

# MODEL BUILDER



WORLD'S MOST COMPLETE MODEL AIRCRAFT PUBLICATION

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## REVIEWS:

**Sig's Seniorita**

**Byron's Glasair**

**Goldberg's Super Chipmunk**



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COVER: Miss Margaret Halls, of Peterborough, Ontario, holds Alex McLeod's reduced-size version of Bill Northrop's famous Big John biplane. Alex' Little John is an outstanding performer with a .48-size engine. The scene is Little Lake, Petersborough, Ontario, near Alex' home. For a construction article with full-size plan available for the Little John, see page 12 of this issue.

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Anita Northrop

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**MANAGING EDITOR**  
Richard Dowdy

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**DRAWINGS BY**  
Al Novotnik

**ACCOUNTING MANAGER**  
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### ADVERTISING

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Corporate Office  
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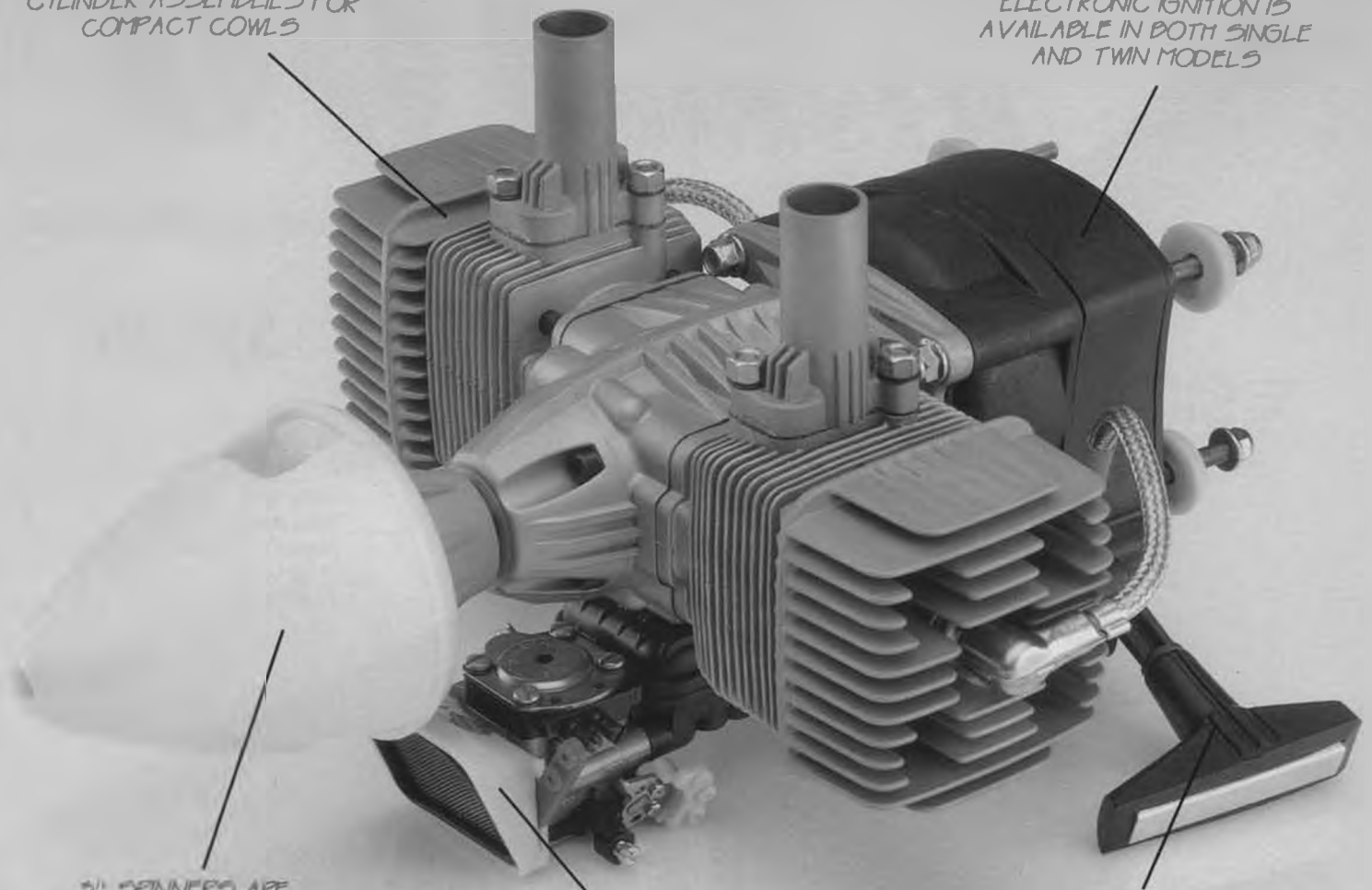
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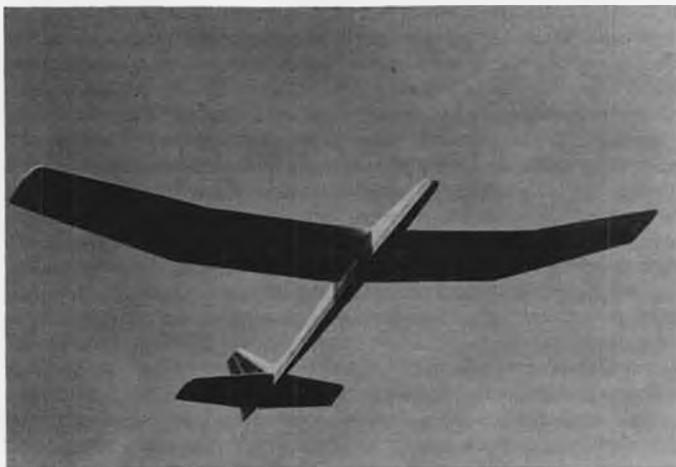
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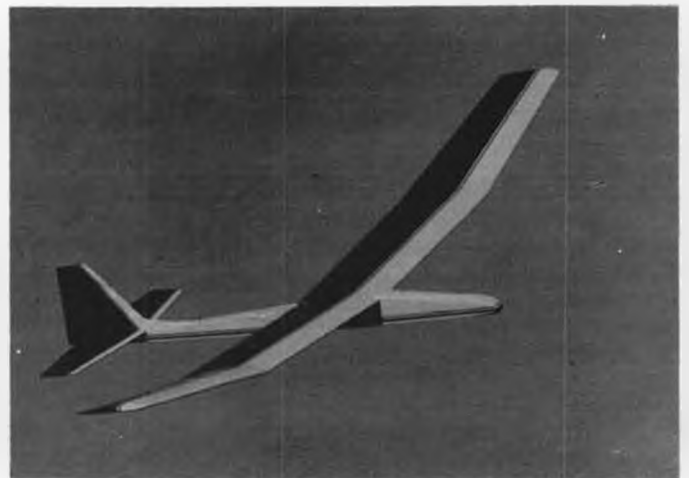
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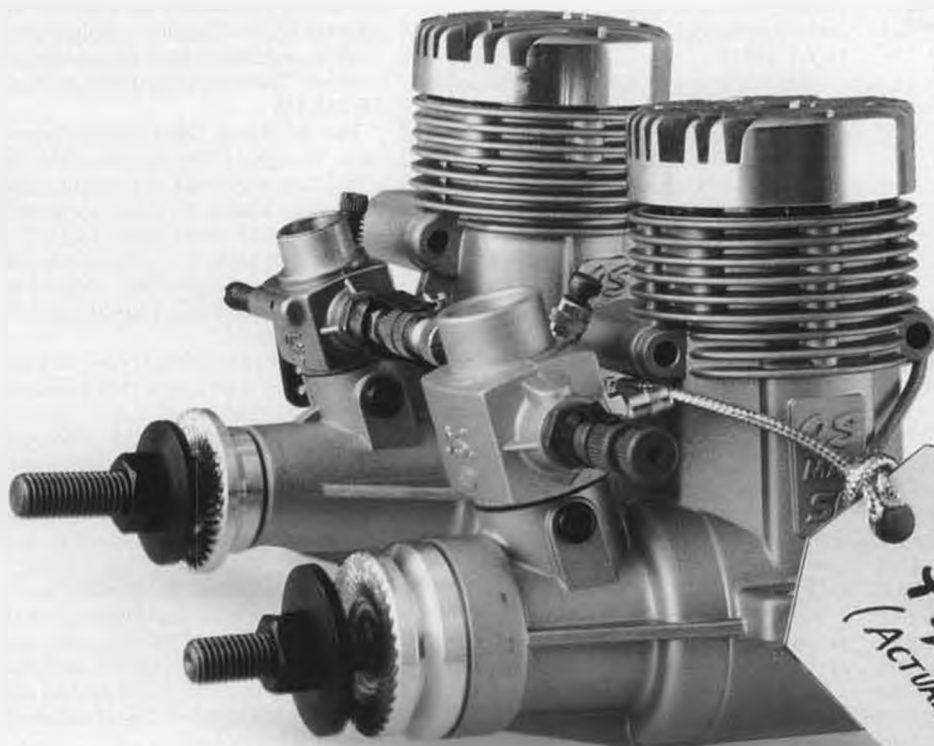
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## from Bill Northrop's workbench

• They say a lot of California folks are making unscheduled "business trips" or visiting with seldom-seen out-of-state relatives during the month of May (when this is being word processed). Apparently they're taking serious a prediction that we're going to have a real shaker here before the month is out. People have been picking on California for a long time, but this guy, Nostradamus, really had a head start, as he made the prediction over 300 years ago, not long after Columbus took a cruise on the Santa Maria Princess. Back then, the only source of smog in Southern California was from Indian campfires... but it was here!

As for ourselves, shake or no shake, it was nice to return home after two intense weeks of preparation, presiding over, and cleaning up loose ends of the premier IMS Atlanta Model Sport and Hobby Show. Note we've added the word "sport." Let's face it, there are folks who enjoy operating radio con-

trolled models but could care less about the hobby of building same. That's fine. How many golfers and tennis hackers build their own clubs and rackets? And all the better chance they will discover the great satisfaction of creating their own models if they can first of all enjoy the finished result.

Anyway... the first show in Atlanta came off with only a few hitches, but a great many satisfied exhibitors and spectators. We'll have pictures and stories in this and the next one or two issues to tell you all about it. Indications are that the show will grow rapidly in the next few years. The huge and attractive Georgia World Congress Center will never hinder its growth, that's for sure!  
**HOW SAFE?**

The article in our April '88 issue on the R.E.A.L. Fail Safe System R.E.A.L.ly fooled quite a few people. Those who were sucked in by Eloy's article about the "heli-spheres" in the April '85 issue, may have been on their guard, but we still managed to fool some of our readers.

Unfortunately, in our attempt to NOT give it away, we probably didn't put a big enough "APRIL FOOL" on page 107, where an ad was supposed to appear... according to the index. We were concerned that those who thumb through from back-to-front while checking the contents might catch on before reading the article. As it was, some folks made long distance calls (hopefully on company phones) to find out "what happened to the ad." One caller R.E.A.L.ly didn't like getting his leg pulled! We didn't give him Eloy's phone number or address.

### HEY KID

We're continuing to receive a lot of very positive mail regarding the "Hey Kid" series on the elementary basics of model building by Bill Warner. The following letter from Duane Nelson, of Fair Oaks, California, kinda sums it up:

*I just want to tell you how much I enjoy Bill Warner's series of articles called "Hey Kid..." Though I'm not a kid anymore, and I fly R/C, I still enjoy all aspects of model airplane building and flying. I have read all of Bill Warner's articles and have ordered kits, etc. from Peck, as recommended by Warner's articles. I have learned lots of new things from Warner, and I feel like a kid who has discovered a new, wonderful thing. I'm*

*going to be out there flying everything that Warner says to build and fly. Why? Because Warner tells you all you need to know, and that makes success, and THAT makes for FUN!*

*So please keep Bill Warner writing articles in Model Builder no matter what you have to do to entice him!*

Very well said, Duane. As for the last sentence, we're doing our best. We keep him locked up in a padded (with balsawood) cell and spray it daily with Eau de Nitrate Dope. He's only allowed out to visit his family when he shoves another article under the door. Incidentally, we think the skillful art work by Jim Kaman complements Bill's work to perfection. Both the photos and the sketches 'make' the complete package.

### TR-260 FIX

The following letter comes from Don Hirst, designer of the quarter-scale TR-260, which was presented as a construction project in our March '88 issue. Incidentally, it was designed for the Quadra Q-35, Q-40, or the Zenoah G38. The now-corrected plan listing only specified "40" instead of "Q-40," which obviously caused some confusion. Don says:

*Please be advised that I have just recently experienced a structural problem with one of the two prototypes built. The problem was stress cracks in the side and top of the fuselage near the tail. Since this could lead to the stab pulling loose and resultant loss of elevator control, the following notation should be added to the plans (It is done! wcn).*

*"When building the fuselage sides, the 1/8-inch lite-ply tail section doubler should be made full width of the sides and run from tail-post to bulkhead K-1. Bulkhead L-1 will need to be reduced 1/4 inch in width to allow for the doubler." This notation should correct the problem.*

We hope anyone building the TR-260 sees this, as a lot of the plans have been sold. Let's hope our builders pay more attention to this warning than some airlines do to structural weakness warnings from the FAA!

### MORE FROM THE MAILBAG

Owen Drumgool, 304 N. Los Carneros Rd., Goleta, California 93117, is trying to track down info on the Northrop NP-3B. He



A portion of the 89,000 sq. ft. Georgia World Congress Center Hall D, with the first IMS Atlanta Model Sport and Hobby Show in session. Giant 32x48 foot boat pond prompted several impromptu races.



Portion of Black Sheep Squadron from Burbank, CA, headed by Tony and Addie Naccarato, were brought to Atlanta by IMS to put on flight demos. Local famous modeler George Perryman (4th from right), and R/C blimp designer/flyer Tony Avak (6th from left, also helped out.



says the original was raised from a river in Iceland where it lay for about 30 years. The aircraft was taken to Northrop Corp., restored, and is flying. It is a single foat plane. Anyone have a clue out there? We'd kinda like to know about it, too.

\* \* \*  
Boleslaw Sobanski, ul. Laczna 36, 43-262 Radostowice, Poland, is a collector of plastic aeroplane kits, and would like to correspond and exchange unusual Polish and Russian Airforce aircraft, jets, helicopters, and glider kits in 1/72 scale for: aircraft kits in 1/72, 1/48, 1/32, and 1/24 scale.

\* \* \*  
Al Casper wrote from Hamilton, Ontario, Canada, to give his answer (correct but too late) to the April Mystery Model. He added the following note of interest:

*Incidentally, I especially enjoyed the "Simply Scale" article on the Piper J3 Cub. I don't think it is too well known that we built J3's here in Hamilton during the 1940's and in 1946 production reached one a day, but eventually a fire destroyed the paint shop and this, plus a drop in post-war sales later on, did them in.*

#### THINGS TO DO

Indy R/C Sales is once again sponsoring the Hamilton R/C Modelers (Indy Northside R/C Modelers) Four-Cycle Ralleye, on Saturday, September 10, 1988. Contest



Show floor from another angle, showing flight demo area in center, with carpeted 60x110 foot car track in background. Charging 1/4-scale gas cars always drew a crowd.

directors are Larry Snedeker, 10274 Briarcreek Dr., Carmel, Indiana 46032, (317) 844-1562 (H) or (317) 872-3200 (W), and Steve Percifield, 156 Wellington Parkway, Noblesville, Indiana 46060, (317) 846-5725 (H) or (317) 545-4221 (W). Indy R/C will contribute radios, engines, kits, and accessories for the winners.

All models entered are scale and to be

powered by four-cycle engines. There is AMA Sport Scale with AMA judging for the scale entries. Three separate events will be on a fun-fly basis, with prizes handled in a lottery. Each entry earns a lottery ticket, and each flight of each entry earns a lottery ticket. Bring lottsas planes, make lottsas flights, and win lottsas prizes! Contact the above listed CD's for more information. •

Dear Jake:

*Thanks for the photos and plans of that stealth peanut. I built one over the winter. It flew great, near as I could tell. At least I didn't hear it crash or anything like that. 'Course, I lost it on that first and only flight. I've been doing a lot of walking around downwind from where I launched it, but I haven't stepped on anything yet. Well, I take that back. There's a Saint Bernard that lives down there, and I did step in something, but it wasn't my stealth peanut.*

*Anything new on the stealth horizon? I'm looking forward to starting a new project.*

*Clandestine Operator in Escondido*  
Dear Operator:

The government is working on a new concept for transportation and launch of the MX missile. It's called the stealth train. Lockheed and the Baltimore and Ohio Line are rumored to be the prime contractors. In tests so far, the new train has demonstrated extremely low sound and vibration levels due to advancements in engine exhaust collectors and mufflers and in pneumatic-driven acoustic dampers. Radar cross section has been reduced by computer-mapped streamlining and by the use of absorptive materials. In addition, an active laser-based masking system is actually succeeding in reducing the visibility of the train. Pentagon sources indicate that the only technical challenge still facing the stealth train is to find a way to cut down on a number of hobos and automobiles being run over.

Jake

\* \* \*  
Dear Jake:

*The helicopter guys in our club have been trying to convince the rest of us that*



#### ADVICE FOR THE PROPWORN

—By Jake

*ball links are the only way to go. They claim that ball links eliminate slop, work at any angle, never break, and therefore are the only logical choice for any linkage system. Are they really all that great?*

*Clevis User in Connecticut*

Dear Clevis User:

Yes, they are. In fact, if you're trying to attach a heavy spherical weight to a prisoner's ankle, ball links are the only thing that will do the job.

Jake

\* \* \*  
Dear Jake:

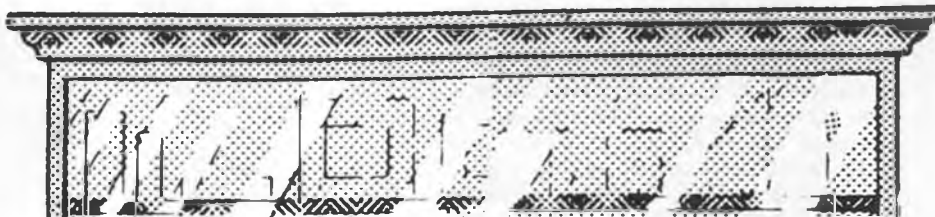
*I've been trying to read an article on aircraft stability augmentation systems (SAS), but I've become hopelessly confused. The*

*author was trying to explain the various control loops associated with an SAS. First, he talked about a pitch loop. That didn't bother me, because a pitch loop I can understand; you pull back on the pitch stick, and the airplane does a loop. But then he mentioned a yaw loop. Now that sounded pretty weird, but I heard that somebody did a knife-edge loop at the last Tournament of Champions in Las Vegas. To do one of those you must have to use the rudder, so I guess a yaw loop is possible. Finally, the guy said something about a roll loop, and that's where he totally lost me. Ailerons make a plane roll, not loop. I can't think of any way*

*Continued on page 106*

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



• Read any good books lately? If not, here are a few to tempt you: Doug Pratt's *Selecting R/C Systems and Components* is a good guide to finding the right equipment to complement your desires in modeling radio controlled planes, boats, and cars. Each radio system featured has a numbered rating to help you make a wise choice. This 120-page paperback is available from Zenith Aviation Books, as is *How to Choose R/C Ready-To-Fly-Airplane Kits*, by Pratt and Chip Smith. Here's a book that gives you insight into the products of 12 different ARF manufacturers. Each chapter has subjective comments on the models covered, concisely and clearly, to help you determine what plane is right for you. Lots of photographs enhance the text, making this a valuable book for one looking to get into ready-to-fly aircraft.

On a different subject, *Vietnam MiG Killers: Deadly Duo Over Vietnam*, by Robert Door, chronicles the exploits of the planes and pilots who did battle in the skies over Vietnam with the NVA. Planes featured include Phantoms, Crusaders, Thunderchiefs, and others that met the MiGs head-on in combat during the Vietnam war. There are 80 color photos, and 128 pages in this hardbound book from Zenith Aviation. To order these and more great aviation and modeling books, write to Zenith Aviation Books, Box 1MB, Osceola, Wisconsin 54020.

\* \* \*



New scale cockpit detail kits now available from J'Tec.

J-Tec, 164 School St., Daly City, California 94014, has come out with some great-looking scale instrument kits in 1/3-to 1/12-scale kits for WWI, WWII, Golden Age, general aviation, jets, cars and boats. Almost any true-to-life instrument panel can be made. Twenty instrument bezels with clear plastic faces are included. Detailed

instructions show various ways for making all types of instruments. You can find these exquisite kits at your J'Tec dealer, or by writing to John Tatone direct at the above address.

\* \* \*

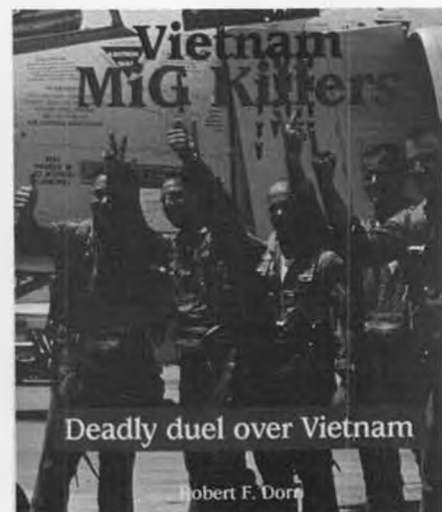
Altech Marketing, Box 286, Fords, New Jersey 08863, has introduced two new Enya high-power engines, the GP60XF-4, and the GP60XF-4H. The GP stands for gear pump, meaning the .60 cubic inch engines use a metal gear-driven fuel pump that is easy to



Handy guide to radio systems from Zenith.



How to find the right ARF kit from Zenith.



Vietnam MiG Killers from Zenith Aviation.



PT-19 plans from Wendell Hostetler.



New Hammer 40 R/C from Davey Systems.



Enya 60XF-4 engine now available.



New Enya 60XF-4H for choppers.

hook up. This system produces more horsepower and greater reliability. The carburetor has been modified for use with the gear pump, and Enya continues to use the AAC system for superior output and durability. The GP60XF-4 is intended for aerobatic fixed-wing aircraft, and the GP60XF-4H is intended for advanced helicopter use, and is the first Enya 60 engine to use a heat sink head because of its higher output level. See your dealer, or contact Altech for more information.

\* \* \*

Wendell Hostetler's Plans announces the release of their latest design, the Fairchild PT-19. This model spans 9 feet, 6 inches, weighs 24 pounds, with a wing area of 1965 square inches. The detailed plans feature traditional box construction with balsa, basswood, and ply. The model includes a

three-piece wing and removable tail for ease of transportation. The plans come on two 42x96-inch sheets, and are available from Wendell Hostetler, 1041 Heatherwood Lane, Orrville, Ohio 44667.

\* \* \*

Davey Systems Corporation has begun shipping their latest pattern ship, designed by Dick Sarpolus. The Hammer 40 is a smooth and fast model with a wide flight envelope, a generous side area, symmetrical tapered wing and comes with accurate die and machine cut balsa, maple and plywood, preformed wire parts, precut sheet sides and tail, detailed instructions, and hardware. The span is 60 inches, and the recommended engine is either a 35-40 2-



Complete rocket starter kit from MRC.

Continued on page 106



A winder for free flight fliers.



Impulse II radio system from Great Planes.

# BIG BIRDS

By AL ALMAN



• Well, I had a chance to put GKD's Electronic R/A unit in the air. It went into my lavender-colored, 120-powered Ace 4-120 and interfaced with the on-board C.H. Electronics ignition; and, although weather and time didn't permit more than about 40 minutes of flight time, the module worked just as well in the air as it did on the test stand.

The instructions George Paris includes with the unit are simple and easy to follow, and that includes the formula for finding magnet spacing (you do add a second magnet). I followed George's advice and anchored the pickup wheel with silicone rubber after disconnecting the mechanical retard/advance coupling I'd been using. There may be other ways to secure the wheel, but using silicone is simple, easy, and effective.

As far as I could tell, the engine performed equally well with the ER/A. This electronic module does its job automatically, and the current drain (5ma) is almost nil. Since this unit doesn't advance till engine rpm is 3000 (plus or minus 10 percent), you always start safely with the ignition retarded, which is about four degrees.

## BATTERY MIXER

Here's another goodie from GKD: it's

their version of a battery backup system.

Now this one is different from other dual battery systems mainly because it's so simple and so inexpensive. Y'see, the tab for this one is well under ten bucks!

And what do you get for this paltry sum? Well, it ain't much. Two little (1/4 x 1 inch) printed circuit boards with two diodes already mounted on each board, two pieces of 1/4 x 1-1/4-inch heat-shrink, a 4-inch piece of solder and easy-to-understand instructions; but it is enough to do the job efficiently and effectively.

The instruction sheet does state right off that this product is for use with five-cell battery packs and is *not* to be used with Kraft radios. Now, I do know that five-cell packs are stipulated because four-cell packs might not be able to deliver adequate voltage with this battery mixer, but I have no idea why Kraft systems are a no-no.

By the way, the two 5-cell airborne packs do not have to be a matched pair. In other words, you can use any combination of battery packs, like 500 mAh and 1200 mAh, or 500 mAh and 800 mAh, or 800 mAh and 1200 mAh, if you want to.

Each of the two packs are plugged into their own switch harness and then a mixer

board is installed in the positive (red) wire between each switch and its receiver plug.

One switch/battery/mixer harness is plugged into its normal place and the other is plugged into any unused channel in the receiver. If, however, there are no open channels (perhaps you only have a four-channel rig), use a Y-pigtail. First connect any of the four servos to one side of this pigtail and the second switch harness to the other side, and you're all set to go.

GKD tells me that when both switches are turned on, the diodes detect even the slightest difference in voltage between the two packs and allow the one with the highest voltage to feed the system. So, under normal conditions neither battery pack will be run down since they'll both share the load. However, if one of the packs fails for any reason, the good one will take over immediately with no problem.

Even though I haven't tried this Battery Mixer in the air yet, I have used it in the shop; and I'm pleased with it. I like things that are kept simple because there's less chance of anything going wrong; evidently GKD feels that way too.

If you have any questions, or want any more information about either the Electronic Retard/Advance or the Battery Mixer, you can write to: GKD Products, Inc., 3705 Innsbrook Drive, Garland, Texas 75042, or call (214)495-4145 after 6:00 p.m.

And when you're in contact with George, why not ask him about some of his other electronic goodies also; he's got a bunch of handy items!

## IMAA

I sometimes forget that there are always new folks coming into this hobby, and, because they're just starting out, certain phases, abbreviations, and acronyms that we "oldtimers" use are confusing to them.

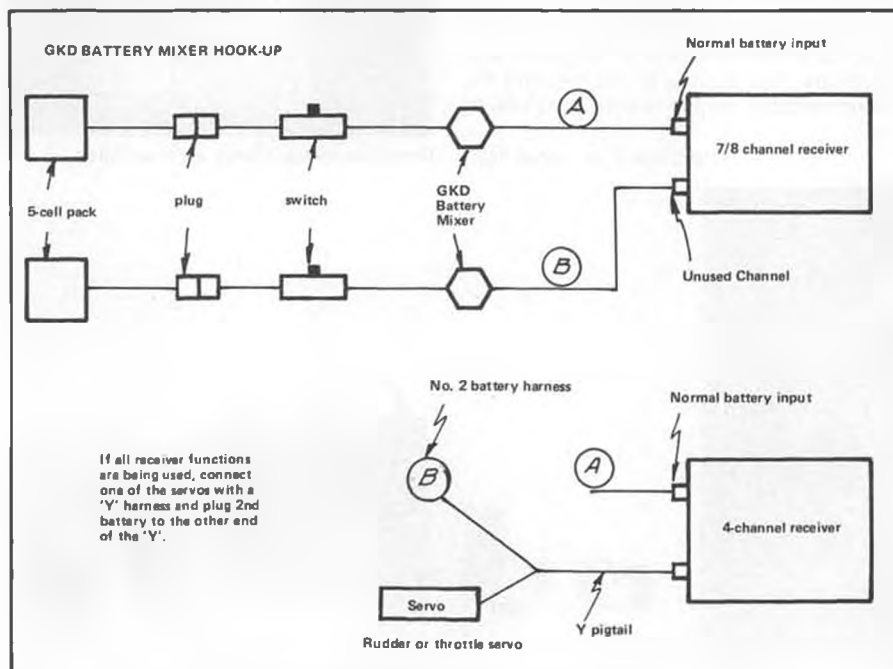
Here's a good example: the many letters asking what the IMAA (International Miniature Aircraft Association) is, what it does, how to get more info, and how to join.

So here's the straight skinny: The IMAA was formed at the 1980 Toledo Show to promote informal/noncompetitive flying of BIG radio-controlled model aircraft throughout the world.

Y'see, most of IMAA's founders were also QSAA (Quarter Scale Association of America) members who were unhappy with, among other things, QSAA's dogmatic and narrow-minded rules concerning non-scale, sport aircraft. We also wanted to have an organization that was truly democratic, one in which all the members actually voted (every two years) for their governing body, the President, Vice-President, and eleven District Directors.

Although there are always going to be some who thrive on a steady 24-hour a day diet of competition, most of us get enough of this kind of stress throughout our normal work week and need (and appreciate) the easy going, laid-back, noncompetitive kind of fly-in that has become an IMAA trademark.

These BIG Bird Fly-Ins are so popular with both pilots and spectators because they are informal. They're really social and sharing events where old friends meet and new friendships are easily formed and



Here's a block diagram showing the hookup for GKD's Battery Mixer.



Bruce Gale used Balsa USA plans as the basis for this 90 twin-powered Aeronca C-3.

cemented.

Pilots like to attend (often with more than one aircraft) IMAA-sanctioned fly-ins because they know it's pretty much like flying at their own field; there are no trophies and they're not scored, evaluated, or judged by anyone. In fact, other than "door prizes" given when pilots' names are picked at random, the only other prizes allowed according to IMAA rules are awards for things like who traveled the longest distance to get to the fly-in, who had the worst crash, or perhaps recognizing a particularly young/old pilot.

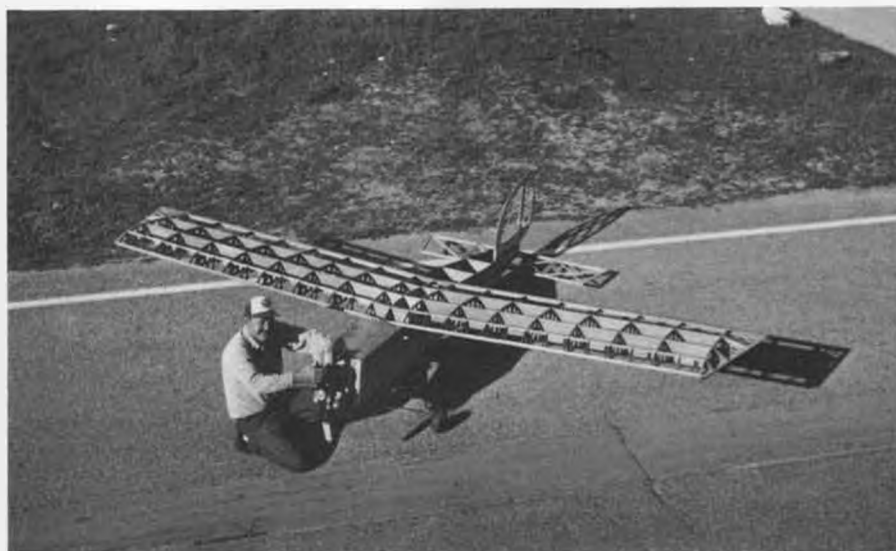
And spectators are usually first awed, and then delighted, by a number of different kinds of brightly colored BIG Birds that festoon the field. Their interest consistently runs high because there's nothing boring about the fly-in's activities; since there's no competition, none of the birds look alike nor are they flown through the same repetitive maneuvers that become ho-hum to the average onlooker at the pattern contest.

Let me tell you about the sharing that goes on at an IMAA fly-in. Guys are happy to be given the chance to share their knowledge and how-to's with everybody else, which is a far cry from what you'll find at most competitive events. Here a pilot is usually reluctant to reveal any "secret" he thinks will give him an edge over the other fliers.

The requirements for aircraft at an IMAA-sanctioned event are simple: monoplanes must span at least 80 inches, bipes no less than 60 inches, and if you want to fly, your



A nice Balsa USA Sopwith Pup by Chuck Jones. A Saito 2.7 Twin swinging a Grish 26x6 makes this bird fly like the real one.



Jim Johnson is dwarfed by his double-size Giant Stick. He should have it flying soon.

bird must undergo an aircraft safety inspection. As a matter of fact, we've established an outstanding safety record because we pioneered the mandatory airworthiness inspection.

Also, IMAA has been accepted as an "Official Academy of Model Aeronautics Special Interest Group" to represent BIG Bird modeler interests in AMA-related mat-

ters. And IMAA members enjoy liability insurance protection at all IMAA/AMA-sanctioned events.

Like every other successful organization, we also have an outstanding quarterly publication. It's called *High Flight* and is designed to assist, educate, and entertain. It's

*Continued on page 70*



Out in Hawaii they like Big Birds and keep turning them out.



Gene Ehlers scratchbuilt Stinson Tri-motor. Three O.S. FS-20s are the power for this 82-inch beauty.

# Little John



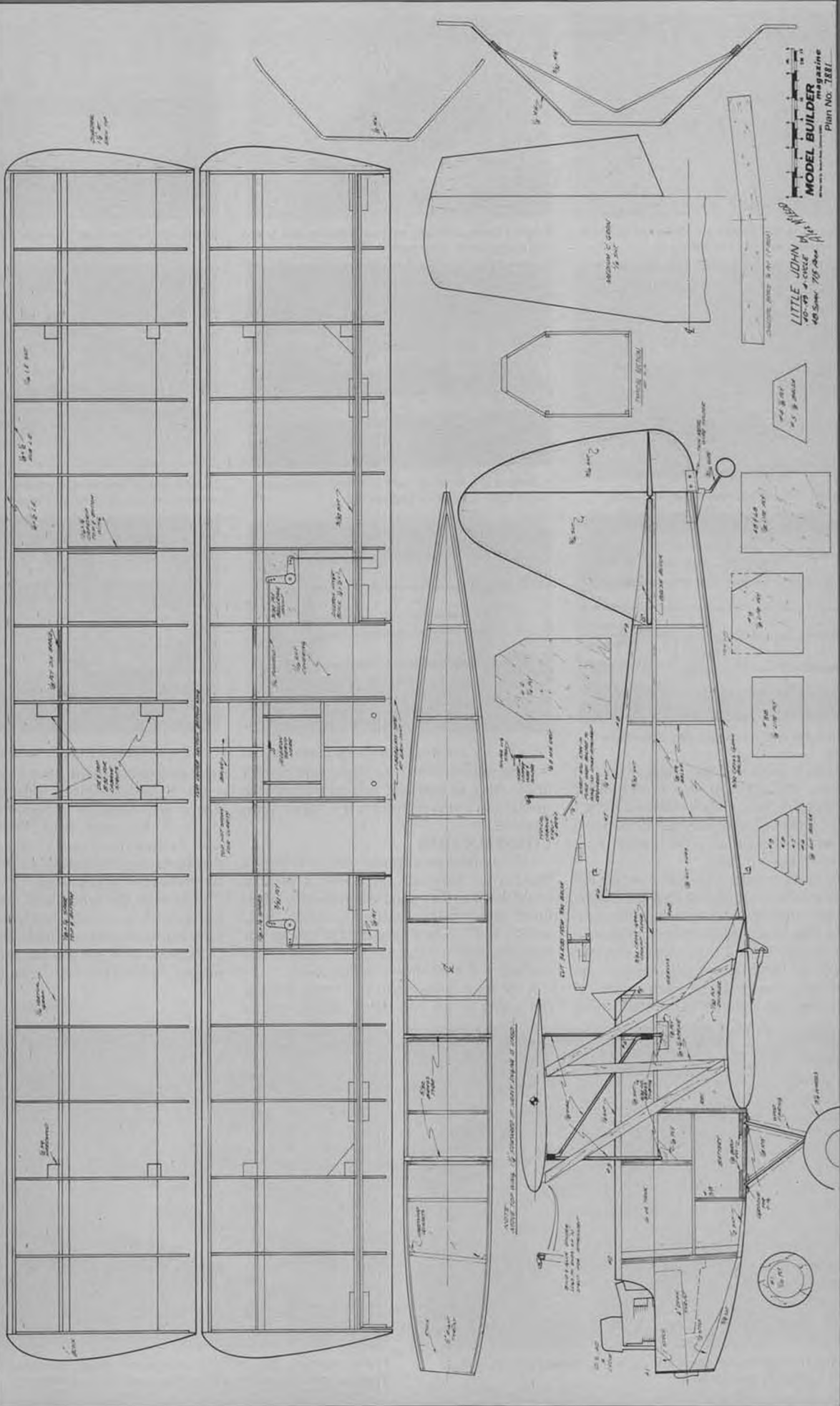
By ALEX McLEOD. . . Here's a reduced-size version of Bill Northrop's popular Big John biplane, designed for 40-to 48-size four stroke engines. Full-size plans are available from Model Builder's plan service.

- Having built and flown a Little Beau Bipe, a Wild Child, a Duster, a Galloping John (yes, with all of that banging and flopping at the tail), and even a friend's Big John, I was sold on Bill Northrop's all-size biplane design. There isn't, however, a size to fit the 40-48 four-stroke engines. Here then is my presentation of the Little John Bipe (with apologies to W.C. Northrop).

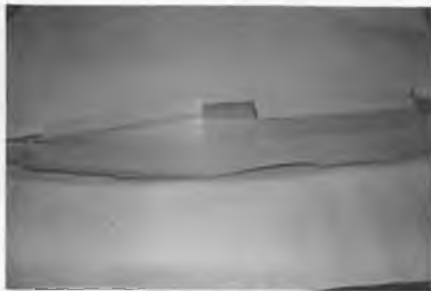
It flew quite gently with an O.S. 40 four-stroke and was a real winner, a pussy cat. I thought it had a lot of aerobatic potential, and I was right. With an O.S. 48 Surpass, the vertical maneuvers are a joy. Not everyone will want a fully aerobatic airplane, but on low rate at the transmitter and two-thirds throttle, it's a real Sunday flyer again. When the power is cut back to one third, it will just hang in the air with a little up elevator and almost thermal. On idle it can be landed at a very low speed. This is due to a light structure and generous wing area. At five pounds, my L.J. came out at a 16 oz/sq ft wing loading. A 48-inch wing span makes it



First flights were made with an O.S. 40 four-stroke, but the engine lacked the punch needed for aerobatics, so a Surpass .48 was installed, which greatly improved the plane's performance.



LITTLE JOHN  
40-49 4-SCALE  
48 Size 7/8" dia  
MODEL BUILDER  
Magazine  
Plan No. 7881



Fuselage ready for shaping and sanding. Note tubing where cabane struts plug in.



Engine compartment before shaping and painting inside with polyester resin.



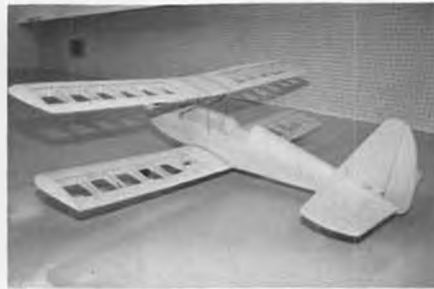
Inside of the fuselage. Note brass tubing epoxied in for cabane struts.



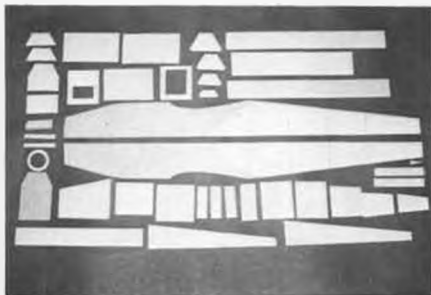
Completed assemblies ready for finishing.



Ailerons are built as part of wing, then cut apart later to assure proper fit.



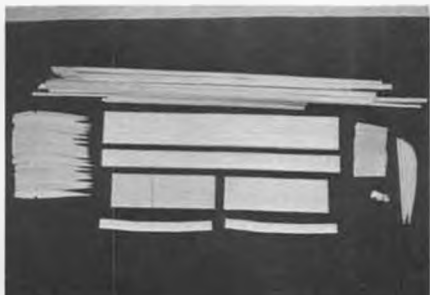
Completed airframe ready for covering. Simple sheet structure is light and strong.



Fuselage sides and parts cut out and ready for assembly.

a one-piece airplane for transporting in small cars. Perhaps you may even build it lighter by using heat shrink covering films. I used Sig Coverall and butyrate dope for a more permanent finish. The bottom line, however, is: keep it light.

The semi-symmetrical airfoil, used on the Little John is very similar to its big brothers and makes inverted maneuvers quite comfortable. The large rudder makes knife edging quite easy with a little down elevator. Slow rolls and eight-point rolls are quite axial even at low speed. The ailerons are extremely effective right up to the stall which



Parts kit for the wings speeds up construction. is quite gentle. With up elevator and careful application of power, it will even hang motionless in a strong breeze. It is really a fun airplane.

#### CONSTRUCTION

I like to take an airplane with me when I holiday in Vermont, therefore, I usually build them so they can be completely taken apart and transported in my model box, which is 47 inches long on the inside. For that reason I built the wings 47 inches long instead of the 48 shown on the plan.

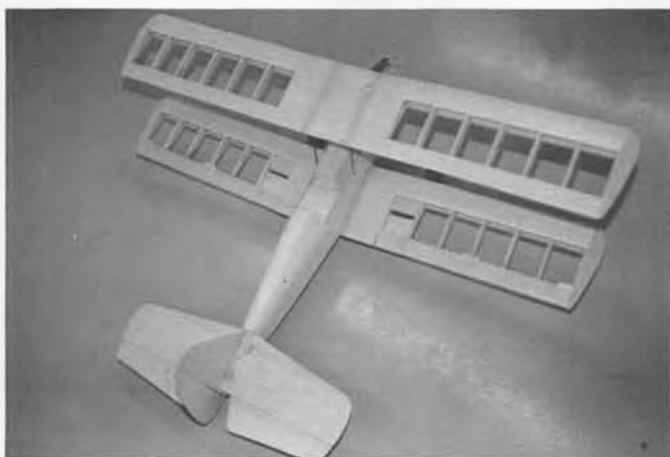
It seems to be the style now to say that I'm not going to go into detail about how to



The tail surfaces are cut from sheet balsa. glue each piece to the next. I won't bore you with a piece-by-piece description then. There are, however, a number of special paints to be mentioned. The first thing I usually do is make up a kit by cutting out all the parts and collecting all the necessary hardware and accessories.

Start with the wings and cut out the 34 balsa ribs from 3/32-inch medium sheet. An easy way to do this is to make a cutting template from .035 soft aluminum siding with jagged holes punched near each end to

*Continued on page 94*



The completed air frame ready for covering. Good-looking, simple model is well-built and strong.



There's nothing like a fine biplane model to get the creative juices flowing and this version of the Big John is no exception.





# Electronics Corner

By ELOY MAREZ

solid state electronics such as we are dealing with, we generally work with sub-multiples of those values which must first all be converted to the same level in order to obtain a correct answer to any calculation. Probably the best example to make for you is in the use of current, since the current flows we generally encounter are in milliamps (1/1000 Amp) only: 50 milliamps would have to be stated as .050 Amps for use in our formula.

Taking the basic  $I = E/R$ ; variations of the same now emerge which can be used to solve for any one element providing the other two are known:  $E = IR$ ,  $R = E/I$ .

There is yet another element to be considered in our calculations, that of Power, expressed as "P" which is measured and stated in watts. Watts is the figure that gives us the total electrical power consumption or output of an electrical or electronic device, and is determined by multiplying the voltage times the current. The basic formula is  $P = EI$ ; variations being  $P = I^2R$  and  $P = E^2/R$ .

As an example, we can use this formula to calculate the INPUT power in our R/C transmitter. Remember that we need to know two values. In this case, the voltage applied

Continued on page 86

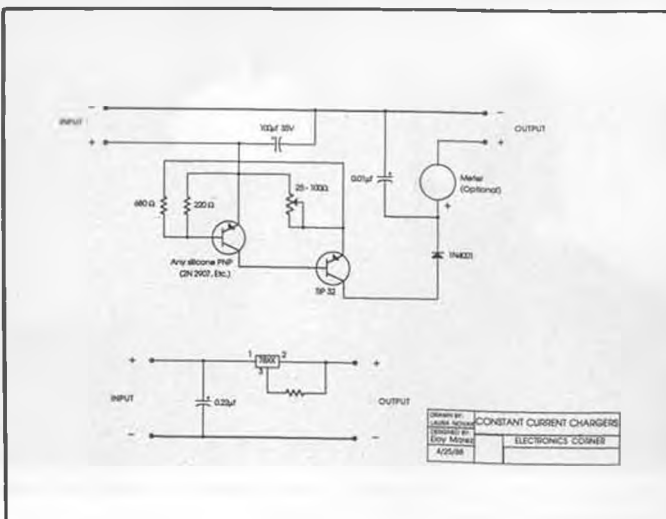
• Once upon a time, in the early days of electronics, there was an experimenter named George Simon Ohm. He lived from 1787 to 1854 and was far from being a "Simple" Simon. In fact, he left us a legacy which affects our every day life, and definitely our R/C hobby, as much as does the law of gravity. Ohm's principle, which in time came to be known as Ohm's Law, explains the relationship between the forces within an electrical direct current (DC) circuit. In effect, there is the applied voltage, designated "E"; the resistance within the circuit, "R"; and the resulting current, "I." The basic Ohm's Law then, is stated as  $I = E/R$ ; that is, the current can be determined by dividing the voltage by the resistance, and is based on full units of Amperes (I), Volts (E), and Ohms (R).

For example, one Ampere of current will flow from a one Volt source to which a one Ohm load is connected, which brings up the first caution in your use of Ohm's Law. In

UNITS AND SYMBOLS			
Unit	Symbol	Multiple	Value
Volt	E	Kilovolt (kV)	1000 Volts
Volt	E	Millivolt (mV)	1/1000 Volt
Volt	E	Microvolt (uV)	1/1,000,000 Volt
Ohm	R	Kilohm (K)	1000 Ohms
Ohm	R	Megohm (M)	1,000,000 Ohms
Ampere	I	Milliampere (mA)	1/1000 Ampere
Ampere	I	Microampere (uA)	1/1,000,000 Ampere
Watt	P	Microwatt (uW)	1/1,000,000 Watt
Watt	P	Milliwatt (mW)	1/1000 Watt
Watt	P	Megawatt	1,000,000 Watt

OHMS LAW FORMULAS FOR DIRECT CURRENT				
Known for finding unknown values of:				
Values	I	R	E	P
I & R			*IR	I <sup>2</sup> R
I & E		E/I		EI
I & P		P/I <sup>2</sup>	P/I	
R & E	E/R			E <sup>2</sup> /R
R & P	P/R		PR	
E & P	P/E	E <sup>2</sup> /P		



An externally powered variable-metered Constant Current Charger, built from the schematic by Laura Novak, at left. Such a charger is handy if you use a lot of different batteries requiring different charging rates.

# Goldberg Models' SUPER CHIPMUNK

By JAMES CUMMINGS & DEWEY NEWBOLD. . . This all-wood version of Art Scholl's classic plane is intended for 45-60 two-stroke, or 60-90 four-stroke, and four-channel R/C systems. It's a beaut!



• Few aircraft are as familiar to modelers and aviation buffs as the late Art Scholl's red, white, and blue "Super Chipmunk." Therefore, it is no surprise that a number of kit manufacturers offer scale and near-scale versions of this airplane. The first widely successful R/C version of the Chipmunk that I can remember was published way back in the June 1967 issue of *Model Airplane News* by Jack Stafford, although it was not the Art Scholl version. The following is a direct quote from that article:

"'Chipmunk' was the word in talking to the guys who were lucky enough to participate in the Aero Classics at Palm Springs, California, in 1965. As Jerry Nelson expressed it after the meet: 'There was an airplane that looked and flew like one of our R/C models.' Quick, light on its feet, and precision aerobatic, under the capable guidance of Hal Krier. Wouldn't it make an ideal pattern ship?" Stafford's R/C Chipmunk design became the basis for a popular kit which was sold for many years. The design flew so well that it was used by U.S. Internationals Team Member Cliff Weirick at the 1967 World Championships in Corsica.

Carl Goldberg Models has been well-known for many years for producing practical, easy-to-build and fly R/C models. Many of today's R/C fliers, myself included, fondly

remember some of their early experiences with the Goldberg "Falcon" series. This latest release from Goldberg is a real win-

ner, and, although I do not know if anyone is using this model in pattern competition, its flight characteristics could cause one to



Authors chose two-stroke power as they plan on adding a smoke system at a later date. A big four-stroke should make the Super Chipmunk a lively performer.



The quality of the materials in the Goldberg kit are nicely complemented by the author's fine craftsmanship.

give this more than passing consideration.

Goldberg's kit is beautifully packaged (The box art alone is enough to sell the kit!). The generous hardware package includes fiber motor mounts, all clevises and rods, miscellaneous bolts and screws, and heavy-duty 3/16-inch music wire landing gear struts (instead of the usual 5/32-inch material). A large, clear canopy is included along with vacuum-formed parts for the instrument panel and cockpit floor. The cowl and wheel pants are of heavy molded ABS plastic as are the molded wing tips. Goldberg also sent along a supply of Jet cyanoacrylate adhesive and two rolls of their new Ultracote plastic film covering material.

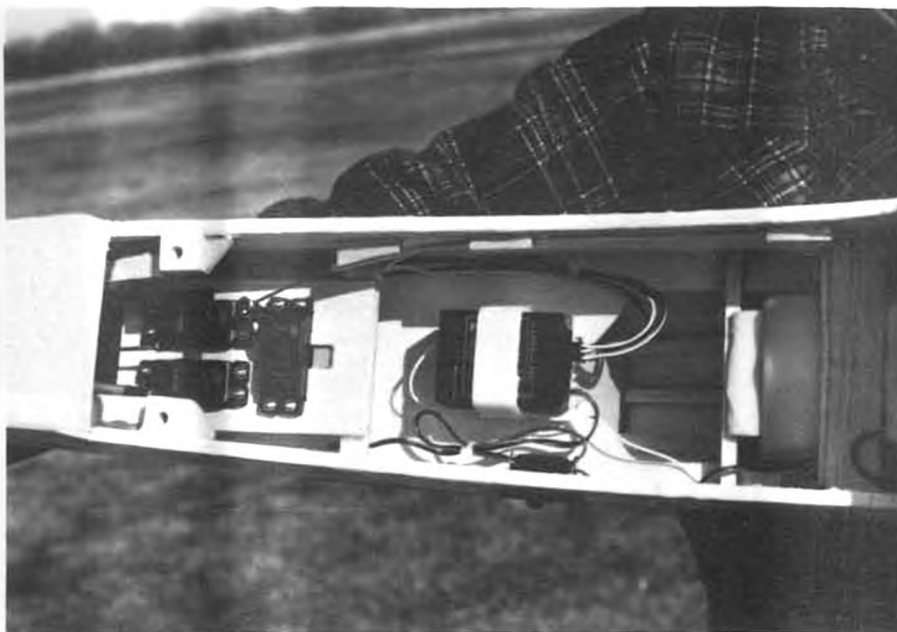
The kit is designed for .45 to .60 two-stroke or .60 to .90 four-stroke engines. The wingspan is 64 inches, overall length is 53 inches with a wing area of 688 square inches. The plans call for a finished weight in the six- to eight-pound range. The Super Chipmunk can be built for basic four-channel operation or with optional flaps, retracts, and smoke system. A beautiful sheet of pressure-sensitive mylar decals is included for modeling the Art Scholl color scheme.

Construction of the Super Chipmunk is all-wood and should present very few, if any, problems even to the inexperienced builder. The simplicity and ease of assembly is due to excellent structural design and plans and instructions that are, in my opinion, among the industry's finest. The full-size plans are quite detailed, showing equipment installation (including the optional retracts) as well as the general construction. The 35-page instruction manual is superb and includes over 200 step-by-step photos. All aspects of building and flying and Chipmunk are covered, including radio and engine installation and initial setup and trimming. The folks at Goldberg deserve a pat on the back for their thoroughness in this aspect of the Chipmunk kit.

The basic fuselage structure is mostly of lite ply and uses an interlocking design that allows you to assemble and align the major pieces without the aid of a flat building sur-



A test-fitting of all components save the engine is an opportunity to visualize the finished model's fine lines.



Servos and receiver installation leaves plenty of room in the spacious fuselage of the Chipmunk.



With the O.S. .61 FSR engine humming, the Super Chipmunk banks to the right over the field during an impressive fly-by past the camera. Flying is superb and matches the quality of the kit's components. Both authors give it a hearty "thumbs-up."

*Continued on page 76*

# Sig's Kadet Seniorita



Author's son goes through the motions of firing up dad's Seniorita.

