MODEL BUILDER

NOVEMBER 1986

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WORLD'S MOST COMPLETE MODEL PUBLICATION

FEATURES

CO_2 Power
At the Nats
Byron's Fan-Fly
Ramblin' Through Europe
Review: Webra's T4-80

CONSTRUCTION

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Electric R/C
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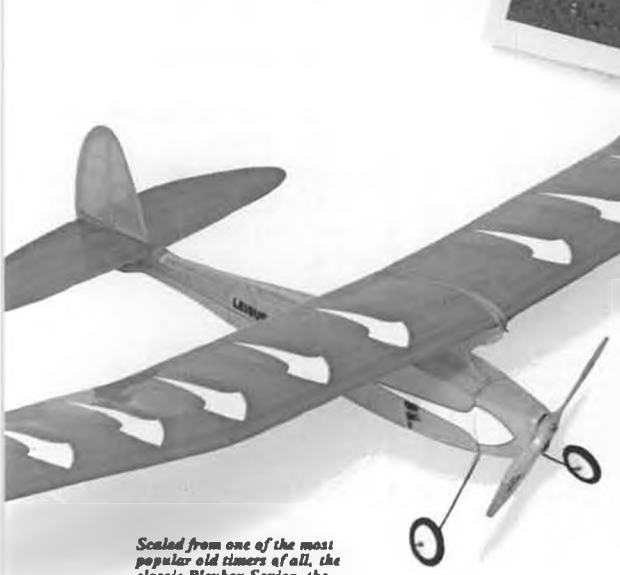

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MODEL BUILDER

NOVEMBER

1986

volume 16, number 178

898 West Sixteenth St., Newport Beach, California 92663 Phone (714) 645-8830

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COVER: "Day's End," by Bob Benjamin, depicts a scene in early 1940, high above the Pacific, as two Grumman F3F-2's of the U.S.S. Enterprise's VF-6 return to the fleet after a test of navigation skill over the top of a layer of thick cumulus clouds. Exuberant at having located their carrier precisely, the two young naval aviators, one of whom is the squadron leader, chase each other in mock combat down through the large breaks in the clouds. It is "Day's End" for more than just their exercise, as within the next year the day of the Navy's biplane fighter will end as well. The original of this 20"x40" painting is available for purchase through Ray Hudson Associates Inc., 106 Central Way, Kirkland, Washington 98033. (206) 822-1263.

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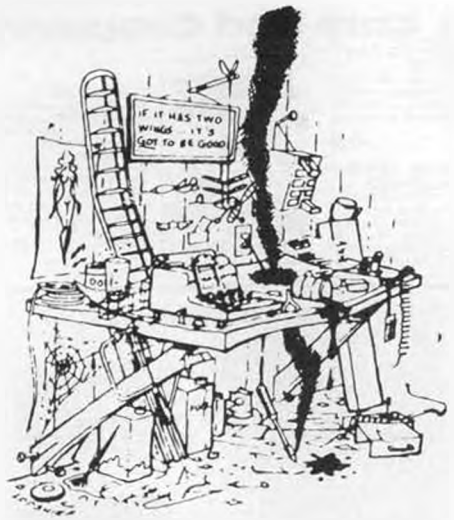

from Bill Northrop's workbench

• One of the most important elections in AMA history is about to take place. Ballots for electing the President, in addition to Vice President of Districts 1, 5, and 9, are due to be mailed out shortly, and if everything runs according to average, about 20,000 votes, or only 20 percent of AMA's total membership of 100,000, will officially register their preference for, and determine the office of AMA president.

It's obvious that those who vote have more interest in AMA than the majority of members who join primarily for the insurance coverage. It's also quite clear to this editor that the AMA voters represent a high percentage of the hard core, continuously active modelers, and that many of these are *Model Builder* readers. Therefore, it is felt that we are talking to a majority of the active modelers and those who are interested in the future of modeling and its national organization, the Academy of Model Aeronautics.

Many of our regular readers may be wondering why we are taking any interest in this matter at all, as it's pretty well known that we, as well as other private enterprise model publications, strongly object to the way in which AMA has gone into direct competition with us by expanding the AMA membership newsletter to the status of an all-out slick magazine, which effectively reduces our operating revenue by cutting into our primary source of income, the sale of advertising space.

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"This is not a power play on my part . . . quite the opposite. I think the AMA President's position should be subordinate to the Executive Council. If elected, that's how I would conduct the office. That position is consistent for me . . . it has been the basis of my 22 years serving the Council.

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from Bill Northrop's workbench

• One of the most important elections in AMA history is about to take place. Ballots for electing the President, in addition to Vice President of Districts 1, 5, and 9, are due to be mailed out shortly, and if everything runs according to average, about 20,000 votes, or only 20 percent of AMA's total membership of 100,000, will officially register their preference for, and determine the office of AMA president.

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RCMB Inc. is strongly in favor of John Worth's election to the AMA presidency. This writer has known John since first meeting him at an R/C flying get-together in Hampton, Virginia at the NACA (now NASA) facility, Langley Field, back in 1957-58, where he was employed as an aeronautical research technician. In 1963, he was elected President of AMA, an organization with a 1962 deficit of $9,000 and fighting for its very existence! Working in effect as both President and as Executive Director (on an unpaid basis) with the retirements of Russ Nichols, John managed to get AMA on a break-even basis by the end of 1963. In 1964, he relinquished his presidency to take over the full task of Executive Director and 21 years later, by the end of 1985, the AMA had over 110,000 members, a building and museum of its own, and an operating budget of over 3.5 million dollars. . . much of which was largely attributed to John Worth's efforts.

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Still an active model builder and flier, his current interest is in electric power, with the goal of advancing this activity as a solution to obtaining and keeping flying sites, so that losses due to noise problems can be reduced.

Worth is also on a first name basis with model industry and organization leaders all over the world. He has been married 36 years and has four grown children making it in the world on their own yet still part of a close-knit family. He is 62, in good health, and ready to give more good years to AMA.

Under his directorship AMA has grown from 20,000 members to over 100,000, with a HQ staff that has grown from four employees in 1963 to 45 now. The extremely successful second half of AMA's 50 year history is largely a measure of John Worth's efforts. But he is not yet ready to rest on his laurels . . . he has more mountains to climb and jobs to be done before retiring. We can help him by making it easier and more effective for him to operate. He can do that best by combining the Presidency and Executive Directorship in a unified effort aimed at increasing the AMA membership.

His goals are: to provide more flying sites through more effective PR, to promote more effective use of R/C frequencies, to obtain the most effective use of AMA's new computerized capabilities, and to offer more effective insurance programs.

John Worth doesn't regard the presidency as an ego trip . . . he has more honors than anyone else in AMA. To him the presidency offers a more effective way, combined with the Executive Directorship, to do the big jobs that still need to be done, to provide modeling with greater prestige, stature and recognition.

One final comment . . . John Worth did not come to me and ask for support for this write-in effort. As mentioned before, I heard about his nomination, and the fact that it was rejected, during our visit to the 50th Anniversary celebration at the end of the Nats in the USA's own Sauna Bath, Lake Charles, Louisiana. With his bid pretty well ignored by the Nominating Committee, he had discontinued any further efforts toward attaining the goal. I brought up the write-in idea while John was changing his electric powered Le Crate during the Saturday flight demonstrations, and later that day, when he had had time to think it over, he informed me that he endorsed the idea and would supply the information needed to set up the campaign. With the knowledge that he is going ahead, many others have joined in his support. We hope you will too.

Write in "John Worth" for AMA President! •

Advice for the Propworn

Dear Jake:

In the June 86 MB, in the process of listing colors of things that fly, you said George Washington threw a silver dollar across the Delaware. Washington crossed the Delaware, but he threw his silver dollar across the Potomac. In the future, please consult a historian before providing us with erroneous information again. Thank you.

Rudy in Miami Township

Dear Rudy:

You are correct, of course. George Washington did throw his pocket change across the Potomac. It was Martha Washington who threw George's wooden teeth across the Delaware, when she discovered that George had been out fathering our country.

Jake

* * *

Dear Jake:

Is there any explanation for the reluctance on the part of Dutch aircraft designers to abandon their traditional Goettingen airfoils and move on to the more advanced sections such as Wortmann or Whitcomb, whose performances benefits have been clearly demonstrated?

Fluid Dynamicist in Frostport

Dear Fluid Dynamicist:

The Dutch aviation industry may have a reputation for being somewhat behind the times, but other areas of Dutch research are at the forefront of technological advancement. Composites is one such area where the Dutch are showing the rest of the world how it should be done. In a recent survey, 87 percent of all Dutchmen said they owned at least one pair of graphite shoes.

Jake

* * *

Dear Jake:

About those aerions that provide lift—I agree with you, aerions do exist and are most important. Obviously, however, I should discuss with you my method for reintroducing aerions into a decayed airframe.

