, and fasten the trailing edge down with a 1/2 inch screw. Check that the leading edge is held down firmly by the F-10 pieces, if not, build them up or cut them down as needed. Slip the fin into place, and bolt it in with a 5/8 inch screw from the bottom of the fuselage into the vertical fin post. Check that F-5 holds the front of the fin firmly in place, if it does not, build it up or cut it down as needed. Connect the pusrods, check for neutral and that right is right, and up is up (as you look from the tail to the nose of the plane). The all up weight of the plane should be between 38 to 44 ounces, mine weighs 41 ounces.

To the flying field! I recommend the Astro Flight Rapid Charger or the Leisure Model 105 (for six cells), and at least a 6 Ah. field battery if you do not charge from your car. I recommend a hand launch, though the Brigadier does excellent ROG off pavement. A little up trim may be needed. The climb is slow and gentle, as is the flight in general. Use moderate control, as the Brigadier responds quickly and strongly to commands, though it goes back to normal flight just as easily when you leave it alone. Compare the flight with the motor on and the motor off. Give up, then down, for each motor command, to clear the switch (the up allows the switch to clear). If the climb is nose high, but the glide is normal, the plane needs more down thrust. Shim the motor mount, of if a tube was used, pull out the tube using needle nose pliers and an Xacto knife, and insert a new one at the new angle. If the climb is normal, but the glide is either nose high or nose down, shim the stabilizer under the trailing edge. Shim up if the glide is nose down, shave off some of the material at the back if the glide is nose up. The Brigadier is actually quite tolerant of a range of trim, so the chances are that you can do most of the trim by adjusting the transmitter trim or the horn clevises.

Once the Brigadier is adjusted, normal flight times are four minutes or better with the regular eight cell Astro 05, and six minutes or better with the six cell systems. Check the battery after every two flights. If is is hot, let it cool down before proceding. The usual flight altitudes are from 400 to 600 feet. If there are any thermals, though, the bets are off! Then you fly as long as you find more thermals, and as high as your courage allows! Enjoy, and see how much the Brigadier knows about flying, it knows more than most pilots! At this point, I would like to make a special acknowledgement, my thanks to Bill Effinger, the designer of the Brigadier and the man who runs W.E. Technical Services, for his permission to use the design in this article, and for a very special airplane.

Fly high! •

Electric ..... *Continued from page 29*

out and start building, as if I didn't have enough to do! The 1929 Monocoupe is a 1/5 scale model built from RCM plan #516, and redesigned for electric as the work progressed. The plane is covered with orange Monokote with regular

Monokote trim and a silver nose. The span is 66 inches, chord 11-3/16, area 716 square inch, weight 67 ounces, with an Astro 15 and 3:1 speed reducer swinging a Zinger 13-8 prop. It even has spring shock absorbers! Bill says it is a very practical ship for grass fields, the 4-3/8 Williams wheels going through the grass very nicely. It is stable in rough air, and beautiful to watch in flight. Bill is considering making plans, possibly through an article, or to SEAM members, it is just too good to let lie around.

The other plane is really fantastic! It is a Franklin Sport Biplane, the original was built in 1930-31, and detailed drawings of it appeared in MAN in the April 1963 issue. It was a small plane, with an upper span of 26 feet. Bill did it in 1/6th scale, with an upper span of 52 inches and a lower span of 48. The fuselage is 39 inches long, the wing area is 740 square inches. Bill decided to keep the structure as light as possible and let the rigging help provide the strength (I have done that, too, on my 1/6th scale Tabloid for indoor flying . . . it's the only way to go! M.P.) A prototype with a Clark Y airfoil was not completely successful, so for more lift, a combination of an Eiffel 431 and the nose of an Eppler section gave an undercambered wing of 9% thickness, mean curve 5%, quite similar to the full scale. The plane was flight tested without the engine cowl or engine details, and was covered in Fabrikote with no paint. The wings, rudder, and stab are in white, the fuselage in yellow (Cub yellow). Regular Monokote was used for the trim. Bill sure does do a nice job on the trim! It flew with the Astro 15 and 3:1 speed reducer, at 61 ounces (light!), with pleasing performance. It is stable in flight with good quickness on control response. Bill figures with the extra drag of a biplane, flights may be shorter (he didn't say how much, I would guess in the 4 to 5 minute range. M.P.). Bill said nothing at all about plans . . . I hope he does make some, that is an absolutely gorgeous biplane! *(He is making finished plans, and MB is going to publish them! wcn).*

Speaking of flight times, I have "discovered" that the Astro 15 on an Astro 25 pack flies a lot longer and has more power. I'm using this combination in my Aqua Sport float plane, and the difference is really great. I load the motor with an 8x6 prop, and get quicker takeoffs, great performance in the air, and eight-minute flights. There is a weight increase; my float plane with the regular pack weighs 3-3/4 pounds, with the 25 pack it weighs 4-1/2 pounds, but the increased power more than makes up for the weight. I'm flying on 460 square inches of wing, with floats underneath, so Bill's planes could take the 25 pack quite easily, I'm sure. The ultimate, of course, is the cobalt 15 . . . dream on!

Till next time, try the electric challenge! •

J-3 Cub . . . . . *Continued from page 31*

For engine starting chores, I really like the 'Buzz Box' by Wings Engineering. This glow plug heating device is quite different than most in that it emits a very audible sound (voltage is adjustable for various plugs) that indicates whether the plug is shorted, burned out, flooded, or dry. Voltage to the plug is varied depending on the requirement of the plug at that moment. If the plug is flooded, voltage is increased to burn off the flood, and by listening to the 'Buzz Box,' you can tell when the wet plug is drying out and the engine is about ready to start. It's a welcome addition to my flight box, and beats the heck out of my other methods of starting. Since I still hand flip, it tells me the exact condition of my plug.

I used a Futaba 6J series with dual rate and servo reversing features, which removes the worry about compromising servo/pushrod installation. It's now a simple matter of the best, most sanitary installation, then flip a switch to insure that the control surface is moving the right way (this is the important part!). The receiver and battery pack, each baggied and wrapped in foam, were installed under the tank, and three servos mounted abreast in the front seat area allowed the Cub to fly off the bench with no balance weight needed.

On the initial flight, I used a 10-4 prop

and felt that a bit more pitch was needed, and have used a 10-6 on all successive flights. And what are they like? Well, the Cub flew off the board with only minor trim adjustments (like slowing down the ailerons, for example). It loops easily, rolls reasonably well (it's a Cut, ain't it?), spins (with talent), and even performs inverted flight. Mind you, all this has to be flown, you can't just wiggle the sticks one way and wait. It *is* scale and slow-flying (make that realistic!) and a pretty sight in the air, resplendent in its Yellow FabriKote, Cub decals and black numbers. The tail pops up easily on take-off and it tracks quite straight until you decide it's time for lift-off. Touch-and-go's are routine, and the Cub maintains directional stability on this manuever (a light cross-wind on test fight day yielded several neat one-wheel touch-and-go's) very well.

Overall, the Top-Flite J-3 Cub is a great building kit/plane, a realistic and comfortable flyer that presents no particular problems, and allows you to enjoy. I heartily recommend it to those who are inclined toward this type of model . . . Get one and do it. ●

Soaring . . . . . *Continued from page 34*

the hard part; pull all four lines at once and snug up. Trim off all excess line close to the knot. Practice on the draw strings of the living room drapes and soon you will be able to knot with the best of them."

The same Newsletter offers tips on spoilers.

1) Do not use trailing edge stock to make spoiler blades. It warps too easily. Use 3/16-inch hard to very hard balsa and bevel all four edges so as to give the blade a trapezoidal cross section that is wider at the top.

2) Cover spoiler blades on both sides (bottom first) to prevent bowing or warping of the blade.

3) Prior to any covering, glue balsa stops to the ribs at either end of the spoiler bay. These stops should be installed so as to allow the blade to drop into its correct position. With the spoiler so installed, the spoiler can be precisely sanded to match the contour of the wing. The stops will also help align the hinge line of the spoiler when the spoiler is in a closed position.

4) A one-inch long piece of 1/8-inch outside diameter brass tube bent slightly in the middle can make an ideal spoiler control horn. The spoiler cables, when threaded through the brass tube, can be held in place by inserting a toothpick. This setup makes the spoilers very easy to adjust and no tools are required. Always position the control horns in the center of the blade.

5) When covering the wing, fold the covering material down into the spoiler bays and iron it down well! Later, when the hinge is applied, this will prevent the covering from pulling up due to the forces on the hinge.

6) Trim tape, 1/4-inch wide, makes an ideal hinge for spoilers. It is easily replaced if problems develop; holds very well, and is attractive. By keeping the roll of trim tape in your flight box, field repair of a loose or binding hinge can be done in less than a minute.

★ ★ ★

Last month I mentioned the continuing debate over the origin of natural flight. In any case, some birds are a natural prototype for soaring machines. Remember, there are some 25,000 different species of birds, varying in size from the ostrich that weighs about 125 pounds, to the smallest hummingbird that weighs in at about 1/10 ounce. According to K. Steel, of New Zealand, the skeleton of the Frigate Bird spans some seven feet and weighs only four ounces; the feathers make a flexible airfoil suitable for both life and propulsion.

Birds operate over a wide speed range. The Peregrine Falcon is said to achieve 180 miles per hour in a dive.

Birds' wings conform to their life style. There are four common types:

Elliptical Wings: Birds that live in the forest and on the ground, such as the Turkeys, Doves, Woodpeckers, and perching birds, have short wide wings with many slots (variable spaces between the primary feathers). Such a design confers high maneuverability and rapid takeoff.

High Speed Wings: Long, relatively slim, backward-directed wings without slots are found in birds that feed in the air, such as the Swift, or those that make long migrations like the Terns. This wing is better suited to fast level flight than to fast takeoffs and manuevering in close quarters.

High Aspect Wings: Soaring birds like the Albatross and Frigate have very long, slim, outward-directed wings suitable for high speed flight in strong, steady winds.

Slotted High Lift Wings: Birds that soar over the land, such as the Condors, Vulture, Hawks, and Owl have long, wide wings with many slots. This design combines maneuverability with efficient gliding, enabling the birds to circle in

the small updrafts of warm air that occur over land.

Take your pick.

★ ★ ★

According to the old saying, "All's well that ends." I suddenly find myself with increased responsibility. I've now accepted an assignment in addition to being president of Decision Science, Inc. In the coming months, it will be hard to find time for soaring, no less preparing this column, and so the time has come for me to turn over the responsibility of this column to another equally enthusiastic sailplaner.

I want to take this opportunity to thank my family for putting up with my eccentricities and also thank my friends who have contributed to making this column a success. In particular, I want to thank Joyce Belle for her fine transcription of my notes.

I'd like to stay in touch. Perhaps we can fly together at Torrey Pines some wonderful windy day.

Stay well and happy •

Plug Sparks . . *Continued from page 38*

had his boys (Atwood, Anderson, Hassad, et al) cook up a design. In short order, twelve engines were delivered to Denny for the 50 hour test.

When it was found by the tests the Sky Charger (as produced by the makers of the Baby Cyclone) could not pass the 50 hour requirement without breakdown, this left Denny Industries in a spot as they had embarked on a rather extensive advertising campaign. All due credit to Reginald Denny should be given as he steadfastly held to his original specification. Actually, the Sky Charger ran quite well and could have been marketed except for the promised 50 hour duration figure that Denny was hoping would attract sales on the basis of proven reliability and durability.

About this time, Walter Righter had designed a model engine that ran quite well. Righter was looking for a buyer and heard about the Denny requirement. Righter quickly produced ten engines and the rest is history; the Dennymite engine was born. The rugged cast iron parts easily passed the wear test.

We are indebted to Bob Veir, of California Hobby Distributors who kindly allowed this writer to remove the Sky Charger from the Dennyplane that has been on display at the various trade shows all these years. The engine we have borrowed has #9 stamped on the case and #12 on the backplate. This was probably the result of switching parts during the long runs. The only other Sky Charger known to this writer is #8 in the Larry Boyer collection, i.e., at last reports.