## By SKIP RUFF

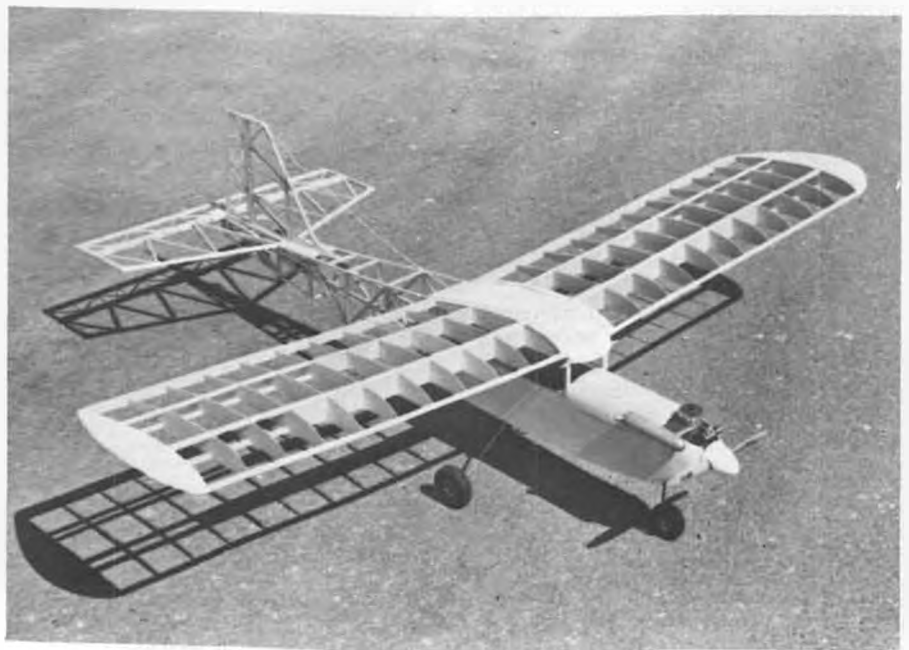
• I know what you're thinking, not another trainer, but before you turn the page to find the "exciting" stuff (ducted fans, helicopters, etc.), just remember that most of us probably learned to fly with some such mundane type of craft. More recently it seemed that most available "trainers" were nothing more than boxy pattern ships and required a fair amount of skill to fly resulting in more than a few discouraged beginners. Happily, that situation has changed, and there is now a good number of basic three-channel trainers on the market. One of the best is the newest offering from Sig Manufacturing, the Kadet Seniorita. This model is a roughly 3/4-size replica of their well-proven Kadet Senior, and, with its 63-inch wingspan, is compact enough to fit in most sedans and yet large enough to retain the excellent flying qualities of its larger and older sibling.

### THE KIT

Knowing Sig's reputation for excellence, I was not disappointed by what I found upon opening the box. The overall quality of the wood was good with excellent die-cutting. Some of the strip balsa was a bit too hard for my liking, but that is a subjective opinion at best. The sheet and block balsa were excellent. The hardware package included the

motor mount, blind nuts, nose gear bracket and arm, threaded rods, control horns, clevises, hinges, pre-bent landing gear, and probably one or two more items I've neglected to mention. Also included are a complete construction manual and a set of

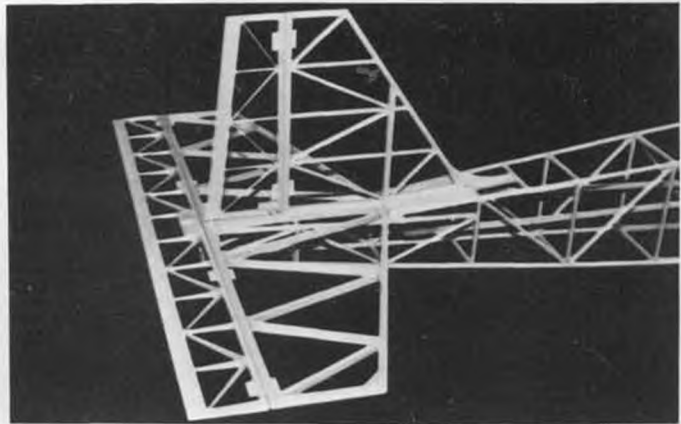
full-size plans, both being among the best I've ever seen. The construction manual is completely illustrated, step by step, and includes tips and directions for finishing, trimming, flying, and everything else one can think of. The plans are equally as im-



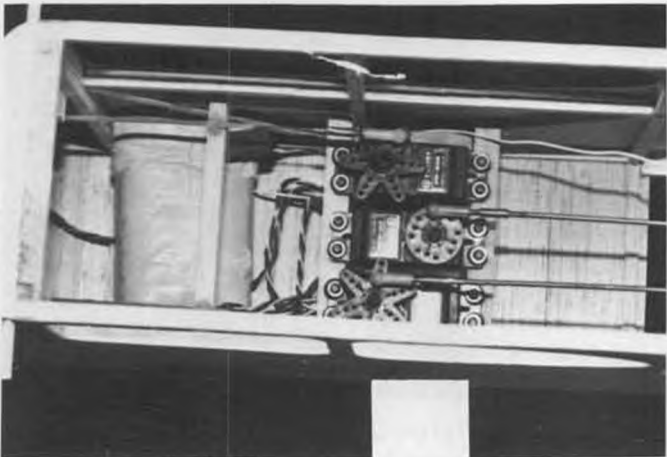
Completed structure of the Seniorita shows simplicity of construction and good design.



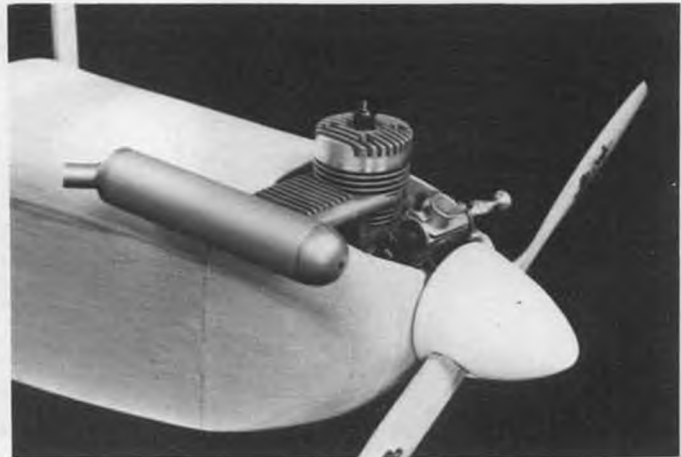
Sig kit comes with nicely diecut wood, all hardware and excellent instructions to help you in making a fine model.



Tail section is typical frame construction. Author's care in building shows in this shot.



Servos for control functions are not crowded in spacious fuselage.



A K&B .20 Sportster is a perfect match for the Seniorita.

pressive being painstakingly detailed. On the whole, an excellent product.

## BUILDING

The excellent construction manual and plans will come in handy for raw beginners because the Seniorita, to be honest, is not the simplest of models to build. The structure, being built-up, is fairly intricate with lots of pieces. There is nothing difficult in the construction; it will just take a bit longer than some of its sheet balsa and foam competitors. Once completed, though, and covered with transparent film, you will be rewarded with an aesthetically pleasing model that will probably outlast your desire to fly it.

My model was built entirely with Slo-Zap and by the book, with two minor exceptions. I installed a Sullivan six-ounce slant tank instead of the round one recommended, and I used clear MonoKote for the side windows instead of the clear plastic supplied. I did come up short a couple of pieces of strip wood, but had an extra sheet of 1/16 balsa left over. A fair trade, I believe!

## FINISHING

Another Sig product was used to cover the model, their "Supercoat" iron-on plastic film. It comes in 15 different colors, including transparencies, and is color-matched (in the opaques) to Sig's line of dopes. The film requires low heat (good for foam surfaces), is extremely stretchable for compound curves, and, for all you electric fliers out there, weighs only 1.5 ounces per



Though smaller than the Senior, the Seniorita retains the larger ship's great flying ability.

square yard! Other than a slight reluctance to stick to the spruce fuselage longerons (a trait common to most films), I found the material extremely easy to work with, providing an excellent and quick finish.

## ENGINE

I was fortunate to receive an engine which is probably a perfect match for this model, the K&B .20 Sportster. A fairly recent offering from this longstanding company, the engine is a Schnuerle-ported,

*Continued on page 74*



A size comparison between the Kadet Senior(left), and the Seniorita.



Byron's  
Glasair  
TD

**By AL ALMAN. . . A fiberglass/foam kit of a popular homebuilt, the Byron Glasair can be a satisfying, fast aerobatic model. The author used a Super Tigre 2500 for zippy performance, and wasn't disappointed!**

• Although I've been living up here in Washington State for only five years, I already feel like a native-born son, probably because of the webbing and moss that have grown between my toes.

And since I've become part of this northwest culture, it's only natural that I'd tend to be proud of all home state achievements; like Aplets and Cotlets, Washington-grown chickens, grapes and wines, Mt. St. Helens, Sasquatch, the Hyperbiplane and the Glasair.

However, the truth is that I didn't go bananas over the Glasair when I first became aware of her back in '81. Sure, I liked her looks right from the start, but she really didn't grow on me till I moved here a year later and found out that this swift little bird had been born and bred in the Evergreen State. And about that time I also got to see quite a few Glasairs being built in garages, shops, and hangars not too far from where I lived.

So, by the time I talked to Bruce Godberon at the '87 N'West Model Expo, I'd worked up a good case of the hots for Byron's 30-percent scale model of this thoroughbred taildragger and was exuberant as I lugged the Glasair TD kit home that evening.

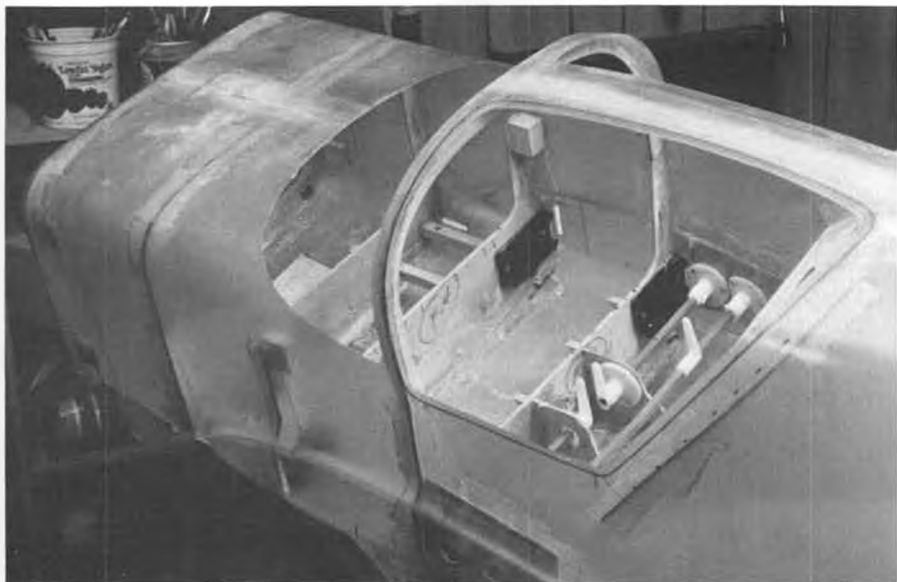
This was my first Byron airplane, and I was duly impressed with the kit; it's absolutely complete and chock-full of quality. After caressing the precision-molded fiberglass fuselage halves and fondling the high density injection-molded polystyrene wings, I pawed through the many bags,

packages, and assembly components.

In addition to all the "usual" hardware I also found a great-looking cowl, well-formed heavy-duty butyl windows and windshield, a 3-1/2-inch CB spinner, 24 inches of Buna fuel tubing, a 16-ounce fuel tank, 4-inch Du-Bro wheels, Robart Super Hinges, 2 different size ball drivers, an awl, Loctite, and a more than ample piece of 6-ounce fiberglass cloth.

And is it ever neat and well organized. All the hardware is separated into nine tagged heavy-duty plastic bags so it's easy to find what you need when working on a particular part.

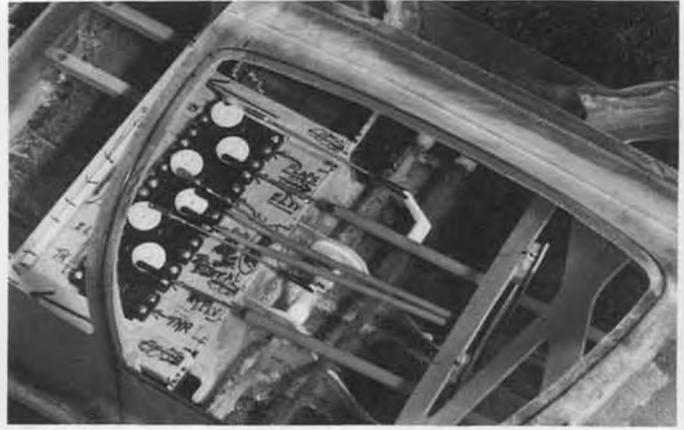
The 16-page owner's manual is comprehensive and includes assembly and operating instructions, parts lists, and safety warnings. Supplementing the well-written and easy-to-follow text are 37 photos and draw-



Byron's torque rod setup. The dark rectangular things on the bottom of F-4 and F-5 are the aluminum extrusions that the wingspars slide into. The rear torque rod is the flap control rod that had to be bent a little in order to minimize binding.



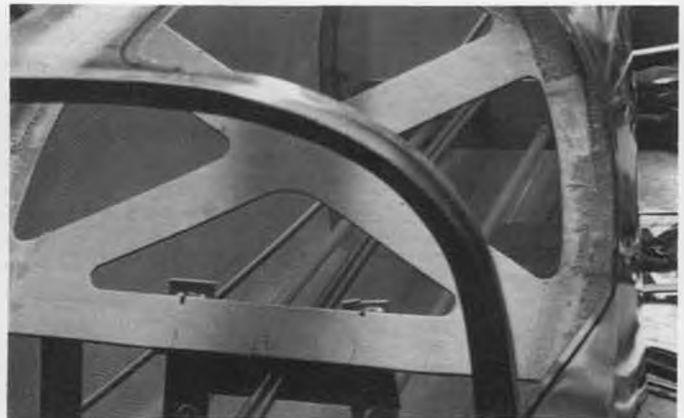
The plug-in wing just before glassing.



Servo installation and connections to the torque rods and the forward pushrod supports. The servo tray is removable.



Glassing the fuselage former.



Pushrod supports can be seen here. The nylon tube on the left is for the antenna.

ings; and Byron even included a useful, good-sized three-view of the real airplane.

Since this bird has a fiberglass fuse and foam wings, and, therefore, not built in the conventional way, full-size plans aren't needed. Instead, a set of drawings (five sheets) clearly illustrates how to assemble each of the components and the radio and control system layout. There's even a template for the unique Glasair striping design found on so many of these full-sized birds.

Construction begins by cutting out the areas for, and fitting, the windshield, side windows, and hatch. Then the fuse formers, landing gear legs, and aluminum extrusions that the wings plug into are trial fitted and aligned. After everything checks out okay, the formers are glassed to the inside surface of the fuse using one-inch strips cut from the piece of six-ounce cloth.

Though the instructions do specify polyester resin, I made this glassing chore faster, less messy, and stink-free by using medium viscosity Hot Stuff (Super T). At first I tried smearing the Super T with a finger wrapped in plastic but found that a half-inch wide squeegee cut from a coffee can lid did even better. And a Willson 500 Series Respirator kept my nose and throat isolated from the irritating CA fumes.

Two diecut 3/32-inch ply pieces are laminated together, and this (removable) firewall is secured to the front of the fuselage with nine 8-32 socket head bolts and T-nuts. A 3/16-inch ply standoff box mount was glued and screwed to the firewall so that my

Super Tigre 2500's thrust washer cleared the cowl (Byron has a Universal Glass-filled Nylon Engine Mount available that fits most two- and four-cycle engines). The fuel tank and fuel lines were also installed at this time.

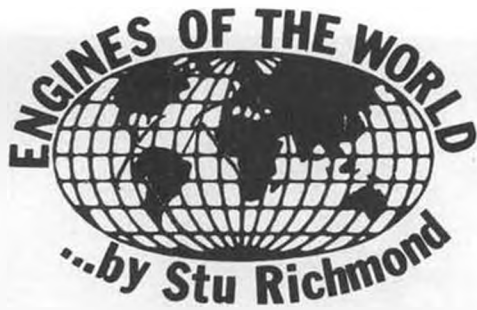
Cutting out a hole in the servo tray to fit servos is the next step and, although the

photos and drawings show only five servos, I decided to go with seven; the two additional servos gave me redundancy on ailerons and elevator. I also played with the idea of a servo for each flap, but decided against it.

*Continued on page 90*



The Glasair on the wing.



# Modelar CO<sub>2</sub>



Steel cylinder is rotated up-down to control speed of Modelar CO<sub>2</sub>. Piston, crankcase and rear cover are plastic moldings. This is a motor, not an engine. Text tells why.

**VITAL STATISTICS:** 1-3/8 inches long to the face of the prop driver, 15/16 inch across the mounting lugs, 1-3/8 inches high to the top of the cylinder head. Weighs 25 grams complete with gas tank, coiled tubing, and filler valve (28 grams equals 1 ounce). Displacement is 0.27 cubic centimeters or .016 cubic inch, and size overall is comparable to a Cox .020. Made in Czechoslovakia.  
**UNIQUE FEATURE:** This is a motor, not an engine.

- There's no such thing as an electric engine, and there's no such thing as a gasoline motor. This was taught to me early in a physics of electricity course. Motors are generally electric or other users of remote-converted energy. Engines are devices that primarily convert energy within their mechanism. So, in fact, Rolls Royce should advertise they build the world's finest engine cars; Henry should have named his company Ford Engine Company; and Wakefields will always use rubber motors to turn props!

So this month's subject is a motor that uses a remotely converted source of energy (carbon dioxide) that is valved into an expansion chamber in controllable flow rates and allowed to expand against the top of a plastic piston. In so doing, the piston, which is connected to a conventional connecting rod with crankshaft, ends up turning a model airplane propeller. The entire

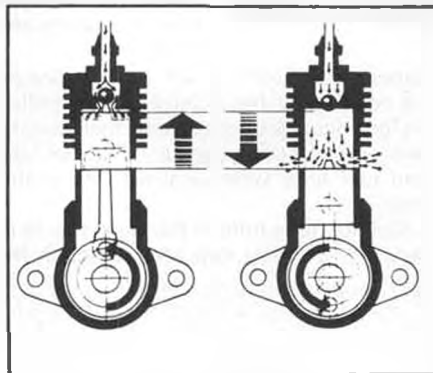
system is efficient and light enough to fly a larger than average model airplane on this power system. To my knowledge there is no larger commercially made CO<sub>2</sub> engine. But getting a Motor Modelar CO<sub>2</sub> unit is something else. The Czechoslovak government owns the well-respected MVVS organization which produces glow and diesel model engines. The Czech government owns the only model magazine in the country, it owns the Modelar organization which produces very cleverly engineered balsa-plastic flying model kits (and this motor too), and it owns the IGRA organization that produces children's toys and a very fine number of flying model designs that are kit-

ted with practically no balsa wood. Volumes from Czechoslovakian factories barely satisfy consumer demand; none are exported to the USA.

The instruction sheet says this motor will fly models from 2- to 3-foot span weighing 2-1/2 to 4 ounces. The supplied prop is seven inches and looks like North Pacific's style and quality.

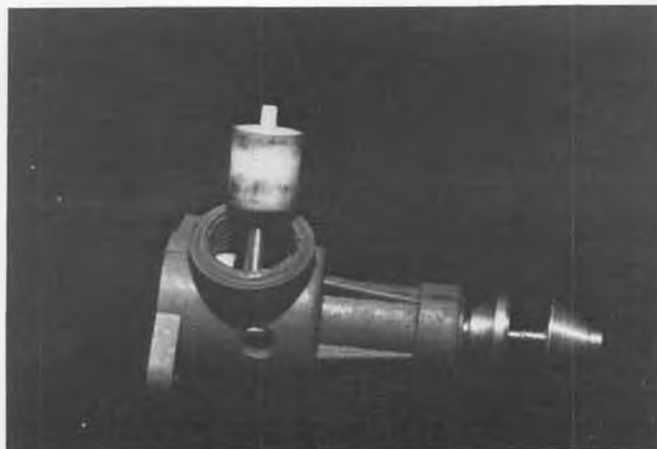
This month's photos aren't too great. The motor has a gray plastic molded crankcase and a white piston that just didn't want to show up well. The crankcase cover is also white plastic and simply presses in place.

The operation of a CO<sub>2</sub> motor is quite simple. CO<sub>2</sub> cartridges are the same the world over. A cartridge fits into the supplied filler tank, and, when tightened in place, the cartridge is punctured/opened against a controllable seal. The filler is then carefully plugged into the plastic charging nozzle, and the carbon dioxide flows past a check valve and fills/stores in the mini tank that's carried inside the model. When the motor's piston is off TDC (top dead center) a perfect seal is formed in the airborne section. When you flip the prop (it'll run in either direction equally well) the piston rises in the cylinder, and a protruding tit on the top of the piston slightly displaces a ball check valve in the head of the cylinder. This displacing action allows the flow of CO<sub>2</sub> to enter the cylinder and gaseously expand

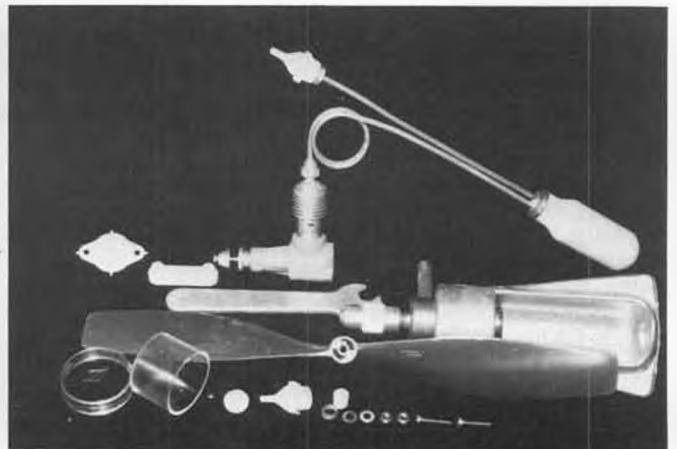


Cycle of CO<sub>2</sub> is simple. Tit on top of piston raises ball check valve to allow incoming CO<sub>2</sub> gas to expand, pushing down piston. Piston coasts back up to repeat the cycle.

*Continued on page 90*



Tit on top of piston displaces ball check valve to allow CO<sub>2</sub> into cylinder's expansion chamber. Hole on side is for occasional oil.



This motor comes with many spare parts. Turns a 7-inch Sleek Streak type prop at 1500 rpm for 45-50 seconds.



# MODEL DESIGN & TECHNICAL STUFF

By FRANCIS REYNOLDS



• The real subject of this second chapter of "Model Design & Technical Stuff" is stability. The enigma of the paper dolls will be explained later. For the little kids in the class, we will start out with some basic definitions.

In airplanes we are concerned with roll stability, pitch stability, and yaw stability; roll, pitch, and yaw being the three orthogonal angular motions possible for a plane. Pitch stability is also known as longitudinal stability, and yaw stability is directional stability. Roll stability is sometimes loosely called lateral stability; but most of the aerodynamics books use the term "lateral" in discussing the rather complex interactions between roll, yaw, and sideslip.

## INSTABILITY OF CAMBERED AIRFOILS

One source of pitch instability is often the wing airfoil. We won't get into why in this chapter, but cambered airfoils are unstable, symmetrical airfoils have neutral stability, and foils with reflexed trailing edges are stable.

Modelers sometimes call cambered airfoils "lifting" airfoils, but all airfoils are lifting or they would be worthless, so let's use the terms "cambered" or "high-lift" airfoils.

Cambered airfoils are used on rubber-

powered models, free flight, and some sport R/C. Symmetrical foils are used in

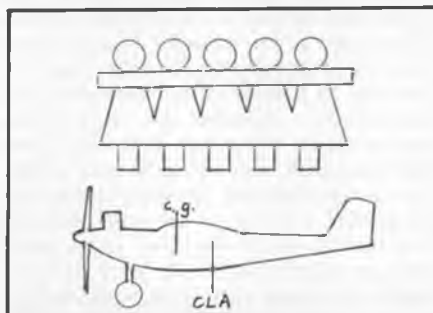


Figure 1: Paper dolls and CLAs.

combat, stunt, pattern, and aerobatic sport R/C because they lift as well inverted as they do upright. Reflexed trailing edge airfoils are used on flying wings because their inherent pitch stability makes the airplane stable without a tail.

"Hey, not all flying wings need reflexed airfoils, because we fly aerobatic flying wings with symmetrical airfoils!" True, Clyde, but let's look a little closer. In order to keep our aerobatic flying wings in level flight, we use a little bit of up elevator. Now sight in from a wing tip. The up elevator

combined with the symmetrical airfoil effectively gives us that needed, stable reflexed airfoil!

## OPTIMUM STABILITY

How much stability do we want? If some is good, is more better? The saying among chocoholics is, "Some chocolate is not enough, more is better, and too much is just right." I'll buy that. In the case of model airplane stability, however, more is not necessarily better. The optimum amount depends upon what kind of airplane we are designing and how we intend to fly it.

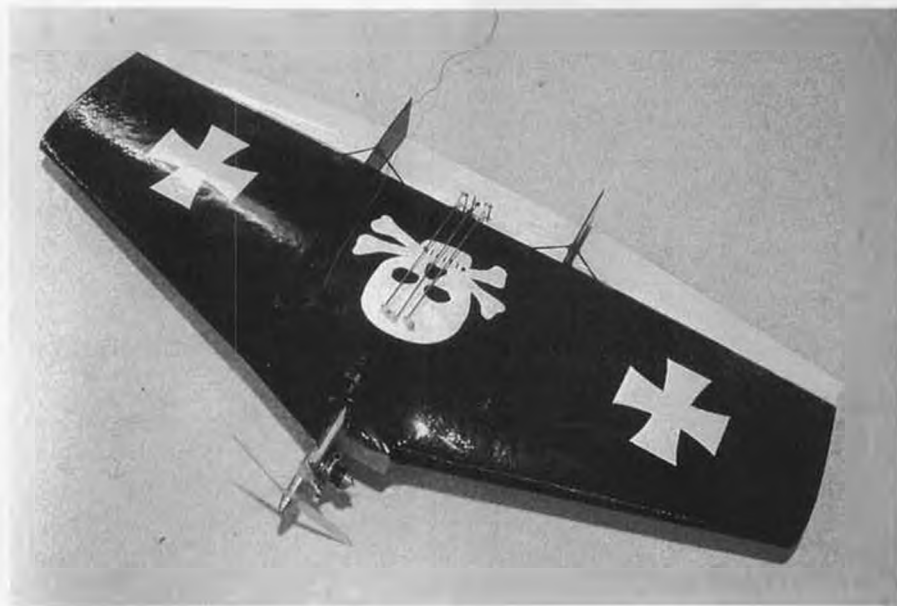
You rubber power, HLG, and free flight modelers know that your models must have considerable stability. These models must be able to fly unaided, and that is really what we mean by stable.

Control liners must have enough pitch stability to fly, but designing extra pitch stability into stunt or combat models would reduce their maneuverability, which we don't want to do. Control line models are a special case, with regard to roll and yaw stability, since the line tension stabilizes them in roll and yaw. For this reason, control line models don't have ailerons or rudders, and some of them don't even have fins. But keep your lines tight!

R/C is a really mixed bag when it comes to how much stability we want. The Old Timers, who only want the radio to come home with, need completely stable models. Trainers are also usually positively stable, so if the novice pilot fouls up, he or she (I'm not biased; I'm writing to admit that women foul up too.) can let go of the sticks, and the model will return to level flight, if it has enough altitude.

Pylon and pattern ships need to be stable enough to fly smoothly without a lot of pilot effort to keep them on a line, but they must not have so much stability that they won't stay in a dive or a climb or a turn. Neutral stability is about what we want. In general, stability and maneuverability are opposites. The more stability, the less maneuverability, and vice versa.

A somewhat unstable airplane can still be flown, depending on the nature of its instability, but it takes constant piloting to



The Black Baron, a "Stable-Unstable" R/C combat flying wing.

Continued on page 103

# ELECTRIC POWER

By MITCH POLING



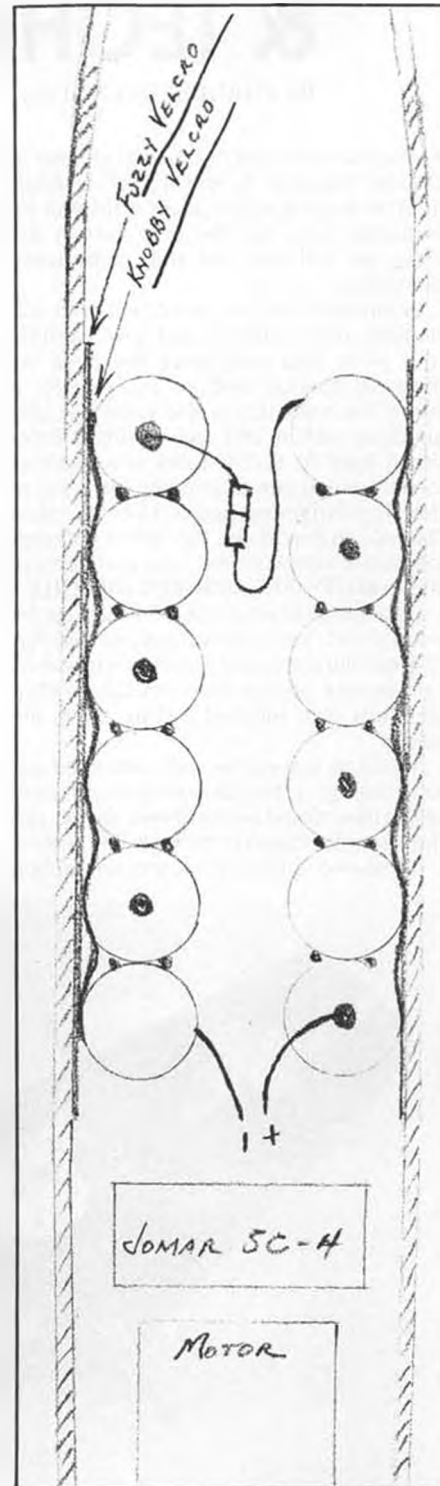
The TRC Impulse 4, probably the best charger on the market.

• Time flies, and it seems like last week, not last month, since I wrote this column. As many of you know, time seems to be harder to come by as you get busier and busier! An answer to the lack of time is the almost-ready-to-fly plane, one that takes less than ten hours to complete. Several magazines have had articles about this recently, and I do agree that the new generation of ready-to-fly planes looks quite good. If you want a ready-to-fly electric, the choices are very good in the 05 (six- to eight-cell) sizes, such as the Etude, MRC Cessna 172, Canario, and Kyosho (Tower) Cardinal. However, if you want to fly the larger planes in the 15 to 40 size, there are no ARF planes available, at least not ones designed for electric. I talked to Bob Boucher at Astro Flight about this, and he agrees that there is a real need for such a plane, and Astro is working on one. Hopefully it will be marketed this year.

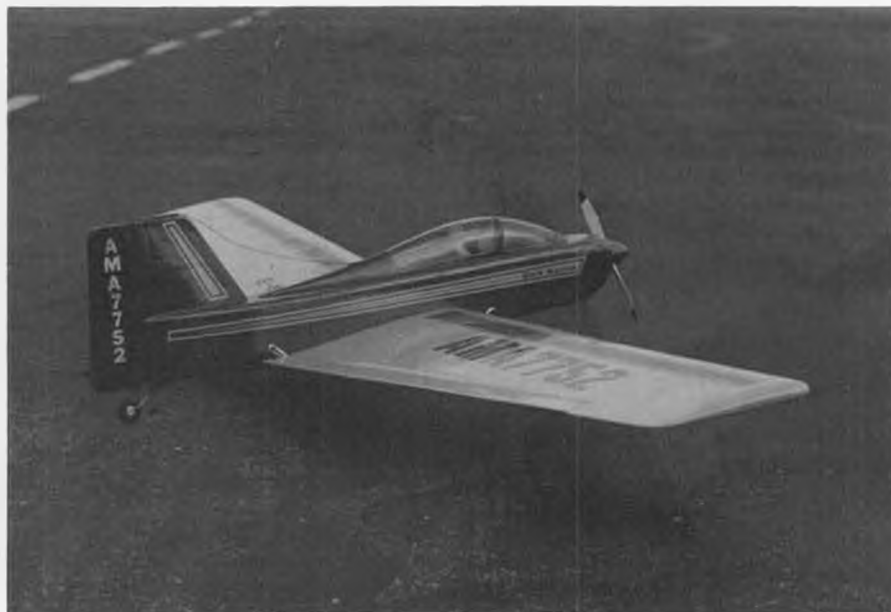
Meanwhile, what to do? Well, I walked into one of my favorite local hobby stores (Websters, in Seattle) and saw a 40-size ARF that really caught my eye. It was a Royal Air 40S, retailing for \$119.95. I walked out with the plane, and Websters is a little richer! The thing that sold me on the plane was the construction, all balsa, built up, and quite light for an ARF. The workmanship was very impressive, as good as I can do myself, with clean joining and gluing. The covering scheme in blue, yellow, red, and white is

very attractive, a lot fancier than I do myself. No decals are necessary. The kit is very complete, even to the inclusion of super-lightweight wheels.

Then to work; even with the extra time I took for changing it to electric I needed only six hours to get it ready. I removed the formers in the middle, front, and rear of the cabin area so there would be lots of room for equipment and batteries. These formers do nothing for the strength of the plane and are easy to remove with a modeler's saw and pliers. I installed the servos with double-sided servo foam tape (3M). This foam tape sticks very well to the servo cases, so I use that side as is. However, I always use some thick CA glue on the foam tape side that has to stick to balsa or plywood to make an absolutely secure bond. This has been very reliable, and I have never had any failures. I like using the foam tape in preference to servo trays, as it is lighter, simpler, and leaves more room for batteries. I used the Cox one-ounce servos on rudder and elevator and the Futaba S32 (one ounce) on aileron. This just happened to be the servos I had on hand! I used the Ace Radio Olympic V receiver and a 500 mAh Sanyo receiver pack. I ran strapping tape and two-inch wide clear packaging tape on the bottom of the wing for extra strength. I cut a hole in the front top hatch for the Jomar SC-4 throttle, and that was it for the electric modifications. As you can see, this model



George Lucas' drawing of velcro battery mount.



George Lucas' Slow Motion; looks like fast motion!

does adapt very easily.

The Astro 40 cobalt motor is a drop-in fit for the motor mount provided. It is held in by a hose clamp. These are available at hardware and auto parts stores. Be sure to mount the motor with the motor leads up, not down, or you may get a short through the motor mount. All-up weight with 18 (three six packs) Sanyo or Panasonic sub C cells was 6-1/2 pounds. I used a Top Flight nylon 11 x 8 prop for most flight tests, and this gave the best results. A Master Airscrew 11 x 8 did not pull quite as well but gave satisfactory results.

The Top Flight nylon props are no longer available, the wood Top Flight props or the Graupner nylon props from Hobby Lobby are an excellent substitute. I personally would be very happy to see the Top Flight nylon props produced again, perhaps they could have "For electrics only" stamped on them. They are very efficient, very quiet, put out excellent power, and last almost forever. I do fly in a high humidity climate, and I do run them only on electrics. I have never had any of them come apart on my electrics while running. If you do live in a very dry climate, soak or boil Top Flight nylon props in water occasionally to keep them from becoming brittle. Electrics are vibration-free and usually run in a reasonable rpm range, from 10,000 to 12,500 rpm. The Top Flight nylon props did shed blades occasionally on gas engines, but that is an extreme environment with high rpm and high vibration. I recommend Top Flight nylon props for their excellent performance with the above provisions, that is, "electric only" and "soak them occasionally if you are in a dry climate." If you see them in a hobby store, go for it, as they are becoming hard to find!

And now to the local field and flying! Takeoffs from grass are prompt, with about a 30-foot takeoff roll. I let the plane build up some speed in a shallow climb after takeoff, then do a climbout. The climbout is quick, you are at aerobatic height after one circuit of the field. Loops required a shallow dive, and rolls were wide and required both aileron and elevator. The plane flies fairly fast, my guess is about 45 to 60 mph, and would easily mix it up with the typical club field that has gas 40-size planes. This is the big advantage of 25- to 60-size electrics; they

do mix well with the typical gas field type of flying.

Landings are smooth and easy, though it is very easy to bend the nose (tricycle) gear if you land slightly nose low. My fix for this is to reverse the nose gear (it is held by a set screw) for the next flight and the next nose low landing will straighten it out!

Typical flights with power on most of the time are five to six minutes. This plane can be turned easily with any of the following: ailerons only, rudder only, rudder plus ailerons, and rudder plus ailerons plus elevator (coordinated turns). All these turns look good in the air; I have never seen a plane that could maneuver with such a variety of inputs. I like that! Spins both left and right are prompt (full up elevator and full rudder), and recovery is prompt with release of the stick. I do think that a little more power would be nice to have, so I will put in 21 cells and see how that goes (the stock 40 system comes with 18 cells). You can also cut the weight by perhaps as much as eight ounces by switching to tail dragger gear and using a glass-filled fiberglass motor

mount. The supplied motor mount is aluminum and quite heavy. A drop of eight ounces would help a lot in making vertical maneuvers (loops) quicker.

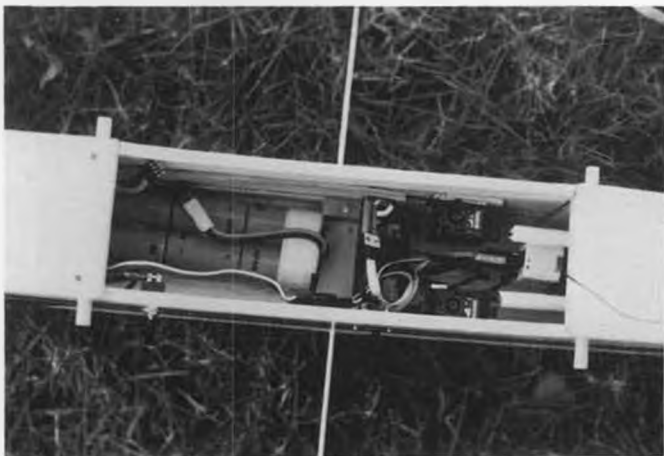
Specifications on the Royal Air 40S are: semi-symmetrical wing, constant chord, 57-inch span, 572 square inches, 4-channel, 45 inches long. It looks and flies like a Carl Goldberg Falcon 56. Royal Air also makes a high wing (40H) and a low wing (40L) version of this plane, and I am sure that they fly just as well as the 40S. The 40L (low wing) may well be more aerobatic, since the weight of the battery pack above the wing should help in rolls. I recommend the Royal Air 40 series as a quick way to get into the larger size electrics, using the Astro cobalt 40. If these are not available at the local hobby shop, contact Royal Products Co., 790 W. Tennessee Ave., Denver, Colorado 80223; phone (303)778-7711.

About this time you might be asked how I am charging 18 to 21 cells. I often use the Astro 102 DC/DC Super Charger. This is a

*Continued on page 78*



An Astro 40 in Royal Air 40S; hose clamp is used to hold motor in place.



Interior of author's 40S. Note how removal of cabin bulkheads and use of servo tape yields lots of space.



Author's ARF Royal 40S ready to go.

# Simply Scale

By CLIFF TACIE

• Planning on attending the Nats this year? Just around the corner as you're reading this, the 1988 Nats are scheduled to be held in Virginia Beach, Virginia, from July 23 to July 31.

Yours truly has somehow been roped into directing the R/C Scale event once again, and we're looking for a really great turnout. Even though I'm involved primarily with R/C Scale, I'm looking forward to seeing the C/L Scale entries that we normally see on the East Coast. East Coast Nats traditionally experience a large Scale entry, and this year should be no exception.

Two new events will be held in Scale this year at the Nats. One, the R/C Precision Scale event, is actually "born again" with the new rules effective in 1988. Once the premier event in R/C Scale, Precision Scale for some reason fell from popularity several years ago when FAI Scale started heading toward a more "standoff" concept. Very few modelers were participating in the Precision event, and it didn't seem to make sense to continue something in which no one

seemed to have an interest. However, after a few years of "standoff precision" (FAI scale), there are once again those within the Scale fraternity who wish their building skills to be recognized not just for building look-alike models of real aircraft, but for actually reproducing these aircraft as completely as possible on a smaller scale.

For those of you interested in this event, it'll mean close scrutiny to detail and accuracy in construction, and most probably head-to-head competition against some of the "big boys." Another event added to the Nats Scale activities is the new provisional FAI Large Scale event. Having received questionable popularity at the 1984 World Championships in Paris, the Large Scale event is now listed in the FAI rule book. Basically, it's similar to FAI F4C, except the static judging will be done at 5 Meters (16.4 feet); there is no complexity bonus, and the weight limit is 55 pounds with an engine limit of 6.1 cubic inches. The flight plan is the same as FAI F4C also, with 12 maneuvers plus Realism instead of the AMA 9 plus

Realism. This will be a good event for you "Large Scalers" to try if you feel your building skills are not being challenged to the utmost in the Giant Scale event and the smaller models found in Precision and FAI F4C are not your bag.

One new provisional AMA Scale event which may have proven very popular this year will not be held at the Nats. This is the "Fun Scale" event, meant for all those scale models that are pre-built, purchased, or maybe a little too "stand-way-off" scale. With practically no static judging at all (only five points static are possible), I predict this event will become very popular with today's modeler who likes to fly a scale model, but doesn't wish to commit to the considerable time and effort it takes to build one from the ground up. There is some legitimate question, however, as to whether such a low-key event such as Fun Scale would really be appropriate at a Nats, where the emphasis is on competition and determining National Champions.

Regardless of which scale event you plan on entering at this year's Nats, there are few basics you'll want to double check before you come.

1. Make sure your documentation conforms to the event in which you are entering. Sport Scale is now limited to eight pages, including three-views (three-views count as one page regardless of size or number). Included in your documentation in all R/C and C/L Scale events must be a signed declaration of the components of the model (cowls, wheel pants, dummy engines, etc.) which you did not construct

*Continued on page 100*



Well known in the Ohio area for his models built in the spirit of Stand-off, John Hodges of Massillon, Ohio earned Second in Military Stand-off with this Miles M20 MK. 1 at the Toledo show this year.



This 1/4-scale full-span Cub took Second in Non-Military Stand-off for Donald Hutchings of Valley City, Ohio. Note cabin treatment on this Sig kit.



An A6M2 Zero by Fred Wolf of Pittsburgh, Pennsylvania. Model appeared to be metal covered, and featured an outstanding dummy engine. A real crowd pleaser.



The winner in Non-Military Stand-off was Mark Frankel of Gladwyne, Pennsylvania with his Gates Learjet 35A. A large model at 1/6 scale, it spans 83.5 inches and is powered by two Rossi .65s.



Third Place in Military Stand-off went to Bob Boswell of Hamburg, New Jersey for his PB5Y-5 Catalina. Powered by two K&B .61s, it is a large model featuring some detailed rivets throughout.

# ALL ABOUT ARFS

By ART STEINBERG

• The first ARF I ever saw was way back during the Vietnam conflict when I was stationed at the U.S. Naval Hospital on the island of Guam in the Marianas chain. The year was 1968, and the model was a really nice little job made entirely of foam similar to the foam models available to us today. It was about 50 inches in wingspan and came ready-painted in a solid orange color. As it was intended for only two or three channels, it had no provision for ailerons. That model went immediately into storage, and I didn't get it flying until about five years later back in California. When I finally got around to it, I installed a Fox .15 RC engine and a Kraft three-channel radio. I then proceeded to fly that little model for hundreds of flights until it was literally too worn out to go on.

The second ARF I was exposed to was a three-channel model put out by Lanier R/C, a sport trainer type called the Transit. Lanier really occupies a prominent place in the history of the radio control sport/hobby, as there is no doubt that this company was almost single-handedly responsible for the

popularization of the Almost-Ready-to-Fly airplane as we know it today! Lanier R/C used to offer a wide selection of ARFs back in the sixties, and even though the company has changed hands since then, today they offer a line of products encompassing everything from trainer types to hot sport planes, and even a standoff scale model P-51 Mustang. Recently I had the pleasure of revisiting two examples of the Lanier offerings.

When I opened the box containing the Transit I didn't know what to expect after all these years. I suppose I was pleased to find that there wasn't much change in the basic airplane, except that the instructions were now a bit more comprehensive.

The wing is supplied in two halves, constructed of sturdy foam and covered with a thin but rigid plastic material which serves to make a very durable and fuelproof skin. The wing and tail surfaces are covered with this white material, and no painting or finishing is required. The wing is quickly joined together using the strong wooden pre-shaped mainbrace, applying a liberal

amount of epoxy to all surfaces which are to be mated.

The fuselage is supplied in one piece, with a white upper section and an attractive blue lower half. The material used here is a type of ABS plastic reinforced with plywood bracing in the forward cabin area.

The motor mount is made of thick plywood and is an example of what is commonly referred to as "crutch construction." This crutch is firmly attached to the plywood fuselage bracing, and the engine is mounted directly to it, using screws. Incidentally, this type of engine installation is really made to order for the new socket head wood screws distributed by Du-Bro Products. I have used these on a number of engine mounts and have been thoroughly pleased with them, as they seem to be resistant to working loose. Lanier does not require that the builder mount the crutch, as

*Continued on page 97*



Capt. Charles Strange poses with the Lanier R/C Transit just before its maiden flight.



The sleek Invader ARF flashes by in a low pass.



The Invader looks a little menacing in its USAF paint job.



The Super Tigre S40 appears to have been shoehorned into the Invader.



While the Transit is a conventional sport trainer in looks, it can be dressed up to be quite attractive.



# PLUG SPARKS

By JOHN POND

• Mention has been made before of SAM in Italy but finally the news from Ferdinand Gale, Via Marconi 10, 28042 Baveno (NO), Italy, clarifies the state of the SAM movement. Ferdi goes on to say the reason for the delay has been due to surgical operations. That will hinder your activities!

Ferdinand says old timer activity started a few years ago in a rather informal way. Then two years ago, an old timer meeting was held at the old sailplane airport at Pavullo. From this, the Society was established with the name of "Associazione Italiani Aeromodellismo Storico" (Italian Association for Historical Aeromodelling). This became SAM Chapter 62 and has become known as "SAM-Italy" or "SAM-I" for short.

Decals of this association are basically the regular SAM decal with the blue, white, and red being changed to the Italian national colors, green, white, and red with the association name on top of the shield design.

At present, two meetings and two competitions have been held. Inasmuch as the activity is in its infancy, the grey-haired boys (like Ferdi) prefer leisurely flying, not the hard competition. We are corresponding with United Kingdom, France, Germany, and Austria. SAM Italy, uses the following rules:

**1. Construction:** Model must conform exactly to the original. No deviation of any kind is permitted for free flight. Structural reinforcements are permitted for radio control but only with old time materials. Kevlar, nylon, fiberglass, carbon and boron fibers are banned, along with all materials not available before their cutoff date of 1950.

**2. Scoring:** A total of the flight time plus the score of static judging based on the seniority of the design.

Since original O/T engines are quite scarce and classes hard to define, the flight

time is modified by the ratio of the total time divided by the engine run time.

For radio control, it appears the ratio will be the flight time divided by the "hands off" time (lowest ratio would win here). SAM Italy feels the models were originally designed for free flight; hence, they should fly well without radio assistance. The longer the better!

**3. Categories:** Two classes have been established with the events listed.

## Free Flight

Antique Rubber	1939 cutoff
Antique Wakefield, 6 oz	1936 cutoff
O/T Rubber	1940-1950
O/T Wakefield, 8 oz.	1937-1950
O/T Power	1950 cutoff
O/T Glider	1950 cutoff

## Radio

O/T Power	1969 cutoff
Vintage Power	1950-1956
Nostalgia Power	1969 cutoff
O/T Glider	1950 cutoff

Of particular note is the Nostalgia event where any type engine may be used. All other events penalize the use of late engines. This is the only event Monokote may be used.

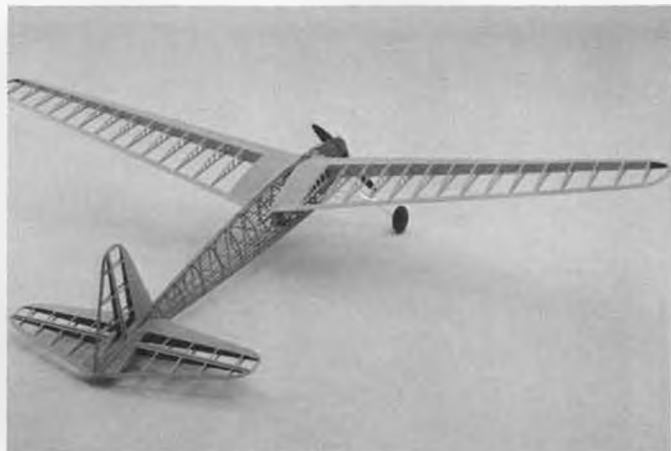
SAM Italy progress has consisted of two meetings, the first, a national meeting organized by SAM-I in Udine last September 1987. Sixty-four classic models were on hand. A low profile competition for free flight was organized on the spot, much to everyone's satisfaction.

Ferdi also states his chapter will send models for proxy flying at the SAM International Champs at Reno, Nevada. He also included some photocopies of the article "Old Timer Gazette" which appears in the national magazine, *Modellistica*.

Gale sent some interesting photos, so let's take a look at what an O/T R/C model looks like in Italy. Seen in Photo No. 1 is a model (no-name) by Arve Mozzarini that features wooden prop, turned cork wheels, inverted diesel engine, and cowling made



2. The canard design is an authentic old time rubber model of 1929! Seen at Pavullo, 1985, at the Italian Nationals meet.



3. Typical fine Italian construction, a Moar by Arve Mozzarini built in 1940 and since rebuilt for today's competition.



1. An Italian O/T R/C model built by Mozzarini. Seen here at Udine, in 1987. Wood prop, turned cork wheels.

of lady hosiery and urea glue; all in the character of the original. However, the model, being covered with Monokote, was "docked" fifteen points in static judging. That's rough!

Photo No. 2 shows a very interesting pusher design of 1929 vintage. Unfortunately, we don't have any information from Ferd Gale.

Italians have been noted for their outstanding attention to detail in their full-sized aircraft and their models also reflect this care in construction and clean design. Photo No. 3 illustrates this point by showing Arve Mozzarini's "Moar" before recovering. This model was originally built in 1940. With the inception of SAM, the model was a natural under present rules. Plans are available from SAM-Italy.

#### SCIF SPRING KICK-OFF ANNUAL

Another excellent free flight meet was staged by the SCIF (Southern California Ignition Fliers) on March 6th at Taft. Weather was just great with high broken clouds (no one would climb that high and stay in sight). Best part of all was the variable wind that prevented many out of sight flights.

C.D. Jim Kelly also reports a Junior event, "Rubber Model in a Sack" was quite popular. The Juniors went for this event in a big way; model cost was \$1.69 plus entry fee of \$1.00. Winning flight with a Guillow Strato Streak was 1:28 by Gene Terra. This was a surprise to the old members that a Junior would display such a knack for getting a model to fly properly. As Kelly points out, the younger set thought the prizes were great. This is one way of getting those Juniors into the old timer free flight ranks. We're gonna need 'em! We need replacements!

Mik "Jasper" Mikkelson was most kind to supply photos of the action and modelers attending this meet. Seems like everyone was waiting for this particular annual. Of course, when presenting photos, we like to show the rare or off-beat models that are only built once in a while.

Such is Photo No. 4 showing a little known Reinhard "Gooseneck" powered by a Super Cyclone. One reason for the relative obscurity of this model is that it appeared in a 1941 issue of *Model Craftsman*, a magazine devoted to all phases; railroading, boating, race cars, and model airplanes. Not too many of the aviation-minded modelers purchased *Model Craftsman* in those days.

Talking about rare birds, Brad Levine stood the boys on their ears when he showed up with an "Agaton" a pre-WWII Swedish design resembling a Modelcraft Miss Tiny or the larger Pacific Ace. According to "Mik," the model, powered by a Morrill Hornet 19, had marginal flying ability. (Ed. note: this is what we call sport flying!)

Kelly also points out with good rubber again available, the rubber events have proliferated into "small" and "big" classes of cabin and stick. The dividing line for small is up to and including thirty-six inch wingspan.

A good shot is seen in Photo No. 6 showing Brad Levine giving Sandy Chapin a hand with the thrust adjustment before launching. Looking on with interest is Phil



4. SCIF member, Laary Clark with little-seen Gooseneck design by Reinhard appearing in *Model Craftsman* magazine.

McCary, a rubber modeler of considerable repute himself.

Many of the Northwest boys were attached by the early Spring weather and Bob Schafer from SAM 8 was no exception. Seen in Photo No. 7 with a George Reich design, the Albatross, powered by a Super Cyclone, the popular choice for this design. The model is not the easiest to "sort out." We hope to get good reports from "Fritz" (Bob's name at the old San Francisco Junior Museum).

We won't give the results as there were 15 events. To list these would take another is-

sue of *Model Builder*. Of particular note is the emergence of Joe Bilgri into old timer flying. Joe entered three out of four winning first in Class C Rubber Stick, third in large cabin rubber, and seventh in the large stick event. Not a bad showing for a guy who has buried himself in Oroville!

Another out-of-stater, Nevadan Fred Caballero of the VAMPS Club, did himself proud by taking first in Class B Cabin and Class B Pylon. The big winner of this meet was Bruce Chandler who showed the boys when he is not the Contest Director what they have been getting by with, took firsts in



5. A rare bird by Brad Levine, a 1940 Swedish design called the Agaton. Owes its parentage to the Miss Tiny by Modelcraft. Photos: Mikkelson.



6. All good rubber modelers from SCIF SAM Chapter: McCary, Levine, and Chapin. Considerable concern over the thrust adjustment.



7. Bob Schafer, SAM 8, seen at SCIF Annual with a Reich Albatross, Cyke powered.



8. Classic shot of a Forster 99 being tuned by Jim Adams. Powerhouse model, Larry Jenno does the holding. Photos: Mikkelsen.

Class A Cabin, 30 Second Antique, second in Class C Cabin, thirds in Class B Cabin and Class B Pylon. Whew! Wotta workout. Bruce has been heard to say he will have to get a larger station wagon for all the hardware!

In wrapping this report up, we simply must run Photo No. 8 showing SAM Speaks Editor Jim Adams, starting up the Forster 99 in his Powerhouse. Larry Jenno holds the model to keep that huge 18-propeller from chewing up Jim. Al Hellman is seen on the extreme right.

#### O/T R/C Glider

Things are really popping on the West Coast for ideas; the latest being the experimental old timer, R/C Glider event staged at the SAM 26 Spring Annual.

Headed up by Bob Angel, Ron Doig, and company, a very successful meet was staged at Taft, March 20th. The event was so successful, the SAM Contest Manager (John Pond) for the 1988 West Coast SAM Champs and the 1989 SAM Champs will feature O/T towline R/C gliders. Ron Doig will be the event director on both years.