There are two methods: the first by pressure induction and the second by liquid application. Perhaps you haven't realized that aerions are available in a free form as well as being naturally present in a newly constructed framework.

Method #1: Pressure induction is difficult to do uniformly and requires an exact mating form and a fairly expensive press. It is just like the way Uncle Ben does it on his packages of rice when he presses in all those vitamins—in fact, aerions are sort of like vitamins. Making a form for pressing vitamins into grains of rice, however, is a lot simpler than making one to fit your airplane. And sometimes the more fragile structures don't look just right after the process. Most of us reject this method.

Method #2: Liquid application is really easy and works well. You first have to dissolve the aerions in a solution made up of acetone, androcilicon extract, and a little spit. This is applied quickly with a brush. The solution evaporates fast and some of the aerions are lost, but enough remain to do the job. Aerions are dangerous if inhaled, (in 1983, Mr. Harlan Bedlow's nose absorbed so many aerions that it rose to the center of his forehead and stayed there) so a mask should be used and there should be very good ventilation. The aerions can also be dissolved in dope and applied similarly.

Many modelers don't see satisfactory results because they have not stored the aerions properly before application. In free form their life is much, much shorter than when impressed into a structure or applied to it with the proper solution. Storage is difficult; putting them under your pillow, however, works well.

I could send you some aerions if you want to try out my liquid application method, but realize, please, that they may lose their strength in transportation.

Ed in N.Y.C.

Dear Ed:

I'm sorry, but I can't recommend your airframe refurbishment techniques to modelers in general. A few experts might make it work, but there are too many hazards associated with the process for me to endorse it for anyone else.

I bought an aerosol spray can of aerions from Neiman-Marcus and tested your theory. First of all, too many or the wrong kind of aerions (Rh positive instead of negative) could alter the molecular structure of your airplane. When I sprayed a second coat on

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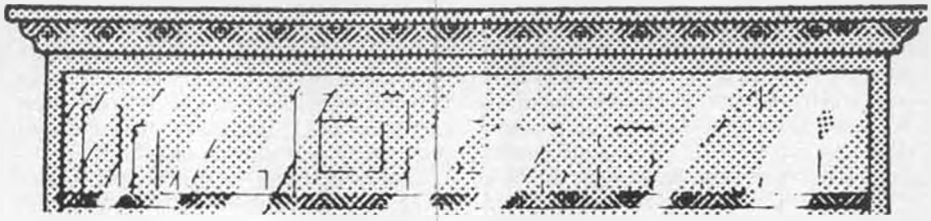
OVER THE COUNTER

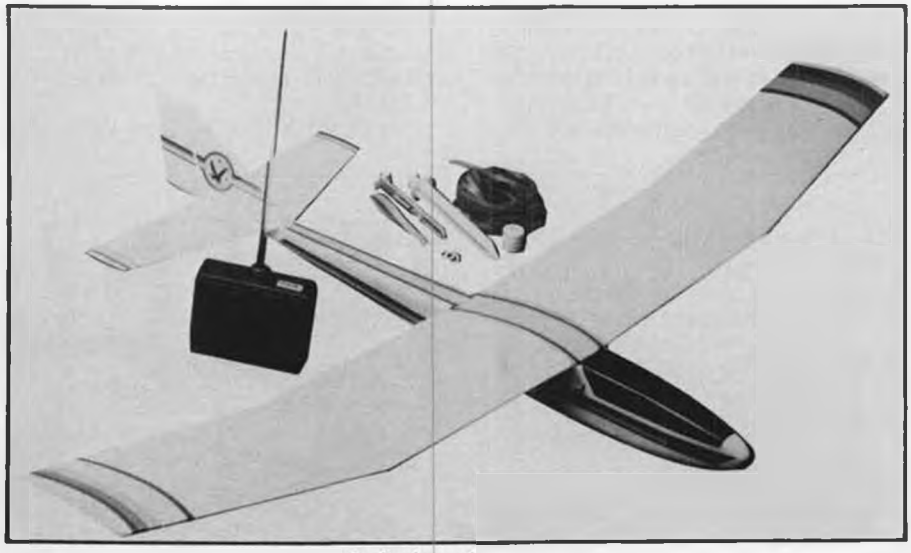
All material published in "Over the Counter" is quoted or paraphrased from press releases, furnished by the manufacturers and/or their advertising agencies, unless otherwise specified. The review and/or description of any product by MB does not constitute an endorsement of that product, nor any assurance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



• Let's begin our look at new products this month with a visit to the book shelf, where we find the new 1987 Zenith Aviation Books catalog. With more than 400 new titles included, the '87 catalog should have more than just a few books to interest the aviation nut. In addition to more than 3,000 aviation-related books listed, there are many video tapes available as well. One of the new book titles is *Northrop F-5/F-20*, a comprehensive look at the Top Gun's chase plane, one of the world's most advanced military jets. Also featured is the F-20 Tigershark, billed as "Chuck Yeager's favorite fighter jet." Learn all about this first combat plane built without a government contract. More than 100 photos, including 8 pages of color, show you these planes inside and out, with closeup views of cockpits, weapons, and markings. If you are planning a model of one of these jets, this is the book to have for your documentation. You'll find it, along with 3,000 other books and tapes, in the new 1987 Zenith Aviation Books catalog. It's free from Zenith Aviation Books, Box 2MB, Osceola, Wisconsin 54020.

* * *

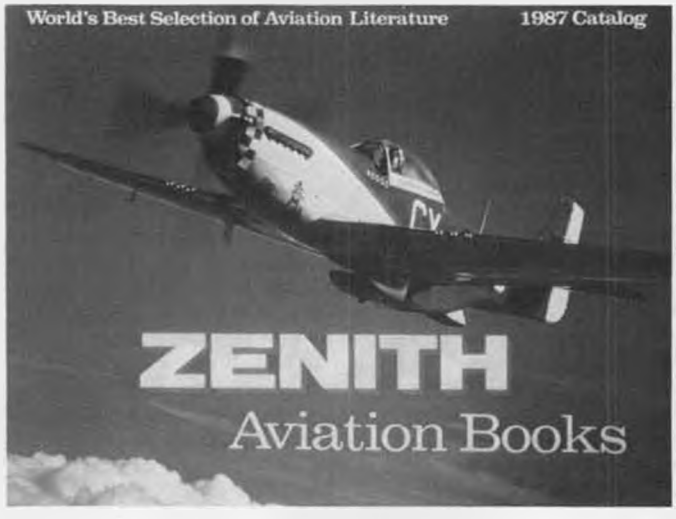
Circus Hobbies has introduced the latest in R/C radios with the Galaxy Computer 8 Multi-Function Micro Computer Radio Control System.(What a mouthful!) It is claimed that the Galaxy Computer 8 is the first transmitter that can handle seven completely different models by entering all the details about each model. After programming such essentials as trim positions and function code, you need only select that code and then fly any model you've programmed into the Galaxy Computer. All control adjustments are input through an easy to use key pad, and are displayed on the LCD readout on the front of the radio. The Galaxy Computer 8 features 8 channels with servo reversing on all channels, a fail-safe system for battery and signal loss, stop watch, alarm timer, 5-year lithium battery for CPU memory backup, PCM and PPM transmission, full NiCd batteries with charger, 4 JR4001 servos with trays and mounting hardware, direct servo controller cord, servo extensions, and operating manual. The Galaxy is available in mode 1 or mode 2 in a pattern version, and a helicopter version as well. For more information on this radio system, contact Circus Hobbies, 3132 S. Highland Dr., Las Vegas, Nevada 89109.



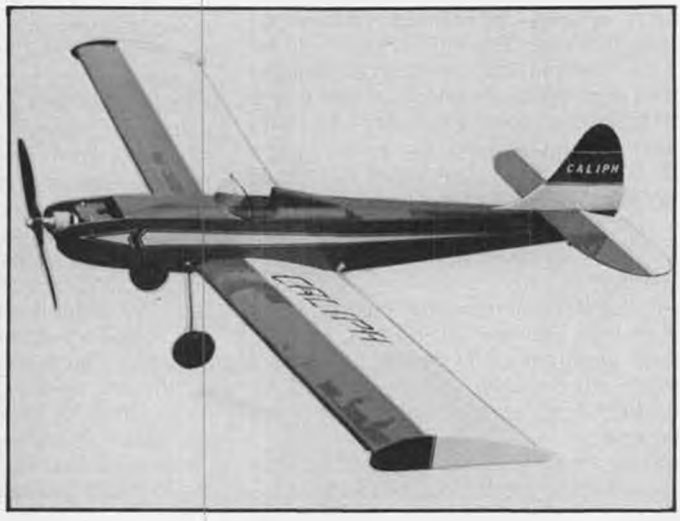
Cox Hobbies' Eagle II Sailplane for single-channel R/C flight.