Actually, the Sky Charger was a very ruggedly built engine with full length reinforcements running from the fins to the mounting lugs. Inspection of the motor reveals the only weak point of the motor appears to be in the spring leaf ignition system. This arrangement, based, on a Baby Cyclone design, would never have lasted the 50 hour requirement.

One interesting feature of this engine was the needle valve body and intake tube being cast in one piece. Of course, production methods would have eliminated this by drilling the intake tube for a removable needle valve so necessary for inverting the motor.

The Sky Charger, according to Joe Wagner's Model Engine Index, has a displacement of.573 cu. in. As measured at Replica Engines (Carl Carlson), a stroke of .8125 and a bore of.75 gives a .358 cu. in. displacement. This is very similar to the Baby Cyclone in size (.37). In any respect, the engine never made a full production line, as the Baby Cyclone was still selling very good.

A noticeable Ira Hassad feature on the engine is the five-bolt arrangement on the cylinder. Also, the propeller drive washer had ten holes (a multiple of five). Any Hassad engine collector will recall Ira's penchant for the use of five or ten divisions in his engines. (At one time, every motor manufacturer worked for C.C. Moseley; Atwood, Ohlsson, Anderson, Hassad. What a design team!!)

A typical Baby Cyclone practice incorporated in the motor was the left hand thread on the retainer screw holding the connecting rod on the crankshaft.

The engine also was made with a cast iron sleeve with a specially machined piston consisting of an aluminum top pressed into a steel sleeve. The wrist pin pads were then drilled and tapped into the piston top extending into the piston sleeve. The wrist pin actually held the top of the piston in place!!

Another neat gimmick was the drive washer being screwed unto the 3/8" dia. portion of the crankshaft and then pinned in place. That one would never come loose!

In retrospect, the engine was quite advanced in concept for its time. Truly a shame the ignition system wasn't as rugged as the rest of the engine!

THIRTY YEARS AGO, I WAS. . .

Robert Wynne has been bending my ears again with early reminices of the thirties at Moffet N.A.S., at Sunnyvale. This writer recalls all the action too vividly, but let Bob tell it:

"Moffet Field was built in approximately 1933. After the loss of the airships USS Akron and USS Macon, the Navy had no use for the field. With no lighter than-air traffic and very little heavier-than-air flying, the civilian airplanes were allowed to use the runway. Normal practice was to call the operations office first. Very often there would be no answer because of such low activity. Many touch and goes were made on and off that field, as it turned out to be a good practice area.

"As a result of low use, the Navy

allowed modelers the use of the field on Sunday. Usually the flyers would gather at the north end of the runway and generally quit when the mid-afternoon wind came up.

"Models simply drifted down the runway and were easy to retreive. Occasionally one would run into the hangar with more damage to the model than the hangar. Quite a few contests were held there, some big, and some informal.

"Late in 1938, with war in Europe a definite possibility, the field was closed to model activity. (Columnist note: This was also due to the incoming Ames Research Laboratory, with people, wind tunnels, and top secret work.) About this time, I discovered girls, and modeling came to a definite halt. The Navy turned the field over to the Air Force during the war to be used as a training base. This later was returned to the Navy as a part of their peacetime training program.

"I can recall one interesting happening with the model group that should get a chuckle. Seems like one Sunday morning, a man from San Francisco turned up with a beautifully built model with absolutely no dihedral. A long discussion among the bystanders and kibitzers ensued. The builder claimed the model would be stable and fly satisfactorily. The remaining modelers protested it wouldn't fly.

"He finally started up the engine and launched it. Wonder of wonders, it flew, if only after a fashion. The air at that time of the morning was quiet, but eventually the model did get into an attitude from which the only recovery was SPLAT!! At that point, the builder turned to the assemblage and said, 'See, I told you it would fly'."

WILL THE REAL CARL CARLSON STAND UP?

Aha! Finally heard from the real Carl V. Carlson, who is residing at 811 North Columbus, Glendale, CA 91203. Carl mentions the photo from Joe Ott, published as Carl Carlson, is not of Carl. Carl and Joe did visit the 1935 Nationals at St. Louis, and Carl believes the photo was taken then.

Carl has submitted photos of his 1931 Wall powered biplane called "Big Crate". This appeared in the May 1932 issue of *Aero Digest*. Photo No. 8 shows Carl in 1931 with Big Crate #1, a Wall powered model. Big Crates #2 and #3 (which we will see later) were engined with the Gil motors. "Big Crate #3 won the Senior Open contest at the Nationals at Akron in 1934. This was the last model contest I ever entered, as I went back to college."

"Late in 1932 and in 1933, I worked with Gilbert Nelson (not Knight, as erroneously reported) for the Power Motor Boat and Engine Co. on the early development of the Aero Knight engine."

Carl has kindly included a drawing made by him of the Aero Knight, showing the cylinder head cast with the cylinder and not bolted as shown in the Pond drawing. (This was actually taken from a Knight engine in the Karl Carlson collection. Gets more confusing all the time!)

"Incidentally," Carl also states, "The carburetor did not have a float. Mixture and fuel flow was by a poppet type valve."

At the same time, Carl started the Carlson Model Airplane Co. to produce kits as shown in Photos No. 9 and 10. These were intended for the Aero Knight engine. However, the engine did not run long enough to be able to fly the models, hence, none of the kits were sold. Carl did run the company for two years, producing rubber powered and solid scale model kits.

The foregoing is of considerable historical interest, as Carlson appears to be the first manufacturer to produce gas model kits. Truly a shame he was so far ahead of his time and the Brown Jr. engine.

SAM SALLIES

Latest report from C.D. Bob Shafer of SAM 8, indicates the club is still having problems with the Harts Lake field on any particular day. Biggest trouble is that you can get cancelled at the very last moment.

Bob says Don Zipoy was a great help in negotiating with the US Army. Bob says all he had to do was to call Range Control Sunday morning. After getting clearance from Sgt. Hutchinson, it turned out he was an R/C modeler. Nice to have an airplane devotee on your side!

Wouldn't you know it! After all the negotiations, somebody forgot to put in a reservation for good weather. The weather was cold and windy, cutting down the attendance. Rats!

Don Nordlund won the 30 Second Antique event, the rubber was copped by Bob Benjamin, and Ray Neuman won Ignition Cabin. The new event, which is gaining popularity, R/C O/T Assist Event, was won by Hugh Flournoy.

One great thing about the "bummer" of a contest was that SAM 8 picked up three new members. How about that!

GORDON CODDING AGAIN

Every so often, we receive photos of the darndest looking models you have ever seen. This is due to the precision type contests that were constantly being held in Southern California between 1935 and 1939.

Gordon Codding has sent us Photo No. 11 showing an unusual model designed by Clyde Austin called the "Dingbat". The man on the right tuning the Baby Cyclone is Webster Hill.

This five foot model, powered by a fixed spark Baby Cyclone, somewhat resembles a "Weick A-1 Safety Airplane". Some Waldo Waterman influence can be seen in the swept back wings. An unusual tricycle landing gear was employed, with the single wheel being under the propeller.

Codding further reports that Clyde and Web were partners at that time and published plans of the model. Gordon recalls one of the designs still flying at Rosecrans and Western Field in Gardena as late as 1939. A set of prints have been uncovered in the Clyde Austin estate, so it shouldn't be long before this design is available to the fellows who like the "out-of-the-rut" type models.

SCALING

With so many good designs being adapted to the various classes, many modelers are puzzled over an easy way to determine just how they get the desired size and/or wing area. Thanks to Bob Angel, newsletter editor of SAM 26, "Central Coast Chapter", here are some methods for scaling your favorite airplane.

CASE I

Assume you have an aircraft of 50-inch wingspan with a wing area of 350 sq. in. and you wish to scale the model to a 72 inch wingspan.

Actually it is simple when you know how. First, find the scale factor which is 72 divided by 509, giving a 1.44 magnification factor. Since SAM rules require you to know your wing area, what is the wing area of your new biggie?

Simply multiply your original wing area by the square of your scale factor. In other words, the new wing area equals 350 x 1.44 x 1.44 equals 725.76 sq. in. A quick recapitulation is in order:

(1) Scale factor = dimension wanted divided by dimension you have.

(2) New wing area = original area times the scale factor squared.

CASE II

Here is a c ase where you have a model with 72 inch wingspan and a wing area of 725 square inches. You desire to scale this model down to 350 sq. in. of wing area. To find the scale factor, divide the desired wing area by the original wing area and then find the square root of the result.

S.F. = 350/726 = .694

Using the scale factor, the wingspan of the scaled model is 72 x .694, equalling 50 inches. You will note this is the reverse procedure of Case I. Now, I don't want to hear anyone say they can't scale a model easily.

AMPS BOWL VI

Received a nice writeup and photos from Jim Persson, of SAM 32, of the Sixth Annual AMPS Bowl, which was held rather late in the season, April 25. No question about it, the unprecedented rainfall in California really put the "queetus" on all model flying for four months.

Flying was held at the San Ramon area near Dougherty Road. Photo No. 12 shows the gradual encroachment of housing, as seen in the background. This photo shows Jim Persson winding John Gomez' Comet Curtiss Robin. This model was a startling performer, being one of the best flyers of all the events held; .020 Replica, Scale, and Phantom Flash Events.

Because of the westerly breezes that spring up like clockwork around 11 a.m., flights were limited to one and a half minutes. However, trust Jim Persson to promptly lose his Comet Phantom Flash after two minutes. After an hour of fruitless searching, he gave up. Finding those small rubber models is tough! Undaunted, our hero put up his backup airplane with the same results. He got lucky this time, and recovered the model. Who said those small models didn't need dethermalizers? As a side note, Persson claims the secret of his success is the clear covering he uses. "Handi-Wrap" in this case!

Photo No. 13 shows a portion of the SAM 32 gang (some had already gone home before the end of the meet). Rubber powered models are making a

tremendous comback now that halfway decent rubber is again available. The Marin A/C Contest featuring Joe Ott models should be a real lulu! Joe Ott himself put up the trophies for this great looking meet.

Wrapping up the contest, it is well to note that old sparkplug Persson won the Sweepstakes award consisting of the AMPS Bowl Perpetual Award and a Cox .020. The best part of the day then occurred as John and Beth Gomez invited tha gang over for a terrific luncheon featuring hand churned peach ice cream. That's nostalgia!

Results looked something like this:

.020 REPLICA
1. Cliff Silva
2. Art Watkins
3. John Gomez

SCALE
1. John Gomez
2. Jim Persson
3. Cliff Silva

PHANTOM FLASH
1. Jim Persson
2. Al Rasmussen
3. John Gomez

COWL VS. NO COWL

Boy! All this columnist has to do is to make a disparaging remark about the lack of a cowl on an otherwise attractive model and does he catch it! Latest one to take this writer to task was Gene Wallock (P&W) about the old photo of Frank Cummings (July MB) with an uncowled Comet Sailplane with folding prop.

Gene claims the folding prop was not so much for the streamlining as it was for lack of landing gear. Most modelers will remember the Goldberg design featured a retractable landing gear that failed to protect the propeller when the model glided into the ground. Ya learn something every day!!

SAM ABROAD

Latest reports from England via Dave Baker (founder) and Alex Imrie (president) is that the SAM movement over there has grown to such proportions that the SMAE (English counterpart of American AMA) is giving SAM more and more space on the Nats program.

Aeromodeller, the outstanding modeling magazine in Britain, has come right out and suggested that SAM carry the ball for all large functions that feature old timers. The magazine has given a full column to Alex Imrie and monthly features an old timer design. The interest is phenomenal!

From this vantage point, this author can see a separate Nationals in the making for Old Timers. The pattern, as in the USA, is again repeating itself. This is simply great, and the aforementioned boys should be highly commended.