O/T F/F Towline gliders were a regularly scheduled event in the early days of SAM Champs. The event was eventually dropped because of lack of entries. It appears that R/C would be the answer for the comeback of O/T gliders. If this recent SAM 26 contest is any indication, then O/T gliders are the latest rage. Here are the rules subject to modification at the end of the flying season.

1. Any glider, or model of a full scale glider/sailplane which was first designed, kitted, or had plans published prior to December 31, 1946 is eligible to compete.

2. All appropriate and applicable SAM R/C rules will be followed with respect to plans, construction methods, allowable modifications, number of models; plus all flying rules, such as on-field landing requirements, flyoffs, etc. The only exceptions follow:

3. Wingspan is limited to 120 inches, platform measurement. Scaling is permitted. No wingloading requirement.

4. ROG is not required. Timing begins at towline release and ends at initial touchdown. Every launch, or release is an official flight. No attempts.

5. Contest management will provide at least one launch device (hi start or winch). Maximum line length from ground anchor point to glider is 700 feet. Any contestant may provide his own launching device, provided he allows any other contestant to use it.

6. Three official flights are permitted, with a time target of exactly 20 minutes cumulative for all flights. Fewer than 3 flights may be taken. Each second over 1200 will be deducted from the flight score.

We would be remiss if we missed Phil Bernhardt's (SAM 49 newsletter editor) comments:

"I really like the time target idea, as it: 1) introduces a new element of skill into the game—knowing when to come down out of a thermal and fly an approach that will get you on the ground exactly when you want to be, and 2) keeps everyone in the running right up to their last flight, which is a sure way to keep the excitement level high



among both pilots and spectators alike."

#### ENGINE OF THE MONTH

For this month's engine, we are indebted to Jim Persson of 3749 Gettysburg Court, Pleasanton, California 94566, who has kindly allowed us the use of his father's engine (again Jim Persson). To clarify things, the Hiller engine was designed as a race car engine. The MKI version allowed for some conversion to free flight but the MKII crankcase was built into the spur gear transmission.

Surprising how many people are not aware but Stanley Hiller Jr. of helicopter fame was the designer and manufacturer of the Hiller engine designed to suit his Hiller Comet car. There were also two models of the Comet car, the latter making its appearance in late 1941.

The particular engine we used to produce the drawing was used by Jim Persson's father exclusively in race car competition. Jim Persson Sr. was well known around the tracks in the forties, racing mostly in Northern California; i.e., Oakland to Fresno with an occasional jaunt to Los Angeles.

Although the engine was advertised in *Track & Rail*, a regional publication put out by Bobb, it wasn't until the January issue of *Model Craftsman* came out with a full-page announcement. The car came complete with engine and body for \$28.00, fully assembled. This was a real bargain! All wiring was installed with simplicity and excellence to eliminate ignition troubles. In fact, the ad stated all you had to do was to unpack it, fill it with gas and oil, and let'er go. Certainly did much to add to the popularity of race cars.

In the follow-on advertisement in the February issue of *Model Craftsman*, the Hiller people came up with another tricky gimmick, this time a center post for running the car. According to their claims, any hard level surface could be used by installing an 18-inch long ground tube. Into this, a steel center post, fitted with ball bearings, fits into the tube. Fifteen feet of cable with necessary clamps and swivel was provided. If so desired, additional cable could be obtained. Here was a system that would allow one to run in the tennis court, school playground, or your own backyard!

Not one to sit on his hands after offering a "portable garage" to carry the vehicle, Hiller, in the April 1941 issue of *Model Craftsman*, offered a new MKII Hiller Comet race car along with the MKII Hiller engine. Also offered was a hand starting device that took a lot of drudge out of starting the engine but also a fueling can with a long spout filler and pressure device for forcing fuel into the tank.

Another attractive feature of the "1942" Hiller Comet advertised in the December 1941 issue, now priced at \$36.00, was the choice of color in the baked enamel coat: red, white, blue, silver, yellow, and green. Neat idea!

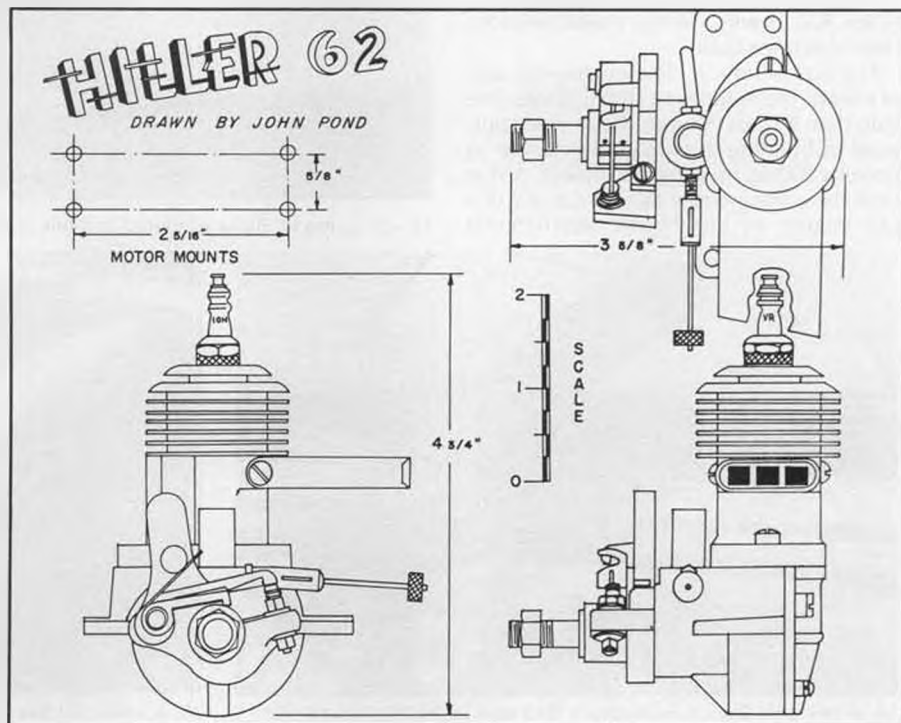
To give the competition something to shoot at, Hiller Industries, located at 311 California St. (the Robert Dollar Building in downtown San Francisco's financial district) announced a new integral spur gear and a double action timer cam together with a foolproof battery case holding two



10. The original *Flush Mite* being tested by Frank in 1937. Model was later lost.



9. The 1936 *Texaco Winner* by Frank *Flush* sits on the Wayne County Airport runway. It is now in the AMA museum.



flashlight dry cells (later increased to three). All this was Smith Spark Coil, VR-1 Champion Spark Plug and metal-covered condenser.

Stanley Hiller didn't waste any time in the July 1941 issue of *Model Craftsman* by advertising a guarantee of all parts and performance. Cars were tested on the Hiller track before shipping. It truly was a shame the war came along and Stanley Hiller got interested in the design of a helicopter bearing his name. All production efforts were directed to this effort. One can only speculate how far the Hiller equipment would have gained popular acceptance. It certainly wasn't from the lack of finances, production, ideas, and advertising.

Hiller engine specifications are a little hard to come by as only the displacement of .620 cu. in. was given, making it a Class B Race Car. (Class C in aircraft.) The engine with a machined cast iron cylinder and die cast aluminum crankcase featured an aluminum piston with three Perfect Circle steel rings. Other features included a duraluminum connecting rod and high speed bronze "oilite" bearings.

**50 YEARS AGO, I WAS. . .**

For the benefit of you "Johnny-come-latelys" who don't know who Francis Tlush was, Frank was the winner of the 1936 Texaco Event. Photo No. 9 shows the winning model on the runway of Wayne County Airport, Detroit, Michigan. Tlush won the Texaco Event with the spectacular time of 45 minutes, 34.5 seconds.

In his letter to this columnist, Frank says, "As we move along, we go through our possessions and collectibles trying to clean house; reduce our inventories, give or donate to worthy people and organizations the cherished things that made history in the thirties."

Another pic by Francis Tlush (Photo No. 10) is a shot of Frank cranking up his original "Mite" model. In recent years this design has become extremely popular in old timer R/C events. Many scaled versions have also been built.

Francis continues: "The engine was one of a kind. The engine is a slightly larger version than a Class A type. The primary purpose in building this small engine was to power a 200 sq. in. wing area model. At that time there was no rule against the use of a gas engine in the Moffet International

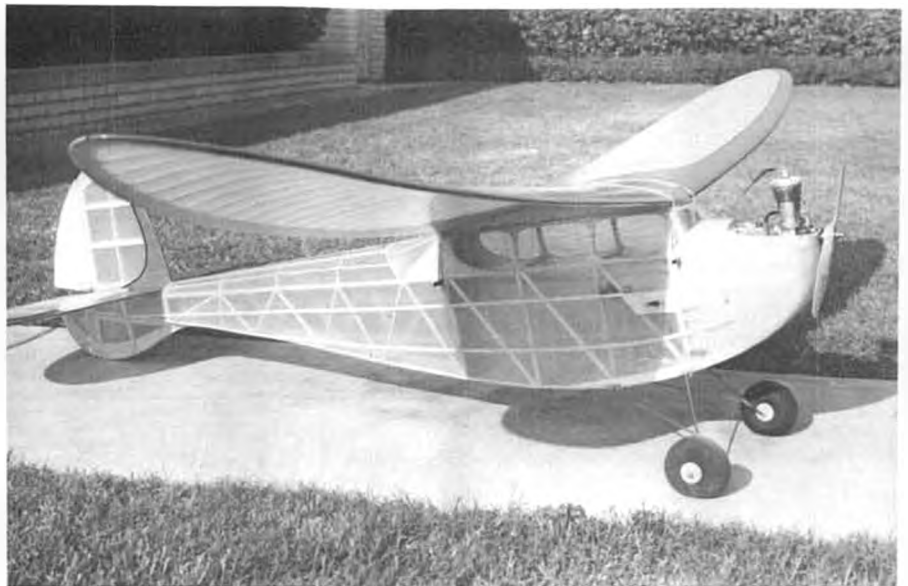


11. A Korda Victory kitted by Scientific Model Airplanes, built by Roger Gregory. It's a super flyer. Photo: Johnson.

Trophy class. The idea was not new as Maxwell Bassett tried it and won some meets locally.

"However, the engine would not cooper-

ate at the 1937 Detroit Nationals. Came back home, made a few refinements, and it became a real performer. Needless to say the combination was a real winner. A ther-



12. Dr. James W. Buice produced this fine scaled Scotty Murray Topper.



14. A rare one! Dick Schumacher's Pixy seen at the Model Engineer Exhibition in '87. Power is HP VT21 4-stroke. Photo: K.Harris.



13. A well-built Bay Ridge Thermal Magnet seen at Old Warden Aerodrome Vintage Rally. Photo: K.Harris.



16. A good-running GHQ engine in Don Bekins' version of a Lanzo Bomber won the Texaco event. Wonders never cease!

mal took it away to parts unknown. It probably came down in New York City or in the Jersey Meadowlands. There simply wasn't any way to chase the model across these flats."

Francis sent in a few more photos which we will probably use in later issues. Tlush says his brother, Charlie, is still active at 86 with his machine shop still trying to invent things.

Frank lives in Cape Coral, Florida, for the winter and keeps busy fiddling with his boat. "Never can tell when you get steam up and go fishing. Then I use all those sophisticated electronic fish finders. Ironical! Sorry to say the body doesn't cooperate but have no complaints as we are still *DOING!*"

#### O/T ELECTRIC R/C BREAKTHROUGH

Talk about exciting things happening in the month of March, the recent meeting of all West Coast SAM Chapters (California and Arizona) proves that with good leadership in the form of moderator, Don Bekins, an agreement was reached which will be binding on all chapters for the year 1988. Now we are getting someplace!

The columnist acted as Secretary (he had to take notes anyway), hence, he was on the final preparation of the rules. Bekins was clever in bringing down his word processor and printer. Before the SAM 26 meet was over, all clubs had a copy. This columnist can't help but agree this is a tremendous step forward in the advancement of O/T Electric Events. Hopefully these will lead to a set of national rules.

#### 05 ELECTRIC R/C OLD TIMER Provisional Special Event Rules Limited Motor Run & Texaco Combined Preamble

These rules were drafted at a meeting at Taft, CA and agreed to by representatives from SAM 21, SAM 27, SAM 30, SAM 49, SAM 51, and with written input from SAM 41. SAM 26 and SAM 31 have also agreed to abide. These will form the basis for the 1988 interim electric power rules. A review will be conducted in 1989 to evaluate the rules for suitability.

#### SECTION I

##### MODEL REQUIREMENTS

- A. Any SAM recognized Old Timer gas model may be flown in this event. The model may be proportionally scaled up or down from the original size plans.
- B. Unless stated otherwise, the model shall



15. Graham Sinclair with his prize-winning Flying Quaker, Saito 65-powered, seen at the PDARCS Field, near Melbourne, Victoria.

- conform to applicable SAM 1988 R/C Old Timer Rules.
- C. There is no minimum or maximum size or weight of the model for this event, but (per SAM Section I, Par. 5) it must have a minimum wing loading of 8 oz./sq. ft. Wing area is calculated from PLAN-FORM (not projected) area.

#### SECTION II BATTERY, MOTOR, POWER CONTROL & PROPELLER REQUIREMENTS

##### A. BATTERIES

1. A maximum of 7 cell Ni-cad rechargeable pack with a MAXIMUM RATED capacity of 800 mah shall be allowed.
2. For the electric Texaco event only, the model must weigh a minimum of:
  - a. 5 ounces per cell for ferrite motors.
  - b. 6 ounces per cell for non-ferrite motors.

##### B. MOTORS

1. Any direct current, permanent magnet electric motor up to and including any production 05 motor or less may

- be used. (i.e. 035 motors are okay)
2. A production 05 ferrite magnet motor is defined as follows:
  - a. Frame size: 35mm diameter by 49mm long maximum.
  - b. Armature displacement: 9.5 cc maximum.
  - c. Motors must have a 3-bar commutator.
  - d. Motor armature shall be wound with not more than 28 turns of wire.
  - e. Motors must be readily available through national hobby trade.
3. A production 05 non-ferrite magnet motor (including, but not limited to) is defined as follows:
  - a. Armature displacement: 10.5cc maximum.
  - b. Motor armature shall be wound with not more than 7 turns of wire.
  - c. Motors must be readily available through national hobby trade.
4. Motors may drive the propeller directly, or indirectly via a (gear or

*Continued on page 95*



17. 1988 SAM Champs' R/C C.D. Buck Zehr with his Cyke-powered Sailplane. He's won enough trophies!

# FOO-2-U-2

By DON SRULL. . . This is a scaled-down version of Ron Shapton's .020 scaled-down version of the original 1939 pylon design by Dick Obarski. This new version uses simple electric power, and it's a gem!

• Many antique and old-timer free-flight power designs are ideal subjects for the new mini-electric motor systems. When scaled down to between 80 and 120 square inches of wing area, these little "scale" models are wonderful sport flyers. You can't beat them for simplicity, and they all are sure to trim out easily and fly well. One of the finest old-timer pylon designs is Dick Obarski's 1939 FOO-2-U-2, a simplified and further development of Carl Goldberg's classic "Zipper." The FOO-2-U-2 in recent years has again become a formidable competitor in the form of Ron Sharpton's .020 Replica version, published in the November 1975 *Model Builder*. Scaling down the 150-square inch .020 Replica to just over 100 square inches and simplifying somewhat gives us a perfect sport design for a two- or three-cell mini-electric motor system.

I used a VL Products model HY-70 motor, flying the model on both two and three cells. Other mini-electric motors are suitable, including the MRC unit which comes in their small foam ARF electric free-flight; the Ferrell Enterprises .007 motor; and the

new Knight and Pridham KP01 from merry old England. Two features of the VL motor which make it particularly nice for the old-timer mini-Replicas (a new class?) are: the easy radial mounting directly onto a flat firewall and the incorporation of a propeller freewheeling device. The freewheeling prop will disengage from the motor drive pinion in case of an accidental "hard landing" with a full charge shortly after launch. This will save the motor and batteries from damage due to the high current from a stalled motor. The freewheeling prop also disengages after the power is exhausted and reduces the drag of the gliding model.

Construction of the mini-FOO-2-U-2 is very conventional, and the plans are, hopefully, self-explanatory. Remember to use light balsa for all parts except the wing spars and leading edge. These later pieces should be of stiff, straight balsa stock. Keep the model as light as possible. The only item requiring a little extra care is the forming of the wing saddle atop the pylon. An easy way to assure a perfect fit to the wing's undercamber is to fit and glue the 1/16-inch sheet balsa saddle pieces together onto the

bottom surface of the finished and covered wing. Some Saranwrap or wax paper to prevent sticking and the use of a little thick cyano glue makes this job quick and easy. Glue the pylon to the saddle before removing from the wing.

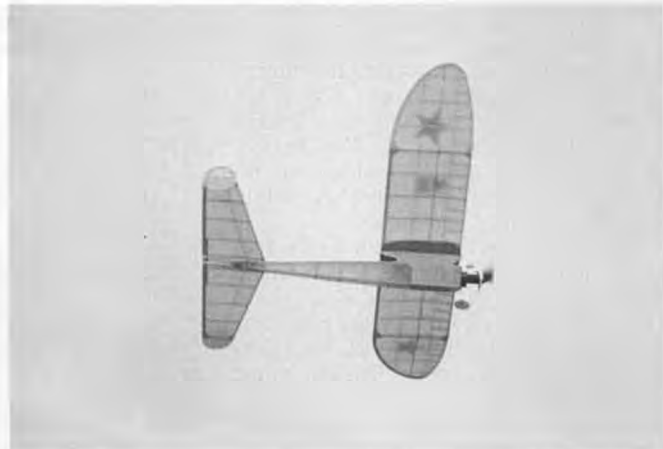
Cover the entire model, including sheet balsa parts, with light Japanese tissue, and finish off with three or four coats of low shrink dope such as Sig Litecoat. Before installing the mini-motor, make a dummy spark ignition engine from a Williams Bros. plastic cylinder and contact cement it to the electric motor. This is a "scale" model after all.

Motors other than the VL require that you install batteries, switch, and charge jack in the fuselage prior to covering. The two-cell VL model HY-70 motor is self-contained outside the firewall and doesn't require any inside installation. In any case, installing these little electric motors is very simple; simply follow instructions and keep the batteries as far forward as possible, since the FOO-2-U-2 has a very short nose and a ten-

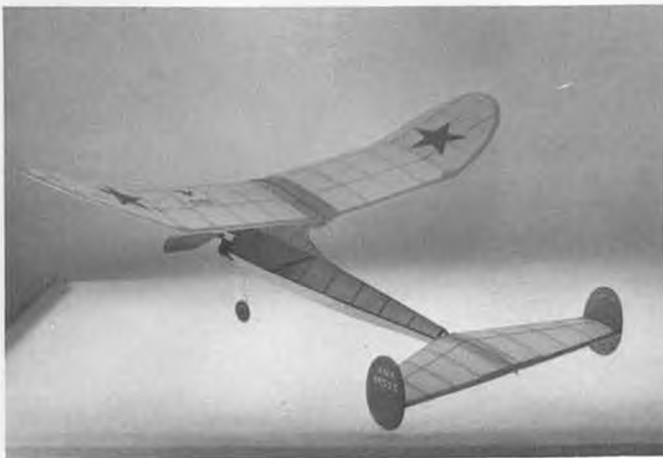
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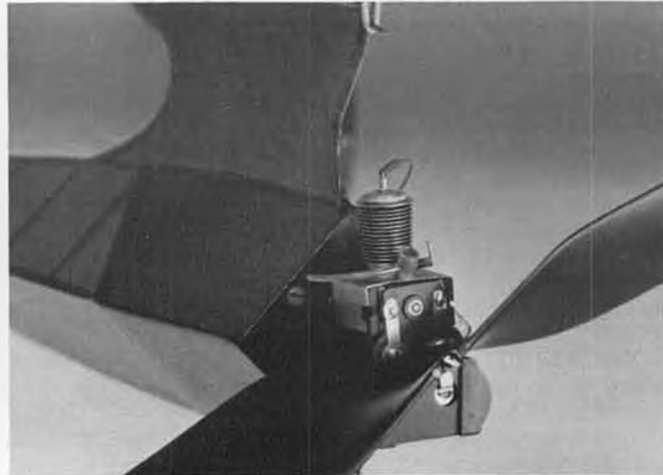
Author launches his nifty FOO-2-U-2, a scaled-down version of a 1938 OT classic design.



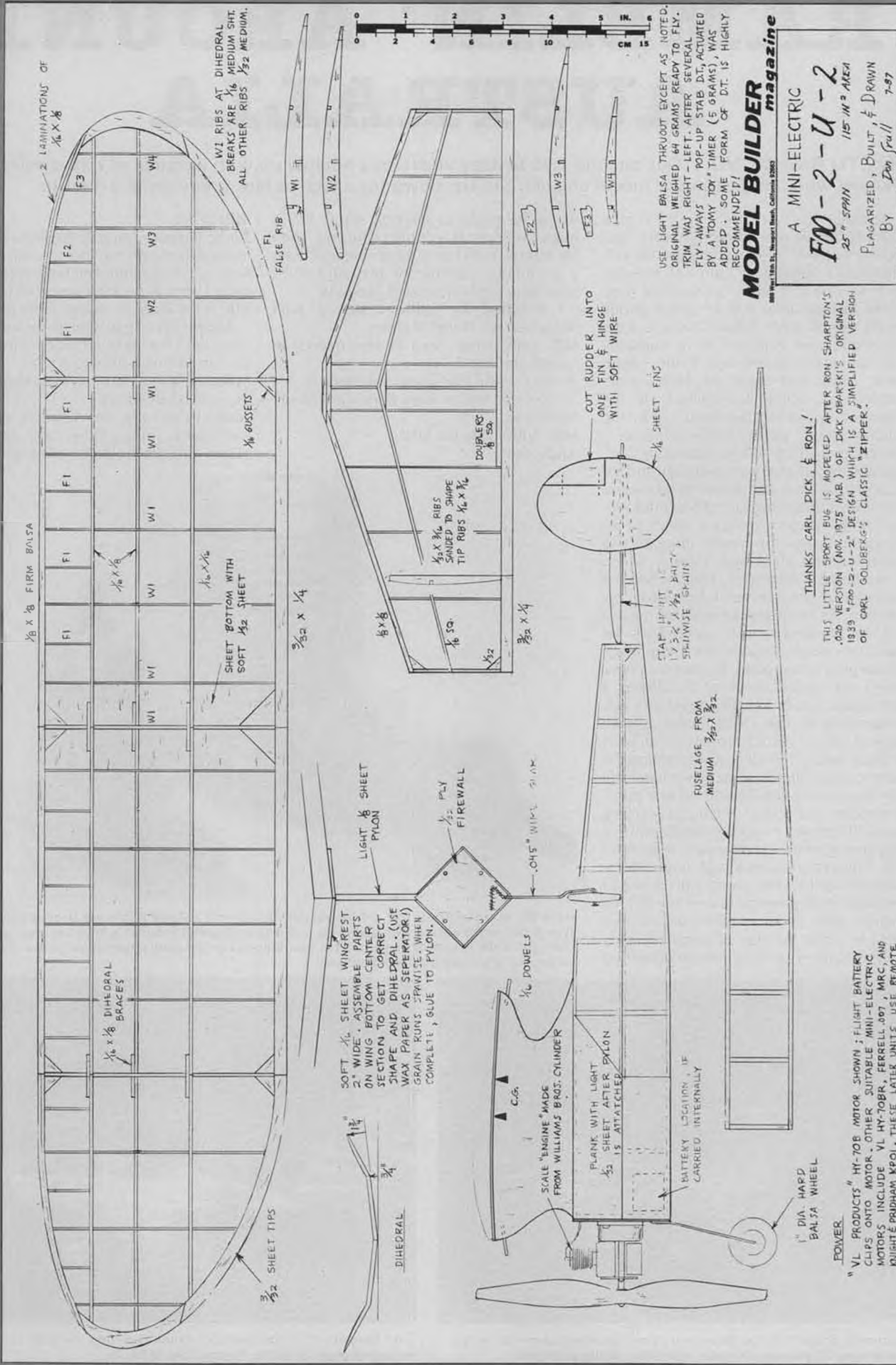
Overhead, the FOO shows off its unmistakable profile.



Conventional construction and light balsa result in a good-flying, simple model that makes for a lot of enjoyment at the field.



Dummy engine was made from a Williams Bros. plastic cylinder.



1/8 x 1/8 FIRM BALS  
2 LAMINATIONS OF 1/16 x 1/8

W1 RIBS AT DIHEDRAL BREAKS ARE 1/16 MEDIUM SH. ALL OTHER RIBS 1/32 MEDIUM.

1/16 GUSSETS

SHEET BOTTOM WITH SOFT 1/32 SHEET

3/32 x 1/4

SOFT 1/16 SHEET WINGREST 2" WIDE ASSEMBLE PARTS ON WING BOTTOM CENTER SECTION TO GET CORRECT SHAPE AND DIHEDRAL. (USE WAX PAPER AS SEPARATOR!) GRAIN RUNS SPRAWISE. WHEN COMPLETE, GLUE TO PYLON.

LIGHT 1/8 SHEET PYLON

1/32 PLY FIREWALL

.045" WIRE SHANK

1/16 DOWELS

SCALE ENGINE MADE FROM WILLIAMS BROS. CYLINDER

PLANK WITH LIGHT 1/32 SHEET AFTER PYLON IS ATTACHED

BATTERY LOCATION, IF CARRIED INTERNALLY

FUSELAGE FROM MEDIUM 3/32 x 3/32

DIHEDRAL

3/32 SHEET TIPS

1/16 x 1/8 DIHEDRAL BRACES

1/16 x 1/8 RIBS SPRINGED TO SHAPE TIP RIBS 1/16 x 1/8

DOUBLERS 1/8 SQ.

1/16 SQ.

3/32 x 1/4

1/16 x 1/8

1/16 x 1/8

1/16 x 1/8

1/16 x 1/8

1/16 x 1/8

1/16 x 1/8



USE LIGHT BALS THRUOUT EXCEPT AS NOTED. ORIGINAL WEIGHED 40 GRAMS, READY TO FLY. TRIM WAS RIGHT - LEFT. AFTER SEVERAL FLY-AROUNDS A POP-UP STAB DID, ACTUATED BY A TONY TOM TIMER (5 GRAMS), WAS ADDED. SOME FORM OF DT: IS HIGHLY RECOMMENDED!

**MODEL BUILDER** magazine  
800 West 15th St., Newport Beach, California 92653

A MINI-ELECTRIC  
**F00-2-U-2**  
25" SPAN 115" IN<sup>2</sup> AREA  
FLAGSHIP, BUILT, & DRAWN  
BY Dan Sull 7-87

Plan No: 7-88-07.

THANKS, CARL, DICK, & RON!

THIS LITTLE SPORT BUE IS MODELED AFTER RON SHARPTON'S .020 VERSION (NOV. 1975 M.B.) OF DICK OBARSKI'S ORIGINAL 1939 "F00-2-U-2" DESIGN WHICH IS A SIMPLIFIED VERSION OF CARL GOLDBERG'S CLASSIC "ZIPPER".

POWER  
1" DIA. HARD Balsa WHEEL  
" VL PRODUCTS" HY-70B MOTOR SHOWN; FLIGHT BATTERY CLIPS ONTO MOTOR. OTHER SUITABLE MINI-ELECTRIC MOTORS INCLUDE VL HY-70BR, FERRELL 007, MRC, AND KUNIG & PRUDHAM KPOI. THESE LATER UNITS USE REMOTE (NOT IN THE FUSELAGE) BATTERIES, CHARGE JACKS, & SWITCHES.

# RAMBLIN' AROUND AUSTRALIA

By STU RICHMOND. . . Our rambler is in Sydney where he's hooked up with a couple of rare species; two Aussies who build exquisite model engines. Stu sits down for a face-to-face interview this month.

• Australia has very few model engine builders. You've met Gordon Burford, and you'll meet Ivor F (these fellows are collaborating to reproduce Elfin 1.49 diesels). Andy Kerr owns a precision machine shop in the Sydney area, and he has a buddy (mate) named Steve Rothwell who is a design/production engineer for a company that maintains underwater diving equipment. Andy and Steve are both model builders, and neither are satisfied with the engines they can buy for speed and for the Scramble event, so they build their own!

Andy picked up fellow American Gary Gau and myself, put us up overnight and fed us, and took a day off of work to take us on a ramblin' sightseeing tour of beautiful Sydney. Andy's factory makes a series of replacement parts for model engines and makes a racing .40 of Andy's design which shows fantastic potential. The .40 has the most-cleverly engineered lubrication flow I've seen. It's an engine designed to run fast and not break—one that speed fliers the world over might someday welcome when prototyping is complete. By contrast, Steve enjoys the Scramble event I outlined a while back where a small engine in a not-too-good-flying free flight model gets an elapsed hour to record as many air/seconds of flight time as possible to determine the winner. Steve's approach to power is a vastly over-engineered over-structured one cubic centimeter (.06 cubic inch) easy-starting diesel. It features a locking needle valve, a drag spring for the compression lever that's a la Chinese rope trick and ought to be patented world wide, along with dual ball bearings! Steve gave me one of his "R 100" engines with serial number 010—a true treasure. After the day of ramblin', Andy took us to meet Steve at the machine shop

where he works to see how the R 100 is made. My camera recorded it for you. Then Steve took us all home for dinner and beer; a wonderful evening for two Americans who were ramblin' around Australia.

I recorded the follow interview with Andy Kerr for *Model Builder*:

**MB:** Andy, what's your current interest in model airplanes?

**Andy:** Control line speed. I actively fly FAI 2.5cc speed with a Rossi filled up with different bits.

**MB:** Who made the bits?

**Andy:** Me!

**MB:** Why?

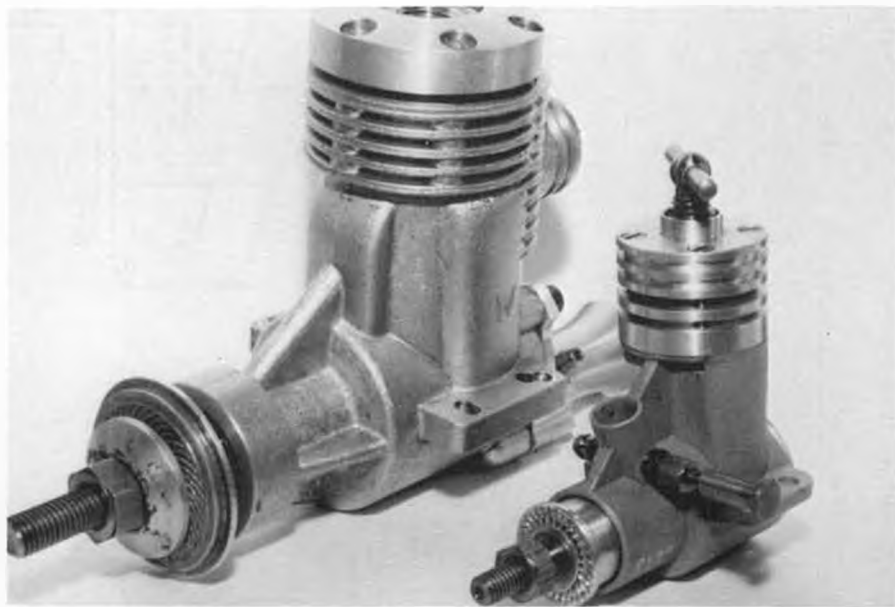
**Andy:** Because some of the Rossi bits tend to break the way I run them, and having the necessary machining/engineering facilities, away I went in my own way with bits.

**MB:** Is the Rossi .15 doing better now?

**Andy:** I've not had a break for some time, other than the odd circlip doing its own little rotten thing it likes to do.

**MB:** How about the band that's shrunk onto the crankshaft's disc?

**Andy:** I don't use 'em. I simply made my own crank. I use a Rossi case, backplate, clamp ring (to hold the glow plug), and



Australia manufacturers few model engines. On the left is Andy Kerr's pre-production prototype 6.5cc speed engine with elaborate and well-engineered internal lubrication passages. On the right is the Scramble engine of 1cc that features engineering uncommon to any tiny diesel engine; it's made by Steve Rothwell.



Mammoth Scale P-26 Pea Shooter by Geoff Burfield spans 88 inches and weighs 27 pounds. JR radio and Webra Bully on board.



Gary Bergen's 102-inch span Chipmunk is among the large scale models becoming popular in Oz. Photos: Leo O'Reilly.



Steve Rothwell holds a handful of parts for what has to be the world's most rugged 1cc (.06) model diesel engine. Parts are produced on advanced machinery in Australia.

that's where it stops. And I do okay by Aussie competition standards.

**MB:** I saw a big .40 size racing engine you made; please tell the readers about it.

**Andy:** A friend of mine in New Zealand built a .29 for nitro speed U-control with a pipe, and, although he came from a farming background, he did a *brilliant* job. He did one of the better jobs worldwide. He made about 10 to 12 for the boys there and a few for the guys in Australia too. We've been good mates because of our similar approach to modeling. I've bought his crankcase die and now I'm filling them with bits of me own making to convert them up to a .40 which is more viable in the marketplace. Since I'm into metal manufacturing for a living and being an avid model builder, I'd love to make a small business of limited production model airplane engines that sell. I love model building; I've been doing it since I was thirteen. I've probably stuffed (crashed) more engines than I'll ever service. You keep on chasing the elusive dream, I suppose. That's what motivates people—and me.

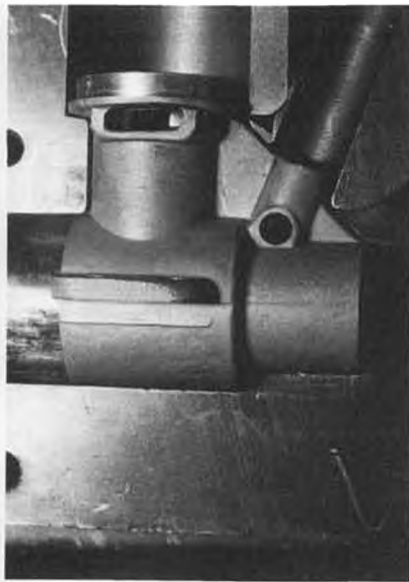
**MB:** Andy, I can see how you and Steve run parallel in model engine ideas.

**Andy:** Steve's more methodical than me; I like to be innovative, but he does too.

**MB:** You two guys make an unbeatable pair. When can you accept orders for your .40 speed engine? Steve says he can accept orders now for his "R 100."

**Andy:** It's essential for me to change to a six-bolt head hold down; there's some testing to be done on Steve's new dynamometer. My .40 is almost to two horsepower at 23,000. I'm not quite ready for orders yet. I want an engine comparable with Dub Jett's FAI engines used by the American FAI team here in Australia, only I want my engine to have much longevity. It's only a matter of picking the right commercially available materials and having the right machining for those materials. This could yield a very long lasting FAI .40 competition winner, but it wouldn't be cheap, mind you! But it

*Continued on page 77*



Here's an R-100 crankcase in the steel die that forms it from molten alloy. The die has been opened for this photo.



The assembled engine is 2-1/2 inches tall, 2-1/2 inches long.



R-100 parts show chromed sleeve with conservative porting, 'O' ring rear crankcase seal, bushed con rod, deeply knurled prop drive washer, massive crankcase casting, square intake window and tapered split collet. Naturally weight is high for the displacement. Scramble event requires high crash resistant engines!

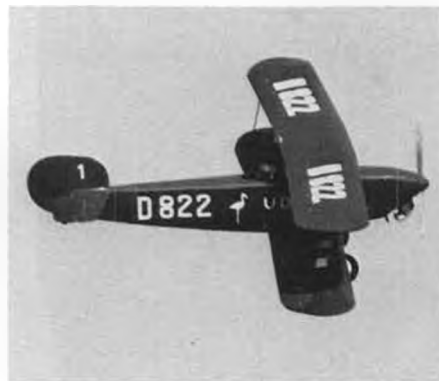


Steve Rothwell is one of very few model engine builders in Australia. Action shot shows him launching a Scramble model powered by one of the R-100 diesels he manufactures. Fuel supply is strapped to left forearm and filling syringe is seen between his fingers. Scramble event is unheard of in America.



BY CEES KAIJIM

# European Scene



Foam sandwiched with veneer was used for fuselage and wings of the Flamingo.

In fact, he did not only build his own Flamingo, but supplied the others, Martin Burgerhof and Ludi van Oss, with quite a number of parts in various stages of finishing.

The fuselage sidewalls were cut from foam that was sandwiched between 1/32-inch veneer; strength was gained by gluing 1/8-inch plywood to the inside from the firewall till just after the bottom wing. The wings and the tailfeathers were also cut from foam, but, for the sake of reducing weight, they were not fully planked. Only the areas near the balsa leading and trailing edge were covered with 1/32-inch veneer, after which false balsa ribs were glued to the veneer and the foam core.

To keep cost and weight within limits, the Flamingo's wings and tails were covered with Solarfilm, a plastic heatshrink material. The fuselages were glassed with 3/4-ounce cloth and G-4, which is a single-component polyurethane normally used to paint walls! To get these 11-foot biplanes of approximately 34 pounds in the air, a direct-driven 2.2 chainsaw engine is hardly enough. You need a really big prop to overcome the drag of such an airplane. Of course, they could have decided for larger engines than the ones they had (two Quadra .35s and one Zenoah .38), but they had seen the possibilities of a good reduction unit. Willy Diks's offer to supply them was accepted gratefully; now they were able to turn a 32 x 18 prop at approximately 2800 rpm! As they have demonstrated

*Continued on page 90*



Jan Huvenaars, and his Udet Flamingo with 11-foot wingspan.

- The Udet U-12 "Flamingo" is not an airplane many of you will be familiar with. Its designer was Ernst Udet, a famous German WWI ace with 61 kills on his record which made him second on the scoreboard behind the Red Baron, Manfred Von Richthofen.

After the war, Ernst Udet started to design and, initially, build his own airplanes. The U-12 Flamingo was the airplane he used by the end of the twenties for his airshow performances.

Four members of the R/C club "The Wings," from Nistelrode, The Netherlands,

took an interest in this large and impressive biplane and decided to make a club project of it. Last year, three Flamingos were ready for takeoff from the club's extremely smooth grass field. The fourth man, Willy Diks, did not build a Flamingo but, being a machinist, constructed three belt-driven reduction units (2.8:1) for the others. He did this following the constructional lines of the Practical Scale units I described in the March issue of *MB*.

Jan Huvenaars led the building team. After a lot of calculations and tryouts, he chose foam as the main building material.



The Flamingo, powered by 2.2 chainsaw engine with gear reduction that turns 32x18 prop at about 2800 rpm.



The U-12 Flamingo was used by German Ace Ernst Udet for airshow performances. This model was based on his airplane.



# Pattern Flying

By DICK HANSON

• At the modelport last week I was talking to a friend concerning his first aerobatic model. Not unexpectedly, we started talking about setting up the model so that it would fly as well as possible.

The conversation went something like this:

"Dick, how do you trim your models?"

"Well, Bluto, I use decals."

"Dick, can we keep this on a serious plane?"

"If you insist, Bluto, if you insist. But you must realize trimming the model so that it is aerodynamically as good as it can be is only one part of the answer to getting the model to fly as well as it can.

"Dick, if you are double-talking me—"

"No, no, I was only trying to point out that other factors, namely you and your radio that need trimming just as much as the model."

"Are you making fun of my haircut *and* my new radio?"

"Come on, Bluto, you're getting paranoid! What I mean is you must establish a flying technique that will let you know when the model is flying correctly."

"Oh, boy, here we go—Mode 1 versus Mode 2 or single stick—all I wanted to know is how to trim this bird so I can learn a few basic maneuvers. Every time I ask you the time, you start in on the comparative merits of quarts versus escapement movements in watches!"

"Sorry, Bluto, I guess I do get carried away sometimes. What I should have said is that there are some techniques in how you use your transmitter that will let you know if the model is really trimmed out."

"Dick, do you mean I have to use one of those goofy tray things?"

"Bluto, trays, neck straps, and other transmitter support devices may not appeal to you, but they do serve an important purpose you may not realize. They allow you to relax your grip on the transmitter."

"Is that such a big deal?"

"It can be because heavy concentration can cause you to squeeze the control stick so hard that you lose the feel for stick center position. Further, you may start twisting the transmitter around in odd positions trying to control the model with transmitter movements, not control stick movements."

"Goll-ee! I thought you were supposed to twist and lean over as you flew; doesn't that help?"

"Only if you aspire to be a go-go dancer, sweetie."

"Okay, okay, Dick, what do you suggest?"

"If you just can't tolerate a strap or tray, try holding the transmitter with both hands positioned like this: the last two fingers on each hand underneath middle fingers under top edge. That's it. And thumb and first fingers on each stick. Here, try the thump

on top and the first finger on the upper portion of the stick. This will let you feel the stick movements in thumbs and fingers, gives you better stick position awareness."

"This feels weird! Why not just hold the box with fingers underneath and thumbs on top?"

"Fine—if you can fly relaxed that way and not push holes in your thumbs. The worst problem is that they can become numbed through constant pressure."

"Okay, if I understand you, the idea is to keep the transmitter steady and develop a light touch on the sticks. I'll try it, but what does it do for trimming the plane?"

"It *doesn't* trim the plane; it simply helps you avoid constant unconscious trim inputs. In my opinion, to trim the plane, you must start by adjusting it to *absolute hands-off flight!* Many times a person has handed me a transmitter while their plane was flying, and chances are it was out of trim for hands off flight! The owner usually said he had not noticed any real trim problems, he just added a little corrective stick pressure."

"Okay, Dick, let's fly my plane. I'll check the frequency board if you'll fuel it up. I want to see if I can trim it for hands off flight!"

The model flew very well, with no tendency to drop a wing. But it obviously was drifting to the left, which brought it closer to us. Bluto made a 180-degree turn and flew back on the same path. The only thing noticeable was that it was now drifting to the right. This brought it in even closer.

"Why is it doing that, Dick?"

"Wind, Bluto. There appears to be a slight breeze up above the trees, and we can't feel it on the ground."

"What do we do now, wait for a perfectly calm day?"

"Ideally, yes, but from a practical standpoint it may be a long wait. Instead, let's see if we can determine the wind direction and do all trimming directly into the wind."

"Why not downwind?"

"The apparent speed is lower into the wind, so we can observe the model for a longer period of time."

The way our field is laid out, we could easily move to a new flight path that put us directly into the wind. The model now flew level and held track nicely.

"How about that, Dick, it's perfectly trimmed!"

"Possibly, Bluto, let's try a few other tests starting with reduced speed first. If you have to retrim the ailerons for hands off flying, you may have a warped wing or stabilizer or maybe just a misadjusted rudder or engine thrust."

"Hey, one at a time! Okay, here goes. Hmm, looks like it starts to go to the left now when I let go of the sticks."

"Try it for a few more times before trim-

ming. This is to ensure your aileron servos are really centering."

"Look, I paid \$80 each for these servos, they better center!"

"Excuse me, big spender, but the price doesn't guarantee that the original tight centering won't gradually loosen up or that the servo pot won't develop a problem and cause the servo to oscillate under certain conditions. We can check that after you land."

"Okay. Look now, it's apparent the model really does have a definite trim problem; it goes left when we fly at a reduced speed."

"Let's land it and give it a visual inspection before we continue."

After a careful inspection, we discovered a difference in aileron hinge alignment and more gap on the left aileron. This apparently allowed the aileron to change effectiveness at different speeds.

Realigning the aileron and closing the gap solved the problem. Further flights showed no change in aileron settings at any speeds. Bluto was now getting into this trimming thing and hit me with another question I get from time to time.

"Dick, can we trim the plane so that it flies hands off upside down as well as upright?"

"What do you think?"

"Well, Hot Dog Harry says you can if your plane is all on center line; engine, wing, and stabilizer."

"It may sound good, but it just isn't so. The reason why is due to the fact that the trim required for lift, no matter how slight, must be altered, no matter how slightly again, to create lift when the model is flown inverted. Just remember, the lower the angle of attack necessary for upright flight, the lower the angle (less corrective elevator input) requirement for inverted flight. Some fliers unconsciously hold just a little "up" elevator pressure for all upright flying so that the model flies hands off upside down. This can cause real problems when doing rolls because you must allow for the 'down' trim."

"What if you use a wing design that lifts more when upside down and a stab that lifts more when right side up; wouldn't that work?"

"Buddy, you have been sniffing glue again. Let's continue this trimming business next time when you are sober!"

Note: Bluto spent the next two weekends trying to see if he could trim for hands off upright and inverted flight. He called to say that the closer he got to solving the problem, the worse the plane flew. In fact, he said it was now so sensitive he could hardly fly it!

I'll tell you next month what he did to it and how he worked out another trim problem. •

# R/C SOARING

By BILL FORREY

• There were a few new model sailplanes and motorgliders seen this year in the old Sports Arena on the banks of the Maumee River, not many, but a few. Of these few, there were only a couple of true "unveilings," whereas most "new" models were making their second or third public appearance at the show having been previously introduced at other shows or in other media.

The purpose of this short report is to let you know what has become available recently and to give you a "once over lightly" review of each new model. No attempt will be made to critique the models because one does not get the opportunity to carefully study each new model in the half-hour or so before the show starts. One simply rushes to photograph all the models before the doors of the show open and the model-hungry frozen hordes flood into the hockey ring crowding every isle and booth.

Many of the new models shown in Toledo have been previously covered in the February (RCHTA show) and April (IMS show) columns and need not be repeated here. I will make an exception for Robbe's Arcus, and ASW 24 because of my camera failure in Chicago and compounding errors made somewhere in the magazine's production. To be fair, Robbe was actually showing two never-shown-before new models, the ASW 17 Royal and the RC-Uno.

## AVIOMODELLI KITS

Not all high-tech, composite ARF gliders come from Germany, Great Britain, or Japan, some come from Italy! Imported by United Model Products and distributed to hobby dealers nationwide by United Model Distributors, the Aviomodelli line of ARF R/C aircraft is building a good name for itself.

Now, in addition to the Super Rieti glider which has appeared in this column only once before (see May 1988, page 40) there is the VOR 250, the Asiago, and the scale Caproni Calif. The Asiago was the sole glider hanging on display in assembled

form, so it is the only photo I can supply of the three new sailplanes. In overall looks, the Super Rieti and Asiago are very similar. They both have constant chord stabs and the same fuselage. The big difference between the two is that the Super Rieti has ailerons and the Asiago is rudder-elevator.

The Asiago is highly prefabricated. It has Obechi-sheathed foam core wings, molded Duraflex fuselage, ready to install transparent canopy, preshaped balsa stabs and rudder, accessories, plans, and instructions. The quality of the workmanship is very good.

The wing of the Asiago spans 92 inches which puts it well under the Class C 100-inch limit. What isn't clear from the color flyer I'm reading is the bit about the airfoils used, "High efficiency wings with E 205 and E 193." Does this mean that the root section transitions from the Eppler 205 to the

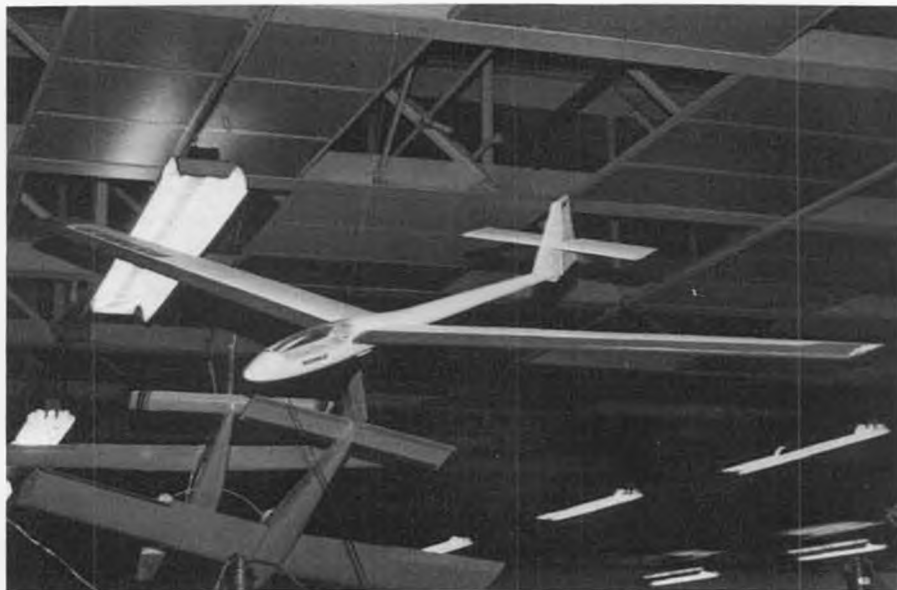
Eppler 193 at the tip? Could it also mean the top section curve is the E 193 and the bottom section curve is E 205 as on the Top Flite Antares and Wristocrat? At any rate, the performance should be excellent with either combination, although I must say that I've never seen an Asiago fly to be able to lend it my personal recommendation.

One interesting side note about the Asiago and the VOR 250 is that both are able to accept the Aviomodelli motor pylon for infernal combustion two-sigh-cul engines of .09 to .12 ci or 1.5 to 1.8 cc displacement.

The VOR 250 is similar in features and construction to the Asiago except that it is more catered toward the beginner.

The wingspan of the VOR 250 is 2.5 meters or 96 inches. Obviously, it too falls neatly in the AMA Class C or so-called "Standard Class." The airfoils used in this wing are likewise ambiguous, "High efficiency wing with Clark Y and E 387 profiles." Both of these sections are higher in mean camber with the Clark Y being the highest at 5.85 percent. This means slower flying speeds for the fledgling pilot.

The VOR 250 has a rather free-flightish horizontal stab which is fixed to the rear half of the vertical stab about 1/5 to 1/4 the



The Aviomodelli Asiago hangs suspended by a wire above the UMP booth at Toledo. A very nice 92-inch ARF from Italy. See text.



Scott Christensen of Top Flite Models designed this beautiful electric motorglider, the Phasoar, for Astro's new 035 cobalt. Will be a kit, probably by this fall.



Olga Dona of Condor Trading shows off their latest import from Mini-craft Co. Ltd., the Lynx 140 slope ship.



Robbe booth looked like an air traffic controllers nightmare. Foreground is the ASW 17 Royal, and behind it, the ASW 24.



Robbe's Arcus. Here's the photo you were looking for in the February column. Skinny airfoils and slick fuselage make this one fast!



The Cox Cadet III from Cox Hobbies will attract many sales from the 2-3 channel glider crowd. Has micro servos and AA or AAA pack.



Robbe's RC-Uno is a beginners' dream plane. Assembles in one or two hours, stable design flies hands-off, lands slowly, and looks nice.

way up the trailing edge. The horizontal stab has a movable elevator whereas the Asiago has a all-moving stab pivoting on a wire. Both get the job done, but the VOR 250 may be easier to set up initially because the incidence angle is predetermined by the molded-in stab fairings in the Duraflex fin (one piece with the fuselage).

Contact United Model Products in Wheeling, Illinois, for prices and the name of a dealer near you who carries the Aviomodelli kits, or better yet pop in at your local dealer's hobby shop and ask.

#### TOP FLITE MODELS

Although it may be a few months away, Top Flite Models does have plans to kit the neat little Astro 035 cobalt-powered motor-glider you see Scott Christensen holding in the photo. The design is called "Phasoar" and is quite similar to the Wristocrat R/C HLG in outward appearance.

The Phasoar is 32 inches long, spans 57 inches, has a wing area of 340 squares, and uses the same airfoil as the Wristocrat (E 193 over E 205). With the Astro Flight 035 cobalt motor and five 900 mAh Sanyos, the Phasoar weighs 26.5 ounces for an 11-ounce wing loading.

Scott says he is extremely pleased with the way the model climbs and handles. The Phasoar's performance is exceptional, and long flight times are common. Scott is really hooked on electric flying now (as I am!).

One very unique feature of the Phasoar is its removable battery compartment in the belly of the model. This compartment is locked in place by a nylon screw in its rear

end and undoubtedly some kind of dowel in the front like a canopy. With this arrangement battery changes are quick and do not involve removing the glider's wing.

Look out for future announcements on this little motorglider in this column. I'm convinced that when it comes out in kit form it will be an overnight success with the growing electric-powered glider crowd.



Bob Sealy's two latest R/C sailplane designs, the Constellation and the Ultima. One is for crosscountry flying, the other for thermal hunting. Both in kit form. See text.

Stay tuned for updates as they come along.

#### EZ SPORTS AVIATION

Nestled among many gas-powered models in the Hobby Shack and Global Hobby Distributors booth was another electric-powered motorglider called the EZ Electric 1800. This is a 90- to 95-percent ready-to-fly ARF model which is imported from Japan and sold nationwide by dealers who carry the EZ line, and a few mail order houses including, of course, Hobby Shack. It will be available sometime in June with prices to be announced then.

The EZ Electric 1800 has a wingspan of 1.8 meters or about 73 inches. Spread out over this span is 530 square inches of fully sheeted wing area with an Eppler 207 airfoil. Ready to fly, the Electric 1800 weighs 49 ounces for a 13-ounce wing loading.

Powerwise, the Electric 1800 is very strong. Unlike many electric glider designs being produced today, the 1800 has some respectable climbout power. Having actually flown and observed the flying of the first production model, I can tell you that when it is powered by seven 900 mAh Sanyos (as in the Astro Flight systems) this model will climb up to a comfortable thermal height (about 400 ft.) in about 45 seconds.

Obviously, the intent with a glider is to catch a thermal, gain altitude working it, and leave it to do something different when bored of circling, too high for good visibility, or too far down wind. Should you manage to miss all the thermals on your first launch, you can power up to that 400-foot

altitude one more time and try a different part of the sky. In two days of flying, we never had a flight less than 30 minutes except one where we purposely ignored lift and tested the plane's stability.

The Electric 1800 comes equipped with a spinner, balanced glass-nylon folding propeller, aluminum folding hub, rebuildable gearbox, and high power "05-size" motor. This motor is modular in design and is rebuildable. The gear box was created from the ground up just for this model, motor, and prop combination; and the components are well matched!