* * *

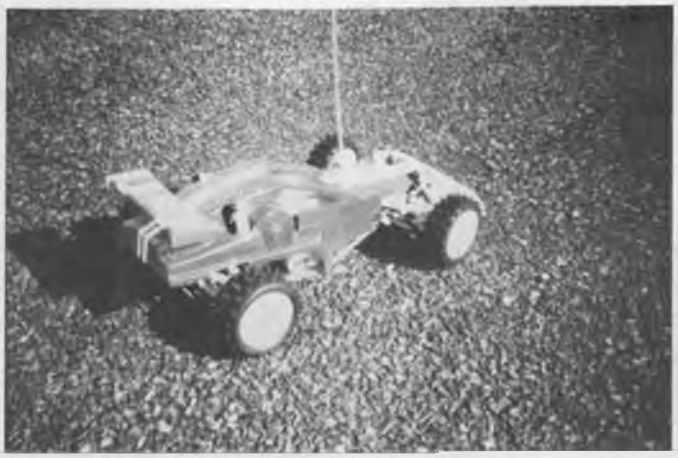
Davey Systems Corporation has designed a new convertible kit for either 05 electric or .20 four-stroke flight. Called the Caliph, this sport/trainer features simple construction, step-by-step instructions, full-size rolled plans and machine and die-cut selected balsa and plywood. Inside the box you'll find sheet balsa fuselage sides, rudder and elevator, as well as formed landing gear and hardware. The Caliph has a 48-



Zenith Aviation Books' new 1987 catalog.

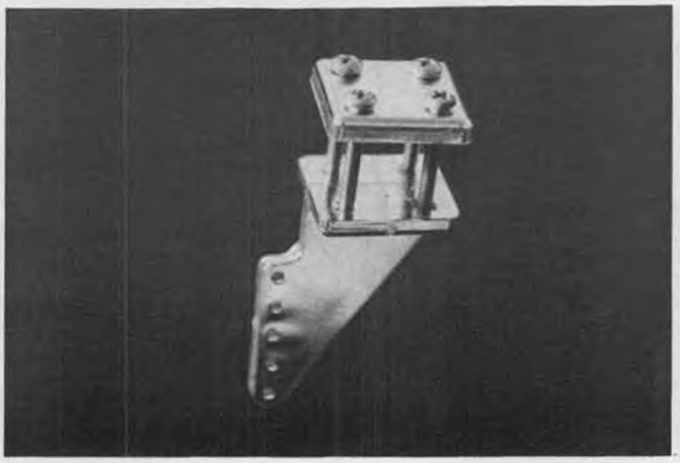


Electric or four-stroke Caliph from Davey Systems Corporation.



PB Mini-Mustang offroad car from Parma International.

Big Bear R/C truck from Model Expo.



Control horns from DP Precision Molding.

VL Products' electric motor and battery for free flight models.

inch wingspan with 390 square inches of area, and a modifed Clark Y airfoil. You can get the Caliph for only $44.95, at your hobby dealer, or write to Davey Systems, One Wood Lane, Malvern, Pennsylvania 19355.

* * *

Now available for big bird fliers are these new control horns from DP Precision Molding. These horns feature tough nylon in a T-base style, designed for 1/6 to 1/4 scale aircraft. Seven colors are available, including blue, yellow, orange, red, white, gray, and black, to complement the color scheme of your plane. Each horn comes with four 3/4-inch long stainless steel Phillips head bolts for easy mounting. The bolts self-thread into the horn base providing an anti-vibration mount. Prices for these new horns are from $2.00 a pack for the unplated color nylon, to $3.00 a pack for the chrome-plated horns. Each package contains two horns and mounting hardware. If ordering by mail, include 75 cents for handling. Send your order to: DP Precision Molding, Dept. B, Box 20639, Columbus, Ohio 43220.

* * *

Helicopter pilots are going to love this new starter from Du-Bro Products. Called the Helicopter Sure Start, this starter allows for "no pressure" starting procedure, and alignment of starter can be as much as 20

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Sure Start helicopter starter from Du-Bro.

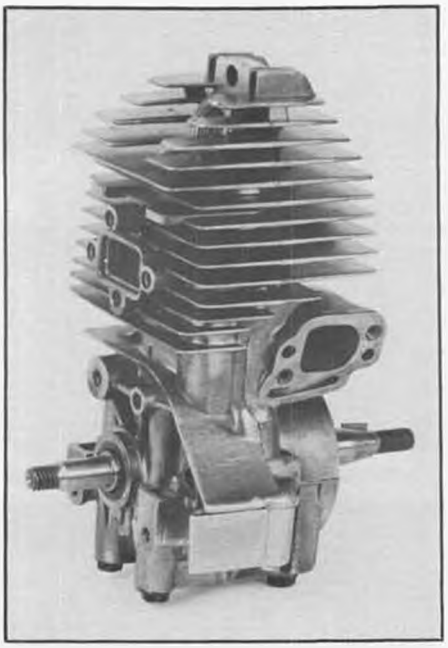
Galaxy Compter 8 radio system from Circus.

Altech Marketing's Coast Guard Lifeboat.

Astro Cobalt 60 FAI electric motor.

BIG BIRDS

By AL ALMAN



In case you decide to upgrade your Q-35 to a Q-40, this is the shortblock you'll be using.

ROCS 4th ANNUAL BIG BIRD BASH & TEA SOCIAL

Once again we were blessed with fantastic weather for the entire weekend. A steady 10-knot breeze made the 80-degree days seem a lot cooler so, in spite of the cloudless skies, over 1500 spectators (mostly families) heeded our call and came to gawk, ask questions, eat lotsa hot dogs and nachos, buy virtually all of our raffle tickets, and have one helluva good time.

We also had a great pilot turnout; 47 fellow BIG Bird lovers accepted our invitation and brought along 66 different flying machines. And this diversification is one of the many reasons that fly-ins have become so popular with pilots and spectators alike. Because these get-togethers are low-key and give pilots a chance to really socialize and share their knowledge, there's no need for competitively similar aircraft...so guys build whatever turns them on.

Every pilot received a copy of our field and fly-in safety rules, and we had no complaints. It's taken a few years, but now just about everyone who's into building and flying biggies appreciates the need for airworthiness inspections and eliminating any taxiing into, or out of, the pit area. They've come to understand that each of us has the right to expect every other pilot to be equally safety conscious.

Once again only three planes were allowed in the air at one time, which didn't hamper anyone's flying; this rule makes it more relaxing for the pilots and easier viewing for the spectators. Another safety precaution we stayed with was having a qualified pilot act as safety observer for each flier.

This year an even wider variety of airplanes showed up, including WWII "heavy metal" and multi-engined birds. And not only were there a number of mighty fine looking BIG Birds on display, but spectators were also treated to some exceptionally good flying. It appears that many more builders have become proficient BIG Bird fliers.

And all types of engines are now being used. Although a fair amount of converted chain-saw and weed-trimmer engines are still providing the power, many of the bigger two-cycle glow engines like the 1.08 Boxcar, Super Tigre, OPS, Bully, and Super Tartan have also become favorites...as have the 1.2s and twin four-strokers.

Apparently the advantages of throttled-coupled spark-advance have also become evident because a number of both two- and four-cycle engines used this CH Electronics ignition system. And we even had three diesel-powered craft in the lineup, too.

Some of the AMA Northwest Show Team members who have BIG Birds (that meet our engine/noise requirements) helped maintain spectator interest with a Snoopy bipe; an awesome, smokin' Chipmunk; and a Senior Telemaster that proved to one and all that the tail can, indeed, wag the dog.

And the spectators really had BIG Bird fever; there were "oohs" and "aahs" and applause for virtually every flight, although THE hit of the fly-in had to be amiable Erv Solberg doing his WWI routine, complete with handlebar mustache, Kaiser hat, monocle, scarf, long coat, sword, boots, walking stick, a BIG Fokker DR-1...and, of course, a very real "Blue Max" hung around his neck. And nobody enjoys this little skit any more than Erv, himself...in spite of his having to wear a long coat on pretty hot days.

While taking pix I commented to him about sweltering under that coat. "But this isn't all that bad," he answered, a BIG grin showing through the sweat that streamed down his face. "You should have been down there at Morgan Hill in California. Now that's what I call HOT!"

After shooting the bull with Erv for about 15 minutes, I suddenly realized that beside being a genuinely down-right nice guy, he's also a bit of a con man. Somehow he'd talked me into having a Fokker D-VIII ready for next year's fly-in. Actually, he promised to help me put together an outfit just like his so that we can do the WWI bit together,

Ron Kemp's Quadra-powered Byron Corsair, with Annco retracts. A beautiful flyer, you can see her leap ahead when the gear retracts.

A 3.7 Sachs-Dolmar handled Karl Hibb's 25-pound Chipmunk easily.

First time I'd seen one of the new Byron Pipe Dreams in the air, and it was most impressive. This one had a ST-3000 up front.

This R&R Stinger belonged to Charles Morse, and with a Quadra 35 for power it was a real fun ship.