We are also indebted to Dave Baker for Photo No. 14 showing the SAM 35 Treasurer, Peter Michel, launching a Houlberg design called the "Isis". As Dave says, "What a beauty and worst of all, it flies as good as it looks". The photo was taken at Watton Royal Air Force Field. This time, Pete had to settle for a second place.

AUSTRALIA

Had a heckuva good time in Australia but haven't finished the writeup on the travels as yet. This little literary effort should please all modelers as it will cover the Nationals, modelers, manufacturers, etc. In fact, there is a little for everyone . . . something like *Model Builder!*

While on tour in Australia with the modeling group for PARCS, a Victorian R/C Club, the writer had the pleasure of meeting Norman Garrett, a long time buddy of Monty Tyrrell, my host on this trip.

Photo No. 15 shows Garrett's neat work on a Taibi Powerhouse. Of course, with their very own field (and a huge one at that!), the PARCS fly primarily radio control, and so the reason for the Powerhouse being equipped with a three channel rig.

It was a bad day at Black Rock as Monty Tyrrell had no sooner eliminated his "Woolaroc" flying scale, than in an ensuing flight with the Powerhouse, the wings folded. A major repair job, but Norm, being an old free flighter, will get it done!

THE WRAPUP

Normally, this writer tries to leave the reader with a good anecdote, or some sage words of advice based on past experiences, or a special announcement, but this time we would like to acknowledge those fellows who have so unselfishly contributed to this column in the form of newsletters, photos, writeups, contest notices, and just plain entertaining letters.

Sometimes we fail to acknowledge your contributions; even worse, fail to use the material in the column. Please accept this apology to those fellows who have never had their staff recognized. Might add at this point, if we included everything that was submitted, Northrop would have to start another magazine devoted strictly to old timers. (Now that ain't such a bad idea, haw!)

An excellent example of what we are referring to is the excellent District II Collectogether staged by the new Regional Director, Darrell "Red" Garlough. Held at the Pollarville Chicken Kitchen near Stockton, this turned out to be a real fun thing, as the banquet room was an adjunct of the restaurant. In addition, after the collectogether was over, a dinner and show was offered at the adjoining Show Boat Dinner Theatre, where old fashioned melodramas were presented. To top it off, the members were invited to a Fly-In at Rough and Ready Island, with the Delta Modelers of Stockton.

The foregoing is exactly what is meant. There simply isn't enough time and space to cover all the fun, but we do try to give everyone a fair shot at publicity. In that same line, the columnist is most appreciative of all photos (especially the oldies) received, particularly with interesting comments. Recognizing the main

theme of old timers is nostalgia, we try to run plenty of the old time stuff that would otherwise be lost to antiquity.

Another vote of thanks is due to those engine collectors who have so kindly loaned their engines for copying unto paper. It is bad enough to catch the dickens for inaccuracy on dimension and parts in drawings taken directly from the engine itself, but imagine the controversy this writer gets involved in when he uses the manufacturer's drawings that pass for scale three-views!

So don't be surprised if you, the engine collector, get a letter from this writer asking if he can borrow your engine (generally a rare one!) to measure up and publish for all to see. As an example, we have the Feeney Four Cycle from Red Garlough and the Tlush Super Ace from Bob Bowen coming up soon. We are real proud to present drawings of these lesser known engines.

To conclude, this writer is not asking (as do other columnists) for contributions, but get this, *he expects it!!* This is your column. We can't print what we don't have. Your contribution may be the very thing we are looking for at the time. As Walter Winchell used to say in answer to the query why he was the leading columnist and constantly scooped the opposition, "A Columnist is no better than his sources". Get the message men!! •

Electronics . . . *Continued from page 41*

I have just had the sad chore of delivering a long-time good friend to Los Angeles Airport! Chris Blum, ex-VP of Kavan Model Aircraft in neighboring Santa Ana, has departed these California shores to assume a position with the Kavan head office in her native Germany. Chris was here for many years, and is well-known to many of us in the industry and in the hobby. We lucky ones knew her personally; to many she was that fetchingly accented phone voice with whom they discussed their R/C helicopter hobby.

We worked together for many years; many of the instructions, ads, and product sheets you've read on Kavan products were the result of our joint effort. Though she is not a modeler, she is extremely knowledgeable about all phases of our hobby, and is an honor graduate of the Marez School for Mode One Pilots, To any non-flying lady reader who wants to, but is reluctant to take that first step towards R/C flying simply because few gals do it, let me tell you that this young lady was my fastest learning student ever! Her third flight was her first takeoff, and by the end of the second session she was through with my old faithful high-winger and was asking for something faster and more manueverable. Favorite manuever? Immelmann; naturalich!

Auf weidersehn, schon Fraulein, your many friends join me in saying: Hals und beinbruch, you are gone but not forgotten!

On the subject of lady fliers, I had a letter from another Chris; Christopher Adams, a glider guider from Reno, who, having read my April column, wrote to remind me of the R/C achievements of one Barbara Henon. Well Chris, I know of Dr. Henon, having had the pleasure of meeting her briefly some years ago, and I do know of some of her successes, though not everything that you mentioned. It was not my intent to slight her . . . or the many other lady flyers, mechanics, pit crew-persons, call girls, cooks & bottle-washers, go-fers, contest workers, or whatever, of whom I have no personal knowledge. We all appreciate and respect you for your part in making our hobby what it is!

LEAD BENDER

That's lead as in "the one ahead," not lead, as in "sled." Well, "the one ahead" on this subject was Kent Eicher, who's letter was the first of several to arrive, asking where to get one of the bending jigs mentioned in the June issue. *Mea culpa*, I dropped the ball on that one, I should have mentioned a source for those of you who have to depend on mail order suppliers.

A little research through the file uncovered a great catalog from Contact East, 7 Cypress Dr., Burlington MA 01803 (617) 272-5051. Said catalog lists a number of single-sided bending tools, for resistor and similar sized components ranging in size from 1/8 to 2 watts. There is also a double-sided tool, such as mine, one side for 1/4, and the other side for 1/2 watt components. The former are priced at from $4.85 to $7.30; the latter is more reasonably priced at only $2.00. The catch (why is there *always* a catch?) is that the company has a $10 minimum order. However, all is not lost; write and ask for a catalog, you won't have any problem finding enough tools in it to total $10; the problem will probably be stopping at that total. You'll find listed many high quality small hand tools made for electronic assembly, which is exactly what the doctor ordered for model builders. If all else fails, you can fill up the order with Xacto blades, which is just one of the items listed.

NEW GOODIES

One of the things I positively dislike is having to cut a mounting slot for a slide switch. Seldom, if ever, do you get one cut by hand that looks as good as the ones punched out with a die. Fortunately, there is now a cure for us hackers . . . a neat plastic guard that not only covers up our mistakes, but serves a dual purpose in protecting the switch from accidental operation.

Such switch guards are not entirely new, they have been used and available from certain of our radio manufacturers, though generally only for the 4PDT Noble switch. Incidentally, said switch has been dropped by the maker, Teikoku Tsushin Kogyo Co., of Japan, which is one of the reasons we are beginning to

see other types being used.

My news concerns just those other types. Bob Dunham, in the guise of his Dunhams R & R in Lake Havasu, Arizona, is making a number of switch guards of various sizes for other common switches. An assortment of five guards, for five of the most commonly used switches, can be obtained for $1.50, postpaid, or tell Bob the screw spacing and knob opening dimensions of your switches, and he will try to match a guard to it.

When the fish in Lake Havasu aren't biting, you can call (602) 855-6934, otherwise a letter to Dunham's R & R, (Is that like I & I, Bob?), P.O. Box 34002, Lake Havasu City, AZ 86403, will get you the desired information.

BOOK SHELF

There are few things that you can't learn from books . . . especially if you can combine theory with practical experience! Such seems to be the idea behind a number of books available for some time from a well-known company, Heathkit, of Benton Harbor, Michigan. Fortunately for many of us, it is consistently adding to the list, and naturally, the subject of these books is all on our favorite subject of electronics. The series, entitled Heathkit/Zenith Educational Courses take you pretty far up the electronics ladder, with courses dealing in such especialized subjects as microprocessors, and TTL and CMOS circuits, however, they also have courses for the complete beginner, in a series of recommended subjects.

Each course, which comes complete with a manual, phonograph records (cassettes are optional), electronic components for experiments, and an end-of-course test, covers one principle subject, a certain phase of the wide and ever expanding field of electronics. Recommended first course is one entitled DC Electronics, through which you learn the fundamentals of current, voltage, resistance, magnetism, Ohm's Law, inductance, capacitance, measurements, and so forth. Completion of this course will give you a firm grasp of the very basics of present day electronics. On this, you can build, with a follow-up course on AC Electronics, then on to Semiconductor Devices, Test Equipment, and so forth, limited only by your own interest and time. The courses are not expensive, averaging around $55, and worth every cent!

A recently introduced course which may be of interest to those of you with limited time is entitled "Electronics for Hobbyists," which is a crash course of some of the subjects mentioned above. It's description in the recent catalog even mentions R/C modeling.

For better understanding of the subject at hand, some test equipment, and the use of an Experimenter/Trainer is recommended; all described in the latest catalog, available free from Heathkit, Benton Harbor, MI 49022. Why not ask for a copy and read all of the detailed information. Tell 'em Model Builder sent ya. Some of the courses are even good for college credits . . . and are deductible from your income tax . . . how can you go wrong?

Till next month, don't forget to fly low and slow! •

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

at full throttle. It might have been a million in one shot, but the switch is a little wimpy anyway, so for the next while I did without a switch completely, unplugging the pack to turn things off. After getting tired of the bother, a Futaba switch was wired in . . . And now you know why one of the cords was cut up to get the plugs from it.

One thing that isn't the fault of the radio, but that you should be aware of. At the end of a race, we have always first switched off the radio, as there are a lot of transmitters in close proximity with racers heading to the pits. With the radio off, we know the thing won't go crazy on us and can take our time in shutting down the motor, usually just letting it die on its own by setting the car on its nose, which gets the pickup out of the fuel and reduces chances of having a flooded motor when the next heat is up. But with these coreless motor servos there is no drag from the motor's armature and brushes, so the servo will easily be pushed by the over-ride linkage to an open-throttle position. After our first heat race, Joshua picked up the car, turned the radio off . . . and we zinged the motor real hard before I could get to the switch to turn it back on. You've been warned.

To put a wrap on it, the Airtronics XL wheel system, using the number 94557 servos, is a very good radio that I have raced with and like. If you prefer the box-type transmitters, order the whole package. If hooked on the Kraft Tx, it works the Rx just fine, at least on the 27 band, and you will still be able to take advantage of an excellent receiver/servo package.

TRY ENOUGH TIMES

And you will get the right product at the right time. At least a couple of times in the past, Twinn-K has sent me batches of AJ's brand tires, the first time was a few years ago when I was doing *Race Car World* magazine and I couldn't find but a couple of sets of tires in the whole box that actually worked acceptably. Later on, they sent more . . . with the same result, except that I didn't write anything about them. If you can't say something nice. . .

But now they have released a new series of molded front tires for 1/8 cars and they look real good. To be honest, I have yet to race on them, but the guys at Delta say they work and that they are using them, so that is good enough for me. The soft compound is all that I have mounted, as that is what is supposed to work best, although there are other compounds available. The real good news is that the tires are consistent from set to set and they aren't badly out of balance, as are most other molded tires. In addition, they come pre-trued, shoulders rounded nicely, and all. Mounted on Delta wheels, they come out just over 2-3/4 inches tall, the usual size for fronts. Even though I did touch them up just slightly, bringing the height down to exactly 2-3/4 inches, as well as getting them perfectly round, it would be possible to mount them (carefully) and race on them without any truing or sizing at all.

If you are tired of balancing molded tires, as well as having been frustrated by the lack of consistency of same and the difficulty in getting them ground to size, check out what AJ's has to offer. You'll like 'em. •

straight ahead. Many model builders just trim the rudder to the left at the cost of several miles per hour in speed.

This going to the right is caused from the torque of the left hand propeller making the hydro drift to the right.