#### CONDOR TRADING CO.

I spotted a really neat little slope glider high above one of the Toledo booths which I thought looked like it would be a lot of fun to fly. Alberto Dona and his wife Olga were kind enough to bring the model down off its perch for me to take a closer look at it, and (of course) get a photo for this magazine.

The name of the model is the Minicraft Co. "Lynx 140." It is a 95 percent ready-to-fly model made conventionally from light plywood, balsa-sheeted foam core wings, and an iron-on film covering. The Lynx comes right out of the box built, sanded, covered (in three colors), and accompanied by complete hardware.

The balsa fin is joined to the fuselage, the elevator and rudder cable housings are installed, the all-moving horizontal stabs are ready to plug in, and all hinges are glued in place. It looks like it might take you one-half hour to assemble!

The stats for this model are: 39 in. length, 56 in. span, 434 sq. in. area, 9 to 11 oz./sq. ft. wing loading, 27 to 34 oz. flying weight, and two- or three-channel radio control. The airfoil is not mentioned in the informa-



EZ Sports Aviation's latest glider is the EZ Electric 1800. It's a fine flyer with a powerful gear motor and factory folding prop.

tion I received from Condor, but from the looks of the almost flat wing saddle and the curvature of the top of the wing, it is probably an Eppler 193 or 205. Judging from its span, length, and the size of those ailerons, this model should be highly maneuverable, predictable (i.e., stable), have good light air ability, and, with a little lead in the fuselage (there looks to be room), excellent high wind penetration. If you plan to fly with AMA insurance coverage, you will need to observe the "one view only" FAI nose radius rule (.295 in.) and curve that knife-edge nose!

The retail price of the Lynx is an affor-

able \$139.95 direct from the importer, Condor Trading. (Distributor and dealer prices are also available, call for quotes.) The Condor Trading Co.'s phone number is: (714) 582-3087.

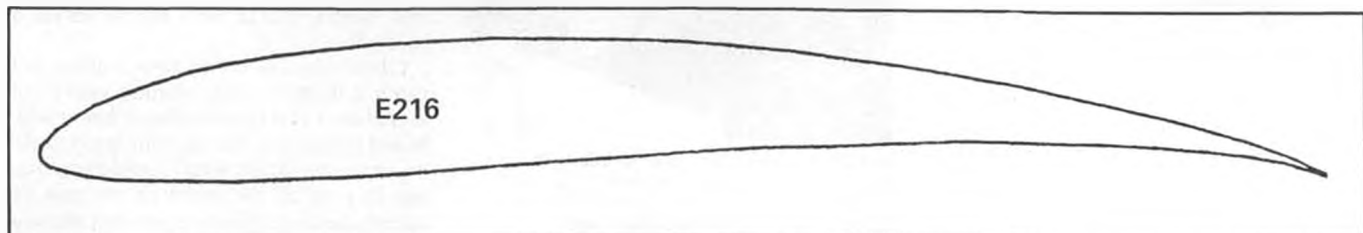
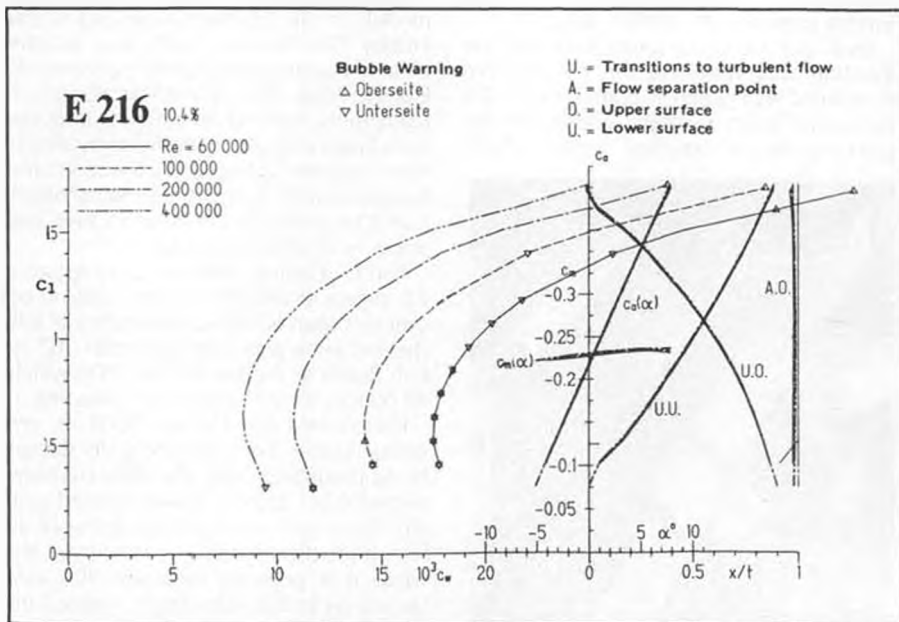
#### COX HOBBIES

My first radio purchase was made in the mid-seventies. It was a Kraft "brick" three-channel system, and it served me pretty well through my first three or four gliders. I never used the third channel, but my first (and only) instructor was sure glad my radio

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Cm0 = -.2248, Alfa0 = 8.107 Grad

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0	1.00000	0.00000
1	0.99692	0.00141
2	0.98842	0.00552
3	0.97564	0.01157
4	0.95877	0.01840
5	0.93743	0.02552
6	0.91162	0.03300
7	0.88170	0.04079
8	0.84805	0.04868
9	0.81104	0.05651
10	0.77107	0.06407
11	0.72855	0.07120
12	0.68390	0.07773
13	0.63757	0.08353
14	0.59004	0.08847
15	0.54177	0.09243
16	0.49323	0.09532
17	0.44490	0.09704
18	0.39722	0.09754
19	0.35064	0.09678
20	0.30560	0.09475
21	0.26249	0.09144
22	0.22169	0.08690
23	0.18354	0.08119
24	0.14836	0.07439
25	0.11644	0.06665
26	0.08803	0.05809
27	0.06333	0.04891
28	0.04254	0.03930
29	0.02576	0.02951
30	0.01311	0.01981
31	0.00461	0.01058
32	0.00031	0.00238
33	0.00108	-0.00385
34	0.00769	-0.00866
35	0.01979	-0.01291
36	0.03703	-0.01630
37	0.05924	-0.01869
38	0.08628	-0.01999
39	0.11795	-0.02020
40	0.15401	-0.01932
41	0.19420	-0.01742
42	0.23817	-0.01460
43	0.28554	-0.01098
44	0.33588	-0.00675
45	0.38868	-0.00210
46	0.44341	0.00276
47	0.49945	0.00757
48	0.55614	0.01211
49	0.61279	0.01611
50	0.66862	0.01937
51	0.72287	0.02167
52	0.77471	0.02284
53	0.82331	0.02277
54	0.86782	0.02137
55	0.90737	0.01863
56	0.94105	0.01456
57	0.96763	0.00945
58	0.98608	0.00449
59	0.99661	0.00113
60	1.00000	0.00000



had a single stick! I eventually sold the rig to a fledgling club member for a fraction of its worth years later still in good shape.

I value that first positive exposure to R/C, and have since advanced to more expensive and flexible radio systems. Well, Kraft Systems and the venerable brick have gone the way of the Studebaker, but the market for an affordable single-stick beginner's aircraft radio remains. In fact, beginners needn't be the only ones attracted to this rig because for 80 percent of the gliders flying today,

three channels (rudder, elevator, and spoilers or flaps) is all you really need.

Enter the near-perfect solution to the single-stick beginner's radio: the Cox Cadet III. It comes with a choice of two dry cell receiver battery packs (AA or micro-size AAA), two micro servos, a double-A dry-cell transmitter with servo reversing, electronic trims, signal strength meter, a single stick gimbal, a fully proportional third channel thumb tab for use on spoilers or flaps, or releaseable tow hook, or electronic speed control, or maybe even (shall I say it?) throttle (hisssss).

I had to say near-perfect because I personally believe in rechargeable Ni-Cds (for many reasons), and this radio doesn't come with them. There is a charging jack on the transmitter, however; and even though there is no Ni-Cd conversion pack available at this time for the Cadet III, there just might be one in the future, given enough requests.

On the positive side, alkaline batteries last a lot longer than fully charged Ni-Cd packs. They also have a much less severe voltage drop off toward the end of their useful life cycle making it less critical to land immediately when the meter enters the yellow warning band or when the servos slow down. Finally, the lack of Ni-Cds makes the radio less expensive to buy, at least initially.

Pricewise, the Cadet III falls right between the cheap and impractical two-stick aircraft radio and the more expensive four-channel rig. (Double-stick mode one instructors might disagree with this statement, but they are in the minority.) Since this radio just became available last December, it may be too early for it to have become "established" in the hobby shop or mail order circuit, but that's changing, just

ask for it.

#### ROBBE MODELSPORT

At the show, the Robbe gliders were all suspended from the ceiling above the top of the booth, behind the power models and helicopters. This made getting a clear shot at them at a decent angle a bit of a problem.

The newest show model was the ASW 17 Royal. I have Robbe's 1983 four-color catalog and the four-color 1984/1985 catalog supplement which contains the 110-inch span sorta-scale ASW 17 (now called the Corona); but it wasn't until I obtained the latest (undated), 208-page, four-color catalog last fall that I was aware of an ASW 17 Royal. This semi-scale ARF glider spans a whopping four meters (157.5 inches) and really looks the part of a scale model.

The initials ASW stand for the manufacturer's name and the designer's name: Alexander Schleicher and (Gerhard) Waibel, respectively.

The ASW 17 is a large and graceful sailplane. That much is obvious to see without having seen it fly. To quote the catalog:

"New technology 4 meter super glider: Among the many (full-size) sailplanes, there is hardly one that has established so many records and is as well known as the ASW 17 from Schleicher and Poppenhausen Rhon, West Germany. Gerhard Waibel, known world wide for his advanced designs, developed this extremely elegant sailplane and, together with the well-known pilot H.W. Grosse, established numerous world records. Naturally, modelers are also showing a keen interest in the performance of the ASW 17. . . ."

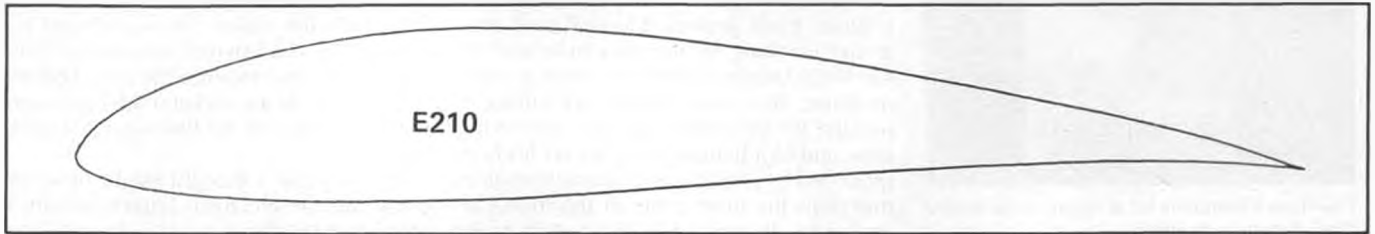
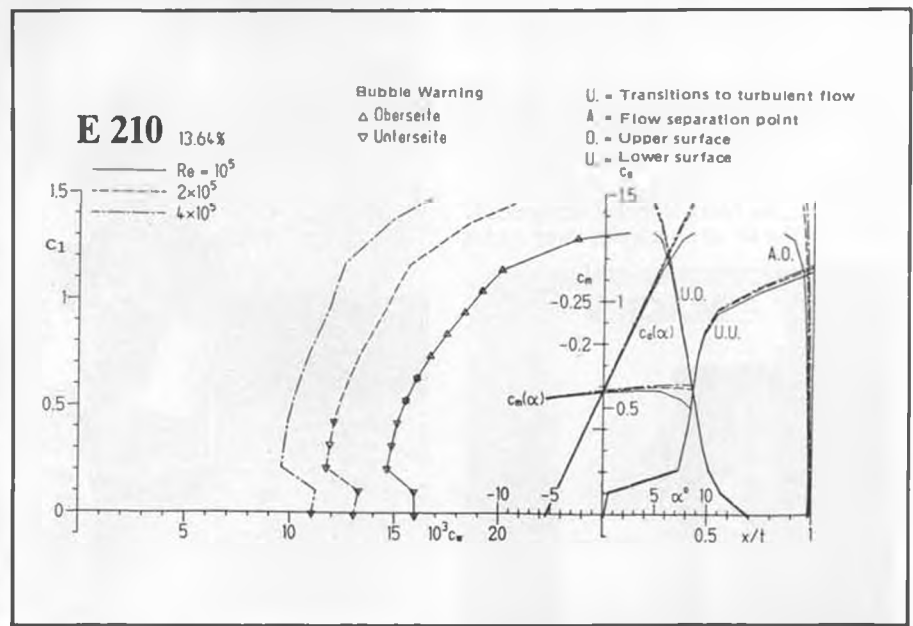
"The ASW 17 Royal is a semi-scale, high

*Continued on page 83*

## E 210

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0	1.00000	0.00000
1	0.99649	0.00099
2	0.98657	0.00414
3	0.97139	0.00936
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7	0.86643	0.03752
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13	0.60532	0.08427
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16	0.45890	0.10148
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18	0.36556	0.10619
19	0.32115	0.10583
20	0.27857	0.10360
21	0.23805	0.09952
22	0.19976	0.09375
23	0.16395	0.08656
24	0.13099	0.07822
25	0.10119	0.06893
26	0.07485	0.05890
27	0.05220	0.04836
28	0.03344	0.03755
29	0.01874	0.02675
30	0.00820	0.01630
31	0.00192	0.00664
32	0.00011	-0.00142
33	0.00415	-0.00786
34	0.01439	-0.01363
35	0.02986	-0.01884
36	0.05040	-0.02327
37	0.07585	-0.02686
38	0.10596	-0.02961
39	0.14043	-0.03150
40	0.17889	-0.03256
41	0.22092	-0.03282
42	0.26604	-0.03226
43	0.31370	-0.03090
44	0.36333	-0.02858
45	0.41467	-0.02499
46	0.46778	-0.02034
47	0.52228	-0.01529
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49	0.63227	-0.00574
50	0.68610	-0.00175
51	0.73807	0.00150
52	0.78735	0.00390
53	0.83317	0.00541
54	0.87478	0.00603
55	0.91146	0.00582
56	0.94253	0.00486
57	0.96733	0.00340
58	0.98536	0.00181
59	0.99632	0.00051
60	1.00000	0.00000



# Getting into MODEL ROCKETRY

By FRED FISCHER. . .After building and flying some model rockets, the author found there was more than just fun involved; his kids got interested, and it became a real family project that was enjoyed by all.

• Like all R/C pilots who have growing families, trying to involve your children in the sport is either too expensive or beyond their youthful abilities or ambitions. For myself, I also suffer from the doldrums. There's only so many aerobatic airplanes that one person can wish to own at one time. So in my last visit to the hobby shop, I took a look around the aisles in areas I don't normally visit for some other hobby I could share with my kids yet stay within my weekly budget.

The shop owner noticed my prowling around his shelves and pointed out a hobby that was one of his trusty lines. Taking a colorful box off a display, he stated that model rocketry would satisfy my "lust" for speed yet not occupy too much of my workshop time nor deplete my wallet. "Rockets?" I said. "Didn't that die out years ago?" He proceeded to lecture me on the state of the art, including the fact that Model Rectifier Corporation had entered the market with some outstanding kits, such as the complete Mach V starter kit he had in his hand. I've learned to listen to George when he gets in a talkative mood, so I cheerfully (?) handed over \$29 and change and went home with the kit.

In one evening I was ready for a launching. Now that is quite a statement; even the ready-to-fly airplanes I've built require the engine to be broken-in and an hour of just fiddling with the linkages. To show you how simple it is, the Mach V rocket is practically prebuilt. The kit also includes three rocket



The Mach V complete kit as found in the hobby shop. Assembly is simple.



Daughter Jade positions the rocket on the launching rod as Tony watches.

engines, three igniters, a launch pad, protective wadding for the parachute and an electrical launch system. For such a small package, this was almost everything I needed for the hobby except some tools, glue, and four batteries. The rocket body is propelled by a solid fuel disposable engine that pops the nose cone off the rocket at peak altitude and opens the parachute to

bring back the rocket. The launch pad is a tripod with a ball swivel; a three-foot fiberglass rod is inserted into the ball. The rod acts to stabilize the rocket until it gets moving fast enough for the fins to keep it going straight up.

The part that I thought might drive me crazy was the electrical launch system. It consists of a pushbutton, a tiny lamp, 15 feet

of wire, and some metal and plastic parts. I hate wiring; I had let a friend wire up my flight box for airplanes. But this neat unit called the Electro Launcher assembled easily in 15 minutes! Adding four AA batteries to the unit (robbed the batteries from my son's toy cars), I anxiously tested the unit, and it worked! Basically, the launcher passes current through an igniter which is really an electric match, so you can start the rocket engine from a safe distance. It even comes with a safety key to prevent accidental firings.

I probably didn't spend more than two hours putting everything together. But I noticed something; I was spending time explaining what I was doing with the kit to my kids. Normally, they steer clear of my flying machines, but this little rocket got their attention. My daughter Jade volunteered to help build the launch pad while my nine-year-old boy Tony sat at my side with his chin in his hands and asked questions endlessly. I asked for volunteers to take some of the equipment to the park, which is a short walk from the house, and I was totally flabbergasted by their positive response.

On Saturday morning I led the "troops" out to the park. With a clear field around me and some apprehension in my mind, I launched the Mach V after the obligatory countdown. The result? A perfect flight! It went only 100 feet up, but it did so on a column of smoke and a sharp snarl of its rocket motor. Of course, the kids ran to catch the rocket as it settled to earth on its parachute. Jade begged to try one launch; I agreed if she would follow my directions and if her brother Tony got a chance too. Since I got three engines in the kit, it would give me the needed practice on installing the engine, igniter, and preparing the rocket for the next flight. Somehow, what I thought would be a short 15-minute stay in the park turned out to be a 45-minute fun-filled adventure with my kids, as they both got to launch the rocket successfully.

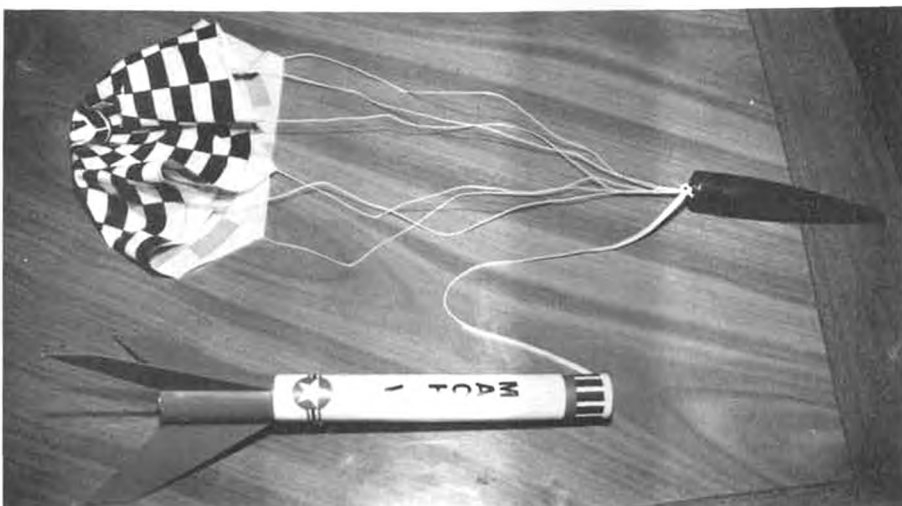
On my return to the store, wise old George pointed out that I could buy more powerful engines for higher altitude flights. While he laid out a few different types, two other kits caught Tony's eye. He got his hands on an Enforcer kit that looked "radical" in his words, but to my surprise he also suggested that I buy for Jade a Wildfire kit that would stand almost 30 inches tall when completed. I suspected some conspiracy with his sister but at prices for rocket kits that were cheaper than my model airplane engine fuel, why should I argue? With a shopping bag full of kits and engines, I went home looking forward to a few hours in the shop.

Well, I was partially wrong. The Enforcer kit uses premolded fins and a nosecone, plus a wraparound silver decal sheet that covers the entire body. The Wildfire also builds rather easily, but required painting. That was just fine with Jade. Using an enamel paint spray can is easy for a girl wishing to be an artist when she grows up. By the second evening after the visit to the hobby shop, both rockets were ready for their maiden flight.

*Continued on page 72*



The kit contents spread out on the dining room table as assembly begins.



The Mach V rocket with the nose off and parachute out.



Tony races to the rocket which has already touched down, eased to the ground by the unfurled parachute after a thrilling first launch.

# Control Line

By JOHN THOMPSON



Vladislav Trnka of Czechoslovakia, the number one stunt flier in his country.

• This month's column will be a little bit like when you clean out the bottom drawer of your field box after a season of flying. All sorts of misplaced and forgotten odds and ends turn up. This month we look at odds and ends passed on to me from my predecessor columnist, Mike Hazel, along with various items that I'd been stuffing in a folder. Let's see now, what have we here.

## PHOTOS

First, some photographs of a beautiful stunt plane, a speed ship, and an engine and tuned pipe.

These were passed along by Stu Richmond of Apopka, Florida, who received them from Vladislav Trnka of Czechoslovakia.

"He's the No. 1 stunt flier in Czechoslovakia and Soviet friends are 'schooling'

him in U-control 2.5cc speed, so he'll have a better chance to be on the Czech team that goes to Cuba later this year for the Socialist Championship model contest," writes Stu. "Vlada is a neat guy. I've been in his home." And he builds neat models, as the photos show. The back of the stunt plane picture (oops, *precision aerobatics plane*) indicates that it's a "Delfin 19" with a wingspan of 1,52mm, length of 1,115mm, and weight of 1,650 grams. The engine is an O.S. Max 40FSR-S.

No details accompanied the picture of the speed plane. Of the engine, Stu says that it is an AAC with fantastic workmanship, having hit 282 kph and at 39,200 rpm.

Thanks to Stu for the information.

## NEW CONTEST

Doc Passen, an active combat flier and

promoter, passes along word of a new contest in the growing "pro" combat circuit (which already includes the world famous Bladder Grabber and Money Nats).

This one is a triple-elimination 1/2-A combat meet with a \$1,000 cash first prize. Entry fee is \$35 until August 3, \$50 from August 3 to September 3 and on the field. Contest is on Labor Day weekend, September 3 and 4.

Doc doesn't include the field location, but we presume that it's in Jasonville, Indiana, where Doc practices his combat flying.

"Come fly with us," Doc writes. "Put those half-As in a suitcase and come do it." For information, contact Doc Passen at P. O. Box 111, Jasonville, Indiana 47438.

By the time you read this, the Money Nats will be over and the Bladder Grabber will be just about to happen. I'll try to have a report on the Bladder Grabber for a future issue.

## VECO

Joe Wagner sends along beautiful examples of some old Veco model plans he has redrafted. Ted Fancher's precision aerobatics column in *Model Aviation* recently carried a detailed history of Joe Wagner's involvement with the original kit manufacture.

His plans recreate the planes in a superlative fashion that would be an excellent acquisition for any CL modeler interested in some of the old classic designs.

Available are the Chief and the Squaw CL planes, as well as the free-flight Dakota, Sioux, Comanche, Pirate, and Prowler (the latter two are Monogram rubber planes). The Chief plans are priced at \$7.50 and the Squaw at \$6.00.

For information, contact Joe Wagner, 135 Waugh Ave., New Wilmington, Pennsylvania 16142.

Joe also sent along a sketch of an interesting CL flap coupler. He explains:

"It shows a gimmick I came up with to make the flaps truly workable on models such as the Sterling Vak-9 and Mustang profile stunters. These models have tapered wings, with a noncontinuous flap hinge line. The old cloth tape hinges usually provide enough slop to let these offset-hinged flaps move. But they never worked smoothly.



Vladislav's stunt plane, an F2B Delfin 19, with an O.S. Max 40 FSR-S.



Another view of Trnka's aerobatic model.





Trnka's speed plane, no details given, but a beautifully crafted model.



Vladislav's speed plane is swift, thanks to its AAC engine.

"I acquired an ancient Yak last year, which I disassembled and rebuilt completely. I hinged the control surfaces with my favorite baseball-stitch dacron thread hinges, then had to come up with a way of making both flaps move smoothly and easily.

"This sketch shows how I did it."

#### GETTING INTO CL?

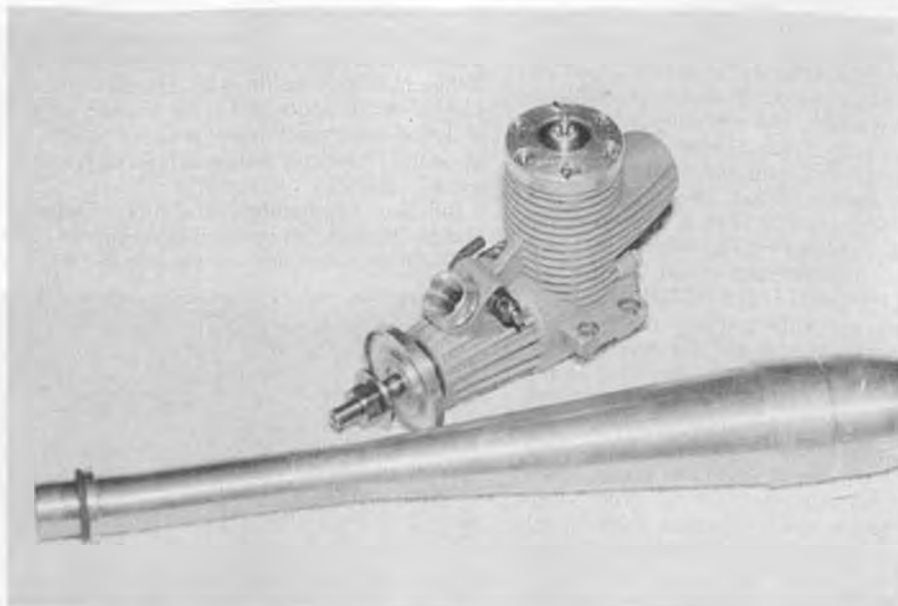
If you are thinking about getting into CL competition, maybe you've been to your first contest and are wondering how to go about getting started. There are some excellent resources out there to help newcomers connect with others already involved in the hobby.

Naturally, just going to contests will help build your store of knowledge; watching and talking to the fliers is a great way to learn. But each type of competition (almost) also has a special interest group dedicated specifically to promoting and sharing information about that activity.

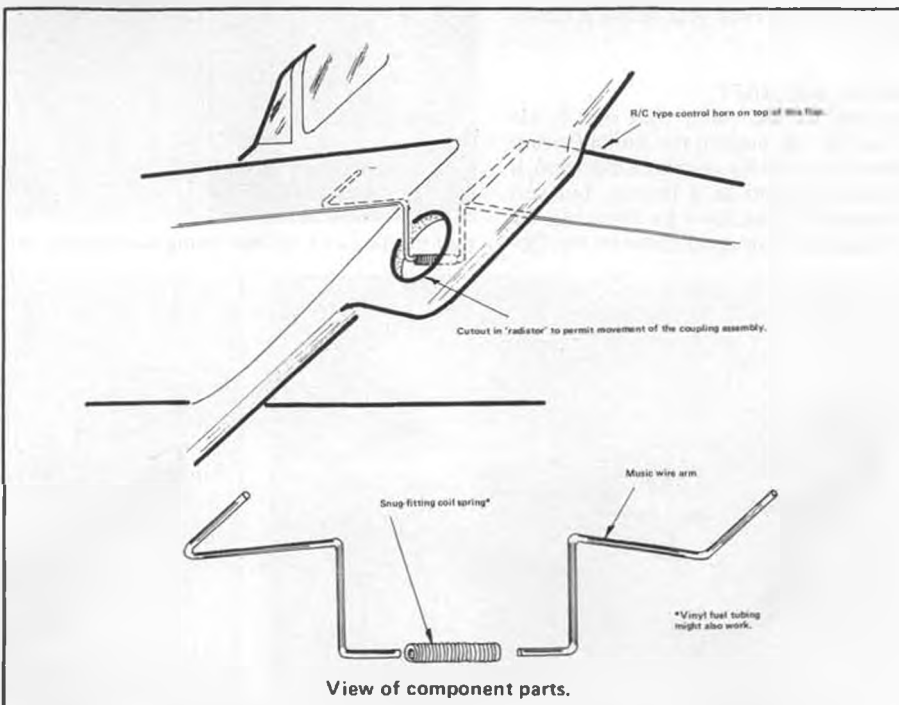
These groups vary in structure and procedures, but all are worthwhile. All also are distinguished by perhaps their best service: excellent newsletters about the hobby. In these newsletters you'll find detailed information about competition, aircraft, rules, issues, how-to tips, etc. The price of the newsletter is membership in the organization, which also gives you a vote in organization affairs and provides you with a voice in the groups that help steer the future of the competitive events. Some of these groups are recognized by the Academy of Model Aeronautics as the representative of their particular event's fliers.

Here is some information on those groups and ways you can get involved:

*Miniature Aircraft Combat Association (MACA).* This longstanding organization is the recognized special interest group for CL combat, working with AMA on combat rules issues, promoting combat in general, organizing world championship team selections, keeping national standings, etc. The excellent, regular newsletter, called *MACA News*, is filled with news, technical information and advertisements from combat specialty suppliers. Dues are \$15 a year and can be sent to Mike Urban, 316 Spring Ave., Glen Ellyn, Illinois 60137. MACA has



The AAC engine, with fantastic workmanship, has hit 282kph, at 39,200rpm. All photos courtesy Stu Richmond.



Continued on page 80  
Coupling for flaps with non-continuous hinge line, by Joe Wagner.

# INSIDERS

## INDOOR FLYING REPORT

By DAVE "VTO" LINSTRUM

### NEWSFLASH

#### PANDA RUBBER OUTSTRIPS PIRELLI!

Pirelli from Italy is dead, but now we have "Panda Rubber" from China that is even more powerful! Tests by Fred Pearce on samples show from 3603 to 3715 ft/lbs/pound. This is better than the best Pirelli strip. It is only available in 2mm width, but you can strip it to indoor sizes. Price at presstime is \$12 plus \$2 P&P to: Champion Model Products, 880 Carmen Court, LaVerne, California 91750; (714)599-3348. Get your Panda Rubber before the Wakefield fliers buy it all! Tell George you are an "Insider."

#### RICHMOND TELLS INSIDE STORY!

You may think that sounds like the *National Inquirer*, but it is the National Free Flight Society that has "The Inside Story" by F1D World Champion Jim Richmond in the 1988 NFFS Symposium Report. He tells all, and this article is worth the price of the book! Editor Herman Andresen, Drafter Bruce Wennerstrom, and Production Coordinator Sal Fruciano have put together a Sympo with 25 (count 'em, 25!) articles. Get yours today by sending \$15 (includes postage in USA) to: Fred Terzian, NFFS, 4858 Moorpark Ave., San Jose, California 95129. Tell Fred you heard it from VTO.

#### OBSCURE AIRCRAFT

This one should catch your eye. It has three wings! We present the Breda-Pensuti Triplane from 1919 for your consideration. It has been modeled as a Peanut, but you might want to consider it for Pistachio. Be sure to send in your candidates for the Ob-

scure Aircraft feature. All flying weirdos are welcome.

#### INSIDERS WORKSHOPS

Latest in our expose list of "Insiders" workshops is the neat but model-stuffed shop of Bill Hannan. It is located in the spare bedroom in his home in Escondido, California. Outside the window is a hummingbird feeder. Inside is an amazing display of small sport and scale models of widely diverse types. Many awards festoon the walls. Drawers and shelves hold various model supplies.

Bill does his drafting, word processing, and building in this inspired environment. No wonder his models are so unique! See



Insiders columnist admires his Micro-X kit, Stinson Voyager, in AMA scale.

photo for the inside view.

#### PEANUTS & PISTACHIOS TRIPLE

Yes, Hannan has hit a triple with his third edition in the P&P series. The first two volumes went over so well that Bill has published a new one, showcasing the finest in teensy scale models, from 8-inch Pistachio to 13-inch Peanuts. The 8-1/2- x 11-inch format is ideal for making xerographic copies of plans. One favorite is the 1938 "Minute Model" of a Piper J-3 Cub by Herbert K. Wiess, originally published in *MAN*. Order your copy today from Hannan's Runway, Box A, Escondido, California 92025, for \$5.00 plus \$1.50 postage. It will make a great addition to your library.

#### NFFS HALL OF FAME

The National Free Flight Society has an-



Carl Headley with Oh-No! lifting body Bostonian admires Mike Arak's Peck kit, Lacey M.10.



IMS Peanut kit '28 Heath Parasol is a fine flyer.



IMS '37 Aeronca K is nostalgic design at its best.



Bill Hannan in his neat Escondido workshop wallpapered with models and awards.



Bill's latest book is a treasure of interesting and obscure model information and plans.

announced the recipients of the Free Flight Hall of Fame for 1988. The Society is extremely proud to recognize their contributions to the development and continuity of Free Flight model airplane activities throughout the USA and the world.

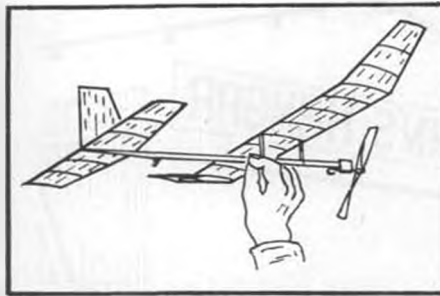
**Frank Cummings.** A most prolific competitor whose name was invariably at the top of the winners list during the late thirties on through into 1965. He flew any and all free flight types and was a member of the USA indoor team in 1964.

**Walter Erbach.** A very creative talent whose pioneering effort kept indoor activity alive. He has been a continuing spirit in the development of ornithopter flight.

**Tom Hutchinson (deceased).** An educator of aviation principles to the young and creator of top competition model designs.

**Elbert J. Weathers (deceased).** A free spirit in innovative model aircraft development. His "Mystery Man" was a most graceful design, unforgettable for its uniqueness.

**Robert P. White.** A top competitor who pays attention to details with a winning end result. A world champion in 1987 Wakefield. His competition record is truly outstanding.



## P-24 CONDOR KIT!!

See text this month for details.

Awards will be given at the NFFS Symposium on Thursday, July 28, 1988, during the 1988 Virginia Nationals.

Anthony J. Italiano, Chairman, NFFS Hall of Fame Award Committee.

**LOW CEILING LOWDOWN** by Herman Andresen

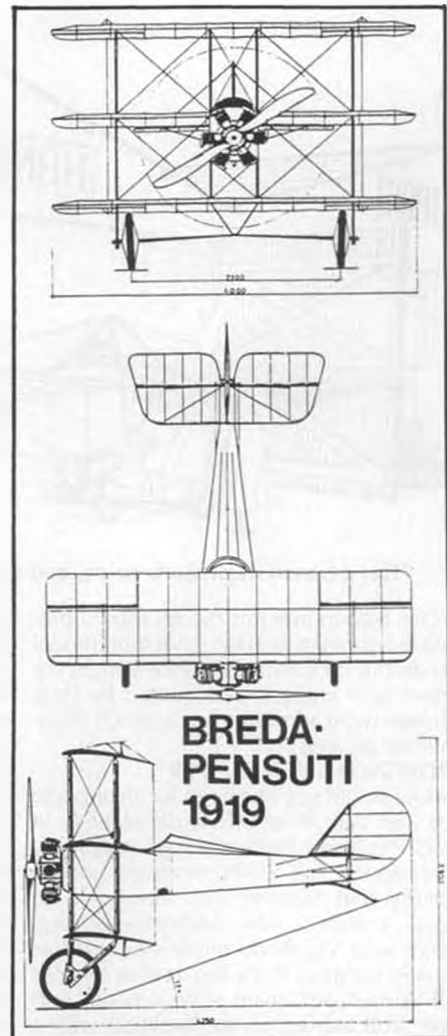
Having started model competition indoors, indoor has always held a special place for me. Now that Ray Agee is lining up the gym, it is a good chance to reminisce and discuss a few subtleties.

Indoor flying is: fun, simple, educational, high performance, usually no retrieval problem, usually no weather problem, little crash damage, less luck factor, inexpensive, no sunburn, pure, fun.

On the down side is site availability, limited fresh air, sunshine, and exercise.

Back in the sixties we had access to Arcadia Gym through the efforts of Terry Thorkildsen and Linc MacPherson. Linc was an ex-free flyer from Oregon who was also track coach and teacher. After several demo sessions to the science classes, we had more freedom of use and came close to several records despite giving up 25-percent in ceiling height. Bill Waterman put on a good show with his large stick and cabin models, and there was much activity in Peanut and even Jr. HLG. Lotsa fun.

There was a tendency to discourage newcomers from starting with too-advanced planes, though history shows many meteoric improvements by beginners. Lo-



Breda Pensuti 1919 Triplane is VERY obscure!

cally, Barry Scholder was close to record time with his first Paper Stick Model. Admittedly, he was coached by record holder Thorkildsen. Steve Brown, Indoor Team Member, has only been at it a couple years. Even the legendary Jim Richmond con-

*Continued on page 75*



Eighteen French Peanuts ready for judging. Photo: Ron Moulton.



"Get a bunch of projects going, and don't care if you finish any of them."

• Our lead-in line this month should provide reassurance to many if not most model builders! It is by retired Chance Vought engineer Sam Hodgson, as quoted by Dick Johnson (who admits he has a bunch of unfinished projects).

#### PROFESSOR'S PETITE PIPER

How would you like to go for an airplane ride with Walt Mooney? We did recently, in Walt's "full-size Peanut" Piper Vagabond. This aircraft has been modeled so frequently that Mooney has threatened to equip it with a fake rubber-motor peg. We've seen Vagabond models as small as Shoichi Uchida's Pistachio, and as large as Bill Winter's R/C giant scale version. And Don Srull carried on the tradition with a two-foot span variation published in the Washington D.C. based *Max-Fax* newsletter, just a few days before our flight in Walt's original.

The "Vag" is delightful in its simplicity and seems to exude friendliness, as does its owner. Walt's was number 4 off the Piper assembly line during 1948, only a year after Mooney learned to fly. It is the second such machine he has owned, and his affection for it is contagious.

Walt brought the little four-cylinder engine to life with his "Armstrong starter," and, once running, it idled as quietly as a Model A Ford. Taxiing out to the runway at Ra-

mona, California, we paused to watch the Pitts Special ahead of us depart in a spectacular near-vertical climb. By contrast, our little Piper lifted gently from the earth in sedate fashion, working its way skyward at about 50 miles per hour.

Once aloft, we were treated to a sweeping panorama, with unusually clear conditions enabling us to see as far as Catalina Island, some 22 miles off the coast of Long Beach. The view from 2,500 feet is a refreshing one that can be philosophically reassuring. The crowded towns below resemble model railroad layouts, and remind us how ant-like most people are when on the ground. At altitude, such annoyances as traffic jams and overcrowded conditions seem less ominous. Yet, we must work to retain our freedoms in the face of encroachment, whatever its guise. Private flying, in particular, faces severe political restrictions that threaten its very existence. Will our grandchildren be able to enjoy such rides? Have you written your congressman lately?

From a model builder's point of view, riding in a light plane can give a better understanding of how air conditions affect flight. Vertical air movement, up or down, is clearly felt, not just seen as when watching our miniatures in action. Control deflections can be both felt and seen in ways that



Bill Pinkston's latest Cierva Autogiro has no difficulty landing safely, if he doesn't put too much helium in its balloon....

may cause one to reconsider future model adjustments more carefully.

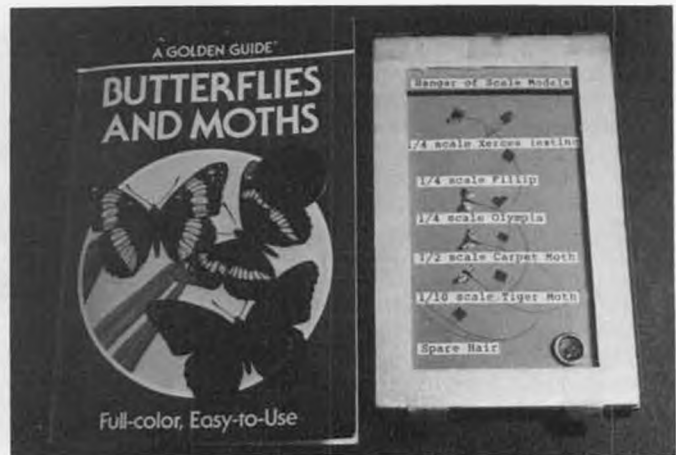
Far too soon our aerial adventure came to a conclusion, and as we returned to Ramona and sideslipped in for a perfect landing, we reflected upon the privilege of having ridden with Walt Mooney in his little Yellow Vagabond!

#### FOR THE BIRDS

During the first great pioneer aviation meet conducted at Reims, France, during 1909, aircraft of many types were flown. However, a trio of Mother Nature's creatures kept the assembled audience amply entertained. Even though Hubert Latham was aloft in his graceful Antoinette monoplane as was Henri Farman in his Gnome-powered biplane, it was reported that: "... three crows which turned out as rivals to the human aviators received as much cheering for their appearance as had been accorded to the machines which they doubtless could not understand. Frightened by the cheering, the crows tried to escape from the course, but as they came near the stands, the crowd rose to cheer again, and the crows wheeled away to make a second charge towards safety, with the same result: the crowd rose and cheered at them a third and fourth time; between ten and fifteen thousand people stood on chairs and tables and waved hats and handkerchiefs at three ordinary, everyday crows. One thoughtful spectator, having thoroughly enjoyed the funny side of the incident, remarked that the ultimate mastery of the air lies with the machine that comes nearest to natural flight. This still remains for the future to



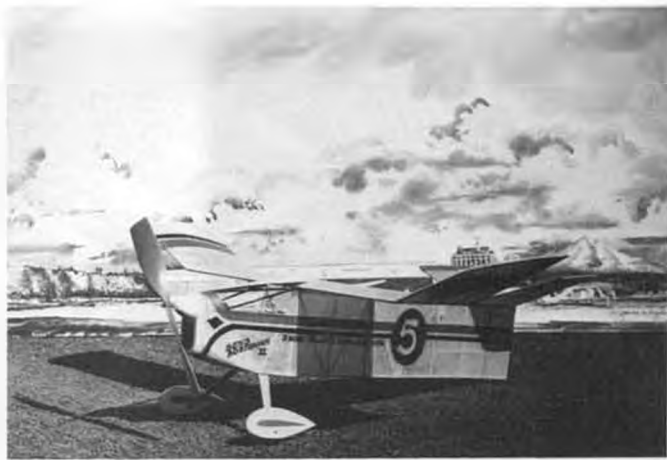
World's smallest indoor flying site "Lapidopteran Dome," invented by Fritz Mueller, of Georgia. See complete details in article.



At right are 1/4-scale butterfly models to be flown in the Dome. At left is their proof of scale documentation.



Republic Rainbow by Dick Howard weighs 65 grams and is powered by four rubber motors. Props are cottage cheese type.



Ben's Bostonian 2 designed by Jim Longstreth to replace Ben's Bostonian 1, stepped on by 5-year-old son Ben.

settle."

Quoted from *A History of Aeronautics*, by E. Charles Vivian, published during 1921.

#### SPEAKING OF NATURAL FLIGHT

A person-powered helicopter constructed by California Polytechnic University students is nearing completion, according to an *Aviation Week* article sent to us by Herb Weiss. The goal is a \$25,000 prize offered by the American Helicopter Society, calling for a human-powered helicopter flight of 60 seconds duration at an altitude of 3 meters.

The CalPoly copter rotor measures a whopping 140 feet in diameter and is driven by a small propeller mounted at each of its two blade tips. These props are turned via lines wound in around an oval-shaped pedal-powered pulley. Control of blade-tracking is via ailerons actuated by R/C model servos. Stay tuned for more developments in this fascinating project.

#### NO-CALS ANYONE?

Profile scale models have a lot to offer, especially in terms of saving time. Since their fuselages are flat, no bulkheads or stringers are required. Let's face it folks, those curvaceous fuselages soak up construction time like a sponge!

Al Lidberg has specialized in No-Cal models and offers plans for them by mail, in addition to more conventional designs. One dollar will bring you a complete list: A.A. Lidberg, 614 E. Fordham, Tempe, Arizona 85283.

#### REALLY BIG R.O.G.

Giant models are not a recent innovation. Ced Galloway favored us with a 1928 *Popular Science Monthly* construction article for a six-foot span R.O.G.! Designed by famous model engine builder Danner Bunch and Avison Koch, the model featured bamboo ribs, silk covering, and a two-foot diameter propeller driven by 28 strands of rubber. Its performance? "Only by seeing the enormous model soar away in flight can one realize the sensation it creates among the spectators."

#### ALBERT EINSTEIN, DESIGNER

Almost everyone knows about Einstein's Theory of Relativity, even if few understand it. But were you aware that he was once involved in aircraft design? According to Peter M. Grosz, writing in *WW1 Aero*, Einstein came up with a radical airfoil dubbed a

"cat's back" for its unusual humped-in-mid-chord shape. Wings of this configuration were fabricated and installed on an LVG biplane and tested by Paul Ehrhard, who years later recalled in a letter to Einstein that: "I hung in the air like a pregnant duck. . ." And, after having the angle of in-

cidence reset: "The pregnant duck became a lame duck. . ." Einstein replied good-naturedly: "This is what can happen to a man who thinks a lot but reads little." No wonder the rest of us have failures from time to time.

*WW1 Aero* improves with each issue, and includes a modeling section as well as a remarkable roundup of articles, drawings, and photographs, plus stirring editorials. Why not order a sample copy? Send \$4 to *WW1 Aero*, 15 Crescent Road, Poughkeepsie, New York 12601.

#### MAGNETIC TREES (Continued)

In a previous Hangar column we presented the first part of a report by Frank Macy, of American Junior Aircraft Company, who assured us that the attraction of model aircraft to trees is perfectly logical. They merely have a tendency to return to their wooden points of origin, and all trees are like family. Frank continues:

"Although some trees do inhabit a few desert areas, none are known to produce wood useful for aircraft purposes. Aircraft-type wood requires consistent and adequate moisture which doesn't exist in the desert climate. Desert wood is generally

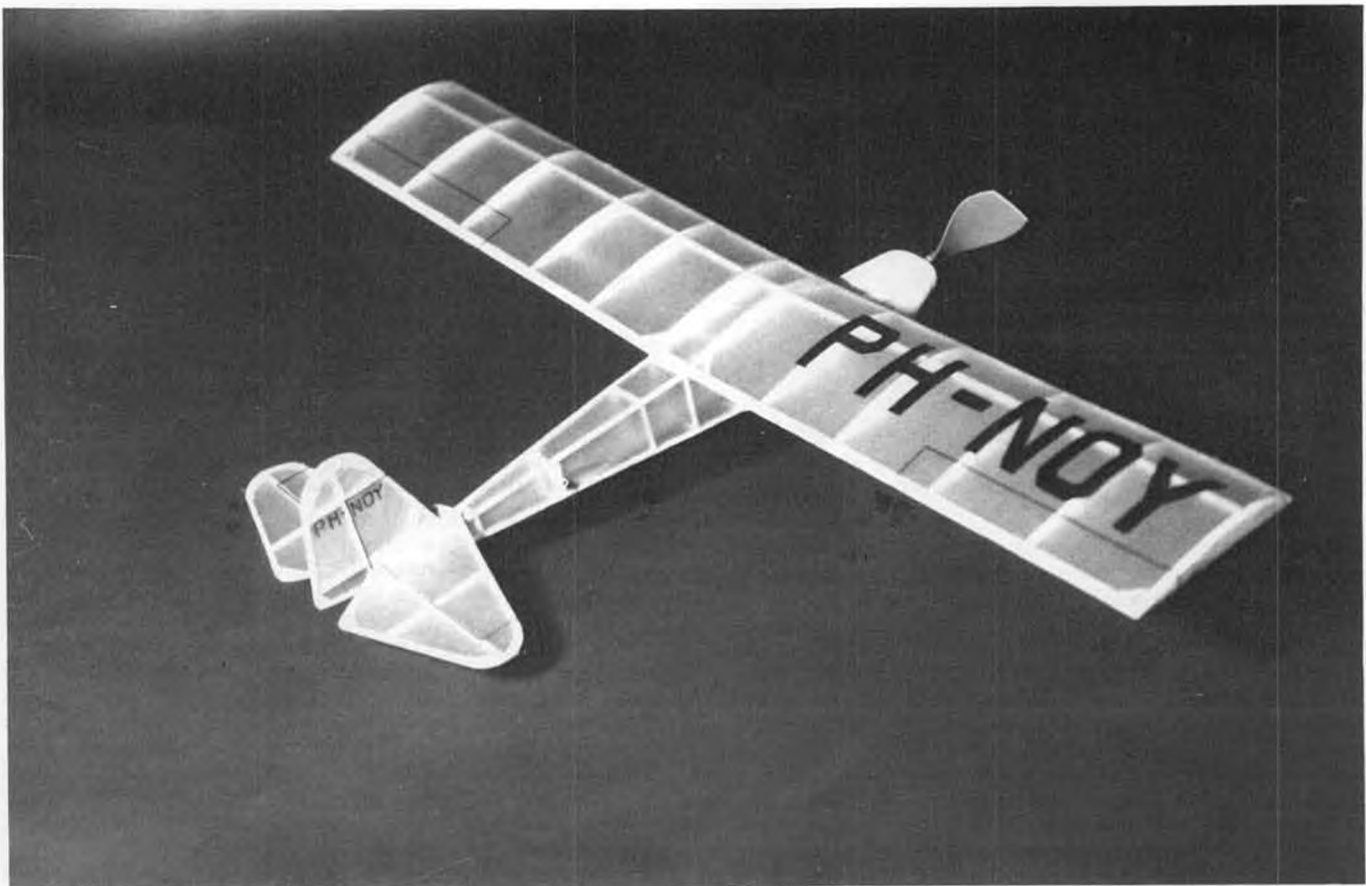
*Continued on page 107*



Intrepid aviators Walt Mooney and Bill Hannan with Walt's classic Piper Vagabond.



Fat Cat rubber-powered model by Insider Dave Linstrum for Florida ROW meet uses Bill Noonan floats.



## Hollandair LIBEL

By WALT MOONEY. . . This month the Perfesser digs deep into his bottomless bag of Peanuts to come up with this Dutch import. It's covered with condenser paper, and Walt tells you how to preshrink it too.

• Here is a simple little Dutch "Miami" Peanut which is easy to build and flies very well. The model in the photos weighs eight grams complete with the rubber motor. It is quite stable, and it is possible that it would still be flyable with a scale-sized tail. The increase in horizontal tail size and in propeller diameter is the only intentional deviation from scale dimensions.

An attempt was made to keep this model

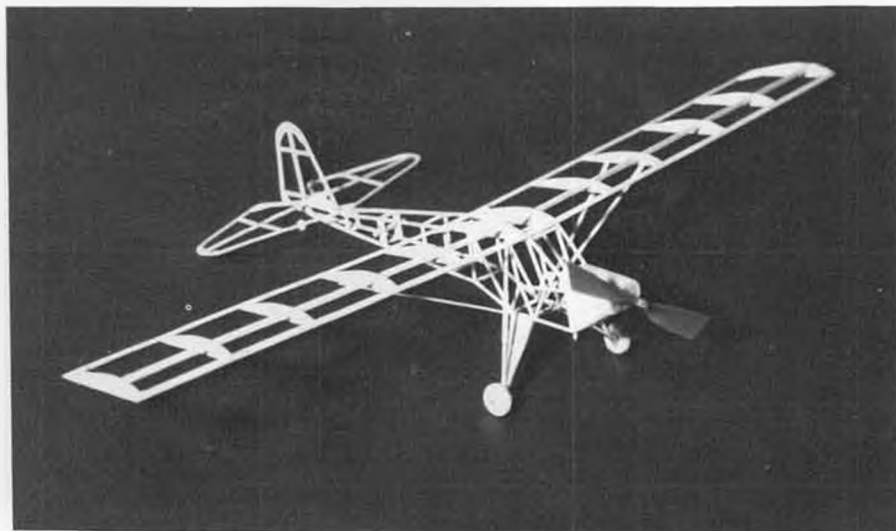
as light as possible for indoor flying. 1/20th square instead of 1/16th square was used for the main fuselage sticks and for the tail structure. Undoped condenser paper is used to cover the model. The covering was decorated with black felt pen before the model was covered, but after the condenser paper was water shrunk to minimize the chance of warping the structure.

Start this model by making a wood frame

the size of your condenser paper sheets. The wood members should have a large enough cross-section that the frame will not warp under the tension of water shrinking the paper. My frame was 11 by 25 inches made with an outline of 3/3 x 3/16 hard balsa with a single cross brace at the half-way point. Using thinned white glue, cement the borders of your condenser paper to the frame. When this has dried, lightly spray it with water and set it aside to dry.

Now commence to build the structure of the model directly over the plans; fuselage sides, horizontal and vertical tail, and wings after first cutting out the wing ribs. Do not install the wing spar while the wing outline is on the plan because it has to be shortened at either side of the two center ribs to allow for the dihedral. When all the parts are dry, remove them from the plan. Crack the wing leading and trailing edge just on the outside of the center ribs and block up each tip to give the proper dihedral and carefully fit the wing spar in place, cracking it to allow the dihedral. A tiny drop of glue at each rib/spar intersection will make the dihedral permanent.

Using a thin blade, separate the two fuselage sides. Then starting at the aft end, put in all the cross pieces using the bottom view to determine their length. When this assembly has dried, add the pieces of 3/32 sheet to the cowl sides and bottom. Care-



By using 1/20- instead of 1/6-square sticks, the weight was kept to a minimum for indoor flight. Covering was pre-shrunk and decorated condenser paper.

rully bend a piece of 1/32nd "A" grain sheet to form the top of the engine cowl. Note the nose block detail and make a backing block to fit snugly into the front of the fuselage. Cement this onto a piece of balsa the right thickness and a little bit bigger than the nose block needs to be, and fit it into the fuselage. Then, using a very sharp blade, carve the front end of the model to shape using the front, top, and side views as a guide.