Another scratchbuilt bird, a nine-foot, Zenoah G-38-powered Cessna 180, by Steve Stephans.

Dave Weigandt's scratchbuilt Hiperbipe only weighed a tad over 17 pounds, so the ST-3000 had no problem making it fly.

which was an offer I couldn't refuse.

Our new control tower proved its worth on both Saturday and Sunday. It's amazing how much more positive control you have when high enough to see everything clearly and, of course, better control means a safer fly-in.

In fact, the only safety problem that did come up was caused by two idiotic ultralight pilots who were tooling around late Sunday morning. At first they stayed well beyond the spectator side of the field...but then, even though they were low enough (about 800 feet) to see what we were doing, both congenital idiots flew into our flight area (which put an immediate stop to our flying) and proceeded to land on the north end of the active runway. Fortunately one of our own guys, who is much

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Erv Solberg, complete with WWI uniform, including a "Blue Max" hanging around his neck, on his way to intercept a group of SE-5's with his trusty Fokker DR-1.

Hangar One Hobby's P-40 kitted with Ziroli's plans. It's said to be a fine flyer.

This A-36 Apache(no, it's not a P-51) probably won't be kitted by Hangar One Hobby. Too bad, it's a dandy airplane.

CHOPPER CHATTER

BY DICK GROSSMAN

• It is common to refer to the Hughes 300D, 500D, etc. in identifying those helicopters, but in so doing, we are being a little fast and loose with the name "Hughes." That famous movie mogul, aviation pioneer, inventor, and all around mystery man has long since departed the scene. The helicopters bearing his name are still in great abundance, but their parentage has changed considerably. One of the real workhorse helicopters is what we refer to as the Hughes 300C. It is a piston engine machine, and as a model is offered by Gorham Model Products as a modified Cricket, by KKK (distributed by California Model Imports) with an ignition engine, and by Morley Helicopters as an inexpensive 40-size scale helicopter suitable as a trainer. In 1982 Hughes Helicopters, Inc. sold their entire production of Hughes 300s to Schweizer Aircraft, a small New York company owned by Paul, Stuart, and Les Schweizer, who is currently manufacturing that machine.

The next step in the Hughes chronology was the purchase of Hughes Helicopters, Inc. by McDonnel Douglas. Production of the 500 series including the 500 E and 530 is being continued by McDonnel Douglas Helicopters Co. There's more to the story. Hughes Aviation Co., a separate company, was purchased by General Motors in December 1985. Incidentally, McDonnel Douglas manufacturers the AH-64 Apache helicopter and is currently involved in a NOTAR project—the development of a helicopter resembling the Hughes 530, but with no tail rotor! (Hence the name NOTAR.)

The most talked about project in the helicopter world is the U.S. Army's *30 billion dollar* Light Helicopter Experimental (LHX) program. McDonnel Douglas Helicopter and Bell Helicopter are working together under the name SUPERTEAM to develop a new helicopter for this program. Boeing and Sikorsky are also joining forces in this project. It will be interesting (to put it mildly) to see what kind of helicopter will come out of this effort. 30 billion dollars sure attracts a lot of attention! Bell and Boeing are also working together in the development of the V-22 OSPREY, a tilt rotor airplane/helicopter. In Europe similar projects are underway. Germany's MBB (Bo 105 etc.) and Aerospatiable of France (Ecuriel, Gazelle, etc.) are planning a new attack helicopter under a program referred to as PAH-2. Britain, Spain, Italy, and the Netherlands are also in the light attack helicopter market with the development of their TONAL helicopter, a combined effort of Agusta, Westland, and Fokker.

If the significance of all this escapes you, what it means in my mind is that helicopters are now and will continue to be a major factor in commercial and military aviation. The new designs and technology are going to make R/C model helicopters a very exciting hobby for years to come.

GLENVIEW

A few of the pictures you see in this month's column are from Aviation Expo, an open house held annually at the Glenview Naval Air Station at the Glenview Naval Base. This is a satellite event in conjunction with the Chicago Air Show which is a weekend of air demonstrations over Lake Michigan viewed by hundred of thousands of spectators lined up on the beaches, in boats, and from the downtown Chicago skyscrapers. The show teams included the French Aerobatic team L'Escadrille flying Alpha Jets, Biplane aerobatics, and helicopter rescue demonstrations performed by Sikorsky H-52 Seaguard helicopters equipped with flotation pods. Painted in the Navy orange and white, these graceful birds land and takeoff on wheels using transitional lift to allow them to carry greater payloads.

I do a R/C helicopter demonstration there every year. High winds made it tough on the full-size birds as well as my GMP Shuttle, which handled the wind well. It was amazing to watch the Bell UH-1H Huey's doing spectacular hovering maneuvers in the high winds. I recently read *Chickenhawk*, by Robert Mason, a book about helicopter flying in Vietnam, and the images from that book made seeing those Huey's a bone-chilling experience!

THE NATS

The AMA National Championship was held in Lake Charles, Louisiana. First place in FAI was Curtis Youngblood of Bryan, Texas. Curtis was flying a GMP Competitor. A close second was Robert Gorham with his now famous GMP Cobra-Jet Ranger. Mike Mas of Miami, Florida, was third flying a Schluter Champion. Mike is a former national champion and is making a comeback in competition after being retired for several years. The reason he retired was simple. When he was competing, no one else had a chance to win! Ted Schoonard was fourth flying his Schluter Champion.

Other results:

Intermediate: First—Michael Dance, Milburn, George; Second—Michael Sedman, Agoura, California; Third—Nick Black, Muleshoe, Texas.

Scale was won by Stephen Mintz of New Orleans, Louisiana.

Based on the reports I received from a number of people, the National Helicopter Championship was conducted under deplorable conditions. The site selected was a partially graded dirt field where some grass had grown, power lines on one side, and some colosseum-like building on the other. It was so bad that 35 out of the 37 contestants signed a protest, and the helicopter contestants were permitted to secure a better field if they could find one.

A Navy Huey performing at the recent Glenview Air Show.

Sikorsky H-52 Flying Life Boat returns from air-sea rescue demonstration in Lake Michigan.

Hughes-Schweizer 300C owned by Omniflight Aviation flies the traffic reporter for station WGN.

Merlyn Graves demonstrates nose-in hovering the hard way with his Schluter Champion.

They borrowed the flying field of the local model airplane club. The temperature got up over 110 during the day—as you might expect in Louisiana in the middle of summer. Incidentally, several of the contestants had radio failures which they suspect was caused by keeping the radios in the air-conditioned motel rooms all night and then bringing them out into the severe heat.

I recall that in the 1985 Nats, the contestants were forced to compete on a field that was slanted, overgrown with grass, and at a remote site not contiguous to the rest of the contest. I think it's time for some letter writing!

EMPENNAGE

Horizontal and vertical stabilizers on full-size helicopters have important aerodynamic functions. On our models they seem to be more cosmetic than anything. The vertical fin can be designed to protect the tail rotor; the horizontal fin seems to have a very minor effect on flight, and many fliers omit it entirely.

Rotary Wing Concepts sells a fiberglass vertical and horizontal stab, with a threaded aluminum clamp. Intended as a replacement for the wood fins used on the GMP Cobra and Competitor, I'm sure they would work with other helicopters as well. They also have their own boom support clamp. For further information, contact your hobby shop or Rotary Wing Concepts, 1201-D Alex Road, W. Carrollton, Ohio 45449, (513)866-6104.

FOREIGN INTRIGUE

Big things are happening in the model helicopter world! In Germany the Graupner firm has taken over the worldwide distribution of the Heim helicopters, and has made many improvements to that fine machine, particularly in the area of packaging, instructions, and some improved components. The real blockbuster (excuse the Freudian slip) is that Robbe, the gigantic model and toy manufacturer has taken over Schluter. If you've ever seen the quality of Robbe products, (or even just seen their catalog) you have to be excited over this.

Miniature Aircraft of Orlando, Florida, will be handling many of the Robbe helicopters as well as Schluter and Heim.

HE DON'T GET NO RESPECT

Maybe now Jeff Urcan will get a little *respect*. Jeff is president of Yale Hobby Manufacturing, maker of Tru-Spin rotor blades, and an assortment of replacement canopies, main shafts, blade weighting and covering material, and many other helicopter products. His rotor blades are sold by the thousands all over the country. They are well-made and less expensive than the OEM and imported blades sold. But all anybody talks or writes about (myself included) are the exotic and expensive blades imported from Germany, Japan, and Sweden. Curtis Youngblood put a set on his GMP Competitor, and went out and won the National Helicopter Championship! Generally, the percentage of people who can really discern the difference in blade airfoils, center-of-gravity, and the like, are found in the same frequency as those who can distinguish between 1961 Chateau Lafitte Rothschild and El California Cheapo. I have used the Tru-Spin blades since they first came out three years ago, and I am still using the first set I owned!