"By mounting the rudder on the left side of the strut, the offset strut or left trim is no longer needed. The drag of the rudder blade will pull the hydro to the left. The rudder drag on the right hand side only increases the right drift which is not needed or desirable.

"We have mounted rudders on the left side with adjustments to move the rudder as close as 1/2 inch from the strut to as far out as three inches. One and one-half inches distance between the rudder and the strut seemed to provide the top speed along with the best cornering. The rudder drag is going to exist no matter where the rudder is located. So if this drag can be used to an advantage this is reason enough to mount the rudder to the left of the strut.

HOW HIGH'S THE WATER MAMA?

The title to a Johnny Cash song could well serve as our next lead. Mike Heishman from Texas called the other evening to discuss 3.5 tunnels. He wanted me to know that not every Texan who enjoys model boating is like the fellow I mentioned back in my May column who only liked "them big hydros." During the course of our conversation, he mentioned that one thing I'd never mentioned in my column was how to go about obtaining a place to run model boats. Well, there's lots of things I've never written about in this column and that certainly is one of them. I suppose that's partly because I've always been blessed with a spot to run and haven't considered it a problem. But I suppose for some folks it is a problem and certainly worthwhile of some consideration.

I can't offer any help to those of you who may happen to live in an area where

I can't offer any help to those of you who may happen to live in an area where there just isn't any available water. Well, I suppose you could construct a lake. Seems like site costs and construction might put this idea out of the realm of practicality. Usually there's water around, the problem is gaining access to it.

The first item that model power boaters must confront when seeking a place to run model boats is the fact that boats are not going to be accepted in certain locations. Even if noise were not a factor, and it is a very big factor, high speed power boats don't really lend themselves to most ponds and lakes located in cities or densely populated suburbs.

The bodies of water that can best meet the needs of model power boats are often located in parks somewhat isolated from populated areas. One of the advantages of using a body of water in a park is that it is controlled by a government agency that is supposed to be meeting the recreational needs of the population it services. It then becomes a matter of convincing the controlling agency that model power boats are a viable recreational pursuit. This is going to take some good public relations on the part of those attempting to gain access to the pond.

The first thing the agency is going to ask for is insurance coverage. This can be easily obtained by joining either of the two national model boating organizations, the North American Model Boat Association or the International Model Power Boat Association, and forming a model boating club. When dealing with governmental agencies I was asked how many others were interested in using the facility for the same purpose. When dealing with such agencies, presenting an organized approach is vitally important.

The next thing model boaters must be willing to do is share the facility with other users. I'm thinking specifically of fishermen who often fish from the shoreline of many ponds. Model boaters need to be especially aware of the fact that when they are using a public facility they do not have exclusive use to that facility. Our club has an agreement with the local county recreation department specifying the days we can operate our model power boats along with what hours are available. This arrangement has worked out very well because it limits the times when model boaters can use the pond. I feel we have all the time we need. We just cannot run our boats any time we feel like it. This assures the general park user guaranteed park periods. This has proven to be a good public relations tool for our club.

Another suggestion to those seeking to use a public facility is to do something extra to help in the maintenance of the area you plan to use. Many park agencies are facing budget cuts due to funding shortages. This is very true of the local agency in my area. Model boat clubs can provide volunteer help to assist in doing things that the agency has had to cut. It might be no more than providing a group of people to help in a spring cleaning of the park. Let the agency know that your group is willing to help in whatever way it can.

Take the time to get to know the person responsible for directing the agency that manages the pond where your club runs their boats. Through good public realtions, your group can become a valued and recognized force. There are going to be times when this recognition is important. I realize there are many people who would just as soon not have me and my friends running boats while they are in the park to enjoy a picnic, a walk, or just getting away for some quiet time. The head of our county parks has received numerous complaints about the model boats running at the park. However, our club has been a

good client for the parks and done some extra things to gain support for our activities. This is vitally important because people are going to complain. But if you've done a good job of informing the agencies involved and properly promoting the hobby, such complaints can usually be placed aside.

INTERESTED IN SPORT 40s?

Kelly Wilson, the N.A.M.B.A. District 7 Sport 40 Chairman, sent me a really well done compilation of different unlimited hydroplanes that can be modeled from existing kits in the Sport 40 class. Among the manufacturers listed are: Dumas, Steve Muck, JVS Products, Octura Models, and R/C Glass. A number of different unlimiteds is listed for each of these different kits. Anyone interested in obtaining a copy can send me a stamped, self-addressed envelope for a copy. JERRY DUNLAP, 119 CREST-WOOD DR. S.W., TACOMA, WA 98498. •

Daphne . . . . . . *Continued from page 55*

tissue. Lay the tissue over this area and gently pull out wrinkes and pat down the edges. A razor blade and a long sharp pointed scissors are good tools to trim away the excess tissue. Don't cover too large an area at one time. Water shrink with a very fine mist. Don't saturate . . . just enough to sag the tissue. The model in the photos was covered with white and blue Japanese tissue. The darkest color in the trim is black domestic tissue. Apply the blue and black tissue trim with a solution of 30% dope and 70% thinner, used sparingly. Cut out the fuselage registration numbers from blue tissue and attach to the model in the same manner. When dry, brush on three coats of non-shrink dope thinned about 50% with thinner, allowing a few hours of drying time between coats. Sig Lite Coat is a good, low-shrink butyrate dope. A lot of rubber modelers prefer nitrate dope, but it is not as easy to find.

The small registration numbers on the rudder and the word 'experimental' under the side windows are dry transfer letters. Rub the letters onto a piece of clear acetate "press apply" material. Trim the acetate as close to the letters as possible and then peel off the backing and gently press in place.

Paint the wheels with three coats of Floquil grimy black. Cut out the hub caps from card stock and decorate with tissue before gluing in place.

The windows are cut from thin acetate sheet and applied to the model with R/C 56 glue. You may need to thin a small amount of this glue with a little water before use.

FLYING

Use one loop of 1/4-inch FAI rubber for low power test flights. Balance at the place shown on the plans and test glide. Do not throw the model into a stall. A slight bending up or down of the elevator should correct any stall or dive tendancy. Start powered flights with no more than 200 turns. After satisfactory testing, use a four-strand motor of 3/16 FAI rubber 28 inches long. A motor this long in relation to the distance from the motor peg to the prop hook can be hard to manage. To help tame it down and allow for better weight distribution after the power runs out, I recommend pre-tensioning. To do this, install the motor in the plane and wind in about 75 turns into each loop separately, then put both loops back on the winder and wind in another 75 turns BACKWARDS, then connect to the prop shaft and wind as if to fly and release prop. When the motor runs down it will look like it was braided and will not bunch up in the back of the fuselage, disrupting the glide. The pre-tensioning will last the life of the motor, as long as you do not remove it from the prop hook or motor peg.

Happy flying with your Daphne. •

C/L . . . . . . *Continued from page 47*

it may be difficult to locate in smaller quantities. The Seal® laminating film suggested by Ken Simpson in the June issue of this column would also work great, even though a very small weight penalty would be involved, as this film does have an adhesive on it.

The idea of using Saran Wrap for covering intrigues me. You know how so many Combat fliers are always just finishing their models the night before the contest? Might be a good idea, just before covering the last two models, to make up a couple of sandwiches for the next day's lunch. A ham-on-rye could serve nicely as tip weight, slip it in the last rib bay on all-wood models, carve out a cavity in foam models and proceed with the covering. Next day your lunch is ready and you know it won't be left beside the front door. Combat fliers may forget all manner of things on contest day, but never forget the models. Be sure to use these two out-to-lunch models in the first rounds and as they get smashed, at least your lunch is ready for you.

With a foam model, where the wing panels themselves are only rarely totally destroyed, it would even be possible to slip in some of your favorite soup. Smash

the model, recover the nourishing panel, peel back the top piece of covering, squirt some fuel on the ground, light it, heat soup over the fire and enjoy the only hot meal of the day. Would make losing a model, and possibly the contest, an almost enjoyable process.

Wait a minute. To really enjoy losing, a hot cup of soup won't cut it . . . but a good, stiff drink might. Before that do-or-die match of the day, pour one of those pre-mixed cocktails into a cavity in the outboard panel and seal it up with sticky mylar, FasCal would work fine. By the end of the match, that throbbing Fox Combat Special will have mixed your drink like you have never had one mixed before. If you lose, no further instructions needed. If you win, and want to keep on winning, stay away from the spirits, instead pour a tall, cool one for the guy you just trounced. He might even let you win next time. . .

AND FOR A TRULY YUKKY MESS. . .

You can cover foam models with gift-wrapping paper, stuck down with common wallpaper paste. This suggestion come from (and I only think I am getting the name right) Nur Iskandar Taib. If that is not the right name, I apologize, Nur, uh, Iskandar(?), but right below this name he reminds me that over eight years ago, when starting on a very short career writing for American Modeler, I asked for contributions and obscene mail, so I am justifiably suspicious.

At any rate, the process goes something like this. Mix wallpaper paste, it can be quite thin and still work fine. Trim some medium weight gift wrap paper to proper size. Dunk the paper in water. When soaked hang up to drip dry. Using a 3 inch wide brush, slop the paste on the model and then plop the damp paper onto the model. Smooth out all the wrinkles and let dry. When dry, glue the motor mounts, boom(s), etc., in place and add your AMA number, using a felt-tip marking pen. Finally, the model can be fuel-proofed, a spray can of Pactra fuel-proofer works OK, as do spray cans of automotive touch-up paint. If you use lacquer, be careful, as a heavy first coat can find the thinners doing funny things to the foam.

As mentioned in the letter, this method is ripped from Wilkens, developer of the Superstar series of FAI Combat models. Have used it myself on three batches of six-at-a-time models. First time through was a real mess, as I didn't know about soaking the paper first, although I did get it on OK. On the next twelve models, I switched to the cheapest tissue I could find in a hobby shop, the stuff sold by Sterling Models. Bright colors, very light, but absolutely no wet strength, so slapping it down dry on the paste covered panels was the only way to do it.

Still, the tissue did work pretty well, although it was a real mess getting it on, especially as the whole model should be covered at once to avoid warps. And there isn't much strength from the covering when using tissue, so the model has to be designed with this in mind ... which the Plastic Nasty was from the beginning. The real shocker with this method came when I mixed up a huge batch of paste, only to find out a few weeks later that, stored at room temperatue, it ferments into an awful looking, worse smelling pile. . .

Hey, I guess that name is right after all, further in the letter is mention that Iskandar is from Malaysia, studying geology, and that he would like his name and address printed, so that CL fliers in the area of Bloomington, Indiana can get in touch with him. Ok, he is at F117 Barta Apts., Lingelbach Lane, Bloomington, IN 47401. Or call (812) 332-5689.

SMALL-BORE COMBAT AT THE NATS. . .

Rich von Lopez writes, as he does every year about this time, asking for a plug on 1/2A Combat at the Nationals. And of course we can slip this in, as the event can be great fun. Last year, Rich even got Riley Wooten himself to fly. Rich will be the CD, again this year, has a promise from Cox to sponsor the event. In addition, Joe Klause and his company, Kustom Kraftsmanship, will kick in with some 1/2A speed goodies.

To be held on Thursday following the completion of Jr. and Sr. Fast Combat, the event will be double elimination and will use slightly modified Fast Combat rules. Entry fee will be $3.00, with the money going to the Team Fund supporting our FAI Combat team. Yes, you can use your "cheater" .051's if you want.

AND THE HOT TIP FOR YOU SMALL-BORE FANS. . .

I'm not sure how to word this, for fear of getting me and/or **Model Builder** in trouble, but first realize that I do have quite a number of contacts in the hobby business, both through this magazine and through working for a hobby distributor. Not all of these contacts and conversations with same can be named or quoted directly. But if you want to be flying anything 1/2A in the next year or so, I would suggest stocking up on engines and parts. Even if the anticipated does not happen, prices are on a never-ending upward spiral anyway, so you can't lose. That's all I can say for now. If you can't figure it out, you probably can't even start one of the things anyway! •

Hannan . . . . . *Continued from page 48*

ber 14th, at Mile Square Park, in Fountain Valley, California, categories will include free flight rubber, towline, gas and electric powered models. Additionally, for the first time, there will be a class open to *any* scale flying wing. Chief Judge Bill Stroman points out that this opens the door to a broad variety of flying wings, including those of foreign origin. Scale wing models may employ any source of power, and they will be judged upon realism of performance as well as authenticity. Why not participate in this fun, low-pressure event?