Now, using some fine sandpaper, smooth all of the balsa structure in preparation for covering. Note that the leading edges of all the flight surfaces are rounded and the trailing edges are tapered.

Using very fine piano wire, bend the landing gear wire to match the pattern in the front view and cement it into the fuselage.

Now the condenser paper should be decorated using a permanent felt pen in preparation for covering. Carefully lay out the registration numbers on pieces of paper large enough to cover the part in question. Then using thinned white glue, cover the part being careful to keep the lettering properly aligned.

The landing gear fairing is cut from sheet balsa. The wing struts are made from hard sheet balsa sticks and given a streamlined cross section. The shock absorber struts are hard balsa with a length of thin soda straw slid over them to represent the shock absorber.

The windows are thin clear plastic. Pick the thinnest you can get off a food wrapper or other source. The assembly of the various parts into the complete model follows conventional practice. Make the main wheels from balsa. Add the details such as the struts, tail braces, and tail wheel. Also add the carburetor air scoop and the exhaust stacks. Use flat black paint to simulate the cowl openings, and paint all three wheels flat black also.

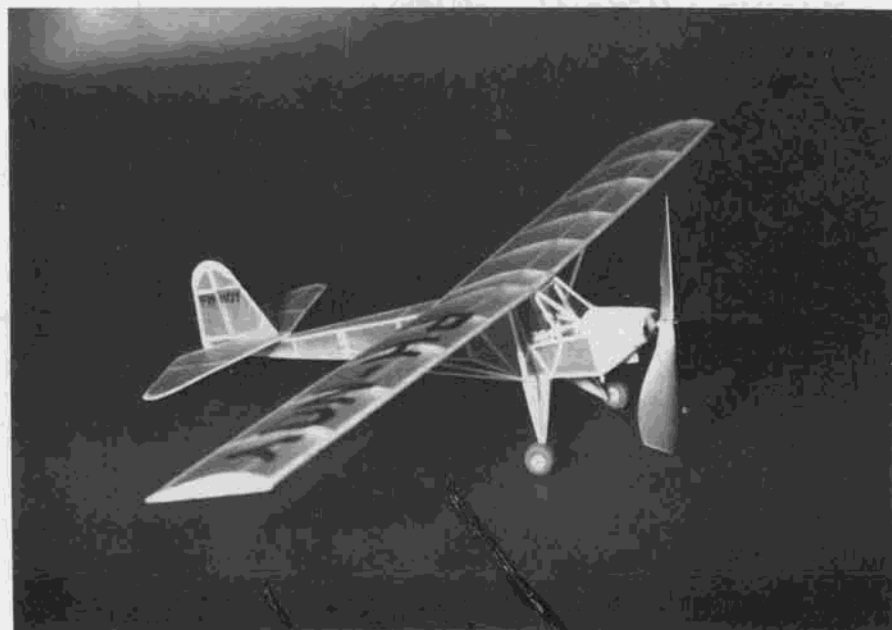
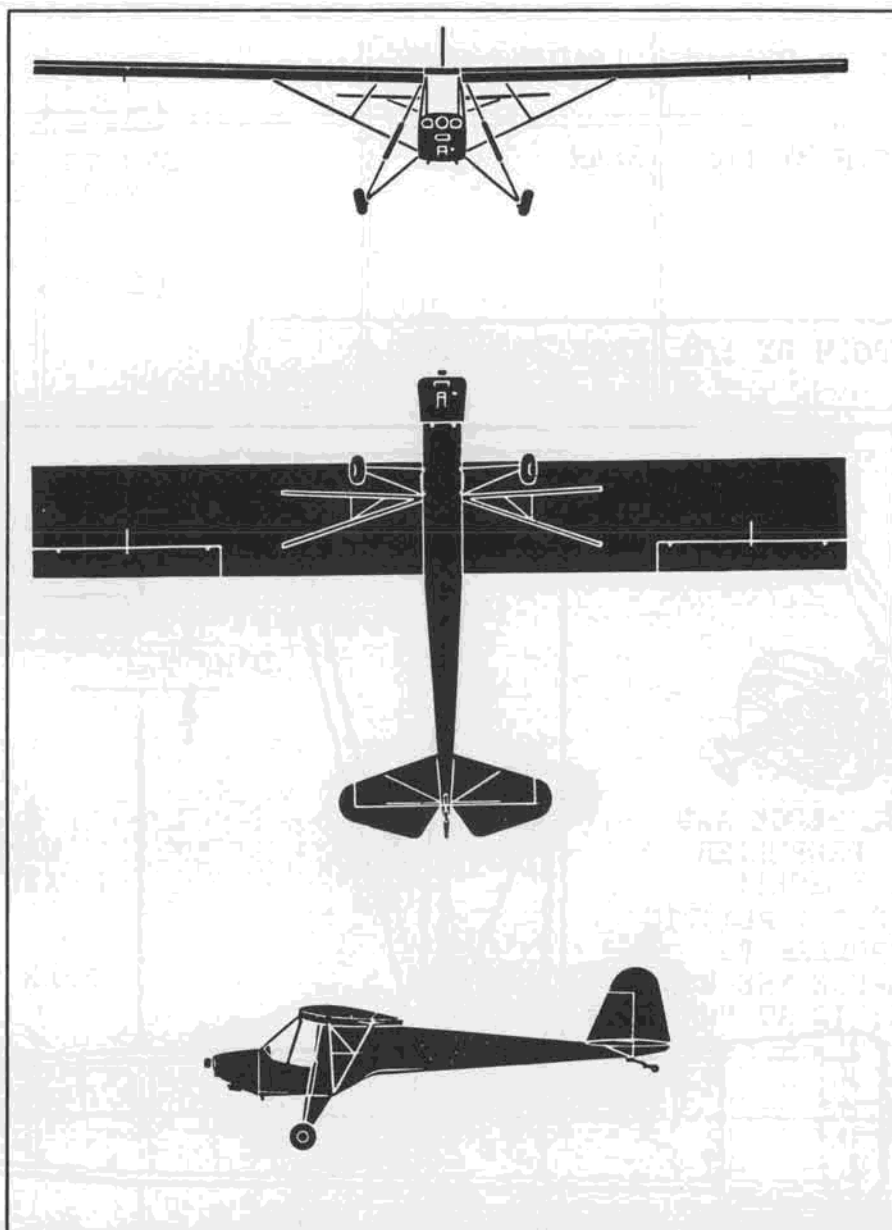
Use a thin black felt pen to put on the outlines of the ailerons and to show the tail hinge lines.

Put a hole in the noseblock assembly to accommodate a plastic thrust button and install a plastic propeller, bending a "Z" hook as shown in the detail of the nose assembly. Don't forget to put a washer between the thrust bearing and the propeller.

Balance the model at the wing spar after making up and installing a rubber motor. The model in the photos flies well on a single loop of 1/16th rubber 10 inches long. The original model required a little more nose weight than it came off the drawing board with, and this was achieved by selecting a heavier plastic propeller than the Sleek Streak propeller originally fitted and showing on the skeleton photo.

Condenser paper does not have to be doped to be airtight, and for a really light model it should not be doped. As a consequence, this model is pretty well an indoor flyer. The condenser paper will sag if it gets wet by landing in the dewy grass on a calm early morning, so be aware. (Guess who found out the hard way? Although luckily none of the newfound warps proved to be nonremovable.)

Have fun with your Dutch Crop Duster. •

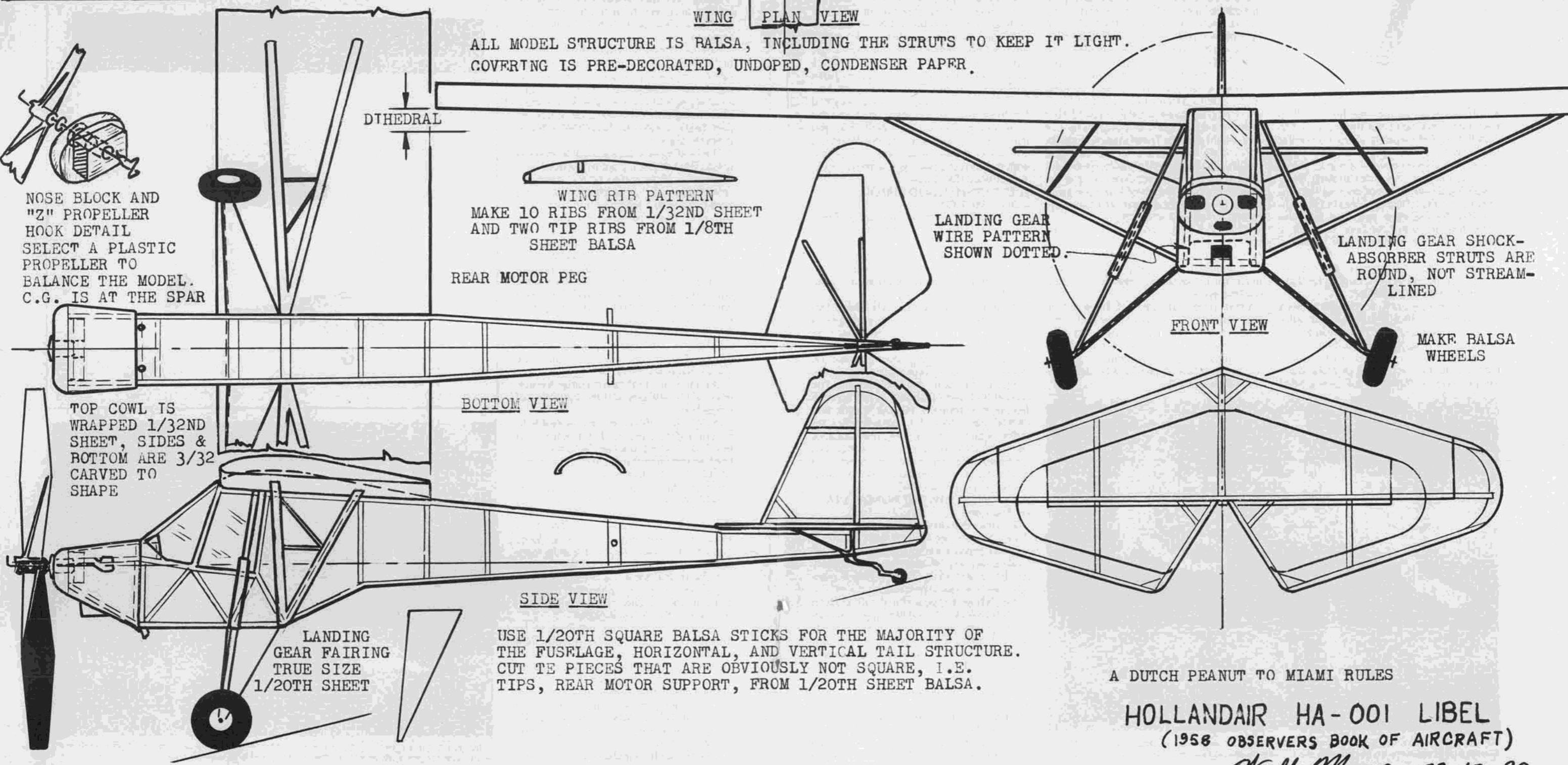


Hollandair Libel is a pleasing Peanut with straight wings, simple box construction that should be a breeze for most any modeler. The resulting airplane is a fine flyer.

1/16TH BY 1/8	LEADING EDGE								
1/20TH BY 1/8	SPAR	STRUTS TRUE SIZE	SHOWN SIZE					STRUT LOCATION ON WING SHOWN BY "X" S	
1/20TH BY 1/8	TRAILING EDGE			1/20TH SQ. GUSSETS					

WING PLAN VIEW

ALL MODEL STRUCTURE IS Balsa, INCLUDING THE STRUTS TO KEEP IT LIGHT. COVERING IS PRE-DECORATED, UNDOPED, CONDENSER PAPER.



NOSE BLOCK AND "Z" PROPELLER HOOK DETAIL  
SELECT A PLASTIC PROPELLER TO BALANCE THE MODEL. C.G. IS AT THE SPAR

DIHEDRAL

WING RIB PATTERN  
MAKE 10 RIBS FROM 1/32ND SHEET AND TWO TIP RIBS FROM 1/8TH SHEET Balsa

REAR MOTOR PEG

LANDING GEAR WIRE PATTERN SHOWN DOTTED.

LANDING GEAR SHOCK-ABSORBER STRUTS ARE ROUND, NOT STREAM-LINED

FRONT VIEW

MAKE Balsa WHEELS

TOP COWL IS WRAPPED 1/32ND SHEET, SIDES & BOTTOM ARE 3/32 CARVED TO SHAPE

BOTTOM VIEW

SIDE VIEW

LANDING GEAR FAIRING TRUE SIZE 1/20TH SHEET

USE 1/20TH SQUARE Balsa STICKS FOR THE MAJORITY OF THE FUSelage, HORIZONTAL, AND VERTICAL TAIL STRUCTURE. CUT THE PIECES THAT ARE OBVIOUSLY NOT SQUARE, I.E. TIPS, REAR MOTOR SUPPORT, FROM 1/20TH SHEET Balsa.

A DUTCH PEANUT TO MIAMI RULES

HOLLANDAIR HA-001 LIBEL

(1958 OBSERVERS BOOK OF AIRCRAFT)

*Walt Mooney 02-18-88*





# Free Flight

By BOB STALICK

• Just when all of the free flight writers have just about worn out the topic of R/C gear in free flight models, along comes the CIAM with a new proposal. For those readers who don't know what the CIAM is, it is the international rules making body governing all international competition, including the Free Flight FAI World Championships. By the time you read this, the CIAM Meeting will have been held and a vote will have been taken on the following proposal.

*88p) Proposal:* To specify the circumstances for the use of radio control for flight termination on FIC models:

1.3.1 "Radio control functions are allowed only when specifically stated in the rules for the relevant category." 3.3.2 Add to end of section: "FIC models may use radio control only for irreversible actions to restrict the flight, that is, motor stop or dethermalisation. Any malfunction of unintended

operation of these functions is entirely at the risk of the competitor." Replace 3.3.5. (a) by: "The total duration of the flight is less than 20 seconds after release of the model, and the model does not incorporate any radio control functions." Reason: Radio control of motor stop and dethermalisation have been introduced on some FIC models. These facilities have some advantages (such as early D.T. of a model after engine overrun, D.T. when the model is over favorable recovery terrain, saving a model by early motor stop to prevent a crash or bad flight, allowing practice on small flying fields) but at some cost in terms of complexity, cost and weight penalty. These aspects are probably finely balanced and the proposal would allow such use of radio control for the competitor who so chooses. It is defined such that the control is not used during an official flight and cannot change the essential character of free flight.

I guess that this proposal will be hotly debated or perhaps laughed out of the CIAM meeting, but the simple fact that it appears as a potential rule (along with 14 others) makes the use of radio in free flight an international issue.

Other proposed rules will be voted on and undoubtedly a few of them will pass. One of them that catches my eye is the deletion of the Builder of the Model rule due to the impossibility of enforcement, according to the rationale provided by the sponsors of the new rule.



Al Grell's grandsons, Dustin and Randy, entered the P-30 and HLG events at the Misery Meet. Dustin places second with his first big model. Randy placed fourth in his first-ever contest.

The Builder of the Model Rule was one that was a raging topic of discussion back in the 1960s. It is still in force in AMA free flight events, but it has bitten the dust in some other AMA events—notably several in the R/C field.

Now, I know that this column is written for free fliers, so I am going to let the above rules proposal stand without comment. My suggestion is that you read the CIAM report by George Xenakis, which should be appearing in an upcoming *Model Aviation* AMA section. I am sure George will cover all of the pertinent rules changes. On to the July column.

## JULY MYSTERY MODEL

This is a very distinctive design from the early 1950s and was flown in international competition. The plans and the article were published in an old English model magazine. Although the triple fin layout has faded from current FIC designs, it was a very popular design feature in the late 1970s and early 1980s. This month's mystery model is one of the first in my memory that has three fins. So, you think you know the name of this ship, do you? Well, if so, you can send your best guess to Bill Northrop, c/o *Model Builder* magazine. First in line with the correct answer gets a free one-year subscription. Do it now.

## JULY DARNED GOOD AIRFOIL —BIRD SECTION

In April 1987 I featured another Bird Section (entitled the Bird B-1). This month's section is slightly different, but has similar characteristics. First off, however, the coordinates for this section are presented in inches, not in percent of chord as is the usual case.

Although many of the early airfoil sections were based on bird wing shapes, a true bird section is a comparative rarity in either the model or full-size world. Quite excellent results have, however, been reported with some experiments on model wings using such "natural" airfoils. The typical bird section shown in this month's feature is essentially for low speeds and should have good lift characteristics together with low drag values. The concavity in the bottom front part of the section can be faired in or faithfully duplicated on a model wing. (Information obtained from *Model Aircraft* magazine.)

## JULY THREE-VIEW—THE BOBCAT 1/2A by Bob Combs

This information was taken from the *Okie Flyer Newsletter*, Bill Baker, editor. It seemed appropriate to feature a more up-to-date version of this month's Mystery Model—note the sweptback stabilizer planform and the low aspect ratio surfaces.

Here's how it appeared in the *Okie Flyer*: "Bob Combs's Record Holding 1/2A Bobcat is a large, light, and fast model that has set a standard during its evolution over the past seven years—the latest being a new Cat III record. Bob also flies the design in A, B, C, and D where it has done a good job. Here are some general comments from Bob:

*Balsa:* A lot has been written about this. All I can say is there is good contest balsa and some not-so-good contest balsa. Weigh every piece of wood. This model requires

wood that is light, true, and strong.

**Covering:** You can do the best job of maintaining a light framework and blow it all by picking up extra weight when you cover. I favor using Micafilm in 1/2As, but here's how I do it:

1. I use only the 3/4 oz. clear, and color the wing tips and bottom of the stab by using a Carter's Marks-A-Lot.

2. Cut open the Marks-A-Lot, pull out the wick, and soak it in about 30cc of denatured alcohol for 3 to 4 hours. Remove the wick and squeeze it with a pair of pliers to remove all the color. Then spray or brush the inside (dull) side of the Micafilm with the mixture. Let dry.

3. Apply one coat of Balsarite thinned about 10 to 20 percent with nitrate dope thinner. Apply to all surfaces and let dry. Apply a coat of nitrate dope thinner. This allows some additional penetration and removes globs.

4. Apply a coat of Quickstik and allow to dry. Use Quickstik for all overlaps by applying it to the material edges before covering. Use CYA on any stubborn spots.

For comparison purposes, I find the following weights on 8.5 x 29 sheets of Micafilm: Clear = 4 grams; Clear, colored with black = 5 grams; Standard red Micafilm = 7 grams.

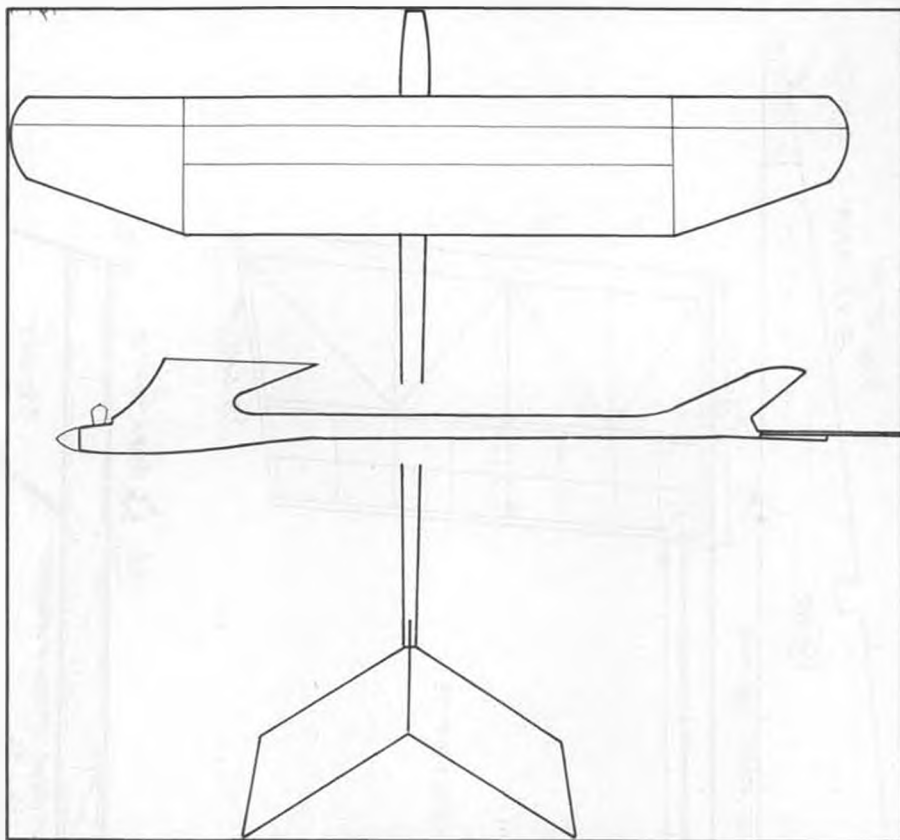
"Engine: Bob uses the standard Cox T.D. .049, but he reworks it until he can obtain at least 22,000 rpm from it using a Cox 5x3 propeller. Most contest flights are made using either a Cox grey 6x3 prop or one cut down to 5-5/8x3.

"If you are interested in building the Bobcat, I can supply black line three-view in full size for \$4 including postage. Write to Bob Combs, 7411 LaManga, Dallas, Texas 75248."

**DOPE ON DOPES by Bob Schafer**

The following piece was carried in the *Classic Flyer*, the newsletter of SAM 8 edited by Bill Darkow. The writer, Bob Schafer, was, before retirement, a chemist with Standard Oil Co. and is well known in the NW for his exquisitely crafted and finished old timer designs.

"BLUSHING—Many modelers have had the unhappy experience of seeing their gleaming new paint job slowly turn 'milky' or dull as it dries. This phenomenon, known as 'blushing' is mainly caused by moisture trapped in the dope film or from



**JULY MYSTERY MODEL**

using incompatible dopes or thinners.

"Since drying dope can cool the surface of your model to below the dew point of the atmosphere and cause moisture to condense on your fresh paint job, the easiest way to avoid moisture-caused blushing is to be sure that your painting area is dry, well ventilated, and the room temperature is well above the dew point.

"Another method is to use up to five percent of a drying 'retardant' which will allow the moisture to evaporate before the dope dries. Typical retardants are butyl lactate and butyl Cellosolve. To avoid blushing caused by incompatible dopes, use the same brand throughout your model or try 'sample patches' on a mockup before applying it to your plane.

"PLASTICIZERS—Dope films are very strong, but they have a low degree of flexibility. They require plasticizer additives.

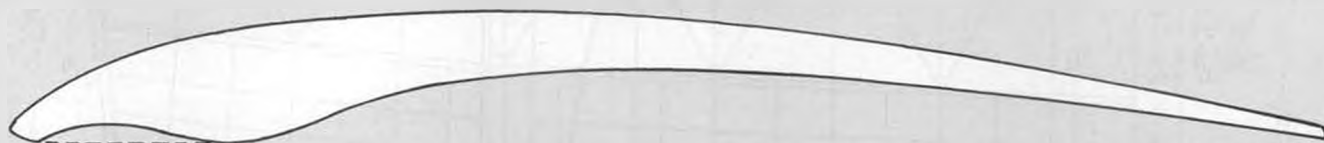
Commercial dope formulas are usually a blend of various types of nitrocellulose, resins, solvents, and plasticizers. When you add plasticizer to a formula, you gain flexibility at the expense of strength. Use a maximum of 10 drops of plasticizer per ounce of dope.

"The importance of using a solvent-type plasticizer such as tricresyl phosphate (TCP) whenever possible cannot be stated too strongly. In general, less of this type of plasticizer is needed to produce the same degree of flexibility than nonsolvent types (such as castor oil). This automatically gives you a stronger dope film with equal flexibility. This solvent is also retained better in the film at high and low temperatures."

**WINNERS by Bob Combs**

This article appeared in the *Okie Flyer*. It represents one successful free flihter's point of view as to what it takes to receive

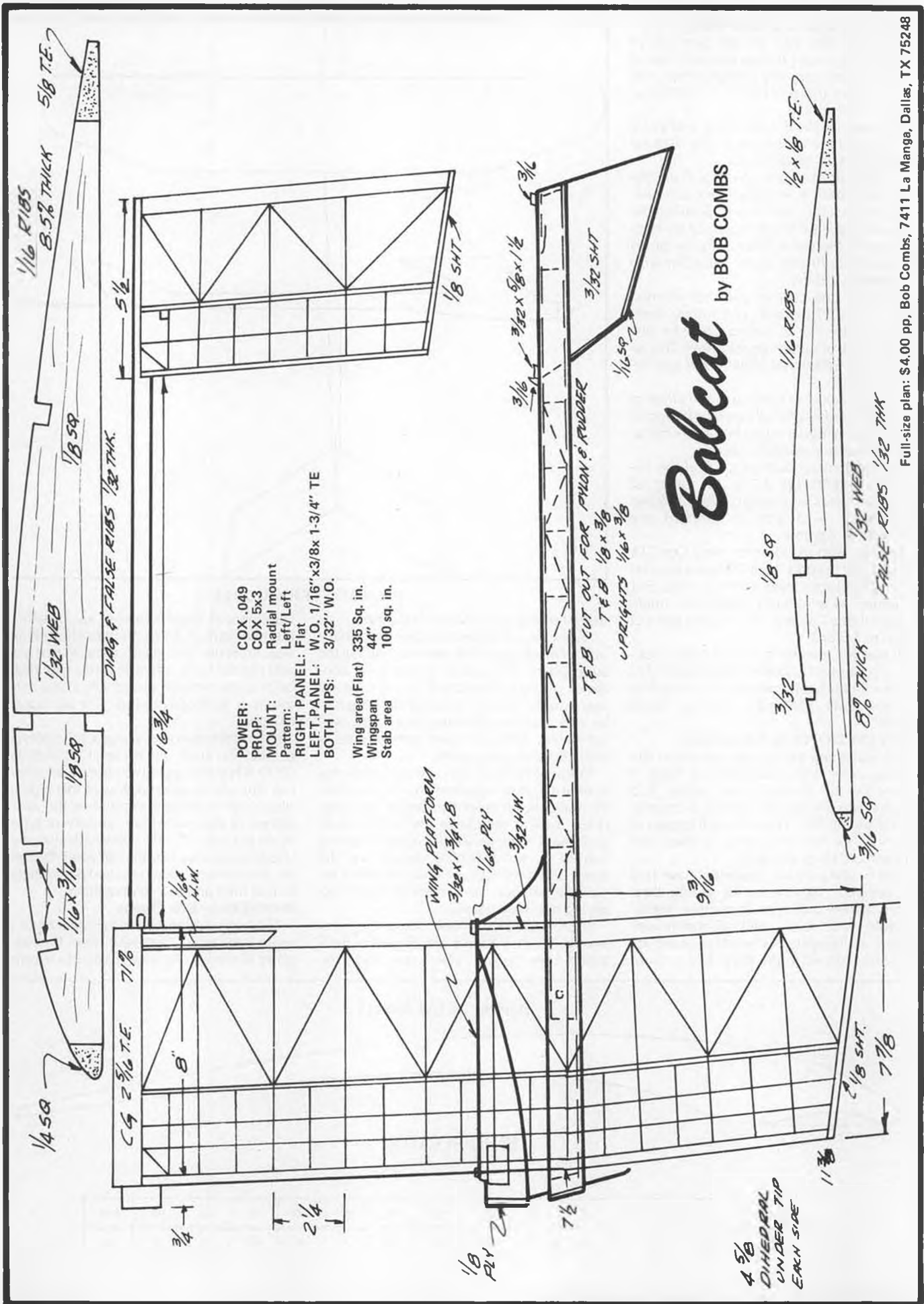
**Airfoil of the Month**



**BIRD SECTION**

STA	0	25	5	10	20	30	40	50	60	70	80	90	100
UPR	.13	.33	.48	.7	.88	.95	.94	.9	.8	.65	.5	.3	0
LWR	.13	0	.1	.1	.03	.36	.5	.5	.47	.4	.27	.15	0

Note: Ordinates are given in inches for a 10-inch chord length.



Full-size plan: \$4.00 pp, Bob Combs, 7411 La Manga, Dallas, TX 75248



Bright yellow color scheme is featured on Larry Kalapus' Satellite 450. Scene is Hart's Lake Prairie at the Annual Misery Meet. Larry is from Spanaway, Washington.



Bob Stalick launches his Dixielander in A Gas at Misery Meet. The ship is blurred due to "blinding speed" of the climb.

some trophies at the next big meet.

"What makes some people winners and while some never seem to get any hardware? Is it because they were born lucky, have the best airplane, or their airplane is trimmed better, knows when to fly, has the best support equipment, or that they practice and know their airplane best? I feel it is all of these things to a degree. In the Southwest the fliers are getting better and the winning times are much higher than they were a number of years ago. There are a few of these people who are winners today and weren't in the past. What happened? If you sit down and talk with them you will find out that they are more dedicated to the hobby. They spend more time building, test flying, and contest flying. They also watch other fliers and have learned some of the secrets about what it takes to be a winner. Let's look at the factors it takes to be a winner:

"1. *Luck*. It's not when a monarch butterfly is climbing without flapping its wings and you launch into its air and get a max. It's not luck when the thermal detector goes up two or three degrees, or there are other airplanes going up and you launch, getting a max.

"It's not luck when your tail pops at 1-1/2

minutes on a 2-minute max and you hit the ground at 119 seconds. It's not luck when your K&B 3.5 is screaming on the ground, you let go of your airplane, and the motor sounds like its got a bad cold. It's not luck when you D.T. at 2-1/2 minutes on an official two-minute flight, and the wind is blowing 20 mph, and you are chasing on foot because your bike won't start.

"It is luck when your plane stays up for 1-1/2 minutes on a 2-minute max and the timer says his watch didn't start, so you will have to fly again.

"2. *Best Plane*. Is there such a thing as a best airplane in our hobby? I do feel that the best flying airplane at one contest could place at another contest two or three weeks later or it might not even make a max.

"3. *Trimming*. You don't go to a contest trimming and expect to win. The odds are against you. I feel there are four stages of trimming, these are:

"A. *New Airplane Trim*—just make it safe.

"B. *Contest Trim*—final major adjustments.

"C. *Fine Tune Trim*—prior to a contest using right prop, fuel, and engine time, make minor adjustments. This to be done as close to contest date as possible.

"D. *At Contest*—test fly to see if your final trim is still holding. This is especially true on a long trip out-of-state meet. The air, temperature, humidity will be different or the plane could have warped.

"4. *Know When to Fly*. I feel if the truth was known, the plane that is flown first is the contestant's best airplane or is the one he thinks will win. I have watched Sal Taibi fly first in an event for years, and a number of years ago I started flying early and found that the air is thicker and more buoyant from 8:00 to 9:00 a.m. rather than later in the day. Get your three maxes in by 10:00 a.m. and then you will have to pick the air. A lot has been written about thermals and all I can say is, if you don't have a thermal detector, get one, and when you are test flying, use it. That way, when you go to a contest, you will know when to fly.

"5. *Equipment*. I really can't say too much on this subject. The equipment on the airplane, as well as the backup equipment, needs to be the best you can buy. A maintenance program must be a part of your being ready to fly and knowing that everything will work. When I go to a contest, I carry a lot of airplanes, along with a flight box, a

*Continued on page 74*



Wayne Drake has recently taken up F1C in place of Nordic. Wayne's choice of models is the Summerwind by Doug Galbreath. Wayne is always ready with a descriptive T-shirt, and this is no exception!



Remember Stan Hill's Amazoom? Al Grell does, and he built one! This black and red silk ship was flown in Nostalgia at the Misery.



By BILL WARNER

Illustrations by JIM KAMAN

Pick up an F.A.C. Moth (not a D.H. Moth!) at your dealer or send \$8.95 plus \$2.00 postage (and 6 percent if you're in California) to Peck Polymers/Beginners, P. O. Box 2498, La Mesa, California 92041. Before we're done, you'll have fuselage construction, prop-carving, design modification, and dethermalizers well in hand.

#### DECISIONS, DECISIONS

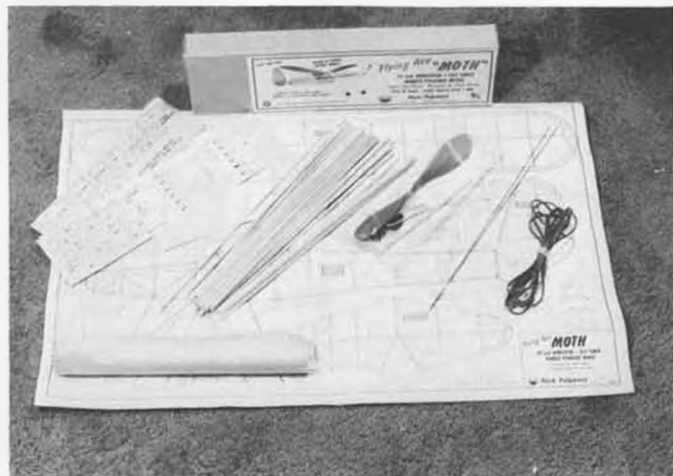
One of the Gang wrote in to comment on a cartoon I had in an earlier episode of a kid trying to cover his model with toilet paper. He remembered his youth when the Sears and Roebuck catalog was used for more than ordering long johns when you lived on the farm. There was one thing that was heaven compared to the rough catalog pages, and that was the tissue paper that oranges came wrapped in from the market. The problem was that they made great model covering, too! Really hard to decide on a beautiful model tissue job or comfort out in the outhouse! Well, every model pro-

• Ken Sykora of Oldtimer Model Supply says that the Flying Aces Moth was about the most popular model ever designed. It worked so well that *Flying Aces* magazine reprinted the plan which first appeared in August 1937! Some of the readers letters said things like, "It's the best flying model I ever built..." "It was the first ship I really got to fly..." or "I'm happy to report that I won my first contest with a Moth..." etc. Ken, who has been building Moths since he was nine, recalls that in spite of the fact that hundreds of other similar ships were published or kitted, the Moth drove them all into obscurity because it was the right ship for its time and place. He figures that its long nose and landing gear position took care of the bane of all beginners' models, namely the tendency to stall from tail-heaviness. It starts out nose heavy and by cranking up the T.E. of the stab and adding a little clay to the tail, it could be made to fly by anyone.

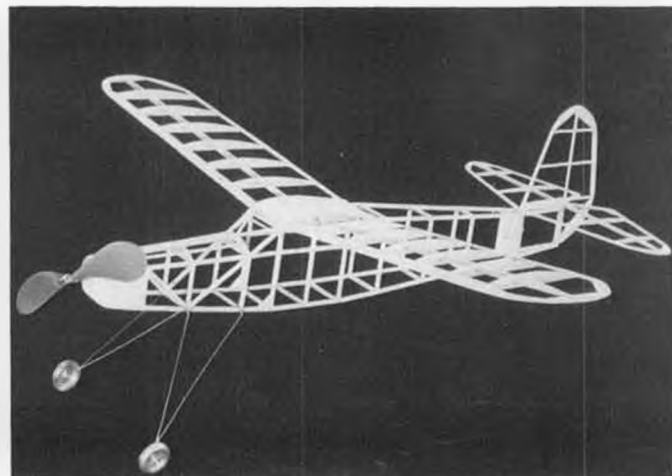
Certainly the 50,000 members of the Flying Aces Club let out a big cheer when the Moth reappeared in the August 1941 issue, but a bigger cheer was heard when Peck-Polymers decided to put out the FAC Moth in kit form last year. Having built several beginner's models, you are now ready for a plane that will really stand you on your ear!



What dreams are made of!

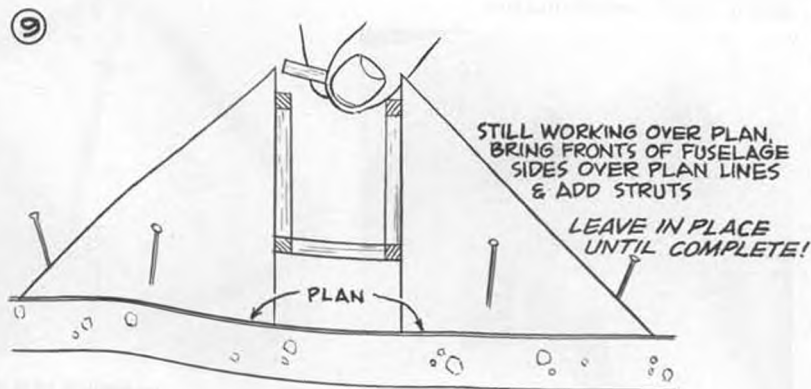
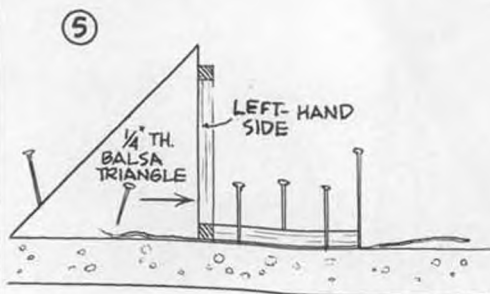
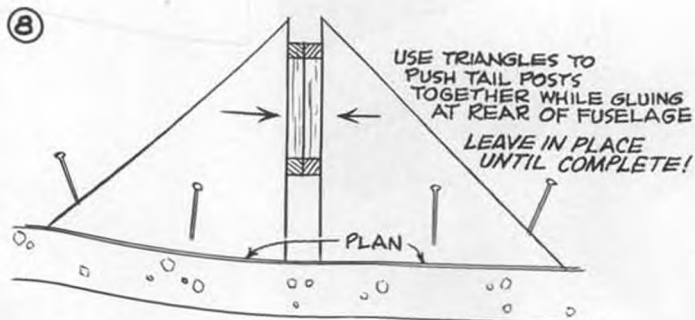
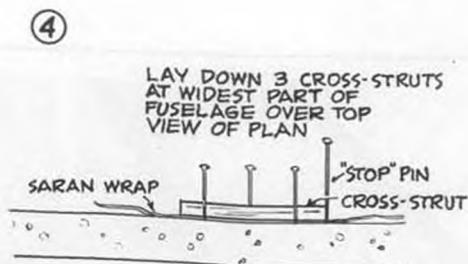
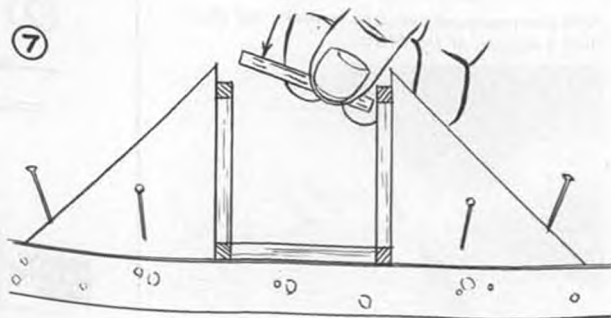
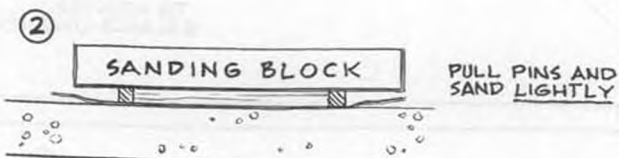
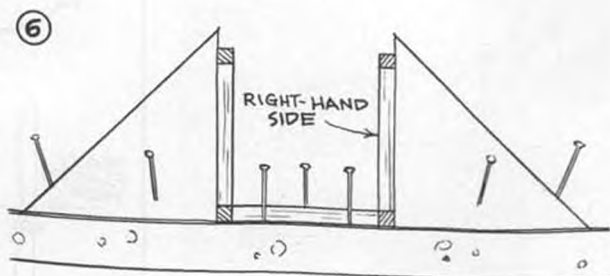
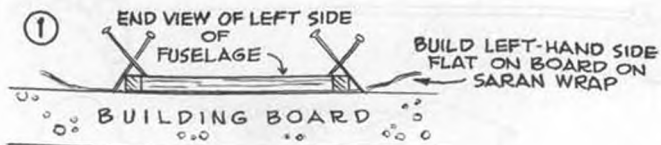


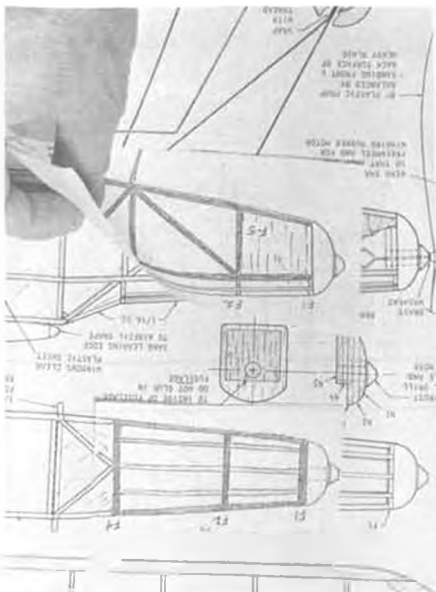
America's favorite model of the 1930s, the Flying Aces Moth.



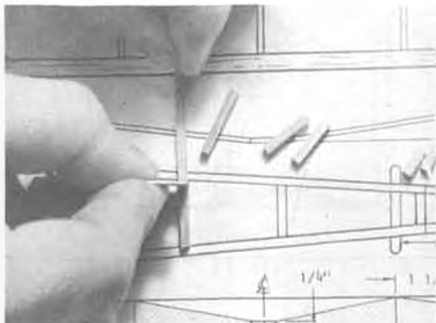
The Peck F.A.C. Moth kit is simple, and will introduce you to built-up fuselage construction and flying fun!

# BOXING UP THE FUSELAGE

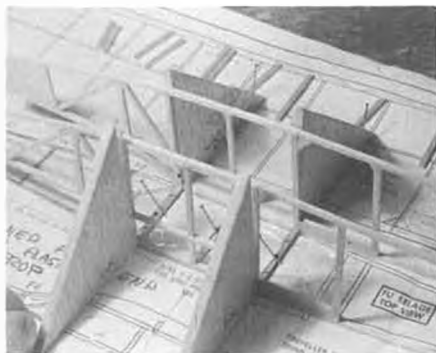




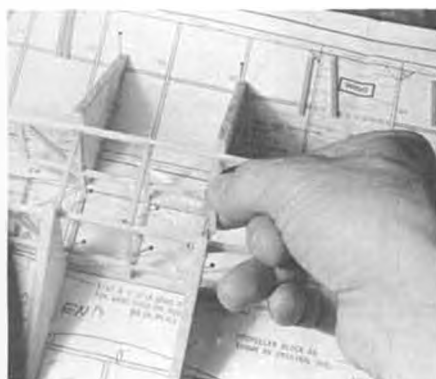
Add photocopied overlays to make the short-nosed version of the Moth.



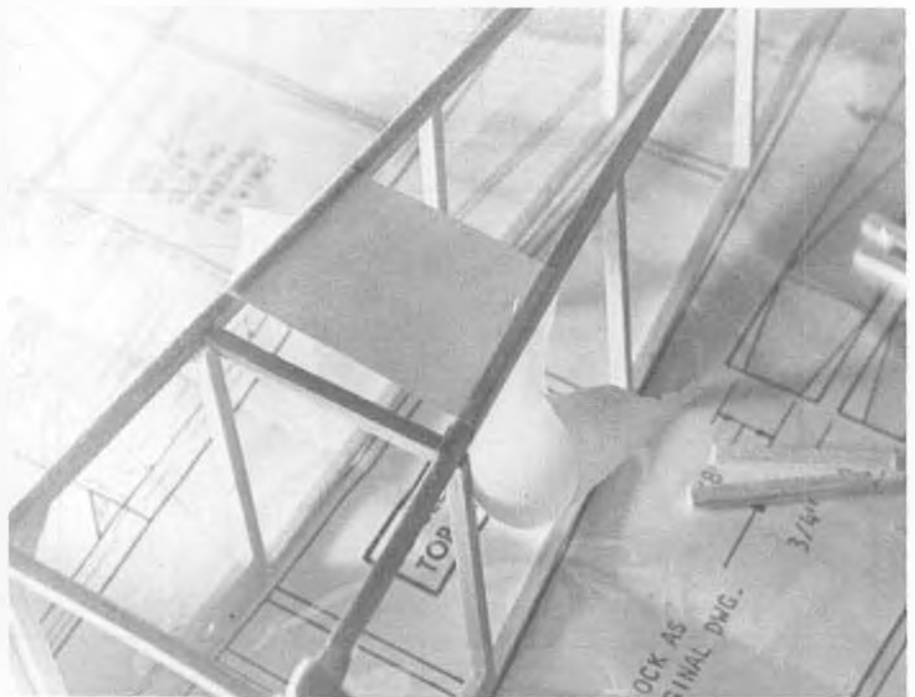
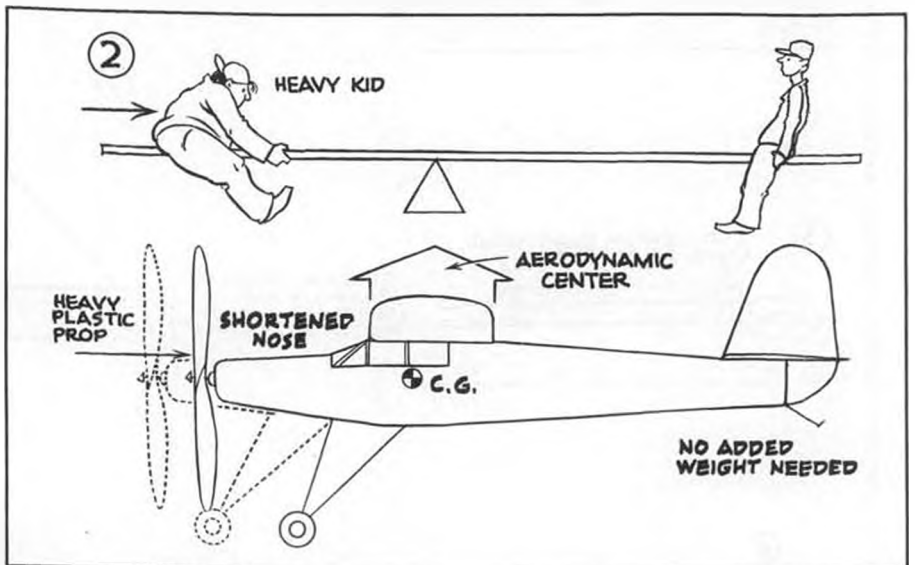
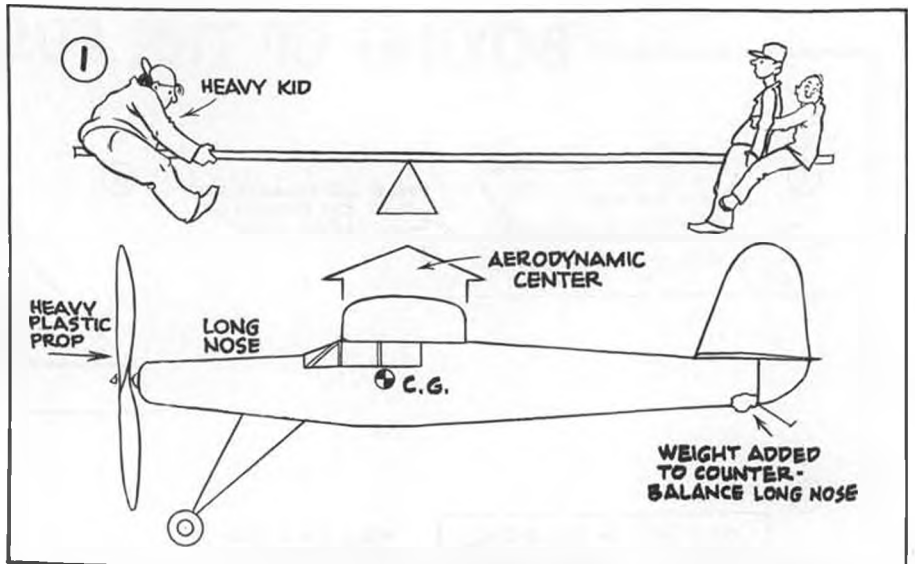
Cut cross-struts for top view in pairs. Don't build a top side and a bottom side. These are enough to connect the R.H. and L.H. sides.



When building fuselage "box," use balsa triangles to insure a square structure.



Add bottom three struts to complete the master fuselage section. See text.



Masking tape can be used to hold pressure on struts being glued in between the "master box" and the tail.

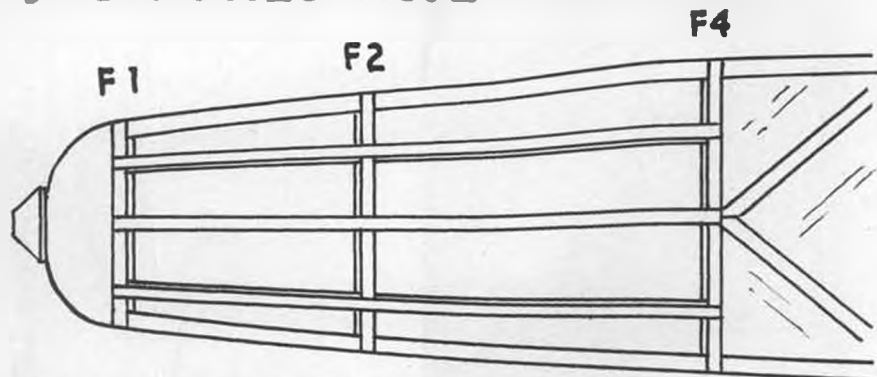


Build second side directly over the first to guarantee identical structures. Put Saran Wrap or wax paper between the two sides to prevent sticking together during gluing.



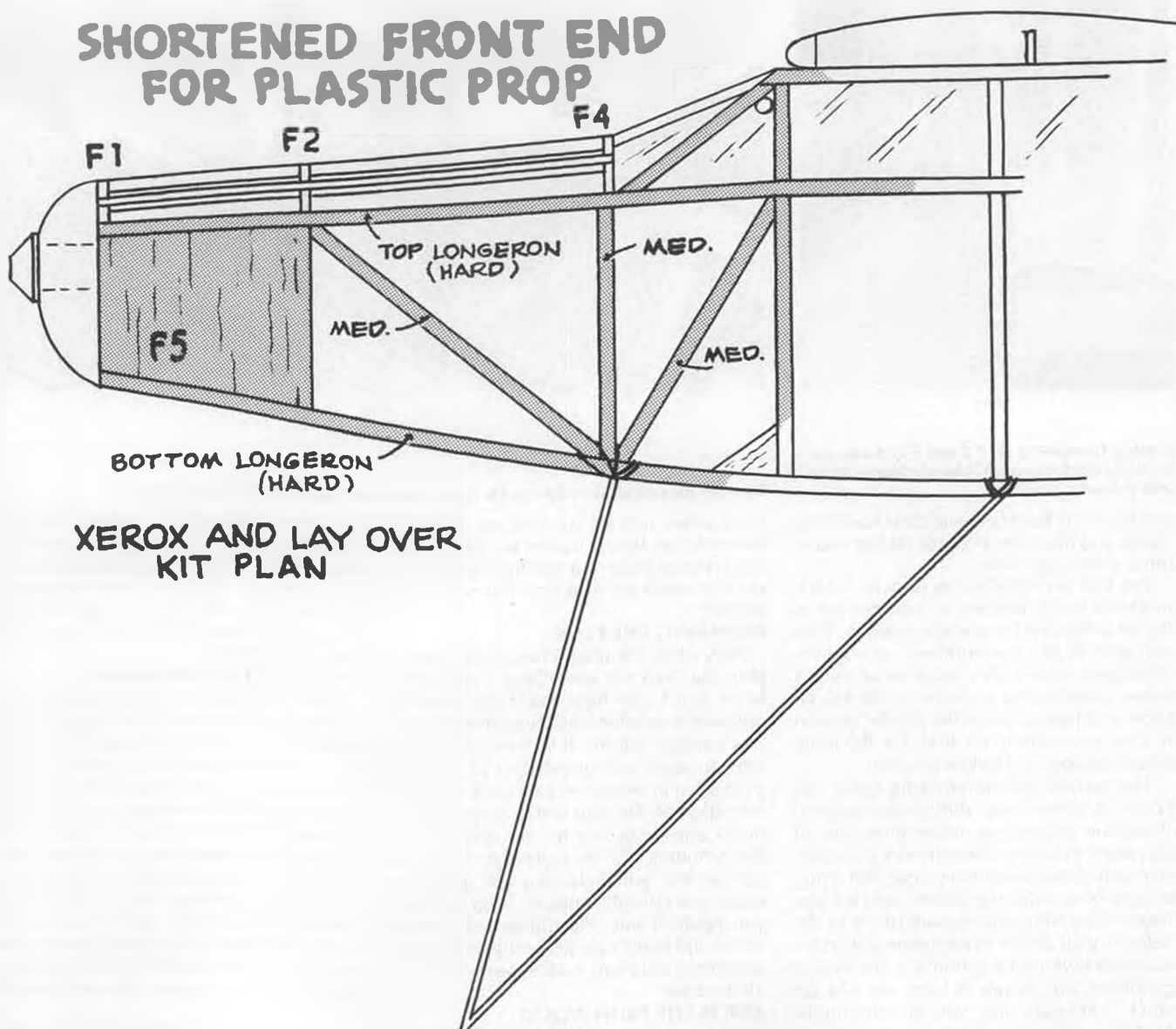
Shortening the nose 1-1/2 inches (left) helps modernize the '37 Moth to accept a plastic propeller gracefully.