The blade is straight, the airfoil seems to work well, and they are *strong*. I have never seen one split. Jeff says he used the strongest resin available, FAA approved for home-built, full-scale aircraft! Yale has a complete line of OEM replacement blades, shafts, canopies, and many other items—and they're made in the good old U.S. of A., and couldn't care less about what the Yen or Deutschmark is doing.

VIB-B-B-B-RATION. What causes it?

Yale weight kit is non-metallic, weighted epoxy for adding weight to rotor blades.

Vibration is nature's way of telling you that your helicopter isn't built right. There are a lot of things that you should do while you're building so that the end result will be a smooth-flying machine. We'll talk about those another time. Let's start from the finished product, a helicopter with the shakes, and work back. Vibration is the symptom, poor alignment is the disease. Once the helicopter is together, it is difficult to use mechanical measuring devices to find the problem. Use your *eyes*! Did you ever look at a picture drawn by a poor artist? Remember how apparent even minor errors in size, proportion, and perspective become, even to an untrained eye. You can use the same ability to zero in on your vibration problem.

(1) *Main rotor blade balance*. This should have been done when you built the helicopter, but you're at the flying field now. Remove the rotor head and lock the blades down by tightening the pivot bolts. Lift the rotor head by the flybar and cradle it on your forefingers. It should hang with both blades exactly the same height. Let your eyes wander and pick out reference points that are horizontal like the floor, buildings, the horizon. Your brain will tell you if one blade is lower than the other. Add some tape to the higher blade until it comes into position.

(2) *Static coning*. Put the rotor head back on the helicopter. Set it on a table and spin the blades with your hand. Use some object in the background as a reference point for the tip of the blades. Your eye will quickly tell you if one blade is passing that point higher or lower than the other.

(3) *Flybar balance*. After flying your helicopter, observe the position of the blades. If you can, lock them down without disturbing that position. They may not be parallel due to difference in the chordwise CG between the two blades. With the rotor head on the helicopter "teeter" the flybar on its pivot and try to determine if it is balanced. If your rotor blades are not parallel, the flybar will need to be weighted on the side of the larger angle formed by the blades to correct the "dynamic balance" of the rotor head.

(4) *Start shaft*. If your helicopter has a start shaft, hold the starting cone between

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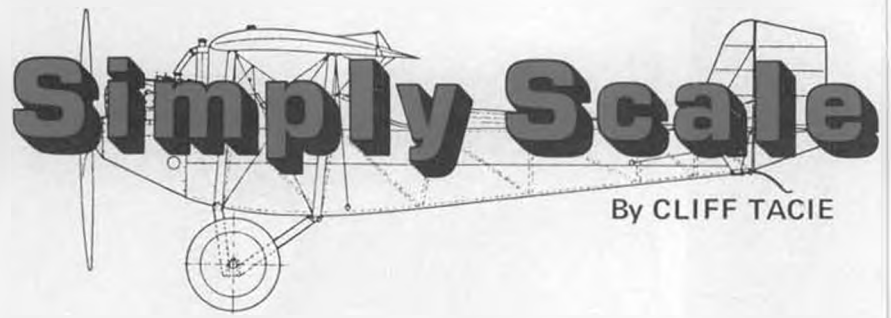

By CLIFF TACIE

FAI WORLD SCALE CHAMPIONSHIPS

World Scale Championships are organized through the FAI (Federation Aeronautic Internationale) to provide international, nonpartisan competition in scale modeling. World Championships are held every two years, hosted by volunteering countries.

The 9th World Scale Championship in FAI Scale was hosted by the Norwegian Aero Club at Kjeller Airport near Oslo, Norway. Kjeller Airfield is an active Norwegian military facility with a 4,000 foot paved runway available for our use. Military activities were curtailed during the event, mainly because most of the military personnel were away on vacation!

For the United States team, it was the old good news—bad news story. The good news was that because of the efforts of many hard-working individuals (Nino Dironza of AMA Travel Service, Tony Ristuccia and Nick Capriotti of the New York area, and Narve Jensen of the Norwegian Aero Club), our travel arrangements and movement of our model boxes went nearly without a hitch. I say nearly, because I did have the misfortune of having my catalog case filled with support equipment (starter, battery, Dremel, tools, etc.) permanently "misplaced" by the airlines on the way over to Oslo. I suppose it's just one of those things you must expect every so often if you're going to travel by air. SAS was so good to us in the rest of our travel arrangements that I can't fault them too much for the loss of my case. They moved our model boxes for us as baggage, saving a enormous sum for AMA, and the flights themselves were most comfortable and *on time*.

The bad news is that we finished a bit lower in the competition than we had anticipated. As I've reported previously, the R/C team was entering the competition with what are considered "high complexity bonus" models; Skip Mast's 30% bonus C-130, Steve Sauger's 25% bonus Stinson Trimotor, and my own 20% bonus SM-81. Surprisingly, the formula required for success was not high complexity, but rather, moderate complexity, light wing loading, and high static. Five of the top ten models were biplanes, with four of those being early vintage.

Phillip Avonds of Belgium deserves to smile about this F-15 Eagle; it placed sixth in the world scale champs, despite inconsistent engine runs. Model features twin K&B 7.5s in modified Turbax fan units.

In the U.S., WWI biplanes with undercambered wings are not universally popular in R/C competitions, mainly because of their ground handling characteristics and their vulnerability to wind conditions. The difference between U.S. competitions and World Championships, however, is that in the U.S., concessions are not made for these models. They must compete on an equal basis with all other model types, taking off and flying their pattern down the designated runway, even if it is crosswind. At World Scale Championships, however, it seems the runway is moved to accommodate these models, even if it is at the disadvantage of the other model types. We actually found ourselves flying across the 100-foot crowned width of this 4,000-foot long runway rather than down it because there was a light crosswind which the judges felt was unnegotiable by the light biplane models! Yes, you can fly a model off a 100-foot paved, crowned runway, but if you're flying anything other than a "floater" it's impossible to make takeoffs and landings look scale.

Overall, the quality of the models in the competition was by far the highest I've seen anywhere. It's common to make comparisons with the models seen at Scale masters competitions here in the States, and using that as a reference, I don't think I'd be far off saying that only a small percentage of the models seen at a Scale Masters finals would approach the static quality of the models seen in Norway. That should not be interpreted as being a knock at the Scale Masters. On the contrary, I mean it as a compliment. I feel that we have at least a half-dozen modelers active in Scale Masters competitions at the present time who could be World Champion in Scale if they chose to participate in FAI competition. Perhaps some of them will do so in the future with the coming changes in complexity bonuses and weight limits.

The winner and new World Champion is Max Merkenschlager of Germany. Max was competing with a Bristol "Scout" which was immaculate. It appeared to be modeled after an aircraft in a museum, since it featured no weathering and was in a "factory

Take a look at how natural the Gemini Twin 1.20 looks in Austalian Lloyd Dipple's Fly Baby. The model is 1/4 scale, and Lloyd made the extra cylinder head covers from a mold made from the originals.

This is how complex it can get guys! Young(21) Jurgen Steinberger of Germany placed seventh with this beautiful BE 2e biplane. It is scary to risk craftsmanship like this in the air!

Ninth-place winner in Control Line was Ron Sear's PT-17 Stearman. This is the second world's championships for this model, and it's still going strong. Based on the Sterling kit, and highly modified.

The winner and champion! The first place Bristol Scout of Germany's Max Merkenschlager putts away after takeoff.

new" condition. Max flew the model as if it was on rails, even in a stiff wind. It was surprising to many competitors to see a lightly loaded model with an undercambered airfoil penetrate as if it had a thick, non-scale airfoil.

The Swiss team took first place as a country with some outstanding models. Hansruedi Zeller flew his well-known DeHavilland 88 "Comet" to second place with a good static and some outstanding flying. Konrad Oetiker, the third place finisher, received the top static score of the competition with his Bucker 133C "Jungmeister." Peter Mueller received very high static points for his Grumman FM-2 "Wildcat," but the lack of a really good flight kept him down to the 13th spot.

Ducted fan models are becoming more common at World Championships since our own Charlie Chambers first flew his "Cougar" at Reno in 1982. This year, Phillip Avonds of Belgium wowed them with his twin ducted fan model of an F-15 "Eagle." A large model, it was within the FAI 6 Kilogram (13.2 lbs.) weight limit, and Phillip demonstrated that it could fly even on only one of the modified Turbax K&B 7.5 fan units. Phillip received a well-deserved high static score for the model and proceeded to make his first flight of the competition his maiden flight! Unfortunately, on his last flight, one of the 7.5s decided it was time for the forward portion of the crankshaft to part company with the rear portion, and Phillip's bid for a higher placing was thwarted.

One of the favorite models among the competitors was our own Steven Sauger's Stinson A-1 Trimotor. Although Steve received a very good static score, it could have been even higher with improved color documentation. Steve flew as well as I've ever seen him fly, finishing in 10th place overall and leading the U.S. team.