THE GORDON BENNETT

Mile Square Park was again the site of the international balloon race during the month of May, and attracted entries representing France, Germany, Japan, Switzerland, and the United States. Mother Nature was rather unkind this year, and her gusty winds cancelled the traditional tethered hot-air balloon rides, as well as the demonstration of the Peck-Polymers R/C blimp. But the estimated 25,000 spectators were treated to Goodyear blimp fly-bys, helicopter rescue demonstrations, static displays of ultralights, sailplanes and a Polish Wilga. The latter was intended to be an *active* display, but was, alas, grounded by red tape, according to a public announcement.

The guest of honor was world-renouned designer/philosopher Buckminster Fuller, who favored the audience with an enlightening discussion of his geodesic domes, which share more in common with balloons than their general configuration. As it turns out, very large examples of these domes would appear to exhibit rising tendencies as the air within them is heated!

A bonus was the massed fly-over of some thirty (count 'em, 30) biplanes. Definitely a mixed-bag, the formation consisted of Wacos, Stearmans, a DH Moth, a SPAD (!) and a potpourri of smoke-equipped aerobatic types. The spectacle of such an array of two-wingers soaring over the colorful helium balloons was most memorable. And next year, even more massive participation is planned!

SPEAKING OF GAS-BAGS

Frank Scott sent a clipping from an Ohio newspaper announcing a new dirigible factory there. *Wren Skyships* intends to produce a metal-clad rigid airship with a capacity of 120 passengers, to be transported at about 150 mph.

Meanwhile, in Pennsylvania, long-time rotorcraft designer (and model builder) Frank Piasecki is working on his *Heli-stat* project, a heavy-lift dirigible equipped with four helicopters (attached) to provide thrust and control.

THAT WHITE CANARD AGAIN

Our request for information relative to the very early White canard "home-built" continues to draw response. Now, we are pleased to present a photo of the first Peanut Scale version, constructed by Don "The Wiz" Assel. Actually, he built two of them, as the first "blew up" when the longerons failed under a fully-wound motor, so the second incorporated spruce fuselage members. In

the photo can be seen a silhouetted photograph of "Wiz" himself. Perhaps *Model Builder* may be able to present a full-size plan of this airborne oddity in a future issue. *(How about it, Wiz? wcn)*

HOW TRUE

"Criticism seems to come mainly from those who are not willing to contribute anything else." Paul H. Poberezny, president of the Experimental Aircraft Association.

AND SPEAKING OF THE EAA

Putting Wings on Dreams is the title of a recent publication devoted to the aircraft in the EAA Museum, the world's largest private collection. Bountifully illustrated with photographs, it features many subjects of interest to modelers, such as their reproduction Wright Flyer, the Wittman Tailwind prototype, a Corben Baby Ace, a Quickie, the prototype Evans VP-1 Volksplane, Rand KR-1, Pober Pixie, Rutan Vari-Viggen, the Bede BD-5 prototype, the Breezy prototype, an original 1911 Curtiss Pusher, the Ryan SCW prototype, the Laird Super Solution replica, Warwick's Hot Canary, and many more. Although not pictured, our own Walt Mooney's Honey Bee is also in the collection.

Priced at a reasonable $4.95 postpaid, the compilation may be ordered from: EAA FOUNDATION, Box 469, Hales Corner, WI 53130.

Please tell 'em **Model Builder** sent you!

BOSTONIAN COMMENTS

From Dave Gibson, Canton, Ohio: "I was in Boston recently, and every street sign reminded me of Bostonian models. Interestingly, Boston is undergoing a building boom. Hopefully so is the Bostonian concept. It is a great idea at 14 grams. The Hyannis Helio at 7 grams would be very esoteric. Personally, I don't think there is an argument between the 7 gram and 14 gram people. The models are very different and should not be compared. So call them Bostonian West and Bostonian East and let it go at that. OR . . . be Solomon-like and divide Boston in two parts. All Bostonian West models must be named after places on one side of the line and all Bostonian East models must be named after places on the other side of the line. (Absurd)."

ANOTHER CELEBRITY MODEL BUILDER

Mariette Hartley, the actress who with James Garner has made the Polaroid camera commercials so popular, is married to Producer/Director Patrick Boyriven. Among his spare-time avocations is constructing model aircraft, and an issue of the Los Angeles Home Magazine featured a photo of him assembling a large scale amphibian from what appeared to be Cleveland plans.

PITCAIRN MEMORIES

Prompted by our review of the book *Legacy of Wings*, Bill Kee of Idaho, wrote to share this recollection from the 1930s: "The first (Pitcairn Autogiro) PCA-2 was in my town for passenger-hopping. I was honored, along with a buddy, to keep the machine wiped down between hops . . . our old city field being dirt runways and 6 inches deep in dust. We were to get a ride next afternoon, soon as school was out. Well, I nearly boiled the old '26 Chevy covering the five miles and elevation getting out there. 'Where's the Autogiro?' I exclaimed. 'Oh, he left 'bout an hour ago.' A dark day in the local boondocks that was!"

FROM THE MOUTHS OF BABES

Bruce Kennewell, writing from Australia: ". . .my daughter can now recognise and say the word "plane" . . . although it sometimes comes out 'pain.' Which, as every aeromodeller would agree, the hobby can be sometimes!"

HADLAND REPORTS

Butch Hadland sent along the results from the indoor scale Nationals held at Buckinghamshire, with the following comments: "The event was held in an enclosed, roofed shopping precinct approximately 300 x 200 when empty. By some masterpiece of planning and double-booking, a plynth the size of a boxing ring was planted right in the middle of the arena. Surprisingly, despite much disgruntlement, it didn't cause much disruption!"

According to Butch, the MIAMI (Florida club) rules were employed for the Peanut class, while regulations similar to the AMA *gas* scale category were used for open rubber . . . rather unusual to say the least. As to participation, the breakdown was as follows:

Peanut Scale: 28 entered, 20 flew
Rubber Scale: 25 entered, 16 flew
CO_2/electric: 22 entered, 9 flew

A satisfying aspect of the meet was the great variety of entries, with hardly any duplication of types.

Hadland still feels strongly that more universal rules are needed for all classes of free flight scale. His views deserve careful consideration, since he is one of the few enthusiasts who not only builds and wins, but proxy-flies, serves as a judge and Contest Director.

QUOTE FOR THE DAY

"Water-cooling an aeroplane engine makes about as much sense as air-cooling a submarine!" Bruce Leighton, U.S.N., from the remarkable book *The Speed Seekers.* •

GUPPY . . . . . *Continued from page 49*

sides with heavily-thinned dope before the plane is assembled. Paint the engine cylinders flat black, the heads metallic gray and the stacks flat brown.

The steerable tail wheel assembly used on the prototype is simple and light and puts a little detail on the model. Sliver up some bamboo to about 1/32 and 3/64, scrape the corners off and assemble a piece at a time with Ambroid. When finished, go over each joint with epoxy smeared on and smoothed with a sharp stick to reinforce, and paint red. The landing gear struts should have a thin piece of insulation from a length of telephone house-wire or similar stuff slipped on and painted red before the wheels are mounted.

My model, was built as shown on the drawing and covered with condenser tissue lightly air-brushed white with thinned Floquil, flew with .075 Pirelli. Heavier models and flown outdoors will, of course, need more power. Experiment with power and prop pitch for optimum duration. Fly in as large right circles as your site will tolerate. Biplanes flown left with torque tend to spin rather easily.

This is a really simple Peanut and can easily be built lightly for long, low-powered flights. It's so ugly, I think it's attractive, and the negative stagger wings are unusual for the biplane nuts. There is enough stagger so that the lower wing can be mounted at a slightly higher incidence than the upper, for longitudinal stability. The theory is that the forward wing will stall first when set

up this way and the rearward wing, which is still lifting and behind the center of gravity, will pull the tail up and bring the ship out of the stall. •

F/F Scale . . . . *Continued from page 53*

camouflage patterns on her fabric, the resulting colors were modified by the hue of the fabric and the intensity of the dyes diminished toward a greyed version of the intended color. A partial cure was found in a revised treatment of the fabric: the mixed yarn was tubbed and steamed to take much of the color out of the darker materials. The result of the treatment was a partially-bleached fabric which took the dyes much better — but it was slightly weaker than before treatment. Additionally, the coarse nature of the fabric required heavy rollering which crushed most of the fibres and contributed to its weakness. The color of this fabric in its pre-doped state would be Methuen 3B3.

As has been noted previously, sunlight had a deleterious effect on fabric that was not protected from its actinic rays. After the introduction of the printed camouflage patterns in Germany, some of the undersurfaces were still in unprinted material and these were doped and over-varnished with a synthetic medium that produced a yellowish-tan color: about Methuen 4C7.

There is one point to remember about any of the combatants' unpigmented fabrics and their appearance: the dopes and varnishes did not penetrate the fabric to such an extent that they would be impervious to internal strain. Wings, for example, aren't enclosed completely in fabric — they need to breathe and drain. It was necessary that air circulate within the wing to work against the formation of mold promoted by stagnant moisture — and to ease the temperatures and pressures that might burst the fabric. The use of drain eyelets at the trailing edge was used to meet these problems. The eyelets were of soft brass; a two-part artifice that was set into place with a special tool, a fibre washer on each side of the fabric to prevent chafing. The hole through the center of the eyelet was about 1/4 inch (0.6mm). Aircraft with dihedral would have their eyelets placed adjacent to the ribs and outboard of that part. Draining condensation, having gathered dust from within the wing, would stain the fabric's inner face.

The tapes applied over the rib stitching on unpigmented undersurfaces would be slightly darker than the fabric which was next to them. The linen, about 72 threads per inch (72 threads per 25.4mm), was only about the thickness of this sheet of paper — and would allow light to filter through. When the tapes were prepared for application, they were doped securely into place. This act would add to the amount of color modification of the tapes, largely through additional tinting, and slightly through increased opacity. This use of more dope or varnish would darken the tapes sufficiently to take them from Methuen (3-4)(A-B)2 to (3-4)(A-B)3 for British aircraft (and those of French manufacture during the period that they used an equivalent doping scheme). The same degree of change would be seen in German aircraft before they began the use of pigmented dopes on undersurfaces. After the French and Germans began the pigmentation of undersurfaces, the degree of change would be very slight — if at all noticeable.

Repairs, when working on a replica, would be unlikely to encounter the next problem. However, when repairing — or duplicating a repair — in miniature-sized aircraft, take care that the smaller size does not lead you astray — paint the patch, not the whole chord of the wing! When working at smaller scales, it is necessary to think in the scale!

CAMOUFLAGE AND OTHER COLORING

Infantry soldiers are taught that the enemies of concealment are the four S's: Shape, Shine, Silhouette, and Shadow. Err in any one of them and you can reveal your position. Operators of aircraft were well aware that the same rules applied in the air. It is probable that the first camouflage was applied to those aeroplanes that were involved in reconnaisance. The most effective recce work is carried out by those who get in and get out with the information intact — and the enemy does not know that they have accomplished the mission!