## SHORTENED NOSE-TOP VIEW



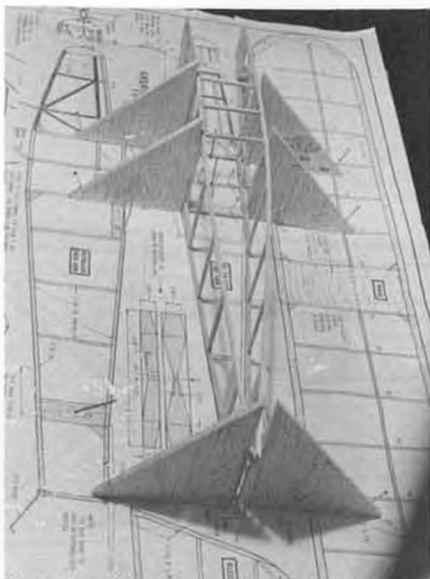
XEROX OR TRACE AND LAY OVER PLAN

## SHORTENED FRONT END FOR PLASTIC PROP

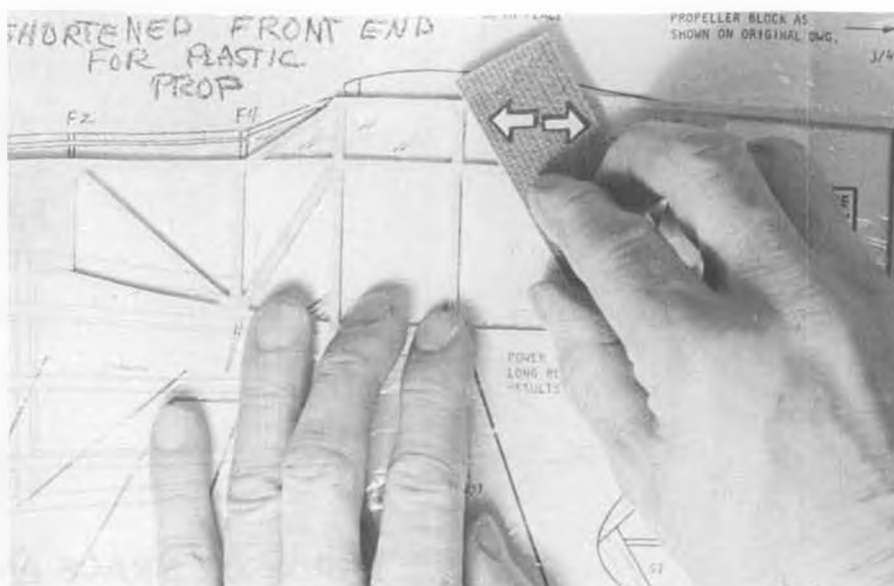


XEROX AND LAY OVER KIT PLAN





Pinch the tail portion of the fuselage with triangles and glue when it is lined up directly over plan view.



Sand the first(right-hand) side lightly with sanding block before covering with Saran Wrap to build the other side on top.



Scallop former F-2 or F-2 and F-3 if you are building the kit version. Use sandpaper wrapped around a pencil.



Remove pins carefully with needle nose pliers so as not to damage your structure.

ject has some hard decisions that have to be made, and there are a couple I'd like you to think about right now.

The first decision has to do with which model to build, the one as it comes out of the kit or the one I'm going to suggest. They will both fly, but the modified one with the shortened nose makes more sense with a heavy, plastic prop as found in the kit. I'll show you how to make the shorter version in case you want to try that. For the long-nosed version, just follow the plan.

The second decision-making crisis will come at some time during the project. Plans and instructions never show you all you need to know. Some model plans put so much on the plans that you get lost trying to figure out what's up! Others don't tell you much. One thing that we are trying to develop is your ability to complete a successful model without too much in the way of problems, but sooner or later, you will get stuck. I strongly urge you to *continue* as best you can, even if it turns out wrong.

Sometimes, just by working on it, you'll suddenly see how it should be. You can always change it later if it isn't right, but giving up will never get you into the wild blue yonder!

#### PREPARING THE PLAN

First, *study* the plan. I have never seen a plan that told me everything I wanted to know, but I sure have made some dandy mistakes by overlooking things that the plan was trying to tell me, if I'd have only taken time to read and understand it! A good modeler may even check off each bit of information on the plan with a pencil, just to make sure he or she has not missed anything. Putting a "?" by parts of the plan that are unclear will help you ask questions when you consult someone who can help you figure it out. Machinists and people who build houses are generally pretty good at figuring out plans, as they work with 'em all the time.

#### XEROX THE PRINTWOOD

You don't have to make a photocopy of

the balsa sheets with the parts printed on them, but the ribs (W-1s and W-2s) are not to be found on the plan, and you may want to make another model from the plans someday, especially after the first one flies away and you don't want to wait until a new kit arrives in the mail!

#### SHALL I CUT UP THE PLANS?

I hate to chop up a lovely plan, but this 24-inch span beauty will just not fit the size building boards I have around. If you are short of space, you too will need to carefully cut each of the main structures illustrated and build it on a suitably sized board. A good place to cut the wing into two pieces is along one of the lines at the center section (the wing is made in three pieces anyway). Try and keep the printed information that goes with the part you are cutting out on the piece of plan with what it refers to. You will also notice that the fuselage can be made in two pieces, too—see the side

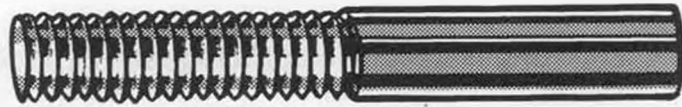
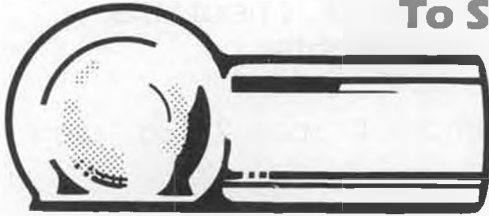
*Continued on page 66*

# DU-BRO

# BALL LINKS

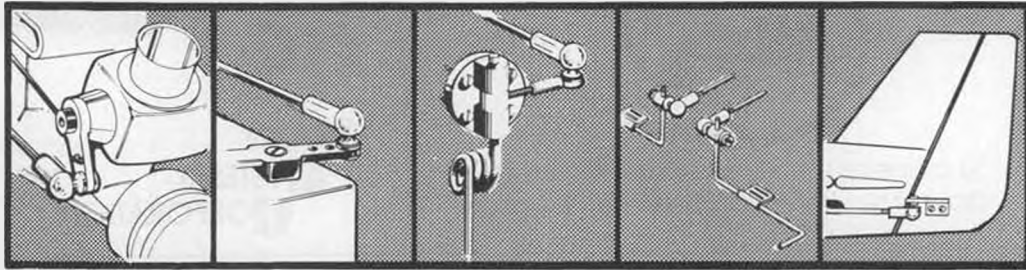
## "A SNAPPY SOLUTION"

### To Some Common Linkage Problems



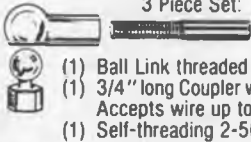
The Ball and Socket action of Du-Bro Ball Links help eliminate linkage binding or any play that may occur when off-set or misaligned hook-ups are made.

Du-Bro Ball Links are clean in appearance and are ideal for many R/C plane, boat, car and helicopter applications. They are ideal for eliminating differential throw in aileron connections and taking the slop out of steering hook-ups. Du-Bro Ball Links are the perfect connection when flex-cable is used to wiggle its way to a carburetor. If your application requires the need for two axis movement, Du-Bro Ball Links are the ultimate!!



#### No. 180 BOLT-ON BALL LINK

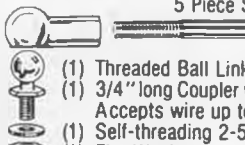
3 Piece Set:



- (1) Ball Link threaded for 4-40 Rod
- (1) 3/4" long Coupler w/ 3/8" 2-56 thread Accepts wire up to .072 dia.
- (1) Self-threading 2-56 nylon socket

#### No. 181 2-56 THREADED BALL LINK

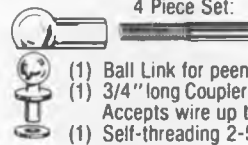
5 Piece Set:



- (1) Threaded Ball Link for 2-56 nut
- (1) 3/4" long Coupler w/ 3/8" 2-56 thread Accepts wire up to .072 dia.
- (1) Self-threading 2-56 nylon socket
- (1) Flat Washer
- (1) 2-56 Hex Nut

#### No. 182 RIVET BALL LINK

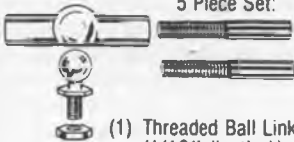
4 Piece Set:



- (1) Ball Link for peening on
- (1) 3/4" long Coupler w/ 3/8" 2-56 thread Accepts wire up to .072 dia.
- (1) Self-threading 2-56 nylon socket
- (1) Flat Washer

#### No. 183 AILERON CONNECTOR BALL LINK

5 Piece Set:



- (1) Threaded Ball Link for 0-80 Nut (1/16" dia. thrd.)
- (2) 3/4" long Couplers w/ 3/8" 2-56 thread Accepts wire up to .072 dia.
- (1) Self-threading 2-56 dual nylon socket
- (1) 0-80 Hex Nut (1/16" dia. thrd.)

#### No. 189 AILERON HORN WIRE BALL LINKS

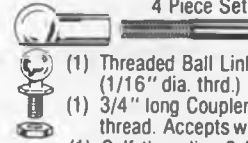
8 Piece Set:



- (2) Horn Wire Ball Links for 3/32" dia. wire
- (2) 3/4" long Couplers w/ 3/8" 2-56 thread. Accepts wire up to .072 dia.
- (2) Self-threading 2-56 nylon sockets
- (2) 4-40 x 1/8 screws

#### No. 190 1/16" THREADED BALL LINK

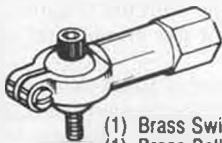
4 Piece Set:



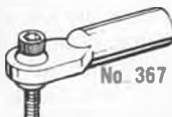
- (1) Threaded Ball Link for 0-80 Nut (1/16" dia. thrd.)
- (1) 3/4" long Coupler with 3/8" 2-56 thread. Accepts wire up to .072 dia.
- (1) Self-threading 2-56 nylon socket
- (1) 0-80 Hex Nut (1/16" dia. thrd.)

#### NO. 259 4-40 E/Z ADJUST BALL LINK

6 Piece Set:



- (1) Brass Swivel Ball
- (1) Brass Ball Link Shim
- (1) 4-40 x 5/8" Socket Head Bolt
- (1) 4-40 Nylon Insert Lock Nut
- (1) Adjustable Nylon Socket self-threading for 4-40 Rods
- (1) Adjusting Screw

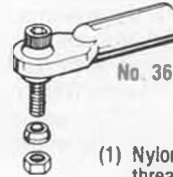


#### No. 367 2-56 SWIVEL BALL LINK

4 Piece Set:

- (1) Nylon Swivel Ball Link self-threading for 2-56 rod (burnished brass swivel)
- (1) Brass Ball Link Shim
- (1) 2-56 x 1/2" Socket Head Cap Screw
- (1) 2-56 Hex Nut

**No. 369 2-56 SWIVEL BALL LINK FOR 4-40 RODS**  
Same as above except ball link is self-threading for 4-40 rods.



#### No. 368 2MM SWIVEL BALL LINK

4 Piece Set:

- (1) Nylon Swivel Ball Link self-threading for 2MM Rod (Burnished Brass Swivel)
- (1) Brass Ball Link Shim
- (1) 2MM x 12 Socket Head Cap Screw
- (1) 2MM Hex Nut

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### Hey Kids. . . . Continued from page 64

view and notice the breaks in the "longerons" (main fuselage sticks that run from nose-to-tail) occur just under the rear of the wing. If you can't get it all on your plan, build it in two pieces and join them later! When you finish your model, the plans should be tacked back together with bits of mending tape so none of them get lost. It won't be much trouble to separate them if you decide to make another, and you probably will!

### CHECK THE STRENGTH OF YOUR STICKS

I built two Moths from Peck kit parts, and all of the wood was about the same strength. That seldom happens. Usually you get some hard sticks, some medium, and some soft ones. I have even gotten kits (not from Pecks) in the past with *all* the sticks so soft they had to be thrown away, or *all* the printwood so hard that it was unusable and had to be replaced with lighter stuff. You can use your stick sorter (February 1988 *Model Builder*, page 44) to separate the sticks from the strongest to the weakest.

### BUILDING THE REGULAR LONG-NOSED MODEL

Most models of this type come out tail-heavy and have to have some weight added to the nose for balance. The relation of the CG (center of gravity, remember?) to the "center of lift" (what aeronautical engineers call the "aerodynamic center" of the plane—the invisible point on the wing which is the middle of its lifting force) is im-

portant. If the wing is lifting *behind* the CG very far, the plane will head for the ol' terra firma without a chance of flying. Also, if the wing is too far in front of an aft (in the tail) CG, it may well put the wing at too great an alpha (angle of attack) and stall out. If you use the plastic prop on the long-nosed ship as it was designed (for the lighter balsa prop), you *will* have to add clay to the tail in all probability. This is not a good idea. Ideally, the heaviest weight you carry should be as close to the "center of lift" as possible. The shorter the nose, the better recovery the plane will make if it gets upset for any reason. The only drawback on most models is that if you can't move the wing, as you did on the Sky Bunny (moving the "center of lift"), you have to move the CG, and that means adding clay to the tail to combat nose-heaviness. The farther back your balance weight (called "ballast") goes, the less you will need to do the job, as the "lever arm" is longer. What it can do, however, is make it much harder for your model to recover from a stall. It is easier to just shorten the nose. . . like having the fat kid you used to teeter-totter with slide himself closer to the center of the board. Think of the pivot point at the center of the teeter-totter as the center of lift. Moving Chubby *toward* the center helped the balance without you having to have your younger brother join you on the light end. Think of not having the younger brother as *weight saved!* On a model, this is important!

### BUILDING THE FUSELAGE SIDES

Kids get very confused and creative when

figuring out how to build fuselages. Some come up with extra longerons and build four complete "sides" and then try to glue them together instead of making only two sides and connecting them with short "strut" pieces. One modeler I know leaned his two sides together and got a triangular-shaped section by leaving out the bottom altogether. Making a fuselage is almost as hard as spelling it right.

I am going to give you directions to make the short-nosed version, as most of you have the kit with the plastic prop and don't want to go through all the trouble of carving a prop just yet. If you *do* want to make the balsa prop, then just build the model as it is shown on the kit plan.

Start by tracing or photo copying the short-nose side view from the magazine. Then lay it over the plan on your building board and tape it in place, lining up the rear lines with the kit plan cabin area. Keep the nose button in line with the original position or you might get unintended up or down thrust.

Tape down a layer of Saran Wrap to keep the glue from sticking to the plan. Cut the hardest sticks you have and use them for the front of the fuselage. It takes any crash damage and needs to be strong. The strut sticks that go from the top longeron to the bottom longeron do not have to be as strong, and you can use lighter sticks here. As you go toward the rear of the fuselage, you can use lighter and lighter vertical struts to save weight, though on your long-nosed version, you will probably have to add weight to the



# IMPROVED <sup>↑</sup> Byrojet<sup>®</sup> Performance

## The Rossi .90 has Arrived!

The long-awaited Rossi .90 has undergone extensive testing under our Research Personnel's direction and it has passed every level with flying colors!

Running on 20% nitromethane fuel, the Rossi .90 powered Byro-Jet, equipped with our newly designed Tuned Muffler, is turning a steady 20,400 rpm and is producing as much as 2 pounds more thrust than the O.S. .77 . . . at an increase in weight of only 5 ounces.

All-in-all, the new Rossi .90 produces more of the same brute power that we previously experienced with the .81! And, as can be expected, the same Rossi reputation for solid, trouble free and reliable operation is obvious in the new .90.

Designed specifically for the Byro-Jet Ducted Fan, the only items necessary to retrofit an existing Byro-Jet System equipped with an O.S. .77 or Rossi .81 is a new Engine Mount, Tuned Muffler and Rossi .90 Engine.

If you have a Byron Originals ducted fan jet or are flying a Byro-Jet powered model of any sort and have been looking for more power and thrust, the Rossi .90 is just the ticket for you.

### SPECIFICATIONS

RPM . . . . .	20,400	Fan Diameter . . . . .	6"
Static Thrust . . . . .	13¼-13½	Total Performance Pkg. . . . .	
Shroud Diameter (OD) . . . . .	7½"	Weight . . . . .	2 lb. 7 oz.
Recommended Fuel: Byron Originals Performance Blended Fuel (20% Nitromethane)		(Includes Rossi .90, Header Pipe, Byro-Jet Fan, Custom Tuned Muffler, Pipe Coupler, Mounting Bracket With Hardware.)	



### Order Information

Item	Order No.	Retail	Factory
Byro-Jet Performance Pkg. w/Rossi .90 . . .	6130099	\$549.92	\$329.95*
Rossi .90 w/Header Pipe . . . . .	6130098	387.99	259.95*
New Custom Tuned Muffler . . . . .	5930100	70.71	49.50*
Engine Mount (#9) for retrofit . . . . .	5930094	35.71	25.00*

\*Add \$3.00 shipping per item. AK, HI and overseas, call for shipping costs. Prices subject to change without notice.

### Available

Exclusively from . . . **Byron Originals, Inc., P.O. Box 279, Ida Grove, IA 51445**

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tail to make the plane fly anyway.

Locate the F-5, F-6, and F-7 parts and pin them on the plan as shown. You will not have to sand off the numbers, as they will be on the *inside* of the model. You are building the *right-hand* side of the finished model now.

Ignore the F-1, F-2, and F-4 formers and construction in front of the windshield. This gets added far down the line. Right now, lay down the bottom longeron in three pieces; note where the "cut" lines are in the area below the windows. Glue the front portion to F-5. Do not get confused by the marks on the bottom longeron back near F-7, as they are not "cut" lines but dotted "position" marks showing you where the cross-struts go when you are putting both sides together later on. Use your sanding block to sand the little angle on each of the sections until they fit together as shown on the plan. Glue them together as you pin them down to the plan (don't forget to "X" the pins, and make sure the sticks go *directly* over the plan putline). Double-check their location after the pins are in.

Using medium sticks, cut *two each* of the upright strut pieces. Make two each because you are going to make two sides, and you can check now to make sure they are both cut to the same length. As you cut each pair, set them aside, in order, so that they will not get all mixed up when its assembly time.

Now pin down, using hard balsa sticks, the upper longeron that starts at the nose and goes back to the rear of the windows. It

is in two pieces and should be glued together, though the change in angle is so small, you could probably get away with just using one stick and just putting a small kink in it with your thumbnail. Add the longeron part that goes at the top of the windows and glues to F-6. Now, pin down the final part of the upper longeron that goes from F-6 to F-7. Again, it may be easier to just kink it slightly where the "cut" line is behind F-7.

Glue in the struts by applying glue to each end of the strut and then first touching one to the contact point on the longeron, and then touching the other end. This "wets" each surface. Then fit it in, making any small adjustment necessary by re-pinning the longeron to fit in that area, unless, of course, the strut is obviously cut too long or too short, in which case you will need to make a new pair the correct length. Save the ones that are too short, as you'll need some short ones to connect the sides later on.

### GUSSETS

You will note that there are some triangle-shaped pieces which go where the strut and longeron meet at the "cut" lines. They are called "gussets," and add strength at these weakened spots. You can glue them in later after the fuselage is assembled. Everything else that is shaded in should be glued in place.

### MAKING THE SECOND, OR LEFT-HAND, SIDE

Do not remove the first side (right-hand side) from the plan! Take the pins out, but

don't go any further. Lay another layer of Saran Wrap over the top of this side to keep the second side *that you are going to build right on top of the first side* from sticking to it. Some modelers don't use the Saran Wrap, and just cut the two sides apart with a razor blade where they stick together. Now repeat the process for making the first side, the only exception being to sand off the numbers on the sheet parts that would show through the tissue covering, and make sure that the sheet parts are up level with the top surface of the side you are making and not pushed down. If they are exactly the same width as the sticks, this will not be a problem, but sometimes they are thinner and need to be brought up flush with the rest of the structure that you will be covering with tissue. You don't want them sunken in, as it will look bad. Allow both sides to dry for a few hours if possible. I often get impatient and wind up pulling things apart before the glue has fully dried, and I expect you get in a hurry, too. The best plan is to work on another part of your model while this is drying, and that way your overall time will not be retarded.

### BOXING UP THE FUSELAGE

Carefully peel off the Saran Wrap and lightly sand each side of your fuselage sides with your sanding block, just to level down anything that's sticking up, not to make them thinner. Now look at the fuselage top view, with the Xeroxed shorter nose attached, if you are building this version, and try and see what the designer is showing you. What you are seeing on the outsides of

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the top outline is really the *edge of each of the sides you just built!* You cannot see any of the structure because you are now looking at it when it is standing up on edge, and all you can see is *one thin width!* This confuses most first-time builders, and I'll bet 75-percent of the kids who build all by themselves have a problem with how to handle the top view. Just remember, you have *four longerons already built into the sides* and you *don't need any more!* Do not build the top view like you built the sides! All you need to do now is to *connect* the sides you have, and to *make sure* all the structure comes out looking like a box and not the Leaning Tower of Pisa.

First, cut two each of the connecting

struts which go from one side to the other (one for the top, and one for the bottom). Sometimes there will be just the one at the top or the bottom, but generally they go one above the other in pairs, usually at the exact point the struts are on the sides, forming a box all around. The exception to this on our Moth is the one bottom strut which connects the sides about an inch in front of F-7. Its only purpose is to have a place to glue your tissue covering to so you can have a hole to help you see how you are attaching the rubber to the peg that is going to slide through the holes in your F-7s later. If you understand what it is for, you'll begin to look for similar "special purpose" pieces on later models. Always ask yourself what the

part you are putting in does. If you understand that, you'll make a lot fewer mistakes. For example, if you understand that the *nose block is removable* so that you can change motors and also adjust your propeller thrust angle, you won't make the mistake of gluing it solidly in place. But that's for later. . . .

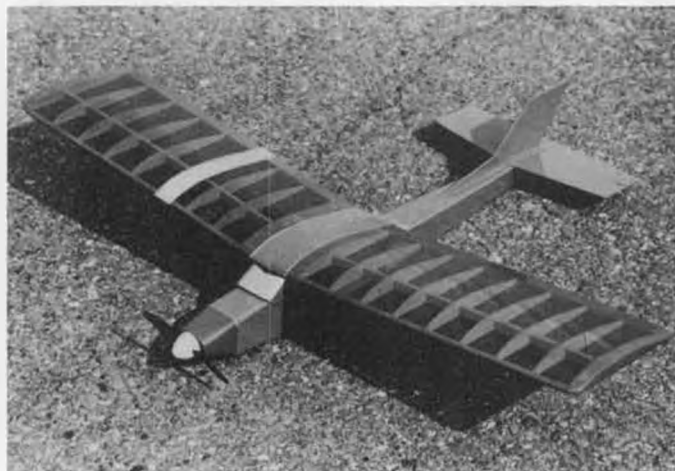
Cut about six or eight triangles a bit larger than the height of each side of your model. They can be made of thick balsa, cardboard, or anything that can hold a side square to the building board and also apply a bit of pressure to hold the struts while the glue dries. Some guys use books, some use steel carpenter's corner-reinforcements, cans, bottles, machinists' squares, video cassettes, or whatever! Some stay in place due to their weight. Others need to be pinned. I prefer balsa triangles cut from a sheet of 1/4-inch, using the corner of a sheet of paper to lay out the 90-degree corner. These are then pinned with one angled pin about halfway to hold it down, and one at the end to hold end pressure against the structure.

Shall we expect the fuselage right-side-up or upside down? What determines this is finding a flat place on the side that will pin down to the board. Often the bottom of a fuselage has curved longerons which would give a "rocking chair," so the best place for this, and most models, is the flat spot where the wing will go. This means making the fuselage *upside down* over the plan. Note that there are three struts that cross under the wing. Pin these down over the locations shown on the top view of the plan, using a three-pin "X" over each one. This will make removal easier later when the sides are up, as taking out the center pin will release the strut.

Next, shove a pin right up against one end of the strut to keep it from sliding when the side of the model is glued up against the other end. These will be taken out before the opposite side is glued on, of course. Put a drop of glue on the end of each strut with a stick, and do the same to the spots where they will touch the inside of the built-up side. Double-gluing is best. Then set the side in place against them (on the flat part of the top longeron) and set two of your triangles up against the side to hold it upright and push slightly against the glued joints. Keep it lined up from front-to-back (or nose-to-tail) so the struts in the side part match up exactly with the struts you are gluing in. Line it up as best you can. Don't worry if the side leans a little away from your triangle. Let the glue dry for a couple of minutes, making sure the side is down snug against the board.

Now remove the anti-sliding pins where the other side will go, and apply a little glue to each strut end and to each attachment point. Use two more triangles to hold the second side in. Now glue in the cross struts opposite those you pinned to the board. They should push the sides out against the triangles and complete the "master box." Pinch the ends of the fuselage together, making sure they match up when viewed straight down over the plan, and do not touch with one a bit higher than the other or do not come together off to one side.

# ELECTRIC POWERED AIRPLANE KITS



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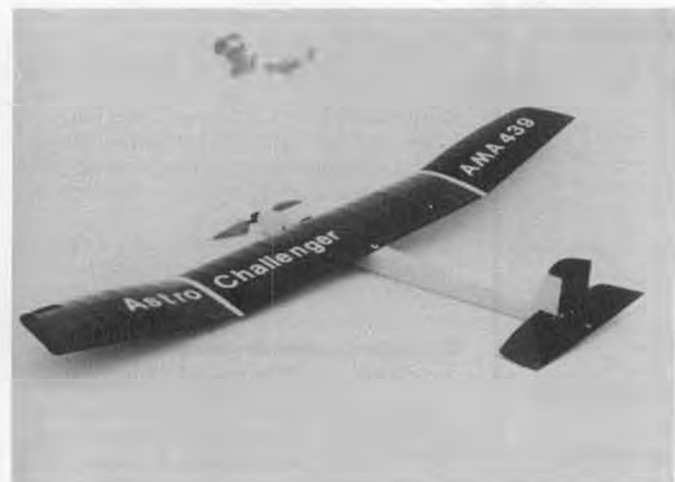
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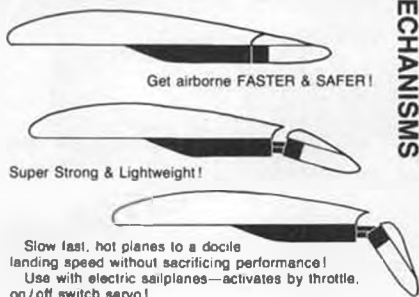
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Make necessary adjustments before the glue dries. They are best held together with a pair of triangles at or near the end while they dry. Now you can add all the struts in between that you can reach. The sides can be held in against them with a rubber band around the fuselage (tie it off to just the right size to give enough pressure, but not so much that it distorts the structure). A piece of masking or other tape can do this also. If you have extra triangles, use them, as they also will help assure a square structure. When these struts are dry, remove the newly-boxed fuselage from the plan and add all the struts on the opposite side you



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couldn't get at before. A little glue fillet at each joint when the entire assembly is dry will add extra strength. Add the gussets as shown on the plan.

Lightly sand the outside all over to level things up, but *not* to make anything thinner, using your sanding block. Glue on former "F-1" and stand the fuselage up on its nose against a flat surface to make sure the F-1 is perfectly even with the front end where the nose block will go. Add "F-2" (plus "F-3" for the long-nosed version) and "F-4." Before they dry, glue in the 1/16-inch square stick into the notches in these formers and line them up. Then glue in the other two sticks. They can hang over on each end a little and get cut off later. A couple of rubber bands may help hold them in until they dry. Tie a

knot in a rubber band to get it just the right size.

## SCALLOPING

Wrap a piece of sandpaper around a round ballpoint pen or similar and sand out or undercut a little scallop between each of the 1/16-inch upper nose-deck "stringers" you just glued in place. This is done to keep the tissue from sticking to the formers. When it is applied only to the stringers, it flows smoothly, without a little bump every time the stringer crosses a former. *Do not scallop* F-1 or F-4, as you *do* need to stick the tissue to them! You will see little dotted lines on the printwood showing the depth of the scallops. The four windshield support pieces, one on each side and two forming the "vee" seen in the top view, can be cut to a bit longer length than needed and custom-fitted using your sanding block. Round them with sandpaper if you wish.

You have now done the hardest part of the model. Congratulations! Next time we will finish up the fuselage and work on some of the rest of the structure.

Note: For those experienced modelers not wishing to purchase the kit, the plan is available from *John Pond's Old Time Plan Service* (see ad in this issue).

## Big Birds. . . . Continued from page 11

mailed to all members in good standing and offers info on new BIG Bird products, plans, building and flying techniques, and chapter activities around the world.

If you'd like any more information about the IMAA, I've got brochures for the asking (please do include an SASE). If, on the other hand, you're all fired up and want to join ASAP, just send a check for \$12 (USA, Canada, and Mexico) for yearly dues to: Secretary Bob Blaney, 14 Parkview Road, Long Valley, New Jersey 07853; (201)852-2674. All overseas memberships are \$25 (US currency).

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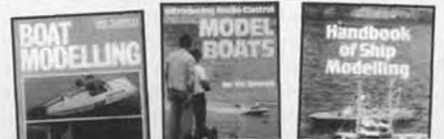
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had grown on me and on my kids too.

So I returned to the shop again. I picked out an XR-20 kit to try next. My kids put up their own money for engines and igniters. It's for certain that we will continue to launch model rockets. Yes, I still fly airplanes over the weekend, but I make sure I spend my time with model rockets and my children too. Maybe they won't grow up to be Shuttle pilots, but they'll remember many fun-filled Saturday mornings with their Dad and their model rockets. I know I do; you see, that's how my Dad spent his recreation time with me.

**Foo-2-U-2...** Continued from page 34

dency for tail heaviness.

Flying the FOO is the fun part. Make sure the CG is inside the limits shown on the plans and all flying surfaces are warp-free. Although pylon models usually are trimmed for a right climb and a right glide, my model preferred a right climb and a left glide. The model's ready-to-fly weight, including some nose ballast, was 64 grams. Using two 80 mAh (mili-ampere hour) cells, the climb is leisurely and graceful. A 30-second motor run gets 1- to 2-minute flights every time. Longer chargers and motor runs of 40 to 50 seconds gets the model up high enough to catch the slightest lift; and with a terrific glide and light wing loading, chasing these little models can be a real challenge. After losing the model three or four times (eventually getting it back each time), I added a pop-up stab dethermalizer actuated by a Tomy Toy timer. It weighs a little more than a fuse system, but I personally don't like the fuss, bother, and risk of using fuses on sport models that are flown a lot. The Tomy DT cost about five grams, but even on this small model it's hard to see a difference. With the DT we can now put the little FOO up sky high, even at our little field, and bring her back every time with a short one- to two-minute DT. Fun stuff like you can't believe!

Substituting a three 50 mAh cell battery for the standard two 80 mAh cell battery that comes with the VL motor, gives the model a faster climb, but provides a shorter motor run. The maximum altitude reached is about the same in either case. Both of these battery packs weigh the same, so the glide is unaffected. I prefer the more graceful, longer climbing pattern for a model this



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### Model Rockets Continued from page 45

On launch day, I tried out my reliable Mach V with a stronger engine. This time I nearly lost sight of it except for the thick smoke trail as it climbed for the clouds! I was glad the kids were with me; they had a distance to cover to retrieve the rocket because of the wind drift. Tony launched his Enforcer; its descent was marked by the brilliant flashes of sunlight reflecting off the silver full body decal. I thought the Enforcer was a wise choice for Tony; there's almost no way he could lose sight of it while it came back to earth. Jade set up the Wildfire next; it has a payload section, and she had placed a note inside of the payload compartment with her name and address in it so that the rocket could be returned to her if it got lost. However, her fears were groundless; she had a great flight, and I noted how impressive it was for such a tall rocket to reach for the sky.

Although the morning wind had picked up in strength, I decided to launch my Mach V with the biggest engine in my inventory. The flight was awesome; it definitely went out of sight until the parachute opened. But my luck ran out; it drifted out of our sight and possible reach due to the winds at the higher altitudes. We all felt a little despair; I resolved to use a parachute with a hole in the middle to bring it down faster next time. That's when I realized something important; this hobby

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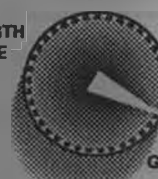
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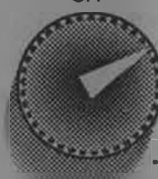
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size, so I also tried a battery pack of two 100 mAh cells. Wow! For a weight penalty of only 3-1/2 grams, you can get runs approaching three minutes and almost out-of-sight climbs. On a calm evening and using the DT, it's great fun. No matter how you fly it, you're going to get attached to your little FOO.

Seniorita. . . . Continued from page 19

plain bearing two-stroke, with a crankshaft rotary valve. Ho-hum, you say? Well, let me list a few advantages this engine has over its competitors: It has a truly effective baffled muffler and is furnished with its own com-

bination radial mount, nose gear bracket, glow plug, automatic mixture control carburetor, and replaceable 1/4-28 prop stud. Not only that, but due to the use of the very latest aluminum alloys and manufacturing techniques K&B has been able to produce a superior quality engine at an unbeatable price. I have seen the engine advertised for as low as \$31. When you subtract the extra items that are not offered with its competitors, that puts the price down in the \$26 to \$27 range, which is about the price of a well-known brand of 1/2-A engine. I don't see how K&B does it! After about 15 to 20 minutes of break in time, the engine ran flawlessly and consistently hand-started with two or three flips of the prop. For a complete technical analysis of the engine, see Peter Chinn's article in the December '86 issue of *Model Airplane News*.

### FLYING

With standard servos and a 500 mA battery pack, my model weighed in at 56 ounces (less fuel) yielding a wing loading of just under 11 ounces a square foot. The

recommended CG was achieved by placing the battery pack just to the rear of the servos.

Actually, two models were built for this test, the second being constructed by my father. Other than the covering material, the only differences between them are the engine (his has a brand "X" .20 size four-stroke) and the fact that mine was built with the optional side-thrust while his engine is straight. Although very slight, there is a trim change power on/off on dad's model due to torque, while mine flies dead true. I do suggest using side thrust.

As I expected, both models fly beautifully and have extremely gentle and forgiving natures. With the recommended control surface throws, they are reluctant to stall, simply mushing with a slight nose-bobbing when holding full up. They are very stable and are as fine a training aircraft as anything yet devised. I would not, however, recommend that a person with no flight experience attempt to fly this model without help, and Sig backs me up in that belief. I'm teaching my wife to fly with this one, and, though it is quite easy for her to handle in the air, the landings and takeoffs still require a second set of thumbs nearby. The model is simply too attractive to risk smashing for no good reason.

In summary, I found all the products mentioned in this article to be excellent and have no reservation about recommending them to anyone.

**Free Flight. . . Continued from page 59**

flight tool box, a box with five cans of fuel with different percentages of nitro. All the airplanes have been test-flown and all the screws, motors, timers, D.T. line, wings, and stabs have been inspected along with the fuselages checked for hairline cracks. I never build during contest season because it takes all my free time to keep 10 to 12 planes contest-ready or as the case can happen, repaired. I carry everything to a contest that I need for minor repairs and the equipment to repair it.

"6. *Knowing Your Airplane.* If you are like me, you do most of your test flying alone and in wind less than 10 mph. I fly alone because I don't want any distractions, and I have a bad habit of pushing too hard if someone is watching. I really enjoy flying in wind less than 10 mph because I usually fuse the airplane for less than one minute's walk after it. The problem with this is when you get to a contest and the wind is 15 to 20 mph, you have to know what trim to make to keep the plane from stalling all over the sky. Do you put weight on the nose, or more turn in the glide, or take out some up in the stab? If you know your plane, you will know what to do.

"7. *Other Basic Things I Have Learned About Contest Flying.*

"A. Get all your gear ready two to three days before you leave for a contest. Inventory the fuselages, wings, stabs, engines, fuse, fuel, pen bladders, surgical tubing, rubber bands and repair equipment. Don't forget to check or charge your battery for the bike, flight box, and ni-starters if you use them.

"B. Load your car the night before, this way you can think about what else you might need the next morning before you leave.

"C. If you are going to a new contest site, try to get there early enough to look it over by car, driving around the site.

"D. Get to the contest early the next morning because you need to look it over by bike to see about trees, ditches, fences, cattle, distance you can see, where and how to get off the field if your plane doesn't D.T. or has a long engine run.

"E. Check your engine by running it and at this time set the needle. If you set the needle properly, you shouldn't have to mess with it the rest of the day. Check your timer by timing it and letting it shut off the motor.

"F. Get a timer, this is one of the most important steps in flying. If you can find someone who isn't flying and will time for you all day—gosh, you are well on your way to winning. If you have a flying friend, you can time each other, but more times than not, you will both want to fly at the same time.

"G. Check your thermal detector and time the thermals coming across the field.

"H. Pull out your fuse for about three minutes and light it about a half a minute before the next thermal period.

"I. Check your fuel, plane, prop nut—making sure everything is ready. Set your timer. Keep one eye on the temperature gauge and the other eye on other planes, butterflies, birds, streamers, and your fuse.

"J. I feel that a lot of the gadgets that are on some planes require too much to remember at launch time, so I have cut these down to two things to remember: 1. Hit the timer (clockwork-type, not human-type), 2. Angle the direction of the launch.

"K. Temperature goes up 2 to 3 degrees reach down and pull fuse to 2 minutes plus about 15 seconds. Watch the gauge for about 10 to 15 seconds, and if it holds at this high setting, tell the timer you are ready to fly. Hit the starter and go for it. Were you ready to fly or not? Let's review: your motor bike has been started and is still warm; you know about the field and know how to get to your plane after D.T.ing; you have pre-checked your motor by running it; you have checked your timer by letting it shut off your motor; you have checked the wing and stab on the plane for a square fit; you have pre-lit your fuse and know it is burning; and you have launched into good air.

"If you remember and do each step, each time, the same way each time, you will be A WINNER, or at least you have done all you can do."

#### SOME WORDS IN CLOSING

As you read this, it is the middle of the outdoor season up here in the N.W. However, as I write this, it is cool and wet outside—not the best time for flying, just building. My latest building project is a Korda Powerhouse 41 for Nostalgia Ignition. Should be a good one for the O&R .23 that has just been waiting for a good model.

So, here's some humor to carry you through until we meet again next month:

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**Insiders. . . . . Continued from page 49**

verted from CL Speed, and became world champ a few years after building his first EZB. With Ron Williams's book (available in the library) and Jerry Nolin's EZB in January '88 MA (both of which are A++) all the secrets are out, so don't be intimidated.

While many shy away from microfilm, most indoor builders prefer it as being easier to work with than condenser paper or plastic films. Experience tends to bear this out also. Better-half Barbara built a mike EZB and shellacked all us guys with it. The MRL microfilm developed by Erv Rodemsky is what everybody uses for good reason; it is strong, dry, and slack.

At .002 oz/100 sq in, mike is less than half the weight of the thinnest Mylar, 1/4 that of condenser paper, and about 1/10 of Japanese tissue. There is an additional saving in the adhesive, which can be water in the case of microfilm. Since the covering adds no strength or stiffness, the minimum structure weight is dependent on the covering weight with a snowball effect.

A good starting point is to use heavy wood, like 8 to 10 pounds, and cover with mike. Bob DeBatty holds both novice and regular pennyplane records using this approach.

As a junior, I could match weights with the big boys, but only because I saved

weight in the wrong places. Those models were too flexible and weak, thus the heavy wood recommendation. So all we need is someone to volunteer their pool table in the garage as a pouring tank, plus a rubber stripper, and we'll be all set.

No activity devised can be harder on an arm than flying a small, low-ceiling HLG competitively. After a few flips, the glide is adjusted. Then it takes dozens of all-out vertical launches of a ping-pong ball-weight object to trim the all-important transition. It's painful even thinking about it. Consequently, it is strongly suggested that C-12 be the glider event of choice. Stoy's "Coot" (with clipped tips to meet the span limit) should be an excellent place to begin. Flapped wings like the Coot's are a bit tricky to get set up but are good performers and avoid the knife-edge 0-0 trim of non-flappers. Despite many arguments to the contrary, every time I clipped a round tip, the glide improved, so this is recommended over scaling the wing down.

The ideal weight for a glider is enough so it can just hit the ceiling with a max launch. If the model is underweight and ballasted, it will usually not get much more altitude 'cause of flex and flutter, so it's usually better to start just barely overweight and sand TEs and tips till the desired result is obtained. A model which can't hit the ceiling is giving up a lot.

Finish is noncritical in the glide mode (as have been all attempts at turbulation) but makes some difference in the launch. A simple non-warping method is to use pouncing paper or 1200+ grit for the final

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sand, then the back of the paper, then waxed paper. The waxed paper holds down the fuzz with almost no weight. On soft wood it is better not to wrinkle the paper or it might gouge. There may be an excuse for not building an FIC, but it is hard to come up with a reason for not flying low-ceiling C-12 indoors.

### P-24 CONDOR

The indoor beginner kit is a new item from the Mace Model Aircraft Company of Tulsa, Oklahoma. Don Mace, the owner of Mace Model Aircraft Company, has been a model builder all his life, and his experience as a modeler and mechanical designer is clearly shown by the quality of the kit and plans. This P-24 Condor kit and a similar P-18 Hawk kit are the latest additions to the kit line. This line consists of an Easy B, an outdoor hand-launched glider, and a small but high quality group of model supplies.

The first large scale use of the P-24 Condor kit was the University of Colorado Aerospace Engineering Sciences Model Aircraft Project. This was the third year of this project. The 250 incoming freshmen form three-person teams that build, fly, and report on a P-24 type model. (P-24 models can have no dimensions greater than 24 inches and use a plastic propeller. They also cannot utilize any specialized indoor construction materials such as condenser paper.) Modelers from the Denver area Indoor Model Airplane Association and other Denver Clubs help the student teams build and fly the P-24s. After this experience has been evaluated, the student teams apply this background and their introductory aerodynamics course material to the design, construction, flying, and reporting of their own P-24 design. Out of the 80 P-24 Condors built by this truly beginning group of modelers, 7 flew for more than 2 minutes in our 40-foot ceiling, category II site.

Since less than 10 out of the 250 students had any "stick and tissue" model building

experience, I believe the kit and instructions can be said to be truly first-rate. With this well-established kit source established, I hope that other clubs add a P-24 event to their contest calendars. It can be a great introduction to indoor modeling.

I know that Don would be very pleased if you would pass on any information about the P-24 Condor and the Mace Model Aircraft Company to your clubmates and flying buddies. Order kits from: Mace Model Aircraft Company, 359 South 119th East Avenue, Tulsa, Oklahoma 74128.

### Chipmunk. . . Continued from page 17

face. Once you have the fuselage parts taped and rubber-banded together and are satisfied with the alignment, Super Jet is applied along all the joints, and the job is complete. The wing construction is very conventional and straightforward and merits no particular comment except that all of the parts fit extremely well in our sample. Our kit was assembled as per the plans, and we opted for fixed gear and no flaps. The plans and instructions clearly show the installation of both flaps and servo-operated retracts for those wishing to add these options (Art Scholl had both a fixed-gear and a retractable Super Chipmunk). There is also plenty of room in the fuselage for a six-ounce smoke system tank which we plan to add in the near future. James built the entire model, including firewall installation, etc. using the Goldberg Jet cyanoacrylate system, and, so far, we have experienced no problems with any loosening of glue joints.

The Chipmunk is designed for fabric or film covering, as there is open framework on the wing, fuselage, and tail surfaces. Goldberg had provided two rolls of white Ultracote which is their new iron-on film covering material. Ultracote is easy to apply and has a non-gassing adhesive which is a

big advantage when applying the film over solid-sheeted areas and using the film over itself as trim. The material handles well, and the surface texture is much more realistic, giving the appearance of a high-gloss paint job versus the usual plastic look of most iron-on film coverings. Ultracote can be painted with polyurethanes, model epoxy paints, and automotive acrylic enamels. Model dope should not be used, however, as it does not adhere well to the Ultracote surface.

James covered the entire Chipmunk with the white Ultracote and painted the complex scale trim scheme with K&B Super-poxy enamel. The only preparation on the painted areas was to wipe the Ultracote with K&B Thinner prior to spraying the color on. Absolutely no problems were encountered with paint peeling during the masking stage or subsequent flying. The finished results are quite stunning, and most observers, upon seeing the Super Chipmunk for the first time, think that it is just another one of James's usual immaculate paint jobs for which he is well-known in the local modeling community. Ultracote is available at present in 12 colors. I don't know if any of these colors are specifically matched to any particular paint system. It would be nice if the colors were matched to the popular K&B paint system or if mixing information was provided. How about it, Goldberg? At any rate, Ultracote is a significant step forward in model film coverings and deserves serious consideration for use on your next project.

Our finished Chipmunk weighs seven pounds, four ounces with an O.S. .61 FSR engine and Futaba eight-channel PCM radio with four S-130 servos. We used a J-Tec scale muffler instead of the usual O.S. muffler to keep the exhaust system completely enclosed within the molded cowl. James tinted the canopy with the Rit Dye method (although the instructions claim that this does not work well) and installed a Williams Bros. two-inch scale pilot figure. The finished model is very attractive and is an immediate attention-getter any time it is brought to the local flying field.

The Goldberg Super Chipmunk's flying characteristics can be better understood when you consider this: The design work and initial test flying of Goldberg's prototype were performed by 1986 and 1987 Canadian pattern champion Dave Patrick. Dave is also the designer of the Conquest IV pattern aircraft that is kitted by another concern. For the initial test flights, James picked up his camera and handed the transmitter to Ron Abels (This would be roughly equivalent to having your newly finished full-size homebuilt tested by Charlie Hilliard). On the first flight, Ron behaved himself rather well and made a smooth takeoff followed by a number of "camera passes" and some routine aerobatics. On his second takeoff with the Chipmunk, Ron allowed the airplane to gain about ten feet of altitude and then executed a full inside snap roll! This was followed by a series of antics such as horizon to horizon knife edge flight and inverted passes only a few feet off the runway. The Super Chipmunk proved to be a bit faster than we expected, but not quite as fast

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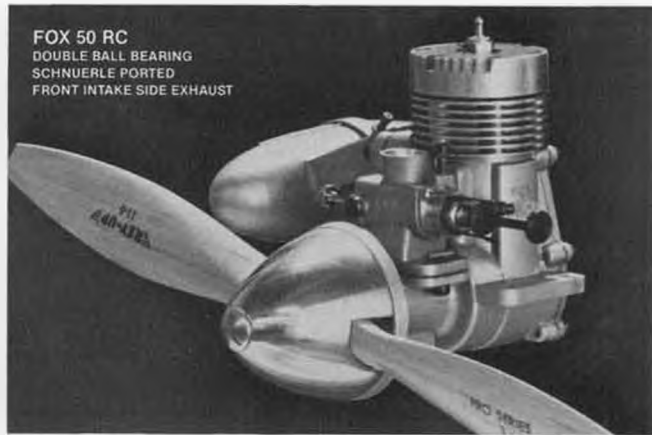
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as a true pattern bird. This may be only because it does not have a tuned pipe! Along with all of this performance, the Chipmunk is gentle on landings with absolutely no tip stall tendencies and has excellent ground handling characteristics that make for nice "wheel" landings.

James's Futaba PCM is equipped with Dual Rates. We set the control surface throws slightly less than called for in the instructions on low rate and about 1/8 inch more than specified in high rate (the rudder throw was set for all we could get in both high and low rates). These settings gave us gentle response in low rate and enough throw for wild aerobatics in high rate.

In summary, the Goldberg Super Chipmunk should appeal to a very wide range of modelers. This kit proved to be truly first class in every respect. When properly finished, the completed model is certain to be one of those models that you fondly remember years later. The kit quality makes building an extremely pleasurable task, and the performance should satisfy everyone from the occasional weekend flier to the seasoned pattern pilot or enthusiastic hot dogger. Both flaps and retracts can be easily added. A four-stroke .80 or .90 should give lively performance, along with a more realistic sound. We chose to go with a two-stroke engine because we planned to install a smoke system at a later date and felt this would be more effective with the two-stroke. If you are looking for a boost to your ego, try being the first in your area to fly one of the new Goldberg Super Chipmunks. En-

joy it while you can, as yours is not likely to remain the only one in your area for very long. For example, the following Monday after our test flying session, the local hobby dealer sold one Super Chipmunk and placed an order for a second for another customer! If we sound enthusiastic about this kit, it is because we are. Goldberg's latest offering is a definite winner and a fitting tribute to the memory of Art Scholl. •

**Ramblin.** . . . . *Continued from page 37*

would give value for money. It wouldn't bend or break; it'd have phenolic-caged bearings from "go"—big strong rods to stand the revs. When you get past 27,000, the big end of the rods expire in a hurry.

**MB:** Andy, we wish you all the success possible. Thanks for talking with us.

I also asked Steve Rothwell to talk to us as follows:

**MB:** Steve, what's your interest in model building?

**Steve:** I came up through control line. I became very interested in combat.

**MB:** Did you win some at combat?

**Steve:** Yes, but I never won a Nationals. I got "seconds" and did very well in my own state of New South Wales.

**MB:** What engines did you run?

**Steve:** We flew Australian rules, not FAI rules. We used .40s. My interest is in competition. I need competitive events. I need a contest. When I flew a lot of combat I'd step back and use second line equipment if I thought that's what my competition had.

That'd even things up a bit and I'd have a good flight. It didn't matter who won or lost, as long as it was a good flight. And it's still a good flight I'm after. My wife Bea has put up with this now for eleven years. Ya' take over the house with models, there's stuff from one end to the other, there are engine bits heating or cooling in the oven, epoxy drying, and paint spilled everywhere.

**MB:** Please tell us about bits in the oven.

**Steve:** I've always been interested in the technical nature of model building/flying and the challenge of doing something better through your skill. I've become interested in a special free flight event—not a purist event either—it's the Australian fun event called Scramble. It's run for one hour's duration using sport free flight models with a maximum engine size of 2cc (.12 cubic inches). You have to accumulate as much flying time as possible over a one-hour contest flying period. There's a two-minute max for any one flight. You must always return to the original launch position to start a flight.

**MB:** So the max score is 3600 seconds?

**Steve:** Yes, and the current record is about 2800 seconds held by Joe Snaith with a Mills diesel. He has one of my R 100 engines, but he's not yet built a model for it.

**MB:** And your R 100 is—

**Steve:** It's one cubic centimeter, twin ball races, hard chrome bore, and designed specifically for Scramble. I'd looked at the commercially available small engines and decided that to achieve the performance I required, I'd have to rebuild them totally. It

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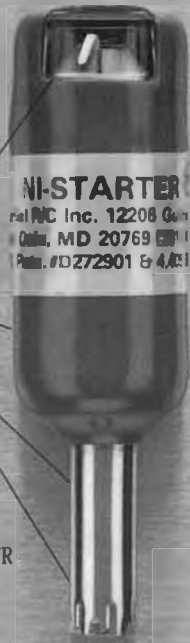
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is far more satisfying to build my own engine. I can't build them for a small price even though the engine is small. I've built a few and sold a few. It's satisfying to me and to the customers too.

**MB:** Steve, if a *Model Builder* reader wants to buy an R 100 can he contact you directly?

**Steve:** Yes, he can buy a bank draft for 140 Australian dollars plus 10 more for postage (about \$110 total U.S. dollars) and mail to Steve Rothwell, P. O. Box 243, Brookvale, NSW 2100, Australia. I try to group the orders so delivery will be a bit slow probably.

**MB:** Your R 100 is a jewel. With twin ball bearings, beautiful fits, hard chrome and such, it ought to run a lifetime. Does it run as good as you want it to run?

**Steve:** Yes.

**MB:** What size prop?

**Steve:** It's not critical, but a 7-1/2 diameter is a good start. My fuel is normally 15-percent castor, 37-percent ether, and the balance is kerosene—much like today's team race fuel. I don't believe you need more than 10-percent oil in *any* engine that's any good. Some engines may need up to 30-percent oil, but I wouldn't classify them as good engines.

**MB:** Steve, congratulations on your attitudes on fun and skills and model engine building, and the R 100. Many thanks for talking with *Model Builder* readers around the world.

I made the following notes after carefully studying the R 100:

1. 90 grams or 3 ounces of weight.

2. Mounting lugs take 4-40 bolts without drilling out.

3. Front ball bearing is sealed and prop driver fits close on 3/16-inch crankshaft to inhibit dirt entering the engine's front end.

4. Prop driver is deeply cross-hatched to prevent prop kicking off, and the driver fits onto a split collet.

5. Clever hex brass bolt fits over the spray bar for finger tightening to lock the needle valve in position.

6. Where else but Australia can you buy a small diesel with a chromed cylinder for indefinite wear?

7. Cooling fans are just sufficient for proper heat retention for kerosene-based fuel. Too often an excess of cooling fins causes a cool-down as the model is launched and a poor engine run results.

8. The free world's rugged automotive counterpart of the R 100 modern model diesel engine must have been the World War II general purpose (G.P.) vehicle affectionately called the Jeep instead of G.P.

If I'd gone to Australia trying to find Andy Kerr and Steve Rothwell, the place is so big I might have failed. I was lucky to meet them in Melbourne at the World Pylon Champs where they extended an invitation to visit them if I rambled up to the Sydney area.

Model building in Australia seems unusually active in the rapid growth of old time vintage models and mammoth scale too. I missed their annual Shepparton all-scale weekend, but Leo O'Reilly kindly sent me photos of entrants that show beautiful BIG R/C scale models in beautiful huge open flat R/C flying land, Australia.

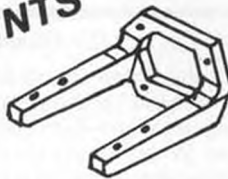
Next column we'll visit modeler's workshops, learn about the Magic Muffler, visit a super hobby shop, and more while ramblin' around Australia.

## Electric Power. Continued from page 25

very reliable charger and is very quite, a real plus since many chargers do get noisy due to the coil used to boost voltage. It has two drawbacks, neither major. One is that the current can taper considerably, a start of four amps may only be 1.5 amps at the end. This makes the charging time longer. My latest newsletter from Astro says that there will be some design changes on the 102 to make it nearly constant current. That will certainly be welcome. The other limitation is no automatic cutoff on the charge; it is done strictly by a 15-minute timer. A peak voltage cutoff would be a welcome addition. If any readers have a circuit for this, send it in, and I'm sure it will be published! How about a peak detector unit that would plug into any of the Astro chargers? I sure would like to see such an item from Astro.