Skip Mast's C-130 "Hercules" was a real crowd pleaser. Everyone kept asking "when is the four-engined model going to fly?" Skip placed a very respectable fourteenth with a good static and quite good flight scores. The SM-81? Well, a mediocre static score made it difficult to be competitive for me, and combined with the engine problems that both Skip and I experienced, I ended up in twenty-second place among the 47 entrants. Perhaps I should start practicing what I preach and just keep it simple scale!

In R/C, we finished fifth among the 17 countries entered, so that isn't too bad. We had anticipated heavy competition from the Russians and the Japanese, two new entrants to FAI F4C, but the Russians decided to pull out at the last minute, and the Japanese team was new to FAI F4C and is apparently still on a "learning curve." Their models were very good, and after a shaky start, they flew quite well, but I get the feel-

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Number two in the world, this DeHavilland 88 Comet was built by Hansruedi Zeller of Switzerland. Twin four-strokes and Zeller's talents guided the Comet in realistic flight.

The American team: Julie Abel, Jeff Perez, Ron Sears, Mike Gretz, Dolly Wischer, Steve Sauger, Skip Mast, and Cliff Tacie.

Like everyone else, the Japanese team really liked Steve Sauger's Stinson A-1 Trimotor. Here they try for the best camera angles, getting closeups of Steve's excellent craftsmanship.

ELECTRIC POWER

By MITCH POLING

• The Boeing Hawks Annual Electric Fly-In was June 28 and 29 this year, in Seattle. Seattle is notorious for wet, cold summers, and the meet was no exception! We did get some sun breaks on Saturday, but we also got some rain breaks too! Sunday was better, I even got a sunburn. Here is Bernard Cawley's report on the results:

There were 22 entrants for the two days, 19 on Saturday, and 8 on Sunday, with one to four planes per entrant. Bruce Klees came all the way from Anchorage, Alaska, and Craig Christensen all the way from Minnesota. The planes ranged in size from 153 squares and 18 ounces to 1140 squares and 7 pounds. There were sport planes, old timers, scale, sailplanes, seaplanes, and sport pattern. Quite a variety! The awards were as follows:

Most impressive (by entrant's vote)—
Saturday: Jack Hewes' 1,000 square-inch Privateer powered by a Keller 50/24 on 18 sub C cells.
Sunday: Ben Almojuelas Electra Sportster powered by an Astro cobalt 15.

Longest flight —
Saturday: 28:15, by Craig Christensen of Lakeville, Minnesota, flying an Astro cobalt 40-powered Olympian.
Sunday: 33:15 by Al Weber of Surrey, British Columbia, flying a Mabuchi RX-540 powered Olympic 850 (Airtronics).

Most aerobatic —
Saturday: Ben Almojuela and his cobalt 15-powered Electra Sportster.
Sunday: Dave Katagiri and his Astro cobalt 05 Uno pylon racer.

Longest distance traveled—Bruce Klees, from Anchorage, Alaska. He brought an Electraglide II which had a beautiful mountain scene painted on the top of the wing.

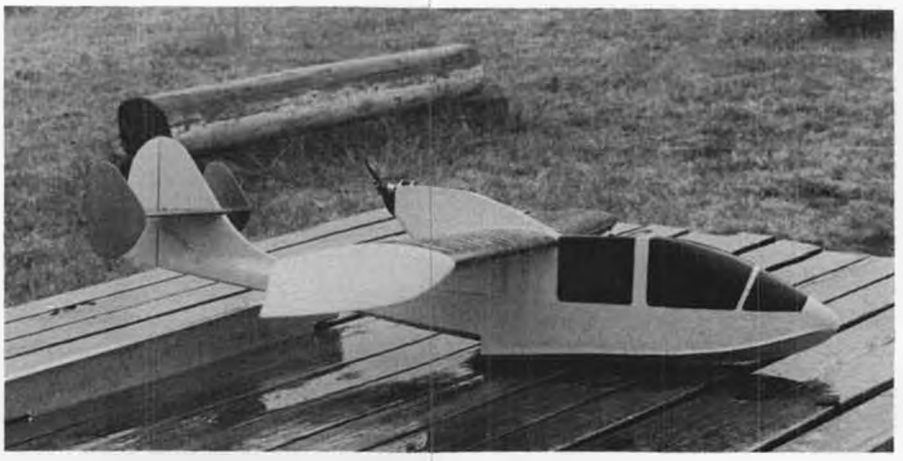
Best crash to Lee Urbaniak of Cheney, Washington, whose Astro Sport lost an argument with our runway.

Thanks are due to the sponsors, including the Boeing Hawks, Astro Flight, SR Batteries, Holley's Silent Flight, Adams Electronics, and Cox Hobbies. Because of their generosity, we broke even financially and had more prizes than entrants. Plans are already being made for next year, with some low key competitive events scheduled as well as the fun-fly events. In general, we all enjoyed, at least in between rain showers and cold wind!

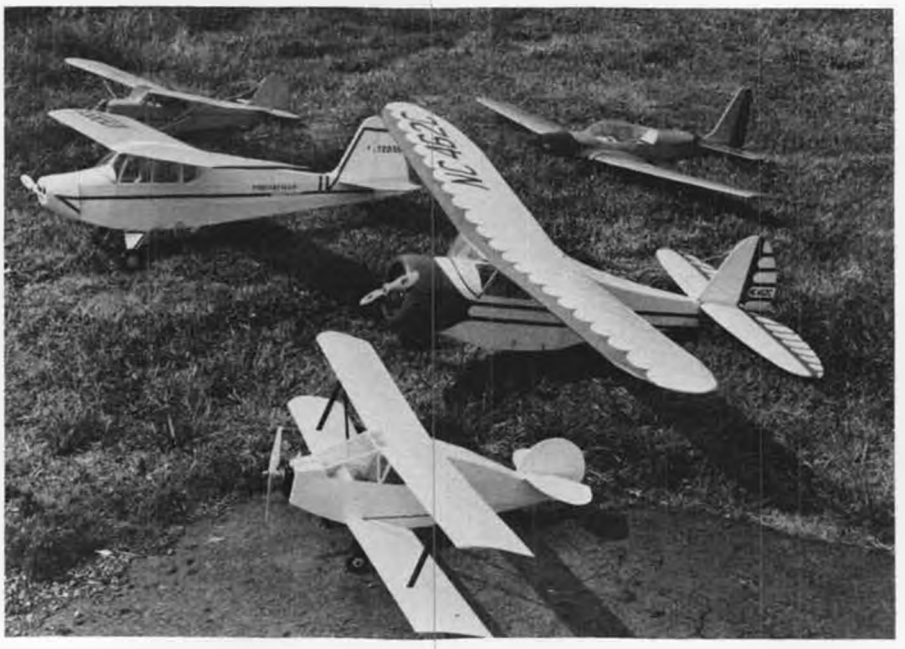
Thanks, Bernard for the report. There were some very interesting planes at the meet, so here are some of my impressions: The most impressive plane was undoubtedly Jack Hewes' Privateer. This plane is big, and you are fooled into thinking that it will just gently climb into the sky like a balloon. It ain't so! It leaps off the runway in about eight feet, and then Jack points it up at 45 degrees, and it goes up like an express elevator. It can stay in that 45-degree climb forever, it seems, and in 30 seconds Jack is up near 800 feet, in 45 seconds he is over a thousand feet. He is competing against gas old timers in the local contests, and winning. I think they will change the rules! Jack is a very skilled builder and flyer, and I have watched him tune in this plane from the first flight. The major change that transformed it from an easy-going climber to the express climber was the prop rework. Jack takes standard 16-to 18-inch props and then carves them to a thin undercamber. Then watch out, up it goes! If you are flying a gear on belt drive, this is the way to go for extra performance, the undercambered props really perform. Of course, the Keller 50/24 on eighteen cells is pretty potent too! Jack's work is immaculate, the plane is a pleasure to look at, like a piece of finely worked furniture.

Electrics make a fine piece of art as well as fly well, I even displayed one of my planes in an art show! There is something that looks "alive" about a well-made electric, as contrasted to the "mechanical" look of gas planes. Other machines have this live look too, in full-scale machines I would choose the 1936 Cord automobile and the DC-3. Well, enough philosophizing!

And, speaking of art, Bruce Klees takes it all the way, with the wing of his Electraglide II. It has a panoramic painting of the mountain range around his flying field in Anchorage, Alaska. He had an Anchorage art-



Jerry Holcomb's Sea Pig seen at the Boeing Hawks Electric Fly-In. Although it rained, it wasn't enough for the Pig to land in, so Jerry opted to land on the grass--successfully!



Scale lineup at the Boeing Fly -In: Ben Almojuela's Monocoupe, Jerry Holcomb's Guppy, Al Weber's Porterfield, and an Aeronca from a Comet kit.

Jack Hewes' big Privateer ain't slow! Keller 50/24 on 18 cells has won against gas old timers in local meets. Undercambered prop helps.