The easiest strategem that can be employed to begin a camouflage is to break up the outline: disguise the shape. The main parts of an aeroplane are very regular in outline, consisting of simple rectangles, squares, triangles, and circles. Nowhere in Nature can such regularity be found: as witness, the oft quoted phrase, "Nature abhors a straight line." Hiding the geometric regularity of Man's works needs little more than a brush and a few pots of paint which are of different value. The use of the word "value" has been advanced with some care. Value, in this usage, refers to the apparent lightness or darkness of the

paint (or color) on a scale of greys. The importance of this factor can be seen if one takes a black and white photograph of an object covered in the traditional red and green of Christmas. Although your eyes will see two very distinctly contrasting colors, pan film will probably record them as one value of grey! This phenomenon can be found in so many color combinations that care must be exercised when making color choices. The importance of careful selection becomes apparent when one remembers that distance will "grey" all colors, thus eliminating the hue which may have been the only distinguishing factor. What use to disguise shape with colors that lose their contrast at a distance? Shape must be lost within the background no matter what the distance, that is, if a camouflage scheme is to be successful. But the "value" is only part of the art, the hue (color) must be considered.

Colors which appear to be of, or are related to, the background against which an object is seen will aid in the elimination of another of camouflage's S factors: Silhouette. Avoidance of silhouette is particularly difficult for an aeroplane. Because it moves three-dimensionally, it is apparent to an observer against the backgrounds of sky, earth, and water. Each ground has distinctly different characteristics, respectively: varying brilliance, changing color and texture, visual featurelessness. The best that a camouflager can do is to disguise the machine for the combination in which it most frequently operates: sky and earth or sky and water.

The factors of Shape and Silhouette are related in such a way that colors chosen to break an outline must not lose their effect through distance-greying (their value must be sufficient far apart to remain effective), and those colors must echo the background over which the machine operates so as to never reveal its presence by being silhouetted. Operation over a relatively featureless sea calls for a solution where in the shape and silhouette are lost against the background through the use of muted colors that blend, or by broad shape-breaking patterns that never reveal more than a part of the aircraft at any one time.

Shine can be diminished, though never eliminated. A top coat of a flat color, dope, or varnish will assist but spewing oil from the engine soon smooths the dulled surface and mocks the effort. Weathering dulls the shiniest of surfaces, however,a section of a wing that is dull when viewed from close range will glint like a signal when seen from a distance: the dullness is relative. Distance makes the surface relatively smooth and reflective for it lacks, of necessity, the textural roughness that thoroughly scatters light.

The interrelationship of Shape and Silhouette is also found with Silhouette and Shadow. Imitation of Nature called for light undersurface color. Shadows are less apparent when they fall on a light surface. The French carried the undersurface color up the fuselage side so that the shadow of the horizontal tailplane would fall on its light ground — or so they did in some instances. Unfortunate for the camouflage artist, the opacity of aeroplanes can silhouette them against a bright sky. So difficult is this problem to master that experiments were conducted using transparent materials instead of fabric cover!

Having given some consideration to the factors involved in the art of camouflage, let us look at the efforts taken by some of the combatants of WWI.

British efforts, with few exceptions, seem to have relied on the khakis and greys of their dopes and varnishes. As we have seen, the use of grey was as much due to pigment shortages as could be attributed to anything else. There are photographs of British aircraft with definite camouflage attempts, but all show penchant for shape-disruption rather than true and full camouflage. This tendency is further evidenced by British use of, and experiments with, dazzle painting. Not that dazzle painting is without novel effectiveness — even a photograph of some patterns will cause the eyes to fight for focus! — but it seems that the British did not take up serious efforts with respect to aeroplane camouflage until the "shadow pattern" schemes of WWII. They did employ, however, sound camouflage patterns on the French SPADS and N.27's that they used (and did not overpaint), they being of French origin.

It is the French who explored and employed the basics of what we consider in this day to be camouflage. Their use of aluminum as an overall color must be considered as an "air camouflage" (it certainly provided no invisibility when viewed against the ground), because it was effective at high altitudes and under certain lighting conditions. Whether this was, by the French, a considered form of camouflage is uncertain: it may be that the prime objective was preservation of fabric.

Uppersurface camouflage for French aeroplanes employed two to five colors. Early machines, using the two-color scheme, were dark green (30E3)* and dark earth (6E3)*. (See footnote.) The French camouflage designers used both complementary and analogous color schemes. Some of their disruptive patterns were composed of colors so nearly of the same base that to term them analogous would not be a misnomer: a light green, a darker green, and an olive that was distinctly green. The same might be done with shades and tints of browns. SPADS in particular, employed a five-color scheme which seems to have used sufficient aluminum in four of the colors to make its presence apparent to the eye.

NOTE: some of the Methuen references given within this article have been taken from MAP's SCALE MODELS Extra MODEL COLOR. It is not an indication of confidence level that these have been shown with an asterisk (*) beside them but, merely, recognition that these are the only reference sources given (others have quoted a reference number from more than one source). Because the METHUEN HANDBOOK OF COLOUR has been printed (it is not color chips), the chance that the copy in my hands does not perfectly match another copy elsewhere is a distinct possibility. Ink-lay variations occur in printing processes no matter how carefully the sheets are monitored with reflection-head densitometry. The Methuen book is still the best available at the price.

The Methuen references given for the French five color scheme are as follows: dark green (3F3)*, light green (3E4)*, beige (5D5)* and dark brown (5E3)*. These colors were aluminum filled. The

of a color; its influence would range from: as if nothing, through a greyish-green influence, to a point where the aluminum would become identifiably apparent. The fineness to which the powder was ground could have its own effect on the outcome.

There was a period, just prior to the employment of patterned camouflage, when some aircraft were delivered (SPAD products) in what has been termed "light yellow." Hampered by the use of names for colors, precision evades me at the quote of a reference number. Munsell show this name as a range from (1-4)A(4-5)! The use of "biscuit," "mid-brown," "chartreuse," and so on, rile me. Consider "toast"; each member of my family would pick a different swatch in its identification. Their choices would mean, to me, bread that has been barely wounded: I think of something burnt, a state confirmed by the presence of smoke. Over the years, I have countered a color name given with the question, "Describe Caput Mortuum for me!" (A cruel streak?) It is because of such imprecision that the Munsell, Methuen, and Ostwald designation systems came into being. What is meant by the term "light yellow" when dealing with the overall color of such French aeroplanes as employed it from mid-1916 to 1918 is an unknown. There would be variation. Choose what satisfies your interpretation. Perhaps some reader can provide a definitive answer to the problem. •

Free Flight . . . *Continued from page 59*

remaining color is black. All of these finishes are semi-matt.

Reference should be made to photographs to detemine the pattern for application of these colors. There did not seem to be any particular factory pattern although, it should be noted, the application was done with considerable skill and good judgment. The one criticism that could apply is that there could have been better use of light color in the areas subject to cast shadow — under the upper wing, for one example. That there was an awareness of the need to diminish a shadow can be seen in the use of undersurface color where the tail-plane could cast its shade.

Undersurfaces for French aeroplanes are reported as being aluminum-filled light yellow (4C3) and a silvery-grey (for which there is no Methuen reference given). The aluminum powder of that day did not produce the silvery color of today's product. Older readers will remember its lead-grey aluminum color — and the constant need to stir its heavy particles. (This fact should be bourne in mind when painting a Nieuport 17, for example. The cowling of such aircraft were painted a silver-grey: 30B3*.) It would depend upon the amount of aluminum introduced for modification logically rudder seemed to be the cure. But no. The fault was over elevation plus incidental direction instability. The resulting loop tendency itself was largely the cause of the inconsistent direction of the model's pattern, aided by the varying effect of the wing warp in the changing attitude in the pitching plane during the partial loop. Varying engine speed also had a marked effect on direction, again because of the amount of loop tendency produced, and the varying effect of wing warp at varying speeds. The apparent occasional left turn was really a left roll taking place with the model nearly on its back in the loop.*

Having cured the loop tendency and restored rudder response (though still critical) the model became tamer, but occasionally went completely off pattern, usually in the form of a right hand spiral tendency. Again, the rudder, which could have conceivably been blamed for a sharp right turn, was not to blame. Eventually having decided that trimming could not cure this trouble, and after discussion with Mike Gaster and Vic Jays, I increased the fin area. This took care of the secondary trouble of directional instability. Trimming to a reasonably consistent pattern became possible again, rudder adjustment now producing normal results. But the pattern itself had radically changed from

the Oliver days. The number of turns in spiral had dropped by half and the climb became much steeper and faster.

The need for the increased tailplane incidence was really obvious because of the increased speed of the model with extra power. But the need for a larger fin was not so obvious to me. I suppose, in theory, the fin should become proportionally more effective with speed increase and therefore able to cope, which leads me to believe that another changed factor upsets the applecart. My considered guess is that the increased general buffeting and turbulence all around the model, and particularly the increased corkscrew effect of the slipstream on the front end of the model (especially the pylon), demand more stablizing work from the fin, either in terms of increased area or moment arm.

To summarize: to cope with the extra power and lower all-up weight of a glow-engined bomb, I suggest the following modifications:

1. To cure loop tendency (a) rig the model close to zero-zero and push back the CG accordingly for glide trim. (b) Increase tail moment arm or tailplane area. Either will assist in also moving CG back. (c) Lower pylon height. An incidental benefit of this may be the smaller pylon area offered to the corkscrew effect of slipstream plus the restoration of the frontal side area/CG relationship which was changed by moving the CG rearwards.

2. To restore directional stability: Increase fin unless moment arm has been increased. Both may be necessary.

3. To ensure good power-on/glide transition: Incorporate wing warp and/or use auto rudder.

4. Decrease dihedral. By rigging close to, or on zero-zero, looping is unlikely, therefore turn is less necessary as an anti-loop device as in the old type spiral climb. Because less turning is involved in the new pattern, large dihedral and pylon area are no longer necessary, which does away with their attendant most undesirable by-products.

A steeper, straighter climb is thereby achieved which is less wasteful of distance flown under power, giving increased height. The chief drawback to this pattern is the poor climb/glide transition often produced. Wash-in in the inner panel of the starboard wing (orthodox wing warp on a model which flies right-right) will usually cure this problem, as well as providing a bonus in the form of extra insurance against the loop tendency gremlin on the climb. Wing warp also allows safer use of right rudder to achieve the desired right hand patttern. Of course, an auto-rudder is the most effective method of ensuring a good climb/glide transmission; I advise both wing warp (go easy with it) and auto rudder.

George's experiences parallel my own, particularly when he speaks about the need to increase fin area as the power is increased. I first became aware of this with my first *Ringo* AB ship, which was FAI size and weighed 17 oz. with a hot TD .15. I scaled up the fin area incorrectly and used a fin the size I'd normally use on a 750 sq. in. C ship. The model was outstandingly easy to trim, and it took me six months to notice the too-large rudder. My next experience was to try and trim out the C model with the same size rudder. Power pattern was inconsistent, and it finally spiraled in to the right. I finally came to the conclusion that this was the result of too little fin area, and have been using the larger proportions ever since. There have been hints as to the importance of sufficient fin area for high-powered models in published material for the past 20 years, but many designs are operating with marginal fin area, particularly with today's hotter engines.

So HOW do you determine the proper amount of fin area? Required reading on the subject is Frank Zaic's paper in the 1975 NFFS Symposium, on the development of his X-18 design. Frank found that with high power, this design would show signs of directional instability, which was corrected with an increase in fin area. He concluded that a tendency to right sprial dive was caused by too little fin area; too much area gave a tendency to loop. (A few issues back, Pete Buskell suggested that another sign of too little area was an inability to fly a consistent pattern in windy weather.) So, it would appear that, when trying out a new high-powered design, it would be best to err on the side of too large a fin than too little, then to reduce area by small amounts until instability is noticed. A lot of dihedral makes the amount of fin area less critical, while reducing dihedral effectively makes for a larger fin.

SHOP TIPS: SPRAY CEMENTS

I've alluded to their usefulness before, but I though this month that it would be beneficial to describe the multitude of uses to which you can put a can of spray cement. (Different folks have a variety of preferences as to the exact type to use: Bill and Bob Hunter swear by 3M #77, Wayne Drake and I used Spra-mount, while Ed Hopkins, of the San Valeers, recommends Scotch Photo-

mount. They probably all work equally well, so your choice is likely to be based on availability.)