Anyhow, most of my charging recently has been done by a new charger on the market, from TRC Engineering. The TRC Impulse 4 will charge up to 18 cells from 12 volts, starting at 4 amps. The taper is moderate, down to 2 amps on 18 Panasonic cells and 3 amps on 18 Sanyo cells. The final voltage on Panasonic cells is higher than Sanyo cells. It turns off automatically just before the voltage peak, and, if you wish to continue up to the exact peak, just push the

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start button again.

I reviewed the TRC two-ampere charger about a year ago, and there I stated how impressed I was with the peak detector that TRC uses. It is the best I have ever used, never overcharges, and gets maximum charge in the pack. Those features are the same in the Impulse 4. The Impulse 4 has another feature too, it charges in impulses (pulse charging). My feeling after using this charger is that pulse charging does something extra for the pack. My battery packs seem to get a 10-percent boost with this charger, that is, more punch in the air (and on the ground too, in my offroad cars). My theory is that the pulses servo to keep the battery plate material more finely divided (a shock effect). This gives more surface area, more available power, and more "punch." This alone is a good reason to get this charger.

The only thing I don't like about the charger is that it makes a high-pitched sound due to the switching coil in it. This is tolerable in my basement or in the back of the car. It is loud enough so that I do not use it on the bench while I am working. I have a prototype model; I understand that the production model will be quieter.

The Impulse 4 also has a low rate switch so you can charge your radio batteries in the field if you wish. Due to the sophisticated peak detector, just about any Ni-Cd radio batteries can be field-charged with this charger. A word of warning, however: I strongly recommend that you put a three-pin Deans plug in your transmitter Ni-Cd pack so the pack can be unplugged from

the radio. Once unplugged, you can field charge it. This is a simple change to make, it isolates the charger and Ni-Cd pack from the radio, and ensures the safety of your precious transmitter electronics. Ditto for the receiver; *always* unplug the receiver Ni-Cd pack from the radio when you fast-charge the pack. These simple precautions will free you from the worries of going to the field and finding you have dead batteries or from the fear of "how much time if left?" after a long flying session. I have been field charging my radios for 15 years now; it is the only way to go!

Anyhow, I strongly recommend the TRC Impulse 4; it is the best charger I have ever used. If you want it to charge more than 18 cells, talk to Jim Tasma at TRC; he says the Impulse 4 can be modified at the factory to charge more than 18 cells if so requested. The cost of the charger is about \$120, I believe. Contact TRC, 0-10972 10th Ave., Grand Rapids, Michigan 49504; phone (616) 453-8527. Enjoy!

Every once in a while I get a letter and photo that *really* makes me sit up and take notice! George Lucas sent me color photos of his Slow Motion built from an Evans kit. It is done in yellow and red; the effect is spectacular. That, plus the streamlined canopy, makes this plane look like something from the future. I was so impressed that I ordered one from Evans Aircraft, and one of these days it will be flying. George says it takes very little time to build, and I believe him.

The wings are foam core with strip balsa planking, and the fuselage is very simple (not all that much of it either!).

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As you can see, the Slow Motion is a flying wing. Bill Evans is famous for his excellent flying wings, this one was designed by him at the request of Bill Winter, who is equally famous! George says it flew right off the board with an Astro cobalt 15 powered by 12 x 900 mA cells initially, now it is using 12 sub C cells. I think George is using the Jomar SC-4 throttle; the Slow Motion will cruise at 1/3 throttle! George says it can do the pattern better than he can, and it will not stall, just mushes out. It has a wide speed range, the best glide, and the best control during glide that George has ever seen on a power plane. The stability of the design is fantastic at all speeds, and it will hold a turn or a climb.

George strongly recommends the Corefilm sold by Evans Aircraft for sheeting



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the wing. It makes the work fast and holds better than anything George has ever used. George does not say what his flying weight is; my guess is between 4 to 4-1/2 pounds. I plan to use a 25 in mine and really go! You do need either a mechanical or electronic mixer to handle the elevons; I think I will go for a mechanical mixer. It looks very good to me. If you are interested, contact Evans Aircraft at 454 Wildrose Lane, Bishop, California 93514; phone (619)873-4932. The Slow Motion is \$39.95, a big roll of Corefilm is \$14.95, and shipping is \$5.00. The total is less than many kits! Have fun

and turn a few heads!

George also has an excellent system for mounting battery packs. He uses two packs of six cells each in the Slow Motion. The six-cell packs are mounted on each side of the fuselage with one inch sticky-back Velcro tape. George's sketch shows how. A new club member destroyed George's Buzzard Bombshell when it was high in a thermal by turning onto his frequency recently, but the 12 sub C cells mounted this way *did not move!* George says the system works great, it is light, easy to remove the packs, they stay cool and well ventilated, and they can

be easily shifted for balance. He also mounts the receiver and receiver battery this way.

George, I'm convinced, and I'm going out to buy some Velcro now! I have always "Mickey Moused" my pack mounting by shoving in styrofoam blocks to jam them in place. It is time for something better, and Velcro is it! Thanks, George, for the info and inspiring photos!

For now, fly high, fly flying wings with electrics!

**Control Line.** . Continued from page 47

11 district vice presidents, one for each AMA district, which can be your local contacts. Newsletter editor is Pete Plunkett, 306-21st St. SW, Austin, Minnesota 55912.

*Precision Aerobatics Model Pilots Association (PAMPA)*. This is the organization that is credited with building precision aerobatics into the spectacularly successful CL event that it is today. PAMPA stepped in when the event was lagging in progress and popularity and turned things around in a fashion that all sectors are trying to emulate. The chief PAMPA accomplishment probably was the creation of the skill system that is almost universal today. PAMPA has ably represented stunt fliers before AMA, run the National championships and other major meets, and organized highly successful world championship efforts. The newsletter, now known as *Pro-Stunt News*, is one of the premier CL publications. The newsletter has just been taken over by Bob Hunt, former stunt world champion and editor of *Flying Models*, and it has a slick new format. The newsletter's forte is technical information, and lots of it, along with lots of pictures. Dues are \$15 and can be sent to Mike Pratt, P. O. Box 506, Montezuma, Iowa 50171. Newsletter address is Pro Stunt Headquarters, 9 Union Ave., Little Ferry, New Jersey 07643.

*North American Speed Society (NASS)*. The North American Speed Society is doing for speed what PAMPA did for stunt, building it up from doldrums into a very strong event. Speed participation is up at contests all across the continent as a result, in part, of NASS efforts. NASS was founded by Chris Sackett of Burnaby, B.C., Canada, who is editor of the fine newsletter *Speed Times*. Technical information, speed contest calendar and results, photos, and product information abound. Dues are \$10 for juniors, \$15 for seniors, and \$20 for open members. Contact Sackett at Box 82294, North Burnaby, B.C., Canada V5C 5P7.

*Navy Carrier Society (NCS)*. The carrier interest group offers a fine forum for technical and philosophical discussion among carrier fliers, as well as a listing of records and national standings and production information. The newsletter *Hi-Low Landings* is edited by Melvin and Brenda Schuette and published by Leroy Cordes. Dues are \$6 a year. Write Leroy Cordes at 1412 West Hood, Chicago, Illinois 60660.

Racing unfortunately has no national organization since the demise of Control Line Racing Pilots and Mechanics (CL-RPM) several years ago. As might be expected, racing is the event that suffers from stagnation and

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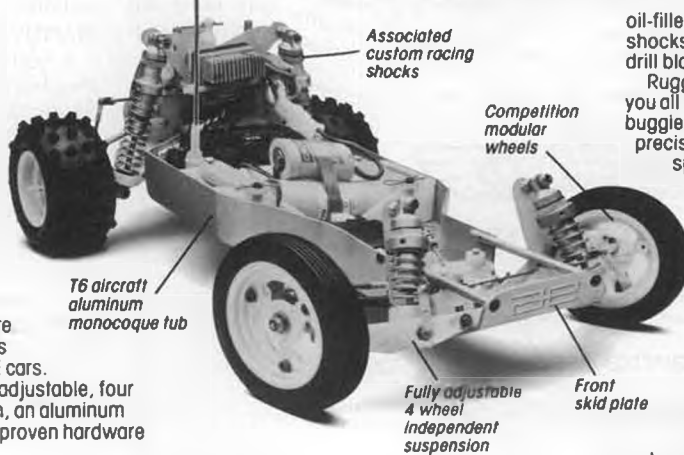
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fragmentation nationwide. An organization and a newsletter are sorely needed. Maybe this will plant a seed.

## SPEAKING OF SEEDS

A new source of a wide range of products for precision aerobatics pilots and builders is growing fast under the name of Pro-Stunt Products. Operated by Windy Urtnowski, former *Pro-Stunt News* editor, the enterprise features mostly stunt items but some things of interest to all CL modelers. Handles, horns, bellcranks, engine mounts, stop watches, adjustable leadout guides, and aluminum landing gear are only some of the items offered. In addition, the periodically published catalog also contains a variety of building hints and tips that make it

worth the effort to get on Windy's mailing list. Contact Pro-Stunt Products at 9 Union Ave., Little Ferry, North Dakota 07643.

## .15 CARRIER

Navy carrier expert and gentleman extraordinaire, Orin Humphries, previously known as the "Spokane Splasher" but now living in Lynnwood, Washington, reports that .15 carrier is catching on in the Seattle area, scene of a growing amount of carrier activity.

"There is a new class of profile carrier arising, an entry-level one that we hope won't get away from us like the first one," Orin writes. "It is limited to .15s on suction, throttle, hook and elevator only, no speed over 72 mph counts, no scale points. We in

the Northwest want to require mufflers on this event right from the start since it is a great time and place to begin such." The .15 carrier event has been popping up all over the country. Sounds like it's attracting a lot of interest.

## MILWAUKEE NEWSLETTER

I very much enjoy reading club newsletters from around the country and invite your club's newsletter editor to send his along. Newsletters are a great way to share the wealth of information about this fine hobby.

One of the most enjoyable newsletters I get is from the Circlemasters Flying Club of Milwaukee, Wisconsin, edited by Art Weber.

This is one of those publications that makes me wish I lived in Milwaukee so that I could join this fine club. The newsletter contains club minutes, reports of recent activities, flyers for upcoming events, technical and philosophical articles, and reprints of nostalgic airplanes of the past.

I'm sure Art would be glad to put you on his mailing list if you sent a small donation to him at 17560 Windemere Rd., Brookfield, Wisconsin 53005.

## MINIATURE AIRCRAFT STUDY

At this writing, in March, the Miniature Aircraft Combat Association's president, Phil Carter, had appointed a technical committee to study the following:

1. Clarification of the new safety thong rule. Primarily how it is to be used, conditions for disqualification, and suggested workable constructions. (If you didn't catch it, the safety thong now is required by AMA rules for all combat events.)

2. Fast combat safety. A study of possibly increasing line diameters to reduce flyways and possibly in the long run reducing engine sizes to .21.

3. Noise. A study of the feasibility of mufflers.

## HANDY TIP

If you fly combat, you probably know this, but if not, it may be a handy tip for on-field repair work.

The hot field box trend over the past year or two has been the cordless electric drill-screwdriver that has become almost standard equipment in combat field boxes.

These fairly compact power tools, available at discount hardware and hobby places for reasonable prices, make that quick engine change or rebuild on the field a snap. Bolts come out of and go into motor mounts or crankcases in a matter of seconds.

I have seen these tools designed as screwdrivers or as drills. My own is a Black & Decker model intended as a drill. Since all the bolts on my engines and planes are socket-head screws, all I need for bits are a couple of ball drivers (No. 4 and 6) with the handles cut off. This saved me the cost of the accessory kits that some units require with the various screwdriver bits. Toss in a small drill bit set, and you've solved another common field problem: drilling holes.

Between flying sessions, the tool lives in a charger that's always plugged in and keeping the tool ready for the next time to the field.



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## REMEMBER SAFETY

I don't like to be a killjoy, but a reminder now and then never hurts. Remember safety at all times, even in the heat of competition.

Don't tune your high-performance engine by standing in front of the plane and reaching around the glow plug. In addition to endangering yourself, you are teaching atrocious habits to the youngsters and beginners who may be watching.

Any prop can shatter and any crankshaft can break, sending the prop into your arm, face, etc.

Always stand behind the prop when adjusting it.

I'm looking forward to receiving information, news, technical tips and photos of your flying activities, your club activities and contests.

What's your favorite fun-fly event? Let's see a photo of your favorite "Sunday flying" airplane or your latest competition jewel.

Anybody out there experimenting with electrics? Endurance?

Let's hear from you, and make this your CL flying column; John Thompson, 1505 Ash Ave., Cottage Grove, Oregon 97424. •

## Soaring . . . . . Continued from page 43

performance glider developed for the experienced glider pilot who is looking for maximum flight performance. This model will impress everybody with its elegant design and smooth flight characteristics. The standard wing design includes ailerons and spoilers, but the performance of the model can be adapted perfectly to all flight situations by adding the optional flaps.

"The ASW 17 Royal is suitable for slope soaring in moderate to strong winds, sailplane towing with a model aircraft, and extended thermal flights after launching with a winch . . . .

"The highly prefabricated components of the ASW 17 Royal speed building time dramatically. No special skills or tools are necessary." The above has only been quoted in part; there is much more text describing the ASW 17 than this, but you get the basic message. To finish off the specs, the ASW 17 Royal has: 1054 sq. in. of wing area, 60 in. of length, 8 lb. weight, and a "combination" of Ritz airfoils. The prices of Robbe goods are somewhat tied into the US dollar's value in German Marks. Call Robbe at (201)359-2115 (180 Township Line Road, Belle Mead, New Jersey 08502) for current prices of any Robbe product.

If you have never seen the quality of a Robbe ARF kit, you will love it when you finally do get the chance. I saw the ASW 19 kit that Al Tuttle reviewed in this magazine several years ago and was very impressed.


The Robbe RC-Uno makes its first appearance in the new catalog as well. It is billed as the "easiest way for the novice to learn R/C flying." It too is an ARF which assembles in about three to six hours according to the catalog text. It has the usual molded white Plura fuselage, canopy base and pilot figure, and foam core Siros wings.

"Low flight speeds and gentle stall characteristics give the novice R/C flier plenty of time to make corrections. When properly trimmed, the RC-Uno is self-

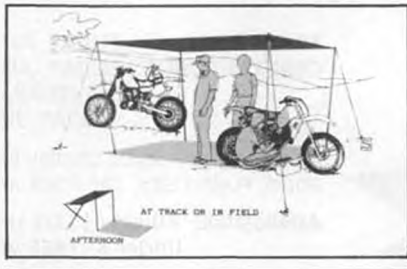
# PORTA-SHADE DOBBY-SHADE

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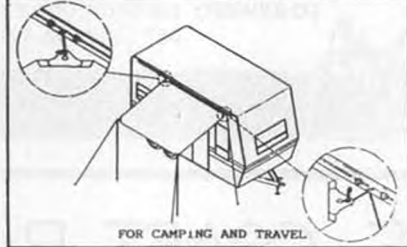
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R/V Trak-Lok-Eye Kit TAA2	\$10.00 • \$1.50 UPS
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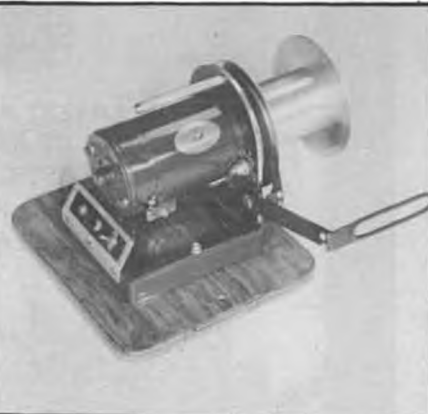
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stabilizing after releasing the control sticks to neutral. The rugged design, combined with separating wing panels and tailplane section prevent major damage during hard landings. The RC-Uno can be launched with a high start system for thermal flying, or hand launched for slope soaring in moderate wind." The high start system, RC-Uno Kit with two-channel radio included, or the RC-Uno Ready To Fly model with two-channel radio included are also available. Call or write to Robbe for prices.

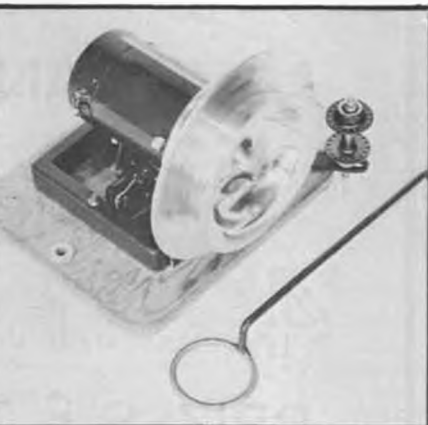
The Robbe Arcus is available as either an electric motorglider or straight sailplane. Either way it is the nicest looking two-meter ship I have seen in a long time! You can build it in four different configurations: polyhedral (rudder/elevator) or dihedral

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(ailerons/elevator/rudder); sailplane or electric motor glider.

It has a 78.75 in. span; 511 sq. in. area; 2 lb., 4 oz. glider weight (3 lb., 9 oz. 7-cell electric; 4 lb., 2 oz. 10-cell electric), and Eppler 178 to 180 airfoil. The Arcus is also an ARF model.

If you like sleek styling in a fast two-meter package, the Arcus is the model you need to check out.

I made quite a big to-do about the ASW 24 in my February column (page 92), so I won't go into a lot of detail here. That's it in the photo next to the ASW 17 Royal, trying to hide behind the helicopter. It spans 3.5 meters (11.5 feet) and has 1073 sq. in. of wing area. The HQ 3.0/13-10-13 combination from root to tip ensures a good combination of strength and low drag.

Be the first in your area to have a scale model of a full-size sailplane which according to the catalog has not been released from the ASW factory yet!

#### BOB SEALY'S QUALITY FIBERGLASS

Last but not least by a long shot is Bob Sealy's booth. In this 10 ft. X 10 ft. area tilted up on a diagonal were two big sailplanes: the Constellation (spans nearly 14 ft.) and the all new, just finished covering it at the show, Ultima (spans 10.75 ft.).

The Constellation is Bob's entry into the growing field of cross country specialty sailplanes. It has a wingspan of 167 in., an area of 1785 sq. in., an aspect ratio of 15.6:1, an airfoil known as the Selig 4061 (also used on the Off the Ground Models Prodigy), a stab airfoil of NACA 0009, a flying weight of 9 to 11 lbs., a wing loading of 11.6 to 14.2 oz./sq. ft., and polyhedral of 4 degrees each side (center) and 12 degrees each tip.

Construction is balsa-covered foam core (wings and tails); the fuselage is molded epoxy-glass. The retail price of \$325.00 (\$225.00 introductory price) includes foam cores, fuselage, canopy, sheeting, wood, all hardware, plans and instructions. Price includes shipping costs.

The new Ultima is designed to be the ultimate in thermal duration. Its most outstanding feature is its unusual looks. It has the Wil Schuemann multiple tapered leading edge design for improved low-speed performance like the Discus. It also has a bit of tip dihedral.

The specs are: 129 in. span, 1254 sq. in. area, S 4061 airfoil, 58 in. length, 75 to 80 oz. dry weight, 8.6 oz. wing loading, ailerons, flaps, stabilator, and rudder controls. The design features a three-piece, bolt-on wing, hand-selected, light balsa-covered foam core wings, hand-laid epoxy-glass fuselage, removable nose cone for easy access to the radio gear, and a one-piece bolt-on stab. The Ultima is also a complete kit which retails for \$270.00, but can be purchased directly from Bob for \$189.00.

I must say here that Bob has designed a truly beautiful fuselage in the Ultima. The photo hardly shows it, but its lines are really right-on!

One of these two models interests you, contact Bob at 521-96th Lane NE, Blaine, Minnesota 55434; (612)780-2737.

#### AIRFOIL OF THE MONTH DOUBLE-HEADER: E 210 & E 216

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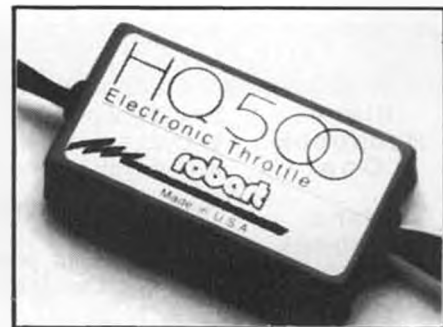
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HOBBYPOXY DIVISION, Pettit Paint Company, Inc.  
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they belong together, and second, there have been months where I've skipped this segment of the column, and the letters and phone calls I get indicate it is missed a great deal when this happens. I hope this will make up for the missed airfoils.

This month I have a translation for you from the mind of Dr. Richard Eppler which should help you (and me) understand the intended purpose of these two airfoils, the Eppler 210 and 216. The translator's name is Dr. Reiner Rebstock, and I know that Colin Brichter of the Tidewater (VA) Model Soaring Society paid one German mathematician a few beers to convert the technical German found in the *MTB 1/2* book over to English (a truly small price to pay!). He then handed the translation over to his club's newsletter editor for republication. From here it was picked up by the Clarence (NY) Sailplane Society's editor and run again. MY OFB and fellow journalist, John Lupberger noticed the piece and called it to my attention. (Got the flow of it?) Now at least one paragraph is coming to you via *Model Builder*. Thank you one and all!

"After the canard configuration was resurrected over the last few years in full scale aircraft, the model builders have expressed interest in this exotic design approach. This has led Professor Eppler to devise the profiles E 210 and E 216. The E 216 is designed for the forward wing. It is distinguished by a particularly high lift maximum coefficient, over 1.5, so that it can also be used with certain large thermalling gliders. However, this



#### ROBART asks . . .

SHOULD YOU OR SHOULDN'T YOU PURCHASE AN ELECTRONIC SPEED CONTROL FROM FUTABA, NOVAK, TEKIN, ROBART or any of the others that are available? BEFORE YOU BUY, take a very close look at the device you have selected

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Most manufacturers profess incredible current capacities of their controllers. For instance, Futaba says that its controller will pass 150 amps continuous and 450 amps surge

Now really consider the wires entering and exiting these devices and you will find the wire rating alone does not support that level of energy. In addition, while the main power devices may be bolted or riveted to a heat sink, the wire leads are still soldered to the main circuit board and will transfer the heat to the foil and other sensitive components. True, it makes for a smaller package but just how many "small packages" do you want to buy this year? Spending \$100.00 for a piece of toast should not be the idea of having fun

#### WANT TO DO A TEST? . . .

If you already own a controller other than a ROBART HQ unit install it in your car, plane or boat and before you activate the full-on position, stall the drive wheels or propeller and see if the control lasts more than a few seconds. Many of you have already experienced the painful and expensive reality of this problem. The ROBART HQ electronic throttles will not destroy themselves no matter how long you stall the motor. If you think we are trying to fool you by using a fuse, well guess again!!!

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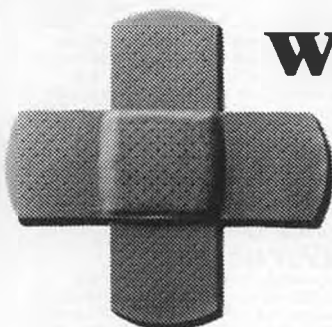
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high lift is paid for by a high pitching moment coefficient of about .21 which requires somewhat larger horizontal tails when used with 'normal' layouts. The 13.6-percent thick E 210 is designed for the main wing (of a canard). Due to its gentle stall characteristics, it is also suitable for powered models." Let me know if you should build a canard using these airfoils, and by all means share it with us in photos and text.

For those interested in obtaining the MTB airfoil books, write to Bob Ratzlaff at Wilshire Model Center, 2836 Santa Monica Blvd., Santa Monica, California 90404;

(213)828-9362. Bob generally carries them all and will send you a copy with just a phone call (and your credit card number!).  
**NEW HOME FIELD FOR R/C SOARING**

That's right, I've moved. So, if you have my address written down in your address book or have it on a club newsletter mailing list, PLEASE NOTE THE NEW ADDRESS: Bill Forrey, Model Builder R/C Soaring, 3610 Amberwood Ct., Lake Elsinore, CA 92530; (714)245-1702. By the time this address gets to print, I'll have been residing here two months. Don't risk the mail forwarding system with your correspondence, change it today! Thanks!

Electronics... Continued from page 15

and the current through the final RF transistor. In most cases, the voltage is 9.6V, with currents around 100 milliamps. The power (P) then is 9.6 (E) times .100 (I) (remember to convert milliamps to amps), which gives us .96W. This is close to the actual values to be found in your transmitter.

Normally though, the specs for any given system do not give the *input* power, but the *output* power, which is always lower, and is the one specified by law. There is always some loss in any electronic circuit, and most RF amplifiers run at 70 to 80 percent efficiency, so your one-watt amplifier above will have an actual output of .75W (750mW).

While the above values are interesting, a more practical application of power calculations is to determine the wattage requirement for a resistor. Let's run through a practical exercise involving the whole of George's Law. We want to test our 4.8V Ni-Cds—under load, as is recommended. It is also recommended that such load be approximately half the rated capacity; say 250 mils for the common 500 mil pack. First the resistor value in ohms. Solving for R:  $R = 4.8V (E) \text{ divided by } .250 (I) (250 \text{ mils converted to amps})$  gives us 19.2 ohms. Not a common value, so we would use a 20 ohm resistor. Substituting 9.6 for 4.8 in the above now gives us the value of 38.4 ohms as the proper load for a transmitter battery. Again, not common, we would use a 40 ohm'er.

Now the wattage rating required. In this case, we now know all three values for I, E, and R, so any of the power formulas may be used. Why complicate it. Use the basic one:  $P = 4.8 \text{ times } .250$  which gives us 1.2 watts. Again, not a common value! Now in the case of a calculated resistance value, unless real precision is required, you merely use the standard size nearest to the calculated amount; higher or lower. However, in the case of the wattage rating, always use the next largest value, two watts in this case. Using the same  $P = EI$  formula gives us 2.4 as the wattage requirement for the transmitter load resistor. The most readily available value will be a five watt'er.

There are volumes and volumes about Ohm's Law, it's applications and effects. I don't have that kind of space available, so you will have to take it from here. I've attempted to give you a couple of practical R/C applications on my way to the main point of the whole discussion, which was to provide the enclosed chart for you. It is intended as a reminder, especially for those formula variations which we don't use too much. Make a copy and stick it over your workbench so you can always locate it and refer to it when you do need it! Now and again you may run across some variations of these terms and units in the model press, presented by those who either don't understand them or are trying to reinvent the wheel for some reason. What is given here are values and terms established by the IEEE (Institute of Electrical and Electronic Engineers) and are the standards in use throughout the world.

# Choose any Great Planes kit - you're choosing quality.

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That's why Great Planes devotes the extra time and effort to insure that only the highest quality materials, parts, and designs are built into every Great Planes kit. After years of manufacturing R/C model aircraft, our tradition of quality is the only way we know how to produce kits. Your continued satisfaction lets us know that we're doing it right.

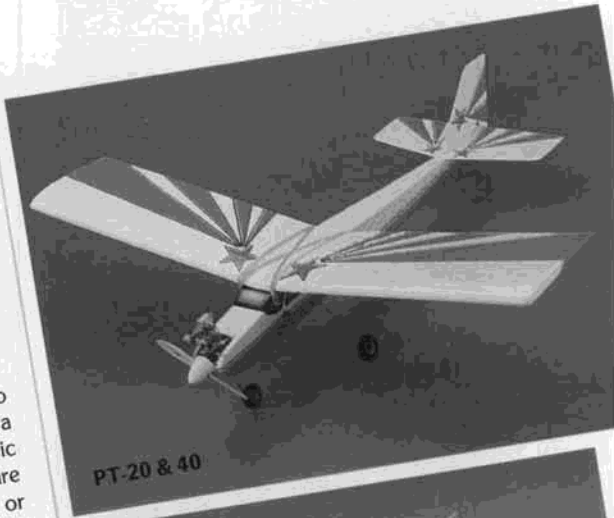
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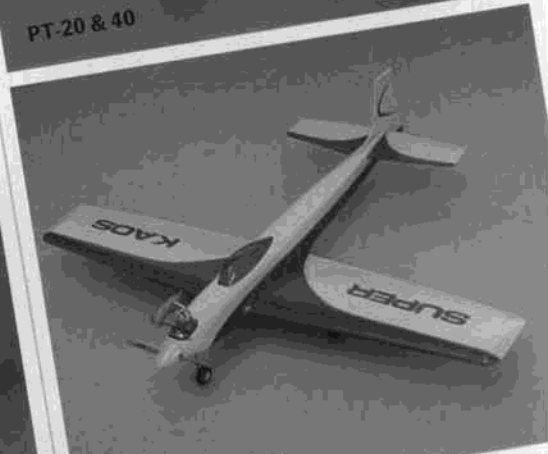
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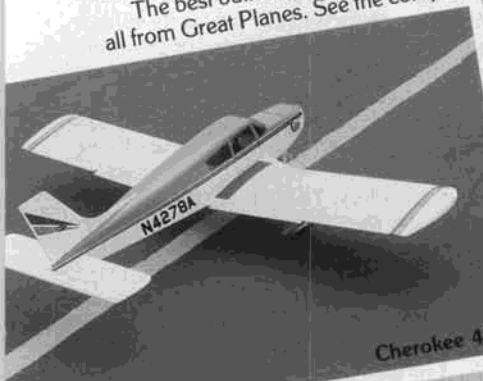
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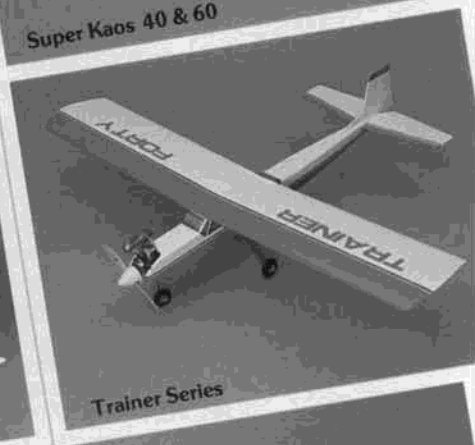
Super Kaos 40 & 60



Cherokee 40



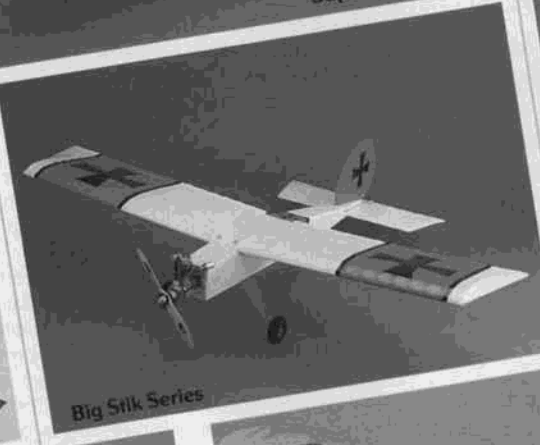
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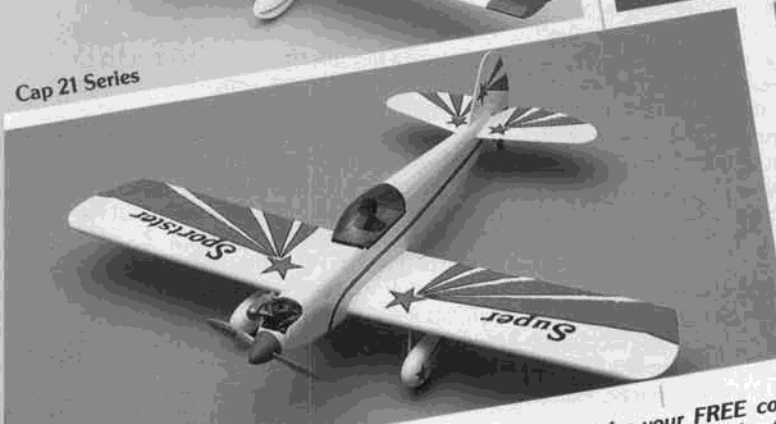
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### A GUY AFTER MY OWN HEART

Our first correspondent this month! Robert Kleinstuber, of Lancaster, Pennsylvania, writes:

"Perhaps you may be able to help me. I know that I can probably buy what I want, but I have always found much more satisfaction, not to mention the savings in dollars, in building for myself anything that I need. I find it, more or less, like growing your own vegetable plants for our garden from seed, rather than buying them; the resultant product always seems to taste better.

"I want to build a constant current battery charger for my receiver and transmitter Ni-Cds and also my 12-volt lead acid starter battery. I have the knowledge and the com-



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ponents to construct the basic charger. I also have the Digi-Key catalog and a local Radio Shack available for components.

"I realize that a simple transformer, bridge rectifier, and filter will charge my batteries, but that the charge rate will decrease as the battery becomes more fully charged. I want a constant current charger. Can you supply circuit information for this type of control?" My kind of guy. Bob, I am going to share my most secret circuits with you. But first, for those with less experience than yours, let's talk a bit about chargers in general and constant current chargers in particular.

Though we don't often find them referred to as such, there are two basic kinds of chargers; constant voltage and constant current. The most common R/C equipment charger, the wall plug-in type that you received with your R/C system is of the former type. As the name implies, it's output is a constant voltage, which within the load range that it is designed for, will produce a practically unchanging voltage. What it is doing to the battery though, is far from constant, and can best be explained with Ohm's Law. (See how useful it is?) In this case,  $I = E/R$  (Current = Voltage divided by the Resistance) applies, though first the characteristics of a rechargeable battery must be explained.

A battery, to a battery charger, is seen as a resistor! When under charge, it presents a load, which can be actually be calculated in ohms. Further, this resistance will vary depending on the state of charge, being

lower for a discharged battery than for one that is fully charged.

As an aside, this internal resistance of the battery presents a terminal limit to how much current it is capable of producing. This fact can come in handy if you ever want to evaluate some of the claims made for electric motor power. A certain battery can only produce so much current, limited by its own internal resistance, and there is nothing that can be done with motor magnet materials, low turn armatures, or even hooking it up with automotive jumper cables that is going to increase it.

Anyway, a discharged battery attached to a constant voltage charger will receive a certain amount of current. As the battery charges, and its internal resistance increases, the current flow through it will decrease. If yours is one of the better quality R/C systems, the charger furnished, even though being relatively simple, has been chosen so that the current through the battery after the prescribed 14- to 16-hour charge, will be low enough so as not to immediately damage the battery should you forget and leave it on for a longer period. This type charger is a relatively simple device; a transformer and rectifier; the LED always included often being merely a current flow indicator and generally not an active component in any other manner. For many other applications it would be considered an inefficient circuit, as its voltage regulation is poor. But its undesirable characteristics are exactly what is needed in this case.

Now for the other type, the constant current supply; an AC-powered charger being merely a power supply being used to charge a battery. Though it starts, as Bob says, with the transformer/rectifier/filter (capacitor—sometimes!), its output is followed by circuitry that, when adjusted for a given current flow, will maintain the exact amount regardless of the resistance of the load. There are limitation of course, determined by the circuit components, so everything has to be chosen to provide the voltage and current requirements. The rule of thumb is that to charge a battery, you must ALWAYS have a higher voltage than that of the battery, and it is always a good idea to have a greater current capacity than the actual requirements.

Two circuits are provided, one which I have used for many years, and which has worked faithfully. As you can see from the photo, I have it self-contained, with a meter shunted to read 300 milliamps. I am using a 25-volt wall plug transformer as a voltage source. The output transistor does not get excessively hot, though it is a good idea to provide it with a heat sink—internally is fine. The only critical part of the circuit is the pot, which can be rather sensitive to set if too high a value is used. In the past I found small value pots hard to purchase outside of the commercial supplier channels, but Radio Shack is currently selling a 25 ohm "rheostat," which is another name for a pot, that though a little large in physical size, will work well electrically. The pot is connected so that lessened resistance increases the output current. A fixed resistor could be used to set the current if only one value is to



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Oh sure, you've heard that one before. But here's one model that's really been engineered to live up to the promise. So while it delivers the kind of sparkling aerobatic performance that's sure to keep the experts interested, the Super Chipmunk's super-stable low speed manners are something we can all appreciate.

Fly it at a crawl, and it simply won't quit. Bring it in a little nose-high, and you'll still have a solid feeling of control all the way to a perfect touch-down.

Fact is, if it's beginning to sound like

the Super Chipmunk would be a good bet as your first "low-winger", you're absolutely right.

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If you're a more experienced flyer, The Super Chipmunk's well-designed flap and retract options offer an added dimension of realism.

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be used, or a multiple switch could select the desired number of rates. The meter is not an absolute necessity, but I find the combination of continuously variable metered output extremely handy.

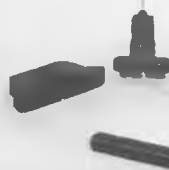
Notice how casually I said, in referring to the meter: 'shunted to read 300 milliamps!' Would information on how to do that sort of thing be useful and interesting for a future column?

The other circuit included I have not used. It is a common circuit included with the application data for some of the many voltage regulator IC's available. Radio Shack stocks the 78XXX series, in three ranges, 5, 12, and 15 volts output. The 12 volt'er will handle our receiver and transmitter batteries; the 15 volt unit being required for 12 volt battery charging. The input voltage should be at least 50-percent higher for proper operation, and can be as high as 35 volts. The value of the resistor can be found from  $R = E/I$ —see how useful all that stuff can be? The current is inversely proportional to the resistance and the same thing applies as in the previous circuit in that a wide adjustment capability can result

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in a sensitive control. Again, fixed resistor values can be used for fixed outputs.

There is an important fact to remember—the constant current charger is not for the forgetful! Overcharging Ni-Cd batteries is a sure way to lessen their capacity and useful life, and this type of charging will keep pumping those electrons in at its preset rate for as long as it is connected. Properly used though, it can be a useful addition to the R/Cer's equipment.

Remember, you can address me here at MB or directly at 311 Mesa Dr. #10, Costa Mesa, California 92627.

**EOTW. . . . . Continued from page 22**

many times now after that first takeoff, they have ample power for a very short takeoff run and realistic, impressive flying.

The sight of three 11-foot, red, classic biplanes flying together makes one long for the golden years of aviation, when nearly every airplane had two wings. It makes no difference that these are not precision scale models; in my opinion it's the apparent realism that counts.

Well, next month I hope to report on one of the largest model exhibitions in Europe, the "Modellbau '88" in Dortmund. Must be exciting!

**European . . . . Continued from page 38**

quickly to force the piston downwards. By screwing the cylinder higher or lower into the crankcase, you control *how much* the fit on the piston displaces the ball check valve and you control the flow of CO<sub>2</sub> to control the motor's speed. Model a top rpm is 2,000. At 1500 it runs 45 to 50 seconds on a fresh full charge in the airborne tank. That's lots of clean, quiet energy.

The completeness of contents is a bit surprising. Included are mounting nuts, bolts, washers, a spare ball check valve and seat, a spare filler nozzle, and plastic plates for behind the firewall. The Perlon (like Nylon) piston runs dry in the steel cylinder. Instructions call for periodic oiling through the two exhaust ports into the hole in the right side of the crankcase and behind the prop driver.

Bill Brown is reportedly gearing up to mass-produce a new line of CO<sub>2</sub> motors in the USA. Peter Buford in Australia plans to also produce a CO<sub>2</sub> motor that'll surely be imported into the USA.

### RATINGS

This motor is virtually the only current production for CO<sub>2</sub>. Design gets 10 points, manufacturing excellence gets 10 points (it's absolutely flawless), and performance gets 10 points for a perfect 30 total points. It costs 175 Czech crowns which is about \$25. The expensive part to buying one is the round trip ticket to Eastern Europe!

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**Byron Glasair. . . Continued from page 21**

After this foam rudder post is installed in the fiberglass fin, the rudder is hinged and fitted and the outer parts of its nyrod push-pull system are glued in place. In an attempt to save weight when gluing foam, I used Hot Stuff instead of epoxy but first sprayed on Pacer Tech's Z-Foam Primer so the CA glue wouldn't make like Pac-Man.

The tail wheel assembly goes together nicely, along with its streamlined fairing, and then it's time to work on the elevators and horizontal stab. At this point you have to decide whether or not to make the stab removable, and I went for a permanent in-

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stallation. Ply caps and hinge covers are glued to the stab halves and then elevators and stabs are hinged.

Now the aft fuselage is mated to the front piece. Care must be taken to get the vertical fin aligned properly. Once again the instructions called for epoxy, but I used Hot Stuff's s-l-o-w curing Special T with excellent results.

The wings come with two aluminum spars already fused inside the foam, and after trailing edge stock has been glued in place on these wing panels, the ailerons and flaps are cut loose. Top and bottom spruce spars are added along with ply hinge covers and root and tip caps. After the

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aileron/flap hinges are installed, these control surfaces are trial-fitted to the wings.

Here's where another decision must be made: to use the aileron torque rod system shown in the drawings and pictures, or to install an aileron servo out in each wing. I like the idea of having both flap and aileron linkages automatically engaged when plugging in the wings, so I stayed with the Byron concept. At first this torque rod setup seemed complicated, but it turned out to be easy and simple to install.

However, the flap linkage did bind a tad. Because the aileron/flap bearing mount plates on each side of the fuse could not be

glued in place perfectly vertical, the single flap control tube connecting between these two mount plates had to be bent a little to keep friction minimized. But there's no such problem with the aileron linkage because it utilizes two separate control tubes that anchor to their own aileron bearing mount plates in the center of the fuselage.

A rather nice-looking instrument panel is built up using a pressure-sensitive decal, and then you're into wheelpant construction. After hassling with pants in other kits, I appreciated having these wheel pants all in one piece. And like the fuselage formers, the axle mounts were installed with glass strips and Super T.

Finally, the servo linkage details, which includes making the two fiberglass elevator pushrods. Since I added a second elevator servo, I connected each of the pushrods to its own servo; the instructions, photos, and drawings show the pushrods soldered together and driven by a single servo.

And although pushrod supports are not mentioned or shown, I'd recommend installing them where the two fuselage parts are joined. Mine were made from ply tongue depressors, with the holes just big enough for support without binding.

Got to admit that I was a bit skeptical about using the 2-56 sized hardware in this fast, aerobatic bird, but was assured, and reassured, by the Byron people that it'd be no sweat.

After a final check to make sure that the wings plugged in properly and that all surfaces were aligned, I was finally at the part I hate most, the finishing and painting, and even though I'd promised myself I'd turn out a dynamite-looking Glasair, I ran into trouble.

It was at about this time that I had a few changes made in my medications, and the doc did remind me that my judgment might be impaired somewhat at first, but I blundered blindly on.

So I did a bunch of dumb things like: holding the wings too tight while sanding so that I left fingerprints in the foam, wiping the airplane down with a dried-out tackcloth that only added to the dust and dirt already present, doing a not-so-neat job of glassing the foam while thinking that it was outstanding work, sanding too much primer of the glassed surfaces, picking black as the base color and then compounding the problem by using spray can paint 'cause "the price was right" and it seemed easier and faster than messing with my old standby K&B Superpoxy.

Anyhoo, I broke up the solid black color with angled orange and yellow stripes on the wings, stab, and fin. She looked pretty good from about 35 feet, and those stripes were visible from a surprisingly long distance. And the devil made me name her "The Black Widow." My Airtronics Single Stick 7-channel FM rig with seven 72-in/oz (#94732) servos provided faultless control, and the airborne equipment was powered by an Ace Sanyo 1200 mAh battery pack.

The Super Tigre 2500 and JTec's new BIG Pitts Style Muffler both fit neatly inside the cowl. The prop effectiveness formulas I fool with indicated that an 18x10 would be an excellent choice for this engine/airframe

combination, and, with the Zinger turning 7200, John Tatone's muffler made the engine sound mellow and realistic.

The Black Widow" came out at 20 pounds, dry. And moving the 1200 mAh pack back just aft of the cabin area had her balanced "dead nuts." Byron made this balancing act easy by scribing identifying marks on both sides of the fuse just below the windshield. All you do is drill small holes at these locations, insert two wires, and then hoist the plane off the workbench. As with all longitudinal balancing, you've got it right when the bird hangs slightly nose down. Her wings were also checked and balanced.

For a 90-incher the Glasair is kinda low on wing area (the full-size bird was designed to give a smooth ride at high speeds despite turbulence), so with only 1080 squares and a wing loading of 42.6 oz/sq ft, I knew she wasn't going to be a floater.

I talked buddy Ronnie Kemp into making those first test flights because I needed to get some inflight pictures, he's also flown a lot of Byron's hot warbirds, and also because his younger body has better reflexes.

That initial takeoff was uneventful. Ronnie kept her on the runway for 150 feet before easing back on the stick, and seconds later it became apparent that the 18x10 was, indeed, giving the Glasair what she wanted most, lotsa mph. Aileron authority was a bit on the low side although rudder and elevator throw were sufficient for almost any maneuver; but other than having a slow roll rate, she handled extremely well.

The first landing was hot because flaps were popped late and she didn't have a chance to bleed off a lot of that excess speed. On subsequent landings, however, flaps were lowered early in the traffic pattern so she came over the threshold and touched down less like a tiger and more like a pussycat.

A few days later, after increasing aileron throw, cranking in differential and converting the BIG Tigre to diesel with one of Bob Davis's diesel heads, I took The Black Widow out for some more fun and games. Well, I wasn't too surprised to find that the same 18x10 was now spinning at 7400. The plane flew great; rolls were just right and the dieselized 2500 pulled her through beautifully BIG, wide loops with no strain or pain.

Because I was curious, I also tried an 18x8-14 on the diesel and found that it at least matched the 18x10, performance-wise. Although her speed with this prop computed out to only 82 mph, the black bird looked like she was steaming close to 100.

This plane grooves and goes where you aim her. Like a good road car, she obeys with no protest or flaky moves of her own, and both pilot and flying machine know who's in charge all the time. She'd be a great choice for a competent pilot who'd like to have performance and speed all wrapped up in a bird that's no CAP look-a-like.

#### POSTSCRIPT

Don't think that because this is basically fiberglass and foam that it's an overnight project; there's still lots to do. As pointed out earlier, the Glasair was my first Byron

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kit, and since I'm used to working with the more traditional building materials (balsa, ply, spruce), I sort of lumbered along in unfamiliar territory. However, Ronnie Kemp, who's built scads of Byron's biggies, including their ducted fans, assured me that familiarity does breed speed in building.

As also mentioned earlier, I was skeptical about the 2-56 hardware. Although I can't deny that heavy-duty stuff would give me somewhat more peace of mind, all linkages and control systems are A-okay after almost three hours of flight time.

But all was not peaches and cream; two things did occur during flight testing:

The nylon socket on the tailwheel steering linkage had a tendency to pop off the

ball link on the steering arm if landings were bouncy. Replacing the socket with a brand new one seemed to help (of course, from then on I made sure that all my landings were "grease jobs").

And the slipstream kept lifting the top front lip of the (left) cabin hatch during each flight, even though it was recessed and flush with the exterior surface of the fuse before takeoff. Adding two more hold-down screws, one to the top and one to the side of the hatch, eliminated this problem.

The Super Tigre 2500 proved itself to be an outstanding piece of machinery. These BIG Tigres have a well-deserved reputation for being easy-starting, smooth-running, and powerful; but you can get even better performance from these engines by using

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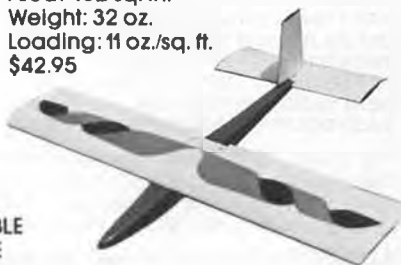
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an O.S. 7D carburetor and a Fox Miracle 4-Cycle plug. Don't slug them down with oily fuel. I mix a gallon of 15-percent standard fuel with a gallon of (fresh) alky and end up with a 7-1/2-percent nitro, 10-percent oil mix that seems to be perfect for BIG Tigres and four-strokers. Above all, don't be afraid to experiment with different props so your bird can reach its full potential, and remember that higher pitch means more speed.

Almost forgot to mention that the wind-

shield and side windows got their smoky color from black Rit Dye. I let 'em soak for about 30 minutes.

**Little John...** . . . Continued from page 14

hold it on the balsa sheet. If you don't have any of this aluminum, find a construction site where this is being used and beg or buy as much of the scrap as you can. All of the ribs are the same size but where differences

are needed. The basic rib can be doctored to suit. The 1/4 x 1/8 spruce spars top and bottom of each wing are plenty strong enough, with vertical 1/16 sheet webbing for rigidity (Don't build the wing without it!). The 1/8 sheet sub leading edge and 1/4 sheet leading edge, make it simple and strong. A smooth and consistently shaped airfoil is assured with the 1/16 sheet leading edge and trailing edge, joined by 1/16 x 1/4 cap strips on the ribs. This type of construction is one of the lightest and strongest I know.

Both top and bottom wings are built in three pieces and assembled with dihedral braces giving 1-1/2 inches of dihedral at each tip. Don't forget the 1/4 ply blocks in the top center section for the cabin struts and balsa blocks in the lower center section for the wing hold on bolts. The 1/8 ply blocks in top and bottom wings for the out-board N struts are glued in place so the right angled brackets can be bolted down.

Ailerons are built as part of the bottom wing then cut out later after sheeting. This ensures that they match the wing contour. 1/4-inch balsa is glued in before the final sheeting for hinge anchors also the ply pads for the aileron horns and right-angled bell cranks.

Fuselage sides are cut from firm 1/8-inch sheet balsa and a 1/32 ply doubler added as per plan with contact cement. Glue in the formers and the firewall with the motor mount blind nuts on the back, then join the sides at the tailpost. (Yes, that's correct, four degrees of down thrust and five degrees of right thrust.) The cabin struts plug into brass tubing epoxied across the fuselage where shown on the plans. Install the tank floor, tank, control rods and ply blocks for the landing gear. I glued extra ply on the fuselage at the trailing edge of the wing for pads to mount the rear strut of pontoons for water flying. Sheet the top and bottom of the fuse as shown.

The cowling is built up with the motor in place. A 1/16 ply disc, slightly larger than the spinner, is glued to the front of the cowling blocks. The nose is then shaped. Don't forget the cowl drain and the crankcase drain holes.

Bend up the landing gear from 1/8 and 3/32 music wire as shown. Fit the pieces to the fuselage and bind them in the proper places with iron wire then solder. I fitted 1/8 ply at the fuse rear to receive a C.B. 40 size tailwheel.

Cut the tail plane, fin, and rudder from medium quarter grain sheet. Do not round the trailing edge of the elevators and rudder. This keeps them from being sensitive to the controls near center.

I covered the entire model with Sig Cover-all and many coats of butyrate dope. Trim was done by masking the large letters and using rub-on decals for the small lettering, panel lines, and rivets. It would be less work using heat shrink film, but the dope gives a more realistic and permanent finish, especially for water flying.

### FLYING

The first flight was made with an O.S. 40 four-stroke and was quite gentle. It showed no bad habits except it lacked enough steam for aerobatics. It sure was fun just

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floating around with growing confidence, that the little biplane wasn't going to stall out. However, it obviously wasn't going to do vertical snap rolls either. After five relaxing flights and many touch and goes, that were quite realistic, I took it home and installed a Surpass .48 with the same type of mount. The first flight with the .48 showed the airplane's potential. At full throttle it could do three snap rolls straight up before slowing down. Knife edging is fun. Inverted flight comfortable at any altitude.

For a tail dragger, it tracks amazingly straight on the ground and can handle 25- to 30-degree changes in direction on take-off. A little up is applied when giving it full throttle. No right rudder is needed because of the right thrust. It will then take off when ready with a touch of up. One last suggestion: Start out with the center of gravity well forward. Then when you get to know the Little John, move it back and enjoy aerobatics on a Sunday flyer. Happy flying!

### Plug Sparks. . . . Continued from page 33

belt) speed reduction drive.

- 5. Ferrite magnet motors, or non-ferrite motors (i.e., Cobalt) may be used.

### C. POWER CONTROL

- 1. Power flow from batteries to motor shall be controlled ONLY by a servo actuated ON/OFF switch. This switch may be mechanical or electronic.
- 2. Proportional and resistive speed controls are NOT allowed.

### D. PROPELLERS

- 1. Folding props may be used as long as they are restrained from folding in flight. The intent is to provide protection for the motor/gearbox in the event of a nose over, while neutralizing any aerodynamic advantage.
- 2. Prop hubs which are partially cut through (in order to protect the gearbox in the event of a nose-over) are NOT allowed. This creates an operational safety hazard and is NOT permitted!

### SECTION III GENERAL FLIGHT RULES— LMR & TEXACO

- A. All models must R.O.G. unless the contest director determines that hand launching is allowed due to field conditions.
- B. Flight time shall begin upon start of the forward motion of the model (for release) and ends when the model touches the ground-based object.
- C. Compliance to motor, battery packs and propeller rules in Section II (of these rules) shall be the responsibility of the contestant.

### SECTION IV LIMITED MOTOR RUN—FLIGHT RULES

- A. Standard motor run shall be a single continuous run time of:
  - 1. Ferrites: 90 seconds
  - 2. Non-ferrites: 75 seconds
- B. There shall be four attempts allowed for three official flights. An attempt for an official flight may be aborted only during the motor run time.
- C. Maximum scoring flight time of each

time shall be 7 minutes. (There is no penalty for flight overtime.)

D. Scoring shall be in seconds: a perfect flight time of 7 minutes equals 420 points. Total score is the sum of the first three official flights. Therefore the total for 3 flights would be 1260 points maximum.

### SECTION V TEXACO (Energy Allotment)— FLIGHT RULES

A. Motor may be started and stopped one or more times (at the discretion of the pilot) until the battery pack is exhausted. The motor run time is considered as part of the total flight time.

B. There shall be three attempts allowed for TWO official flights. An attempt (for an official flight) may be aborted only during the first 2 minutes of the flight.