Bruce Klees and his mountain art, reflecting the scene around his Anchorage, Alaska flying site. Too pretty to fly!

ist paint it for him, and it is certainly dramatic! The plane flies well too, though I might hesitate to risk the painting!

Jerry Holcomb's planes are always impressive, his Sea Pig attracted a lot of attention. It flies very smoothly on the Kyosho 240 LeMans prop drive. This is an excellent prop drive, the LeMans units are well-made, the brushes on the LeMans motors are accessible and use pigtails and independent springs, and the motors are designed for high efficiency.

These motors represent the state of the art in ferrite 05 motors. I recommend them if you need extra power but are not prepared to use cobalt motors. They are drop-in replacements in size and mounting for most commercial 05 motors. Jerry, by the way, landed on the grass; a flying boat does this very well. Not so for float planes, I proved that a couple of years ago at this electric fly. You go head-over-heels! Jerry uses his electrics to test concepts for full-size, home-built planes. This one, with its wing tip wing floats and generally simple lines, looks like a natural for a home-built.

Electrics do make very good proof of concept models for full-scale. The power-to-weight ratio and the flying style is very similar. Jerry flew the Guppy too, which uses a belt drive 035 but it needs more power, a cobalt 020 from Astro would make it really come alive. The Guppy does make an excellent electric, Tony Naccarato proved that several years ago with his indoor electric Guppy.

Ben Almojuela once again showed how smooth and aerobatic his Electra Sportster is with an Astro cobalt 15. This is an absolutely natural combination, the Sportster is designed by Hal DeBolt, a really pro designer, and the plans are available from *Model Aviation* magazine. The plans show a cobalt 05, but I strongly recommend the cobalt 15 instead. Ben also flew his Monocoupe scale plane, it flew very nicely on a geared cobalt 15. This is based on the Sterling kit, but with light balsa and minimum plywood. Al Weber flew the Astro Porterfield, he found that with a larger wing and thicker airfoil, the Porterfield will soar very nicely, and on Sunday he proceeded to prove it. The stock airfoil is a bit thin, if you wish more soaring ability, thicken it to 12%. Al also showed off his latest version of servo amplifier speed controls, this one featured optoisolation, and, of course, a Darlington output transistor. A relay is used for no power loss at the top end. Al has this down to a fine art, his speed controls run very cool.

There were three ready-to-fly models there, and all turned in impressive performances. The Etude is familiar to all by now, and is an excellent introduction to electrics for R/C fliers (beginners should have help). The Zero is new, and it is surprisingly good. It flies quite well on the stock 240 LeMans drive, but then on Sunday (sorry, I didn't get the flier's name!) it was flown with a geared Astro cobalt 05 on seven 800 cells driving a 9 x 6 prop. That really made it come alive! It likes to fly fast, do not let it slow down. When it slows down, it sinks rapidly. All the takeoffs were hand launched, as the plane wants to ground loop, and once the plane accelerates, it flew like gas, fast and aerobatic. Landings are best fast, with a wheel landing, not three point. Three-point landings are rough. I think that the plane would really be potent with an Astro cobalt 15 on direct drive on ten cells, probably on a 9 x 6 prop. Vertical performance should be very good then. In flight, the Zero looks real, it is a very satisfying scale plane. Not bad for a plane that assembles in less than two hours!

I flew the MRC Cessna 172, which is a ready-to-fly from MRC. It assembles in less than two hours, and it flies so well that it was nearly voted the most impressive airplane on Sunday! It climbs quickly, and will soar beautifully if there are any thermals. Most flights were over six minutes. It handles wind very well for such a small plane. Mine weighs 28 ounces with a Cannon receiver, two S22 World Engine servos, and a 175 mah SR Battery receiver pack. The power is a geared 035 turning a special prop, which is very thin and undercambered. This prop is very efficient, and really makes the performance of the plane. The battery pack is six 600 mah Sanyo cells. I peak-charge my packs, so I routinely get 5 to 6 minutes on this plane. Bob Aberle tested the same plane for *Flying Models* magazine and was getting only 2-1/2 to 3 minutes, but I think this was a combination of overweight (32 ounces, using a large radio) and undercharging. The stock charger supplied with the plane may be set up for 20 minutes or longer charges, which is conservative.

Last, and not least, I award the "stiff upper lip" award to Craig Christensen, who watched his beautiful cobalt 05 glider with an expensive Futaba PCM receiver fly away to the east. If any of you live in the Seattle area, and have heard of this glider being found, please contact me at (206)524-9706 or Bernard Cawley at (206)655-7183. The only theory for why this happened was that the glider was quite far away, and a stall started loss of control, then the fly away. We

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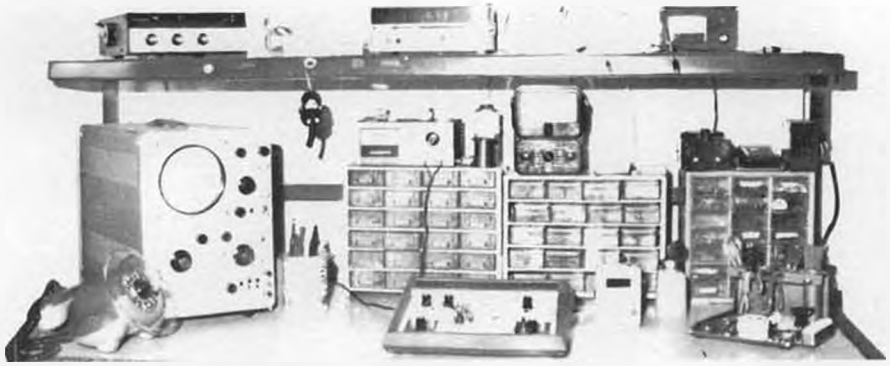
The unknown flier and his electric Zero. With an Astro cobalt 05 for power, it flies real fast–but sinks rapidly when slowed up. Flies like a gassy, fast and aerobatic.



Electronics Corner

By ELOY MAREZ

• THE SAGA OF THE CORRODED BLACK WIRE continues. In our August column, we included some information that came to us from Ian McQueen in Japan. There is yet more input on the subject, the first being from the aforementioned, Mr. McQueen. Ian has done further research on the subject, and has put together a three-page paper on it. He feels that the problem is caused by the chemical makeup of the black insulation, a point which I do not agree with. Anyway, there are valid reasons for why we each think what we do, and Ian is making his findings available to all of us.

His treatise on the subject is available to any of you that wish to pursue the matter, either directly from him at 2-18-7 Kami-Meguro, Meguro-ku, Tokyo 153, Japan, or for a SASE, directly from me.

THE NEXT INPUT ON BLACK WIRE CORROSION comes from Beno E. Echerd, of South Padre Island, Texas, which is close to my home of Corpus Christi. Beno writes:

"I read your article on 'Black Wire Corrosion' in the August 1986 *Model Builder* with great interest. In my case, it was 'brown wire' and the unit was a JR Century VII. . ."

Beno then goes on to describe the spread of this corrosion, leading to a prohibitively expensive repair.

I can see that instead of referring to this malady as black wire corrosion, I should be doing so as "negative wire corrosion." Actually, and I remember mentioning this once before, the first place I ever saw this phenomenon was in Orbit reed equipment, all of which used blue wire for the negative leads. The fact that Beno has experienced this problem in his JR transmitter, which, in a complete deviation from all electronic industry standards, uses brown wire for the negative lead, makes me even less reluctant to accept the McQueen theory about the black insulation.

MORE ON THE SUBJECT OF NEGATIVE WIRE CORROSION comes from Ted Off, Ventura, California, who signs himself "T. Off!" I love it! Anywho, Mr. T. sent in a copy of some words on the subject by a Mr. Dave Day, (D. Day?) (Is this the April issue?), writing in the British *RCM&E* magazine. His writing adds another quite interesting bit of data to be considered; one which I had not previously thought of, but which I can support.

Mr. Day writes that he has worked as an R/C repair technician, and has seen many cases of black, er, negative, wire corrosion—all accompanied by dead flat Ni-Cds. He further states that he has not seen the condition in connection (BAD pun—MUST be April!) with charged and otherwise healthy batteries. He then goes on to describe his personal experience, including one model which sat for five years which, when examined had the plague. Others, much older, but in constant use, were luckier in being corrosion free. He attributes this to his habit of keeping all Ni-Cds freshly charged, with those not in actual flying use being given a topping off charge every three months.

I do remember now that a lot of the cases I have seen of this possible fatal malady were in equipment in which the batteries were completely dead, due to having sat for long periods of time. But I can't really say that such was the case at all times. It is something with which I can experiment and which I intend to do. I can't report the results in the next issue, it'll take longer than that, but as of now I have some Ni-Cds on constant trickle, and some attached to a load, some connected with black, and others with other colored wires, being dropped down to zero volts. We'll see what time tells us.