I first started using spray cements in our kit business, to attach paper patterns to stacks of balsa sheets before sawing parts out to shape. If the cement was allowed to dry for about half a minute, a non-permanent bond formed, which enabled the paper to be easily removed after cutting. Wayne Drake then pointed out to me that the stuff was really handy for attaching sandpaper to a sanding block, and it was.

A note in the San Valeers *Satellite* told how Ed Hopkins used spray cement to hold balsa sheets down to the board while cutting out tapered spars from sheet. I suspect it could also be used to hold a couple of sheets of wood together while cutting out duplicate fuselage sides.

And then there's the Satellite City almost patented idea for building model frameworks without pins. Spray the back side of your plans with cement, let dry a minute, then stick down to your building board. Next, do the same to one side of a sheet of waxed paper, and stick it down on top of the plans. Finally, give the other side of the wax paper (the top one, facing you) a heathly shot of spray cement and let it dry. This will give a nice tacky surface which will hold leading and trailing edges, spars and ribs in place while you glue the framework together. I've tried this system, and it really works! The plans are held flatter than usually results when you tape, pin, or thumb tack them to the board, and the balsa parts (especially the LE and TE) stay put very nicely. To get the finished framework off the waxed paper, slide a hack saw blade between it and the waxed paper. The only disadvantage I can see to this system is that your plans end up slightly sticky and attract all the balsa dust and shavings in your shop to them. *(See the whole thing on Satellite City's video tape. Available to clubs. Contact the Hunters. wcn)*

SCHOOL DAYS REVISITED

You might remember my description of the successful flying experiences my Physical Science class had with the *Twiggy* models at the beginning of the school year. Well, to combat the end-of-school doldrums, I promised the class that if they finished all their class assignments early enough, we'd build some more models at the end of the year. Most of the class took me up on the offer, so they spent the last week of school completing a few of Frank Zaic's X-12 and X-18 designs. Our success rate with these models was even higher than in September . . . every one of them flew and we lost four models in thermals! These are truly the finest beginner's designs I've ever seen. The X-18 is particularly impressive to the kids . . . it climbs like an FAI Power model (about a 10 second run), and really gets high. Building is very simple and straightforward, and the all-sheet construction makes repairs easy. Frank is not producing these kits any longer, which is a shame, but he hopes to get a major kit manufacturer interested in continuing the line. I hope somebody is able to pick up the ball . . . wide availability of these kits would do a lot to insure the future of free flight. *(Readers . . . get after your favorite kit manufacturer! wcn)*

On another note, you might be interested in an account of our annual Physics Olympics competition among Portland-area high schools. One of the events featured (along with a quiz show, musical coke bottles, a slow bicycle race, and water balloon launching) is a paper airplane event. Last year, we didn't do well in the event (a blow to my ego), but this year, we had the technology and turned this into a rout. John Cooney did a little research beforehand, and started trying to make a paper airplane out of his dad's condenser paper. He noticed how long it took a scrap of the stuff to fall to the ground, and came up with his revolutionary design: a 1 inch x 2 inch rectangle of condenser paper. Launch technique was to place in the palm of

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RET has 'um! The Trail Blazers — full size 3 views — and others: Those Flying Aces models that are classics. SASE for list. RET Plan Service, P.O. Box 7893, Midfield, AL 35228.

OLDTIMER MODELS — Everything for the rubber modeler. Over 300 plans, balsa, tissue, condenser paper, absolite film, rubber and lots more. Send $1 for 9 page catalog, refundable with first order. P.O. Box 913, Westminster, CA 92683.

WANTED — OLD MODEL ignition engines, cars, etc. Paying top dollar. Bill Simpson, 7413 Via Lorado, Rancho Palos Verdes, CA 90274 (213) 377-3532.

WANTED: A.J. Interceptor, Hornet, and small hand launch Interceptors; originals or replicas, top price. L.J.B., P.O. Box 997, Ocala, FL 32678.

KITS CUT from full size plans. Send $2.50 for catalog. Repli-Kit, P.O. Box 2066, Inverness, FL 32650.

LIGHTWEIGHT FIBERGLASS CLOTH — Good for repair, parachutes, etc. 10 sq. ft. sample. $3.00. Send to Hobby Cloth, 1121 Randolph, Thomasville, NC 27360.

CLEVELAND'S 1400 AUTHENTIC, prototype practice scale flying model plans. 1/32-1/4 size. Pictorial catalog including prices $1.50. Price list alone 60¢ or SASE and 25¢. Cleveland Models, 10307M1 Detroit, Cleveland, OH 44102.

HELP!!! New mfg. needs supplier/technical and purchasing advise on pre-printed and pre-cut balsa and foam. Also balsa/foam laminates for small 12" to 18" wingspan hand thrown and catapult gliders. Marathon Mkting, P.O. Box 997, Ocala, FL 32678.

GOLDWING canard pusher p-nut ultralight, 2-minute flights; plans $1.00, SASE for list. David Aronstein, 50 Pasture Lane, Poughkeepsie, NY 12603.

the hand, and blow upwards against it, so it fluttered to the ground. From shoulder height, flights of over 8 seconds could be consistently attained, which is about double the duration of a typical folded paper airplane. He equipped our whole team with this design, and our success in the first round with them brought about a chorus of boos, hisses and protests from the less creative schools. Since the event rules didn't define what was meant by the term "paper airplane", our victory stood. By the second round, we noticed some other schools ripping their planes to shreds and trying to fly the scraps in the same manner, but writing paper had too high a wing loading. One chap even burned his airplane, then tried to fly the ashes, but blew it apart on launch.

The moral to this is that any set of competition rules has loopholes, and it only takes one model builder to find and exploit them. •

Workbench. *Continued from page 6*

done, it cannot be undone.

"Now the good news. I've recently discovered as perfect a preventive solution to this very real, very ugly problem as is presently likely to exist: an earplug vent/valve which converts extremely dangerous amounts of sound energy into small, harmless amounts of heat energy!

"Because these earplugs must be custom fitted, this is not a sales message as such for our offices . . . though we will be happy to fit these devices on individuals who can make it to our Cheyenne, Laramie, or Casper offices. But for those who don't wish to make a trip to Wyoming for a set of earplugs, most any hearing aid specialist's office can handle it . . . you'll find them in the yellow pages.

"With the custom-fitted version of the earplugs . . . which is what I recommend . . . one can hear normal conversation with less than 2 dB attenuation while having noise protection attenuation of up to 60 dB.

"In shirtsleeve English, this means that you can have **complete** *protection from the noise of the nastiest ripping, snarling .40 pylon or boat engine, while experiencing* **no** *loss of normal conversational understanding.*

"I emphasize that these devices are much more effective than "mouse ears" (because they always fit, are comfortable over long periods of wear, have greater

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.

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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.

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EAA type R/C sport biplane, mostly spruce, for 60 engines. By Bill Northrop.

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A 3/4" scale model from 1934 Ideal kit. Excellent plans for F/F rubber, R/C, etc.

No. 1723 WHITE TRASH $4.00
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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.

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Semi-scale twin rotor R/C autogyro for .35 engines. Very stable. By Skip Ruff.

No. 9792 CRICKET $3.00
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Rubber stick winner '40 Nats. Span 4½'. Still good in Unlim. By Phil Bernhardt.

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R/C tunnel-hull outboard constructed of plywood, for K&B .21. By Jerry Dunlap.

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Complete plans (3 sheets) for R/C tug. All wood, 37" LOA. By Francis Smith.

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Two inch full scale Classic R/C biplane. Proven flier. 60 power. By Bill Northrop.

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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.

noise attenuation, and need not be removed for conversation) **and** *they will likely save you the eventual purchase of hearing aids.*

"The earplugs themselves are called "Noise Braker" and are custom made for hearing aid specialists by Hocks Laboratories, P.O. Box 14400, Portland, OR 97214.

"Our offices sell these earplugs for $37.50, which includes all costs except local tax, though price may vary by dispenser.

"The slight inconvenience involved in sitting while a hearing aid specialist takes ear impressions of both ears is certainly worth it from the standpoint of saving your hearing. And if you need a further incentive to purchase this very effective, very inexpensive protection, the hearing aids that you will eventually need if you **don't** *protect your ears sell for $450-$795* **per ear.**

"Hearing aids are marvelous little devices. I and most specialists perform daily miracles in fitting them . . . but you will never hear as well with an aid as if you'd protected your natural hearing.

"And note this: **even if you already have a hearing loss sufficient to warrant use of a hearing aid, the damage to your hearing continues if you don't protect what you have left.**

"That's my soapbox for this year, Bill. Thanks for any exposure you can give my preaching.

Sincerely,
Ed Turner"

THORNBURG AT EASE

You won't find Dave Thornburg's *"Thornburg at Large"* in this issue, and probably won't for a few issues hence. Dave is taking what we hope is only a short leave of absence, and he promises to come back. Right now, he's working hard to complete the construction of his home, most of which he is doing himself (says he's not using much balsa or cyanoacrylate on the job).

FORREY REPLACES FOGEL

Depending on your preference of sequence, you may or may not yet have read this month's *R/C Soaring* column. When you do, you will find that Larry Fogel is bidding farewell. Having taken on additional work to the presidency of his own company, Decision Science, he will no longer have the time to accumulate material and produce his monthly soaring column.

Reporting for duty in Larry's Place is Bill Forrey, who provided the fine text and photos for the Two Meter World Cup story in our June, '82 issue. Bill has much experience as a club newsletter editor, is an excellent photographer, and knows his way around the R/C soaring arena, having placed second in the above-mentioned contest. His first regular monthly column will begin with the October issue.

Welcome aboard!

HOT STUFF DUZ IT AGAIN!

You just never know all the possibilities for the use of cyanoacrylates. Just assume that anything's worth a try, and you may be in for a pleasant surprise.

Last weekend, I was installing a set of Malibu garden lights on our back patio. These are the low-voltage (12 V.D.C.) lights that operate off of an outside transformer that usually includes an on-off clock timer. A heavy exterior grade, two-wire cable is screwed to contacts in the transformer box and then strung out through the garden or whatever. At selected spots, a 12-volt sealed beam lamp, over which your choice of colored lenses are attached, is clamped onto the cable, making spiked contact with the insulated wire inside, to light the lamps. We wanted to put three lights in each of two planting areas which happen to be on either side of an 8-foot sliding glass door opening to the patio.

Great . . . the cable has to go across the 8-foot opening to get from one planter to the other! Aha . . . enter Hot Stuff. After stringing out the cable and clamping on the lights, I tucked the cable, about 1/8x3/8 in size, tightly up against the aluminum threshold, which is about 3/16 higher than the terrazzo patio step, and went along it with regular Hot Stuff. Voila! The cable is solidly stuck down to the aluminum and the terrazzo, looking for all the world like a strip of insulation. It won't come loose to trip anyone, unless it is deliberately pried away with a knife or screwdriver. Dumb luck and modern materials wins another one!

VOTE FOR MARY

Politics and modeling don't ordinarily mix too well, but there's always an exception. Phil McCary, who builds some of the neatest and best flying old timer rubber ships you just about ever saw, sent us one of those mailing pieces we're all pretty familiar with when election time comes around. It contains all of the normal appeals for your support, but then Phil added something to the bottom of the letter in his own handwriting that prompted us to bring the matter to your attention.

"Dear Bill,

When elected to Congress, Mary (Gojack) will attempt to have federal land dedicated in perpetuity to all forms of modeling activity. Mary Gojack needs the support of all modelers.