C. Maximum flight time (for scoring purposes) shall be 15 minutes. There is no penalty for flight overtime.

D. Scoring shall be in seconds: a perfect flight time of 15 minutes equals 900 points. Total score is the SUM of the first TWO official flights. Therefore, the total for 2 flights would be 1800 points maximum.

### READERS WRITE

Ernie Johnson of Rancho Cordova, California writes to send in Photo No. 11 showing Roger Gregory with a Scientific "Victory." As can be seen this model is simply a scaled version of Korda's very successful Wakefield Winner kitted by Megow.

This 32-inch wingspan design is a real performer as can be attested to by this columnist. Johnson thought it was such a



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great flyer, he took several photos. The model has been flown extensively at the NCCFC meets at Waegell Field, Sacramento, California. Roger says he always sets the dethermalizer as he never knows when the Victory will take off for parts unknown.

Another contributor, Dr. James W. "Bo" Buice ("Bo" to differentiate from his son, also a doctor with the same name, also into models) has sent in Photo No. 12 showing a scaled version of the Bay Ridge Topper, this model designed by Scotty Murray. Murray will be remembered as the Brooklyn boy who enlisted in the Canadian Air Force, became a Spitfire pilot and was eventually shot down over Malta after several victories.

### NELDER COMMEMORATIVE IN CANADA

Although we mentioned the possibility of Roy Nelder being honored by a 50th Anniversary, in a letter received from Peter Mann, this has been confirmed as follows:

Event: 50th Anniversary Contest for Roy Nelder 1938 Replicas Moffett Trophy Winner

Rules: 1938 Moffett Rules; i.e., the best of three flights wins. All flights R.O.G. Models are to be built in accordance to plans in *Air Trails*, 1938 (available from Pond Plans) or plan #875-O.T. appearing in *Model Builder*.

Flying: 12 Noon to 4:00-5:00 PM. Contest Director will announce.

Prize: Appropriate trophy hopefully to be awarded by Roy Nelder.

Rain Date: In case of bad weather, the meet will be held Sept. 18 (Sunday).

Location: Gananoque, Ontario Airport  
Peter has this to say: "If the event goes over well, we plan to hold another 50th Anniversary in 1989. This will be 50th Anniversary of Fred Bowers second-place win in the 1939 Wakefield. This replica contest will be held (as in 1988) at the Annual Eastern Canada Open Contest of the Montreal Model Flying Club."

As if that isn't enough, in 1990 we will again fly replica models of Roy Nelder's 1940 Moffett Winner using the 1940 Moffett Rules. If you don't like magazine plans, then Pete recommends you procure the Easybuilt Models (Grimsby, Ontario) kit currently being manufactured.

Those wishing further information should write: Peter Mann, 36 Sydenham St., Guelph, Ontario N1H ZW4, Canada.

### SAM 35 ENGLAND

Keith Harris is responsible for the next two photos taken at last year's Old Warden Aerodrome Vintage Rally and the Annual Engineering Show.

The first, Photo No. 13 is a Bay Ridge Thermal Magnet using a diesel PAW 29 for power. R/C O/T has become extremely popular in England (with small fields it follows) and the amount of radio control models at Old Warden reflects the constant increase in this phase of old timers.

The second photo, No. 14, depicts a rare Dick Schumacher design called the "Pixy." This model photographed at the Model Engineer Exhibition, 1987 is powered by an HP VT21 four stroke engine. The original was powered by a "Little Dynamite" of .37

cu. in. displacement. This leads to some speculation as to which model had more power. This columnist would have to bet on the old Little Dynamite.

### AUSTRALIA

Photo No. 15 from Australia depicts Graham Sinclair holding a Flying Quaker powered by a Saito 65 at the Annual Roy Robertson Memorial.

This excellently built model has won numerous beauty awards and best of all, has won more than its share of trophies on the Texaco Event.

This photo was taken at the PDARCS Field located east of Melbourne. The Packer Club owns and operates their own field deriving added revenue from the farmers using the property when not being employed for flying. Smart management!

### SAM 27

How did this get out of order? Simple, when a late photo comes in that is of particular interest, then we fit it wherever we can. Photo No. 16 shows Don Bekins (nothing new there) with his excellent flying Lanzo Bomber (again nothing new) but the "grabber" is the reworked GHQ engine.

This engine with some good parts in it (like a piston) made by Stan Lane of SAM 30, runs a 16X6 Rev-Up propeller at 4000 rpm. This is what is needed for good fuel economy. Just to show Don was right, he won the SAM 26 Annual Texaco Event in March at Taft. 56 minutes!!

### 1988 SAM CHAMPS

This columnist was about through with this column when a letter arrived contain-

ing three photos of Buck Zehr, the R/C Contest Director.

Willard A. "Buck" Zehr of 1381 Timberlane Dr., St. Joseph, Michigan 49085, is most conscientious in making sure results are quickly posted and totaled. To that end, he has designed a single sheet for each R/C contest covering all the events entered. He has also produced a color code system that indicates the place taken.

We have selected Photo No. 17 showing Buck with his favorite model, a Comet Sailplane with Super Cyclone power. As can be seen in the background, Buck is no slouch when it comes to winning trophies. Buck won't win any this time, but says he is going to run the best ever SAM Champs.

#### FREE PLUG DEPT.

Received an interesting brochure from Ned Curry of Laser Lure who specializes in color chrome holographic tape. These are presently being used as fishing lures, but the choice of twelve non-fade ever brilliant colors can be seen at great distances on model aircraft.

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#### ENGINES

Randy Linsaloto of RJL Industries is not letting any grass grow under his feet in his latest flyer. This firm bought out the line of Remco and M&G engines. Currently working on a new batch of Forster 25 and 35 glow and ignition engines, they sell the engines as fast as they are produced.

As a recommendation for the quality work they turn out, Randy states they produced the finished Edco Sky Devil engines for Terry Toups in San Diego.

The new batch of Forster engines will be much higher in quality than previously produced by M&G. Their new equipment is the answer for all machining operations. This will provide an affordable engine (in the \$95.00 range for ignition type) with high quality so prized by the modelers.

All castings will be made from the original dies and will be fitted with a plastic tank on the rear cover plate. Original boxes will also be used for the benefit of the engine collectors.

There are no plans to produce the Forster 99 while the firm has taken the stance no Remco 29 engines will ever be produced again.

To get the latest information, write RJL Model Engines, P.O. Box 5, Sierra Madre, California 91024-0005. Better yet, give Randy a call at (818) 359-0016. Incidentally, for those not aware, the RJL engine (formerly Kraft) is also being produced at the rather modest price of \$104.96, muffler included.

#### THE WRAP-UP

Well, back to normal again in the "Wrap-Up" section as we again report more casualties in the Old Timer Ranks.

First off, coming as rather a shock, the

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sudden death of Pete Vacco will leave a lot of modelers without good balsa wood. Pete was the owner of Hobby Woods located in Linden, California. Pete would have been 65 in a month or so.

Vacco will be remembered as part of the foursome who helped build Carl Goldberg's Valkyrie. (There was no B.O.M. rule in those days.) Frank Nekimiken, Carl Goldberg, Gerald Ritzenthaler (of Ritz propeller fame), and Pete Vacco formed the team who built the model in less than two months.

Of note to the modelers is that all orders have either been returned or forwarded to Mike Taibi of Supreme Balsa Co. Dear Old Dad, Sal, sez they are working their tails off to complete all orders!

From England comes more distressing news. Gordon Coddling, 3724 John L. Avenue, Kingman, Arizona 86401 informs this writer that the famous English designer and model contributor to *Aeromodeller* magazine and associated aerospace industries, Ray Booth, died of cancer on June 26.

In England, this is like losing Carl Goldberg. We thank Bernard Murphy of England for relaying this unfortunate news to Coddling.

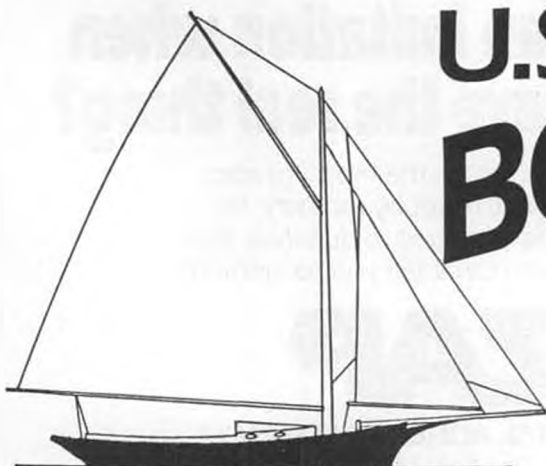
ARFs. . . . . Continued from page 27

it has already been done for you at the factory, but this does not hold true for all of their kits, as we shall see in the next review.

A sturdy tricycle landing gear is supplied,

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but the builder is required to furnish the fuel tank, wheels, and miscellaneous hardware such as wheel colors, clevises, and motor mount screws.

The assembly was undertaken by Captain Charles Strange, my chief project manager, who is also a Navy dentist in his spare time. Charlie just can't resist dressing up even the most unpretentious model, and in this case he applied a little red adhesive shelf paper and ended up with a very attractive model. Ordinary shelf paper is made to order for improving the appearance of most ARFs, and a light application of clear polyurethane will prevent fuel damage. An O.S. 40 FSR ABC engine was mounted, and a three-channel radio was installed to complete the job.

The flight test program commenced at the field with the usual taxi maneuvers. It was determined that the Transit was tracking in a straight line, and when steered either to the right or left, it displayed no tendency to drop a wing and scrape the runway, even at significantly higher speeds. This excellent ground stability can undoubtedly be attributed to the wide stance of the main landing gear.

As the first flight was intended to be of short duration, the tank was not topped off before the initial takeoff. The usual light breeze was coming straight down the runway as I headed the Transit directly upwind and gradually fed in throttle. She rolled straight as an arrow as flying speed was gathered; and in a very short run the model

was airborne, still flying straight and true with no trim changes required to either side. However, it became quickly apparent that the Transit was climbing at a very steep angle. At about a 200-foot altitude the throttle was reduced to cruising speed, but the climb continued, though somewhat abated. At this point I applied down trim in an attempt to cut down the climb, but full down trim was not sufficient to achieve level hands-off flight. I then throttled back almost to a dead idle and proceeded to set up for a landing.

It was then that I noticed that there was more response to turns than I expected, and I made a mental note to set the rudder clevis to the outermost hole when making mechanical trim adjustments. I usually start out with the clevis placed in one of the middle holes, so I knew there was room for further adjustment.

On turning final, this docile little airplane came in rock steady, and, just before gently touching down, she responded to a touch of up elevator by flaring like a true lady.

As I had been using full down trim and had not eliminated the climb completely, I cranked in six turns of mechanical down trim in the clevis and moved the rudder clevis out to the outermost hole to reduce the overly enthusiastic response to turn commands.

The next flight proved that I had the unwanted climb and the turn response tamed down quite a bit, and we went on to put the model through a few aerobatics. Simple

maneuvers like loops and stall turns were easy to do, but it was then that I realized the wing had far too much dihedral. When the plane was being assembled, my chief builder mentioned that he thought there was an inordinate amount of dihedral, but I directed him to make no modifications to the wing and to assemble it strictly according to the manufacturer's instructions. The excess dihedral appeared to be the cause of the sensitivity of the rudder. As a matter of fact, this was directly responsible for a number of flight characteristics. First, it made it extremely difficult to keep the airplane inverted for any length of time. Second, it permitted the airplane to turn very sharply with only slight rudder control. Third, it allowed the model to perform rolls which were so close to being axial types that spectators couldn't believe it was flying without ailerons. Last, the spins and snap rolls were absolutely spectacular.

I have never had a three-channel plane that performed so spiritedly, and it made me wonder what kind of performance it would have displayed if the optional ailerons were added (material was not supplied for ailerons). Perhaps the fact that the airfoil was fully symmetrical had something to do with the superior maneuverability.

In any event, I would advise that anyone assembling this ARF in the three-channel configuration consider reducing the dihedral substantially, and in the four-channel setup the dihedral should be drastically reduced, or even removed en-

tirely. As far as the climbing tendency is concerned, by the time it is completely eliminated, the elevator was trimmed nearly a quarter-inch down, and this was esthetically and aerodynamically unacceptable. Charlie corrected the situation by slipping a few washers under the rear engine mounting bolts, and, with this engine downthrust, we were able to set the elevator at neutral trim. I suspect that the wing incidence may have been off somewhat, giving rise to the climbing tendency.

Once trimmed, the Transit was a thronier decided to make a few modifications and to rewrite the instructions, and the Invader was once again made available to the modeling public.

As in the Transit, the wing is formed by covering a foam core with the same hard plastic sheet. The fuselage is once again made of ABS-type plastic, with the tail fin made of the same material. While the same materials are used here as in the Transit, all other similarities come to an abrupt parting of the ways. The optimum engine choice for this airplane is nier decided to make a few modifications and to rewrite the instructions, and the Invader was once again made available to the modeling public.

As in the Transit, the wing is formed by covering a foam core with the same hard plastic sheet. The fuselage is once again made of ABS-type plastic, with the tail fin made of the same material. While the same materials are used here as in the Transit, all other similarities come to an abrupt parting of the ways. The optimum engine choice for this airplane is a good, strong, 40 two-stroke, and we chose a Super Tigre 40S to furnish the propulsion. This mounted in the horizontal position, and the muffler projects downward so that exhaust residue is largely directed away from the main airframe. The landing gear arrangement is a conventional tricycle configuration, and the main gear is widely placed to assure exceptionally stable ground handling. The canopy is rakishly faired into the sleek fuselage, and the Invader looks for all the world like a ducted-fan model until the on-looker realizes that an ordinary propeller is mounted on the nose.

My good friend and project manager Charlie Strange did the assembly work on this plane as well, and he felt a few comments would be in order. For one thing, this model is definitely not intended for a novice in R/C. The engine is mounted on a prefabricated hardwood crutch, and the crutch must be joined to the fuselage in what is a bit tricky an operation for a beginner to undertake. As previously noted in the Transit review, the crutch was factory-mounted in that model. However, Charlie really had his work cut out for him this time. First, he cut up a quantity of fiberglass cloth until he had a pile of chopped glass fibers. Then he mixed up a quantity of slow-setting epoxy and stirred in the glass fibers until he had a thick putty. Then he used this mixture to anchor the crutch in place. I can confidently provide assurance that no matter what breaks in any future mishap, the crutch area of this model will emerge unscathed!

The fuselage is beautifully slim and



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streamlined, and mounting the servos in the rather confined space requires careful and skillful work if the job is to be done properly. However, a little extra effort will reward the ARFer with one of the sleekest, most handsome sport models around today.

Faithful to our definition of a true ARF, the Invader requires absolutely no covering or painting. It has a completely fuel-proof finish the way it comes right out of the box. However, the entire model is furnished in a solid white color, and no decorative decals are supplied. Actually, with very little effort, a whole myriad of colorful and decorative schemes may be applied. Being a true artist and a devotee of highly embellished models, Charlie slapped on some masking tape, sprayed on some blue, red, and black Red Devil polyurethane spray paint directly out of the can, and wound up with a very outstanding airplane. A painted jet-type pilot finished the job off beautifully. Once again, wheels and tank were not supplied.

A new test pilot was chosen, as it was felt that a real speed merchant would be needed to guide the Invader. After all, just parked on the tarmac this plane looked like it was doing at least a hundred mph! I chose Lyle Larson to do the honors, as he is not only a highly talented and respected pylon racing competitor, but he is also a superbly skilled pilot of conventional model aircraft.

Charlie easily started the Super Tigre, the nose was pointed straight up, and a vertical

engine throttle acceleration test was performed. Both engine throttle and control surfaces were responding smoothly, so the Invader was taxied to the downwind end of the runway. Lyle turned it smartly into the wind and applied throttle until the engine was growling in its full power mode. The Invader rolled briskly down the runway, gathering more and more speed, finally to break ground, rising gradually and gracefully into the air. The climbout was hands-off, and the control surfaces appeared to be in almost perfect trim. Lyle immediately commented on how nicely she was responding.

As no return to the pits was required for mechanical trimming, it was decided to continue on with the flight and to attempt a number of aerobatic maneuvers. Lyle proceeded to go through everything in the book, and I stood next to him making suggestions as to what he should attempt next. The Invader reacted crisply to every command, and behaved exactly like a pattern ship in miniature. For those readers who have never had the pleasure of handling a pattern ship, you are missing a very valuable R/C experience. The performance of a well-trimmed pattern airplane is the standard against which all other airplanes should be measured. It does not require a conscious effort to effect a maneuver with a pattern machine. It is more like just thinking what you wish the plane to do, and effortlessly, almost magically, the maneuver

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is performed.

Having experienced such a faithful response from a model, I am happy to say that the Invader performs in very much the same manner. I think it is now time for me to confess that this was not the first Invader I have had the pleasure of flying. About three years ago I happened upon a garage sale, and I bought a number of models from an elderly gentleman at bargain basement prices. One of these happened to be one of the original run of Invader kits, and when I opened the box I found the parts all wrapped up in newspapers dating back to the early seventies. I put the kit away in one of the hidden recesses of my workshop and

made a mental note to put it together when I found the time. Eventually I managed to obtain a Rossi 40 engine when they were first made available, and this prompted me to assemble the Invader. I thought that the Invader and the Rossi would make a real potent combination, and later I would be proven absolutely correct. The Rossi 40 turned out to be a real powerhouse, but I am sorry to say that the highly streamlined factory muffler disappointed me sorely for two reasons. First, it did very little to tame the harsh bark of the exhaust, and second, after only about 20 flights, it actually disintegrated into a number of subassemblies. That was almost two years ago, and I have been unable to find a factory replacement for that muffler. Hence, I have regretfully retired the engine for the time being.

But getting back to my original Invader, I was absolutely amazed at the astounding performance. There was nothing this airplane wouldn't or couldn't do, and whatever it did was done in a snappy, professional manner. The best part was that virtually no trim was ever needed from the very first time it took to the air. I found that it could be dragged in to land as slowly as a trainer, with never the slightest tendency to drop a wing tip or to stall into an unexpected snap.

Because I was so biased in favor of the Invader, I decided to have the new version tested by Lyle Larson. Lyle's judgment of this airplane fully agreed with mine. We both loved it, and would not hesitate to recommend it to anyone with any advanced sport/trainer experience. However, the required assembly procedure is probably not within the capabilities of those who are without model building experience. Charlie felt that the instructions supplied for the Invader were rather skimpy, and he had to make a number of guesses and assumptions in constructing the kit.

Another point to consider is that except for a bottle of what appears to be MEK used for welding together a few plastic parts, no epoxies or other adhesives are furnished. The builder must supply clevises, push rods, wheel collars, hinges, a steering arm, throttle cable, wheels, fuel tank, etc. If you've been in the hobby for any length of time, these necessities can usually be found lying around the workshop. However, a newcomer may find himself spending \$15

or \$20 over and above the kit price to assemble either the Transit or the Invader.

In these days of really complete ARFs, buying additional supplies may make all the difference when you choose a model. In any event, both of these planes can really fly, and that's what the ultimate aim of R/C is all about. In the sixties and seventies most Lanier products were far ahead of their time. Today the competition has really caught up with a vengeance, and the Lanier models can no longer be considered state-of-the-art. But they are in every sense of the word reliable and dependable, so I unhesitatingly recommend them, and will happily continue to fly any of them that come my way. For further information, contact Lanier R/C, Division of Aero Engineering, Route 2, Oakwood Road, P. O. Box 458, Oakwood, Georgia 30566.

Well, flaps are down and we've just turned final, so this month's flight is just about over. Hope you can join us next time, and I'll keep the copilot seat open for you! •

### Simply Scale. . . Continued from page 26

yourself. Your model will not be accepted for scale judging without this statement (you would be unable to receive Craftsmanship points), so save yourself some last-minute scribbling at the contest site and complete this declaration before you leave home.

2. Weight of your model. Please make double sure your model is within the weight limit of the class you are entering. Technically, once entered in a particular event, you will not be allowed to change events if your model cannot be made to weigh-in within the allowable weight limit for your event. And we do weigh all models!

3. Make sure you are competing safely within the rules. There are many ambiguities still left in the rule book, and if you try to "bend" the rules to your advantage by trying to utilize a loophole, be prepared to be the loser if a protest arises. If you have any question concerning a possible "gray area," please clear it up with myself or John Guenther, Nats Scale Category Director before the competition. I guarantee we'll all have more fun this way.

4. Come prepared to compete. Bring that extra touch-up paint with you, or that heat gun to tighten up sagging covering. Hand tools may not be needed, but they're hard to manufacture on the flying site! Extra props, plenty of fuel, extra servos, batteries and even wheels may be just the items you'll need to propel you into first place!

I look forward to seeing you all in Virginia Beach. We've got a swell time planned for you in Scale with a topnotch team of judges and officials. NASA (the National Association of Scale Modelers) has a special barbecue-type banquet planned for Friday night that you should all plan on attending. Following that we'll have a NASA meeting and scale "symposium." Together, we're going to have a lot of fun!

### TOLEDO CONFERENCE

'Tis the time of year I hear the Siren's song. . . she calls to me "Come, come to me Cliff, come behold my excitement, sample my sumptuous wares, let me surround

you with the objects and desires of which your dreams are made." The Siren's proper name is, of course, The Toledo R/C Conference, held every year during the first part of April in that city on the Maumee, Toledo, Ohio. And every year, I answer her beckoning call. I wouldn't miss it for the world.

This year was an exciting one for me. In the middle of a new project, I went to Toledo looking for the various accessories I would need to complete my pride and joy. Larger servos, larger battery packs, the perfect covering material, big wheels—all items that I might be able to purchase through a catalog or order through my local hobby shop, but here at Toledo I can see them and compare first hand.

I found myself scurrying from booth to booth, exchanging greetings with old friends and gleaning as much information as possible about the products I would need to complete my Sig Spacewalker.

I found my solution to the requirement for a larger airborne battery pack at the SR booth. The answer ended up being a 1000 mA flat pack that is no larger than most of the 500 mA packs you would normally use! SR has a reputation of marketing the best in the business, and that's exactly what I want for my model!

A difficult decision is always "what wheels should I put on this model?" For the Spacewalker, you need 4-1/2-inch wheels that look realistic, but have enough firmness in the sidewalls to resist sideplay during a crosswind landing. There is not a great deal of clearance in the wheel pants, so this is most important. In addition, you don't want a product that "swells" when it comes in contact with water or other liquids. Once again, I found the answer. In the Du-Bro booth was an excellent selection of realistic inflatable wheels known as their "TV" line. These babies appear to be extremely rugged and even have the emblem "Firestone" emblazoned on their sidewalls!

I stopped by the Tru Turn Precision Model Products booth to let Robert Obenberger know how pleased I was with the 3-1/2-inch Tru Turn aluminum spinner I had purchased several weeks before. It's about time someone came out with a line of larger spinners like this. Most important is the requirement for precise balancing, since the mass in a large spinner like this can easily cause damaging vibrations.

Most exciting to me was what I ran across in the J'Tec booth. For what seems like ages, John Tatone has been turning out quality model products which most of us have found ourselves using. At one time, he carried a line on instrument panel kits which included spun aluminum bezels. These made for some great looking instrument panels, but admittedly were a little on the expensive side, and really didn't provide a great deal of flexibility in reproducing the different types of instrument installations. Now John is introducing a new line of instrument panel kits which I'm sure are going to get you excited, as they did me.

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cluded are vacuum-formed sheets of clear plastic that provide the versatility to these kits. Using this single sheet of plastic (if I had one wish, John, it would be that you include two of these plastic sheets in each kit.) containing 10 "bezels" of two different sizes, you are able to duplicate many different types of instrument installations. John had on display a copy of the Spacewalker instrument panel made up in 1/3 scale, and I just happened to have with me photos of the actual instrument panel. It was hard to tell the difference!

Naturally, it didn't take me long to fork over \$6.50 for one of these kits! If you've been looking for the answer to realistic model instruments, look no further, John Tatone has the answer for you.

The ultimate timesaver and functional goody I came away with from Toledo is a pre-built, shock-absorbing landing gear assembly from Bob Shattleroe Custom Landing Gear. Bob carries landing gears for over 70 different models, including the Sig 1/4-Scale Cub and 1/3-Scale Spacewalker, Wendell Hostetler designs, and most of the "Big Birds" you may be inclined to build. His gears are spring-loaded and welded to the proper configuration. I'm using one!

Rather than list everything I saw and came away with here, I'll save some for some future columns. Let's spend some time this month talking about some of the scale models that compete for valuable

prizes at the show.

Both Military and Nonmilitary Sport Scale saw some very nice models entered. One of the most outstanding models in the Military Sport Scale category was the Grumman Fireball by Hal Parenti. A unique aircraft, the prototype was powered by a conventional radial engine driving a three-bladed propeller and a jet engine enclosed within the bulky fuselage. Hal's model is true to scale, sporting a propeller-driving ST .75 in the nose and an OS46 ducted fan within the fuselage. Hal earned a first place in Military Sport Scale for this beauty, and I'm sure I'm not alone in looking forward to seeing it fly in future competitions.

The standout model in Nonmilitary was the giant Gates Lear Jet by Mark Frankel of Gladwyne, Pennsylvania. A very nicely crafted model, the only noticeable deviation from scale were slightly enlarged nacelles to enclose the ducted fan units. This did not detract from the model at all, and Mark did a very good job of duplicating the colorful paint scheme of the prototype. The first place model, it demonstrates that ducted fan models sporting external engines can be crafted in a near-to-scale manner.

In general, it was disappointing to see modelers still not documenting their scale models properly. In an attempt to insure the entrants uniform judging with clearly defined rules, the scale categories at Toledo now follow AMA Sport Scale guidelines as



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closely as possible. This means the modeler must include a declaration of the components of the model he did not construct himself in his scale presentation, an item missing in many of the presentations. Several of the models in the Nonmilitary event, while nicely crafted and perhaps very accurate to scale, suffered in static score because of poor documentation. One presentation had only a three-view, a couple of color chips of unknown origin or relation to the model, and a declaration of craftsmanship. No photos of the prototype were provided. While technically sufficient to judge a model, this type of documentation will not usually garner a first place. Another model actually had documentation consisting of a conglomeration of three different prototypes! The "N" numbers used on the model were the ones depicted in the three-views (no wheel pants on the three views); the color photos provided were of a different "N" number aircraft (again no wheel pants); and the photo provided of the aircraft type with wheel pants was a different "N" number and had a "clipped" wing! Come on, guys, let's get real here. The burden of proof is on the modeler to show that his model looks like the real prototype. This is not the way to do it!

Probably the greatest surprise at Toledo was the lack of entries in the Precision Scale category. Not a single Precision Scale aircraft model was entered!

One must question what the problem is in Precision. It wasn't too many years ago that the ultimate in scale aircraft modeling was to take a first place at the Toledo show.

Many years it was extremely difficult to determine a single winner among the many excellent entries, the quality of all the entries was so high. And now we have no entries at all!

Of course, one year of such an occurrence should not be grounds to cancel the event entirely, but I'm sure you can expect to see the Weak Signals looking closely at next year's entry. It doesn't take a lot of imagination to realize that categories without entries do not warrant consideration.

Perhaps one of the causes of the lack of interest in Precision is the growing trend toward the large models. This year once again saw many Giant Scale models in the Sport Scale categories. Although the models presented were impressive by their size and nicely crafted, fidelity to scale and detailing were lacking in most of this type model. It can be seen more and more in today's large scale competitions and fly-ins. Very few of the large scale models (with some notable exceptions), approach the quality of the models we have been used to seeing in the Sport Scale and Precision events.

I'd be interested in hearing what you, the scale enthusiasts around the country, feel are the reasons for the decline in popularity of Precision Scale. If we can identify the cause, perhaps together we can resurrect the event and once again inject the quality of craftsmanship we once had back into the model aircraft arena.

At any rate, for the sake of continuing the event at the Toledo show, let's get on the band wagon right now to ensure that next

year's show will see a good turnout in Precision. Give your buddy a boost if he's "almost done" with that project he's been working on for several years. If you've entered Toledo before, but haven't walked away with first place, bring your model back for another try. Everyone enjoys seeing such a gathering of eagles, and heaven knows the prizes are terrific even on down through third place!

### THE SIG SPACEWALKER

Some might say I'm a hypocrite, preaching Smaller Scale for the past year or so, and now I'm telling you that my current scale project is the 1/3-scale Spacewalker from the Sig kit. Could be, but keep in mind that I've said many times I like all forms of scale; R/C, C/L, Free Flight, big or small, Precision or Stand Off. You know what they say, variety is the spice of life!

On to the subject of the Spacewalker. I have been attracted to this subject ever since I first saw Sig designer Bruce Tharpe's rendition of it at the Toledo Conference in 1987. The full-size Spacewalker is a home-built design from Jesse Anglin of Hendersonville, North Carolina. From your first look at the design, you are convinced that it must have been a model before it was a full-size aircraft. The moments and outlines are just perfect for a sport model aircraft. The Spacewalker, with a 26-foot wingspan, is not a large aircraft, thus the 1/3-scale model is not as humongous as you might think. With a 104-inch wingspan and a nominal weight of 20 pounds, it should fly easily with the popular Supertigre 3000 engine.

Unlike some of the other \$300 scale kits I

have seen on the market recently, the Sig kit provides everything you expect of it. The fully packed box contains die cut lite-ply and plywood parts that in some cases, actually fall out of the sheet. The hardware package, again unlike some of the other premium priced kits I have seen, includes just about everything you should need to complete the model, from screws and bolts to hinges, wheel pant retention hardware, a heavy-duty tailwheel assembly, aluminum bar and extrusion stock for the plug-in wing design, and even engine mount bolts and blind nuts!

If you appreciate good fiberglass work, you will be delighted with the quality of the fiberglass parts provided in the Space-walker kit. The cowl is a masterpiece of lightness and finish. The one piece wheel pants and formed wingtips can only be described as nearly perfect.

As we have come to expect from all Sig kits, a complete instruction and assembly manual is included. This features step-by-step instructions and helpful illustrations of every facet of construction. Even for the experienced builder, a manual of this type is extremely helpful to prevent one from inadvertently getting ahead of yourself and "building yourself into a corner." I have seen other kits where the only instruction provided is one photocopied sheet printed on both sides with absolutely no illustrations at all.

To say that I am pleased so far with the Sig Spacewalker kit is probably an understatement. At this stage of construction, I have found it to be a quality kit which requires average building skills. It's not a beginner's project, but anyone who has a few kits under their belt would probably have no problem building the Spacewalker if they carefully follow the instructions.

I'm anxious to get mine done. I've seen Maxey Hester fly his at the 1987 Nats and at the Hamilton Hawks Four-Cycle Rally, and it looks like a ball.

I'll keep you updated on my progress (Keep in mind, I'm generally considered to be a sloow builder).

That's about it for this month. Hopefully we'll see a large number of you at the Nats in July. Please be sure to come around and say "Hi." Keep It Scale and Simple!

Cliff Tacie, 49404 Michelle Ann Dr., Mt Clemens, MI 48045

#### Technical . . . Continued from page 23

keep it in line. It is usually a most unpleasant airplane to fly, if not downright hairy.

Many years ago I heard an old time test pilot, Eddie Allen I think it was, tell about an early small airplane he was testing, that he could not land! The plane took off and flew fine on its first test flight, until he tried to land it. The moment he cut the throttle, the nose would drop. There was no way he could slow it down and flair for a landing because he couldn't get the nose up when his speed was low. After trying everything he could think of, he finally flew as low and slow as he could and wrapped one wing around a tree! Fortunately, he fared better than the plane and the tree did.

The problem there was lack of pitch sta-



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bility and control at low velocity and high angles of attack because the stabilizer was too small. To make matters worse, every time he cut the throttle, the loss of propeller slip stream on the undersized stab further indicated its ability to develop the required down load. In brief, the horizontal tail was stalling.

#### SOURCES OF STABILITY

So we always need more or less stability. How do we get it and/or adjust the quantity? Mostly we need some tail (shame on you for not realizing that). A horizontal stabilizer will provide us with longitudinal or pitch stability, a fin or vertical stabilizer will give us directional or yaw stability, and dihedral or a low center of gravity will give us roll stability.

How much of each of these types of stabilities we get of course depends on how much dihedral, how much stab and elevator, how much fin and rudder, and how long we make the tail moment arm (The distance between the center of lift of the wing and that of the tail).

A couple of basic rules: (1) To be longitudinally stable, the center of gravity must be forward of the center of lift. (2) To be directionally stable the center of gravity must be forward of the center of lateral area. And what is "center of lateral area?" you may shyly inquire. 'It is the center of the total area of a side view of the airplane,' I demurely respond.

#### DIRECTIONAL STABILITY

I think it is time to introduce Figure 1. To

find out where the center of lateral area (CLA) of your new model design is, cut an accurate scale side view "paper doll" out of cardboard and balance it on the point of a pencil or pen. The balance point is the center of gravity of the cutout, but since the cardboard is uniform in thickness and weight, it is also the center of lateral area of your proposed design. (Note: *Balancing this way is easier if pattern material is a little "floppy." If too stiff, it's just about impossible. Alternate method is to hang profile by string from two different points. Straight lines draw from the string through the profile will intersect at the balance point or CLA. wcn*)

The cutout should include all of the side area, including the nose wheel, the motor, and even a side view of the prop. Since the main wheels are near the CG, they can be omitted with little error. If the nose wheel strut is too spindly to hold up on the paper doll, forget it, and stick the proper size wheel cutout directly on the nose at the proper distance fore and aft. Remember, you are really balancing the cutout by weight to determine the center of area, fore and aft. In more advanced stability work, we would be interested in the center of area vertically as well, but not in this case.

Now locate the approximate CG of your airplane by drawing a vertical line through the wing cross section on your cardboard cutout at a quarter of the way back from the leading edge (the "quarter-chord point"). See where it is with respect to the CLA. If



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this airplane CG is between 10 and 18 percent ahead of the cutout balance point, your vertical tail size is probably about right. If the CLA is ahead of or too near the

CG, add some more fin and/or rudder to your design layout and cut out and balance a new paper doll. Now is the time to fix it, on paper, not on the finished airplane. For

more detail on this cutout method, see chapter 11 of *The Design of the Airplane* by Darrol Stinton, published by Van Nostrand Reinhold.

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Do your first "flight" testing on the drawing board, with a calculator and with paper dolls (Full scale designers also use wind tunnels and laboratories). Making and correcting our mistakes on paper is much much faster, cheaper, safer, less frustrating, and less embarrassing than finding them in the air.

I don't mean to say that true test flights are unnecessary or that you will never goof on the drawing board and have trouble in the air. I do, frequently. But our chances of success with an original design are infinitely greater if we follow a few rules and make the design as right as we know how, before we start cutting balsa wood. As I said last month, designing is much more than drawing pretty pictures of neat new airplanes. I also find it much more fun than just drawing the pictures.

But I digress. Back to directional stability. Some model designers use rules of thumb to decide how large to make the tail surfaces and how long to make the tail moment arm. These rules are useful if the plane is very conventional, but they can get you into trouble in designing an airplane with a lot of lateral area forward, such as a seaplane, or even a deep-fuselage pattern ship. Paper dolls take such differences into account; rules of thumb don't.

If the CLA is a little too far forward (low or neutral yaw stability), the plane will weave around instead of grooving. It will be noticeably unpleasant to fly. An arrow with insufficient tail feathers doesn't fly well. If the directional stability is too negative, the plane will be uncontrollable.

**LONGITUDINAL STABILITY**

Longitudinal stability is one that most modelers get involved with sooner or later, in terms of getting the CG (or the wing) in the right place. We move the CG forward for more stability. If we get the CG too far forward, the plane is very stable, but it will require excessive up elevator to keep it level, and we may not have enough elevator con-

trol to loop or even climb.

If the CG is a little too far back, the plane may tend to wander up and down, requiring constant correction with the elevator, and it will probably act mushy. If the CG is much too far back, the plane will be uncontrollable and will either stall and perhaps spin or "tuck under" into a dive.

I once built an original-design R/C combat flying wing (see photo). In a test flight the CG was just a tad too far back. It flew fine with the tank full of fuel (which moved the CG forward a little), but as the fuel burned away, the plane got more and more sensitive in pitch, until it became uncontrollable, all in one flight. To start with, it would not spin. In a few minutes it would spin fine, still later it would enter spins by itself, until eventually I couldn't get it out of a spin. Fortunately the ground was soft and the plane was rugged. It lived to fly normally, with the CG farther forward.

There are rules of thumb for the amount of stabilizer and elevator area a design will require for proper pitch stability. The

recommended area for the stabilizer and elevator combined may be from 15 to 30 percent of the wing area. Yes, this is a large range because of differences in the relative length of the tail moment arm, designer habits and preferences, and even whether we are designing a monoplane or a biplane.

A better procedure for sizing the horizontal tail is the use of "tail volume coefficient." This comparison number is the horizontal-tail-area to wing-area ratio times the tail-moment-arm to wing-chord ratio. In other words, the larger the horizontal tail compared to the wing size and the longer the fuselage compared to the wing chord, the greater the tail volume coefficient and the greater the longitudinal stability. It is just the same as the rule of thumb in the previous paragraph but with tail moment arm also taken into account. Why the word "volume" here? It isn't volume in the usual sense, but it is like volume in that it consists of area times another linear dimension.

For a more detailed presentation, see Stinton's book, page 391 and on. He notes,



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"The larger the tail volume coefficient [the greater the longitudinal stability], the larger the usable center of gravity range." If the flying wing I spoke of had had more longitudinal stability, it wouldn't have become unstable as its CG moved back a bit when the fuel load became lighter.

Al Doig has talked about tail volume coefficient several times in his "Soaring" column in *R/C Modeler*. In his May 1987 column, Doig wrote, "In gliders, tail volume coefficients between 0.4 and 0.6

seem to be common." For R/C, I usually stay within the range of 0.40 to 0.70. Full-scale aircraft are usually designed a little less stable than we design our models. Mr. Stinton shows a tail volume coefficient range of 0.30 to 0.65 for sport and competition "aeroplanes" (He is British.)

It's obviously not very critical. A tail volume coefficient of one half will provide adequate stability for most types of models. A couple of examples: If your proposed horizontal tail area is a quarter of the wing area and the tail moment arm is twice the wing chord, the tail volume coefficient is 0.5. It would also be 0.5 if the tail area is only 20 percent of the wing area, but the tail moment is increased to 2-1/2 times the mean wing chord. The longitudinal stability of these two hypothetical airplanes would be approximately the same, since their tail volume coefficients are the same.

We are about out of space, and I must wind things up. We will finish this overview of stability next month.

## NICKEL CADMIUM BATTERY STORAGE

Last month, in my little model airplane dictionary, I stated, "Nickel cadmium batteries keep as well discharged as they do charged." That is basically true, but the subject is controversial. I never charge my model batteries before or during storage, and I have had almost no battery trouble in the 40 years I've been building R/C. Some of my Ni-Cd packs are ten or more years old, and still in good condition. The 1986 edition of the G.E. Nickel-Cadmium Battery Application Handbook states, "Sealed nickel-cadmium batteries can be stored in either the charged or discharged state." The other side of the story is told well by Al Alman in his "Big Birds" column in the March 1988 issue of this fine magazine. Quoting Al, "Store your batteries with a full charge because Ni-Cds stored with a low state of charge have a much higher probability of getting a permanent short. This is due to the fact that the internal energy of a fully charged cell is enough to 'clear' or vaporize a short that is forming. . . ." Al is probably right on the short clearing. I once "zapped" a freshly shorted cell with moderate current and it did clear. However, from my store'em-discharged experience, shorts that don't clear are very rare. I assume Al charges his batteries periodically when they are not being used because they mostly self-discharge in a month or so. I would also wonder about trusting a cell that had already developed a short and repaired itself. Take your pick. I expect that Al and others will continue to store charged, and I and my ilk will ignore their warnings and not regret it.

Until next month, why let the kit designers have all the fun? Francis Reynolds, 3060 W. Lk. Sammamish N., Redmond, Washington 98052; (206)885-2647. •

## Counter . . . . . Continued from page 9

stroke, or a 45-60 4-stroke. For more information, contact Davey Systems, 675 Tower Ln., West Chester, PA 19380.

MRC has introduced a new model rocket,

the Firefighter, a brightly colored rocket with an injection-molded nosecone, three die cut balsa fins, decals, and complete instructions. Two High Thrust engines come in the package, along with the Lunar Launch pad and Rod and the Omnidirectional ball swivel system to allow accurate launches on uneven ground or when the wind is blowing. Look for the new Firefighter at your MRC/Tamiya dealer now.

\* \* \*

Here's a new winder specifically designed for the free flight scale modeler. The Scalewinder will handle scale models from peanut through jumbo, and non-scale embryo and P-30 models as well. The 10 to 1 ratio allows you to pack in 3000 turns in the 2-minute time limit. All metal gears give good "feel" when the rubber is reaching the breaking point. Oil-impregnated bronze bushings and corrosion-resistant hardware mean long life for the winder, and the high-visibility white with bright-colored trim prevents losing the winder in tall grass. For more information, contact Rees Industries, 301 Yearling Dr., Goldsboro, NC 27530.

\* \* \*

Kyosho's Impulse II is a tough, high-quality radio designed to give airplane modelers an economical alternative in two-channel, two-stick radios. The Impulse II features a molded transmitter, smooth-response gimbals, servo reversing, and a charging jack for optional Ni-Cd transmitter batteries. It comes with the transmitter, receiver, two servos, BEC switch harness, battery box, and other accessories. Look for the Impulse II at your Kyosho dealer, or write: Great Planes Model Distributors, Box 4021, Champaign, Illinois 61820. •

## Jake. . . . . Continued from page 7

at all to make your airplane loop using your ailerons, so how can there be such a thing as a roll loop? Can you straighten me out on this?

*Befuddled in Bedford, Massachusetts*  
Dear Befuddled:

You're right about one thing. . . you are confused! When an engineer talks about control loops, he's not talking about maneuvers; he's talking about a control path from the pilot, through the control system, to the control surface, through the aircraft's response to that surface, back to the pilot, through the seat of his pants. The roll loop involves roll stick inputs, aileron deflections, and the aircraft's roll response to those deflections. Loop characteristics include such things as how much surface deflection you get per inch of stick movement, how quickly the aircraft responds (its time constant), and how stable that response is.

Closed control loops involve feedback paths. An autopilot which is trying to command a 20-degree bank angle has a feed back path which tells it what the aircraft's actual bank angle is. When the feed back angle equals the commanded angle, the error signal goes to zero and the autopilot knows that the aircraft has achieved the desired bank angle. The feedback path within a control loop is also known as a

feedback loop.

Authors writing about flight control systems are operating open loop. There is no feedback path to tell them whether or not the intent of their article is getting across to the reader, or whether the reader understands the material. Your complete befuddlement is a prime example of why technical writers choose to avoid reader feedback paths, which are known in the trade as fruit loops.

Jake

\* \* \*

Dear Jake:

Who invented the tricycle landing gear?  
Historian in Hazelwood

Dear Historian:

Huffy.

Jake

\* \* \*

Dear Jake:

My attorney tells me that it is now possible to sue an advice columnist for malpractice. The courts will generally rule in favor of the plaintiff if it can be shown that by following the published advice, he incurred financial or physical harm. Well, guess what, Jake ol' buddy? My lawyer will be contacting your lawyer.

I followed your advice about naming airplanes based on visual inspiration. I took one look at my new U-control stunter and named it "Blanche's Varicose Veins" because it reminded me of my mother-in-law. Well, she happened to see the airplane yesterday and took exception to the name painted on the side. I now have a stomped airplane, a black eye, and a shattered kneecap. This is the financial and physical harm I have incurred by taking your advice.

We're suing for half a million plus punitive damages. I hope you're insured, Bozo!  
Litigant in LeSourdsville

Dear Litigant:

I believe there is a legal principle that requires that common sense be applied to the utilization of any advice. You wouldn't jump off a bridge just because someone advised you to; would you? If you would, then here's some new advice: Go jump off a bridge.

Jake

Hannan. . . . Continued from page 51

very heavy, extremely hard and gnarly, with absolutely no straight grain. This type of wood is useful for ground cover, decorative purposes, or firewood. Healthy trees (in addition to providing wood) also produce oxygen, which has been proven useful to sustaining life and flight. Since the desert nurtures few trees, it follows that there may not be enough oxygen to create healthy and stable air. Therefore, the air that is there is lighter than oxygen, it heats up rapidly, and we all know what happens to hot air. When the off-spring of a tree (wooden model aircraft) ventures within the sphere of the desert, it is most often treated harshly. It is not uncommon for it to be caught in an up-draft of hot air, disappearing out-of-sight. On the other hand, the desert may destroy the trespasser by dashing it coolly into the ground. It does seem that the desert may be

jealous of the fruitfulness of the family of trees. End of report.

"Conclusion: When your models get caught in the parental embrace of the trees, just remember it is a sign of love and affection. If you will be patient, it's quite likely you'll get your model back. Take a deep breath of good, clean air, and whisper 'thanks' to the trees. This, of course, will please them, and, who knows, maybe a strong gust of good air will free your model." Frank had one other suggestion for retrieving errant models from trees, which we rejected on humanitarian grounds.

**WEE R/C**

Our mail strongly suggests great interest in truly tiny radio-control guidance units. Dan Walton, a Beechcraft engineer, wrote in to say:

"The really small R/C models have always fascinated me, and my Cannon rig allows some small models. But Gasparin and Alfery's work (in Czechoslovakia) is remarkable. Such tiny radio systems may one day have a real niche in the marketplace, even though they are now experimental novelties. The small sizes of the Czech CO<sub>2</sub> engines are also worthy of note. With good flying sites becoming less available, this may be the wave of the not-too-far-off future." Incidentally, some readers have asked for sub-miniature R/C circuit information. I must gracefully bow to MB's resident electronics guru, Eloy Marez, for that sort of thing, since my experience in that area is nearly zero. (I am still trying to understand free flight!)

**MORE GIANT SCALE**

Switching deftly to the other end of the size range, Roy Oberg, of Rockford, Michigan uncovered a 1909 issue of *American Carpenter and Builder* magazine. In it was an article about a truly ambitious dirigible model constructed for a German aerial exposition. This monster, fabricated from thin strips of Canadian pine, was 8 feet in diameter and 100 feet long! The mind boggles. . . .

**SPEAKING OF WOOD**

A six-foot long fragment believed to have been part of the ill-fated L'Osiseau Blanc (The White Bird) biplane flown by Charles Nungesser and Francois Coli, which some think may have crossed the Atlantic in advance of Charles Lindbergh and crash-landed in a Maine forest, has been found.

Searchers, aided by an infrared radar equipped helicopter still hope to locate the White Bird's engine in the heavily wooded area. Our thanks to Florence Bakken for this report.

**WORLD'S SMALLEST INDOOR FLYING SITE**

Having trouble finding places to fly? Then take a good look at the Lepidopteran Dome and Hangar of Scale Models shown in two of our photos. Both are the inspired work of Fritz Mueller. Not satisfied with creating Wee R/C models and successful model autogyros, Fritz turned his attention to designing a desktop indoor control-line flying site. This fully enclosed item takes up a mere four- by six-inch space and is totally silent in operation. It won't disturb your neighbors and is even equipped for night flying!

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## MODEL BUILDER

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What's the secret? Well, the models are "quarter scale" reduced-size versions of butterflies, which offer a near-infinite choice of coloration. (Note proof-of-scale documentation book shown alongside the Hangar of Scale Models butterfly collection.) Typically a scale butterfly has a wingspan of about 1/4 inch. In order to fly one of these miniatures, it is affixed via a short (about an inch and a half long) segment of human hair to a tiny concealed electric motor located in the base of the dome. Once mounted, the butterfly is galvanized into action by pushing the appropriate button. If night flying is preferred, a simple press of the "Light" button floods the glass dome with illumination.

Since the electric drive unit is equipped with batteries, operation is possible even in remote areas. The built-in recharger simplifies keeping the batteries up to strength,

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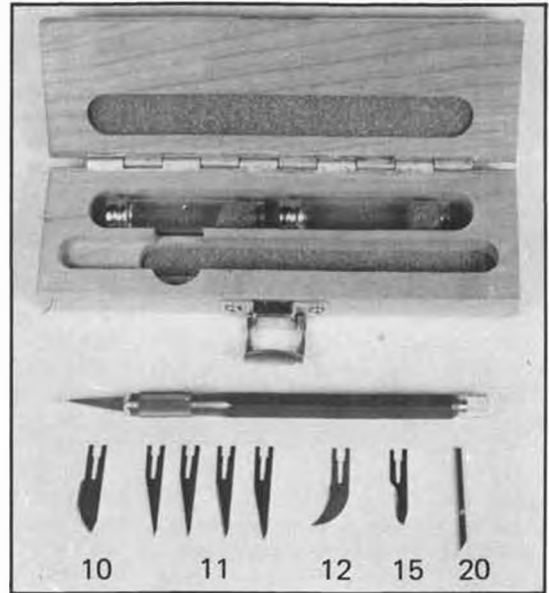
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### VOYAGER, THE BOOK

It seems scarcely possible that the round-the-world-unrefueled flight took place as long ago as December of 1986. Yet, the story seems fresh as today, as written by Jeana Yeager and Dick Rutan with Phil Patton.

Naturally, we were pleased to see the favorable mentions of Dick and Burt Rutan's model-building backgrounds. And the accompanying photos showing Dick with an R/C endurance-attempt model, as well as Burt with a fleet which included (we think) towline gliders, Free-Flight Payload, Control-Line Stunt, Carrier, and Scale models.

This is a truly comprehensive book, dealing not only with the "stars of the show," but also with many volunteers who contributed so importantly to the mission's success. Take Fergus Fay, from Montana, for example. With experience extending from early aviation barnstorming days clear through the Space Shuttle era, he emerged with a firm belief that "aeronautical engineering today remains about 40-percent science and 60-percent a black art." The construction phase of the Voyager project is covered extensively, and descriptions of the obstacles encountered and the solutions reached are made more intriguing by the cast of characters with their (very!) individual personalities. Model builders will readily identify with the weight-savings efforts made, as

well as the frustrations involved. For instance, Burt had specified aluminum fuel system valves, but only brass ones could be located. So, after removing every possible gram of excess metal from them, Dick simply painted them aluminum so they would appear lighter!

Dick also resented the "engineering speak" so prevalent in technology. Note his reaction to the "Unducted Fan" project being conducted near the Voyager's hangar: "Don't tell me what it isn't; tell me what it is. 'Horseless carriage.' 'Wireless telegraph.' 'Unducted fan!' . . . I had an unducted hat once. I wear unducted shoes." His conclusion was that too many engineers would rather say what things are not rather than what they are—what won't work instead of what will.

The section devoted to testing the Voyager is also fascinating. Certainly those of us following the progress via news reports, had no idea of the many difficulties encountered, not only from aerodynamic and mechanical failures, but from human shortcomings, both physical and emotional. Describing the flight characteristics of the craft, Jeana wrote: ". . . Voyager's wallowing flight was a direct reflection of the way its sensitive, long wings magnified the waves of the air so they felt as powerful as the waves of the sea." ". . . it was like riding on the back of a pterodactyl." By the time the actual world flight description is reached in the book, the reader's appreciation for the crew's stamina and determination has grown tremendously, and one can

readily share in their anxieties and trepidations. After the harrowing takeoff and loss of the winglets, almost hour-by-hour reports of the action are given. The storms survived, emotional traumas, mechanical and instrumentation problems met, left us with a profound awareness of the bravery demonstrated by Jeana and Dick.

Quite apart from being a technological triumph, the Voyager mission provided a much-needed morale-boost to a world fed-up with assorted political stupidities. Even the usually jaded newspaper reporters welcomed the opportunity to cover an upbeat, positive story for a change!

We sincerely hope that the Voyager saga will live on in the way Lindbergh's triumphant transatlantic crossing has.

Voyager, published by Alfred A. Knopf, Inc., should be available from most book dealers, including at least three Model Builder advertisers.

### POSTSCRIPT AND SIGN-OFF

For readers preferring an abridged account of the Voyager story, see the February 1988 Readers' Digest magazine.

Since reading Voyager, we have learned that Jeana Yeager plans a museum in Mojave, California, to display Voyager memorabilia, international awards received, and some of Burt Rutan's innovative aircraft such as the Grizzly, Solitare, VariViggen, Long Eze, and Vari Eze.

As for Dick and Burt Rutan, plans are pending for numerous new design projects, possibly including an exciting new unlimited air racer.

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# MRC-Tamiya Thunder Shot

## Ready to blow the doors off the 4WD competition

It's the Shot heard around the R/C world! Tamiya, the leaders in R/C off-road buggies, in an effort to blow the doors off the 4WD competition, engineered a 1/10 scale buggy that's lighter, more powerful, with performance and handling characteristics that make it an instant contender.

### TO MAKE IT FASTER, WE MADE IT SIMPLER

To get the maximum speed out of the Thunder Shot, Tamiya reduced every ounce of excess weight, while maintaining structural integrity. For instance, instead of using a complicated chassis/frame assembly, we combined the two, molded it out of lightweight engineering plastic, and designed it to allow easy access to all the major R/C components. Then we added features like simplified sealed gear boxes to enclose the beveled gears, so they won't float and lose traction. And there's a lighter bumper to keep the nose up and out of trouble.

### THEN WE ADDED MORE...PERFORMANCE

We designed the Thunder Shot with new linkage steering (just like the full sized buggies), to eliminate toe-in when you corner hard. A new running battery position for an ultra-low center of gravity. A new motor mount that takes the guesswork out of adjusting pinion gears.

We also provided oil-filled shocks, so you can adjust them to match the terrain. And there's the aerodish wheels, for a smooth, clean look. Plus a new one-piece body design, which slips through the wind in a breeze. We also put an easy access hatch in the body, so pit time adjustments take a fraction of what they used to be. And you can modify the Thunder Shot to compete in your favorite class.

Soup it up with available ball bearings, super hot motors, and just about everything else you'll need.

### BULLETIN

In its very first race, The Thunder Shot took first place in A Main Modified

Racing against 2 RC 10's with 4-wheel drive conversions, 6 Optimas™\* and 2 AYK Radiants, it not only won but TQ'd and set new track record.

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