Best,
Phil McCary"

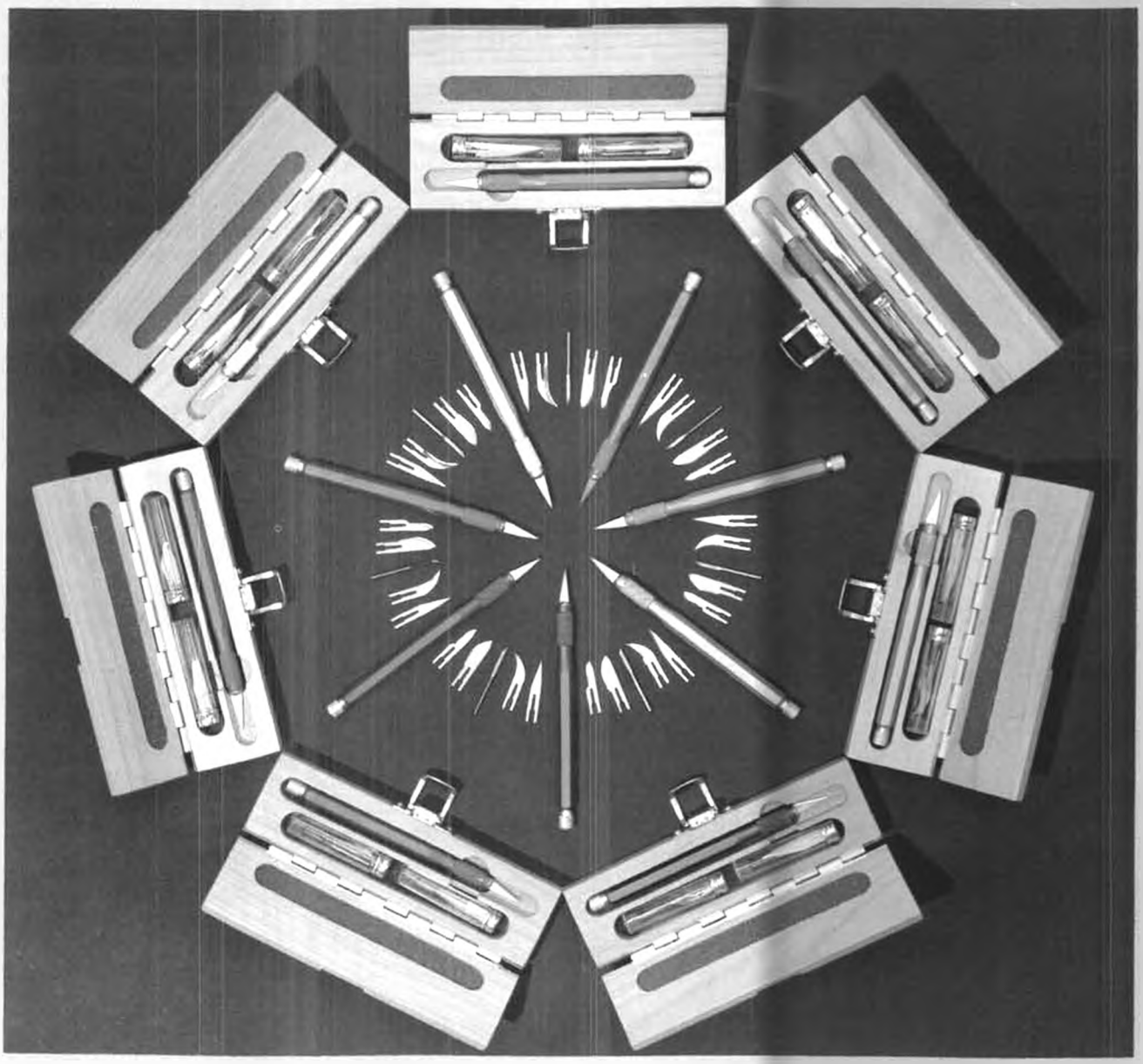
Well, that's good enough for us. OK, Nevada modelers, spread the word to your voting friends and neighbors, and get Mary Gojack into the U.S. Congress! (Equal space offered to any other political figures who have something to offer the modeling fraternity).

IFMAR INTERNATS

The IFMAR (pronounced IF-MAR) or International Federation of Model Auto Racing is finalizing its plans for the first Electric World Championship for R/C cars, August 13 through 21, 1982, at the Grand Hotel, next to Disneyland, Anaheim, California.

Of the 120 contestants, 42 will come from Europe, 35 from Japan, and 43 from various parts of the United States and Canada. Official breakdown is as follows: England, 10; Italy, 6; Switzerland,

IN THE BEST CIRCLES, IT'S **über skiver**



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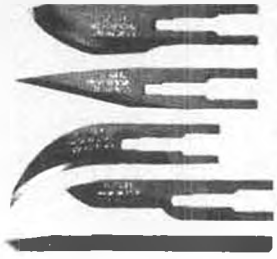

Available in seven satin anodized handle colors: silver, blue, red, green, gold, copper, violet. Complete set in fitted hardwood case; includes uber Skiver, together with two vials containing four No. 11, and one each of Nos. 10, 12, 15, and 20 . . . . . $14.95
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Vial of 6 blades (No. 10, 11, or 15) $2.10
(No. 12 or 20) $3.30

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4; Germany, 6; France, 5; Denmark, 4; Holland, 1; Sweden, 2; Austria, 3; Norway, 2; South Africa, 2; New Zealand, 7; Austrailia, 8; Japan, 20; Canada, 1; and the rest from the USA (Oh, well . . . its close to 120!) Kraft Systems and Sanyo are major sponsors.

The 370-foot track, with 11 turns and a 100-foot straightaway will be located in the Grand Hotel parking lot, along with spectator facilities and a 100x200 foot circus tent for the pit area. Friday, August 13, through Monday, August 16 will be for practice and registration. Qualifying heats will begin on Tuesday, August 17, and the finals will take place on Saturday afternoon, the 21st of August.

REBUTTAL

"Dear Bill,

"I read with some interest your column in the June issue that contained a reprint of Ray Cummings column concerning the need to support your neighborhood hobby shop as opposed to buying from the discount houses, supermarkets, etc. I generally agree with what was, has been, and will be said about buying from the local hobby shop. There is another side to this coin that I've never seen printed in Model Builder or anywhere else. Cost is not always the reason for mail orders to Hobby Lobby or any of the other discount houses.

"I prefer to buy from a (my) hobby dealer, but what am I to do, when he says, 'I can't get it,' 'my distributor doesn't carry it,' 'I don't buy from the distributor that handles that because I don't like him,' or 'that product isn't any good anyway.' I have had each of those answers on many occasions, when I've asked for specific items he doesn't have in stock. One specific item is Grish props . . . the nylon type (which I feel are better than the Top Flite that he carries) and more recently the large quarter-scale wood props that Grish makes. I have had answers one, two, and three from him on Grish props. When I became interested in a large gasoline engine for giant scale a couple of years ago, he used each of the above four answers when Quadras were generally available. One of my other favorite hobby dealers said, 'I'm not handling any of that quarter-scale crap.' I bought an Evra from Hobby Lobby because I could get one and it was reasonably priced.

"I realize (perhaps not the order of magnitude) that a lot of inventory is expensive and it is difficult to have any inkling of what a fickle modeler wants or will buy. However, I believe that part of the reason for turning to mail order is out of necessity as much as trying to save a buck. Also, I believe that a part of the expansion of the discount houses is because modelers can get what they want within a few days by United Parcel. Some hobby shops have switched to arts and crafts because there is more profit in it, and I suppose a faster turnover of stock.

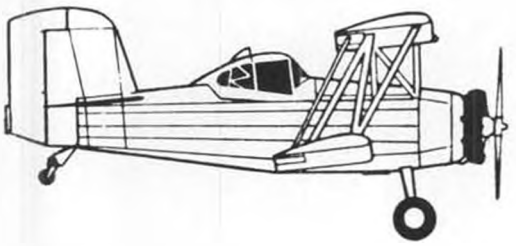
"The shop where I buy most of my stuff finally got a K&S metals display and complained about how much the damned thing cost. He had been referring people to a hardware store that has had such a display for several years. This same fellow said he was going to handle a complete line of quarter-scale stuff, but now he's stocking helicopters and pushing those.

"I guess I could go on ad infinitem ad nauseam, but I hope I've made a point. The hobby dealers share responsibility for their decline in sales, I believe. how many hobby shops are there any more that try to attract the youngsters? Most of the stock is the expensive stuff for R/C.

"Incidentally, I bought some spruce and other items from Aircraft Spruce and Specialty Co. as advertised in Model Builder. It is better in quality and cheaper in cost than that my hobby dealer sells. They also have some interesting prices on aircraft dope.

Sincerely yours,
Bob Chanslor
Peculiar, Missouri"

Good points, Bob, and I'm sure we'll hear from some dealers on the subject. There's still the problem of the nickel and dime stuff (just an expression . . . **nothing** is a nickel or dime anymore!) that you depend on your local dealer to supply. Is it practical, from a time and convenience point of view, to buy this stuff by mail-order, discount or otherwise? •



BIPLANE CONTEST

HOSTED BY: R C BEES INC. OF SOUTHERN CALIF & MODEL BUILDER MAGAZINE

******

IMAC RULES FOR: SPORTSMAN--ADVANCED--UNLIMITED. AMA RULES FOR STAND-OFF SCALE(BIPLANE). AMA SANCTIONED; AMA AND FCC LICENSE REQUIRED. USPJA JUDGES...QUADRA ENGINE RAFFLE...FOOD STAND...PILOTS PACKAGE...PLAQUES TO FIFTH PLACE ALL EVENTS. REGISTRATION; 8:00AM, FLYING; 9:00AM. MAX ENGINE; 4.4 CID, MAX WEIGHT; 44 lbs. ENTRY FEE; $15-PRE-REGISTRATION, $20-AT SITE, $7-SECOND EVENT.

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CD: FRED BROWNS, 8037 CYCLAMEN WAY, BUENA PARK, CA. TEL. 714-522-1931
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T-34B Mentor
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MiG-15 (ducted fan)
1/6 scale


F-33A Beechcraft
1/6 scale


Pitts Special
1/3 scale


T-34C Mentor
1/6 scale


Mirage (ducted fan)
1/7 scale


P-51 Mustang
1/5 scale


A-36 Beech
1/6 scale


A-4 Skyhawk (ducted fan)
1/7 scale


F-16 (ducted fan)
1/8 scale


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1/6 scale


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Avail. in D & H
models (ducted fan)
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General information about these new product releases found in catalog.

NEW for '82


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AFTER 5 YEARS OF RUNNING THERE WAS BARELY A TRACE OF WEAR.

We gave it 5 years of wear in 11 grueling days . . . No backfires, breakdowns or loss of power . . . no problems at all! Once again, Enya proves that in performance and reliability, they're second to none.

The test . . . We took a brand new .40 4-cycle right off the shelf for this endurance experiment; a totally stock engine with no modifications at all. First we miked all internal parts. After bolting it down, we cranked it up – for 124 tortuous hours! We kept it running at 7,000 r.p.m.'s, and regularly went from idle to 10,000 r.p.m.'s to constantly make sure it was tested at all power ranges. In short, we gave it every opportunity to break, but it didn't!

The results . . . After 124 hours, it was still running strong – no sputtering, backfiring or missing. And all the time we ran, not once did we have to make any adjustments on the valves. So we decided to break it down and take a look inside. As expected, the engine maintained its off-the-shelf appearance with no evidence of oil or compression leaks, wear rings or grooves. The engineers were amazed at the lack of heat or burn marks. There was hardly a touch of wear. But it was only when we tested the major parts and assemblies for wear that we could measure the true success of our experiment. Miking to ten-thousandths of an inch, this chart reveals how well our engine stood up to this grueling test:

	Before	After	
Bore	.8770	8770	no change
Stroke	.6725	6725	no change
Piston Dia.	.8750	.8750	no change
Wrist Pin	.1965	.1960	
Rod Bushing Dia. At Wrist Pin	.1975	.1975	no change
Rod Bushing Dia. At Crank Pin	.2172	.2178	
Valve Lifters	.197	.197	no change

This strength is the direct result of experience in selecting materials with the ideal finish, tensile strength and exact temperature coefficients . . . and then honing them to precise tolerance levels. And it's the same precision that we put into each and every Enya product. So if you buy any Enya engine, from our .09 to our monster .60XL, you'll get the same reliable performance time-after-time, year-after-year. Enya . . . buy it with confidence and wear it well.

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