WEE R/C

Not too long ago, I put out a call for information on how to build actuators—and stated then that I have complete faith in my readers, and that we'd soon have such information. Sho 'nuff, the same T. Off mentioned above sent in some information, gleaned also from British publications. Copies are available to YOU—and to YOU, for the usual SASE. Being copies of copies, the photos will not be too clear, but the diagrams, schematics, and text are; and I'm sure the actuators can be duplicated by anyone with a little ambition.

Ted closes his letter with a comment which we have proven here in the pages of EC: "Obviously, pulse is not dead." Amen—and long live all you tinkerers!

MORE FOR WEE R/C'ERS!

Some months ago, I discussed the practice of dissecting nine-volt (actually, 8.4 volt) rechargeable Ni-Cd batteries in order to obtain some super-small and lightweight cells to be made into packs for small airplane use. As I remember, these batteries, and thus the cells themselves, are rated at 70 to 80 milliamps, which is not bad at all considering the size.

Well, along comes an improvement—

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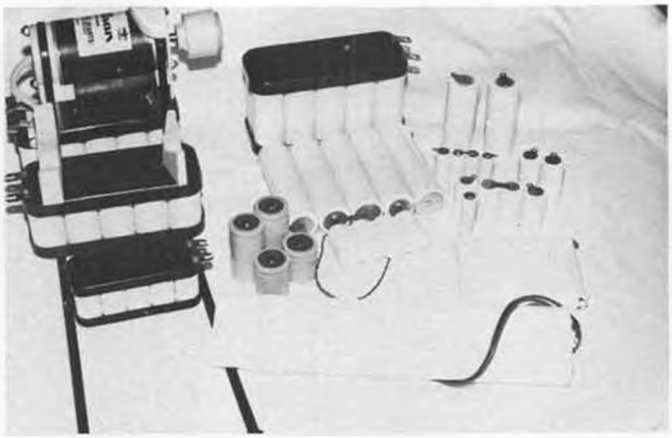
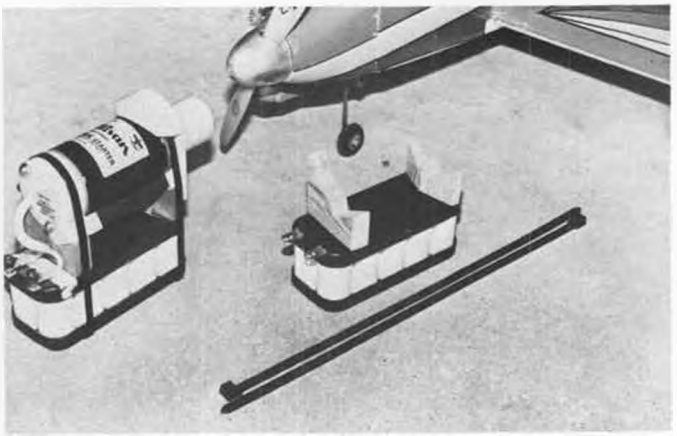
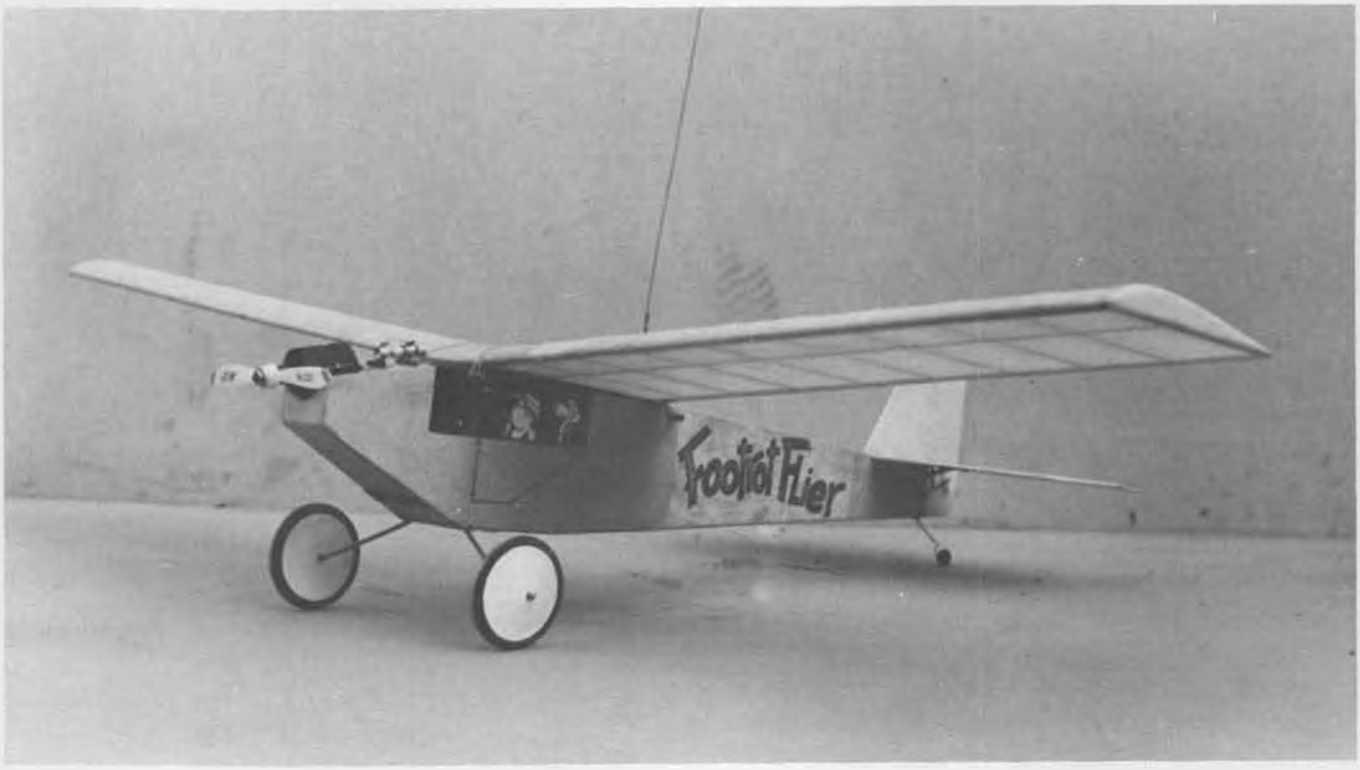


Just a few of the many Ni-Cd battery configurations available from a new supplier, B&P Associates from Deep in the Heart of Texas.



The B&P Associates strap-on Ni-Cd battery pack for electric starters. Two versions are available, with your choice of 4.0 or 7.0 amp cells.



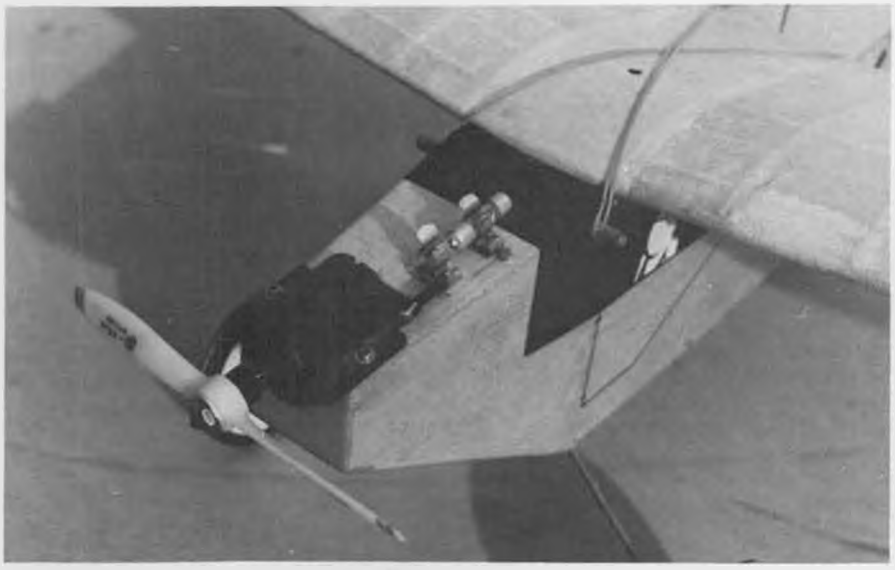
The FOOTROT FLIER

By JOHN REID. . .An extremely simple electric free flight with R/C assist through rudder control, this model comes to us from New Zealand. Its namesake is a deservedly obscure local comic strip. Why not build one?

• The Footrot Flier is designed for rudder-only, radio-assist, "freeflight."

It is possible to add a rudder to most free flight power models, but the dream of steering serenely about the sky in search of thermals isn't always realized. Rudder-only models tend to nose up after a turn. For many converted free flight designs, this can be the beginning of a series of stalls. An expert knows to turn again out of the stall but the result is still an untidy flight pattern. The most common compromise is a nose-heavy trim that looks anything but serene.

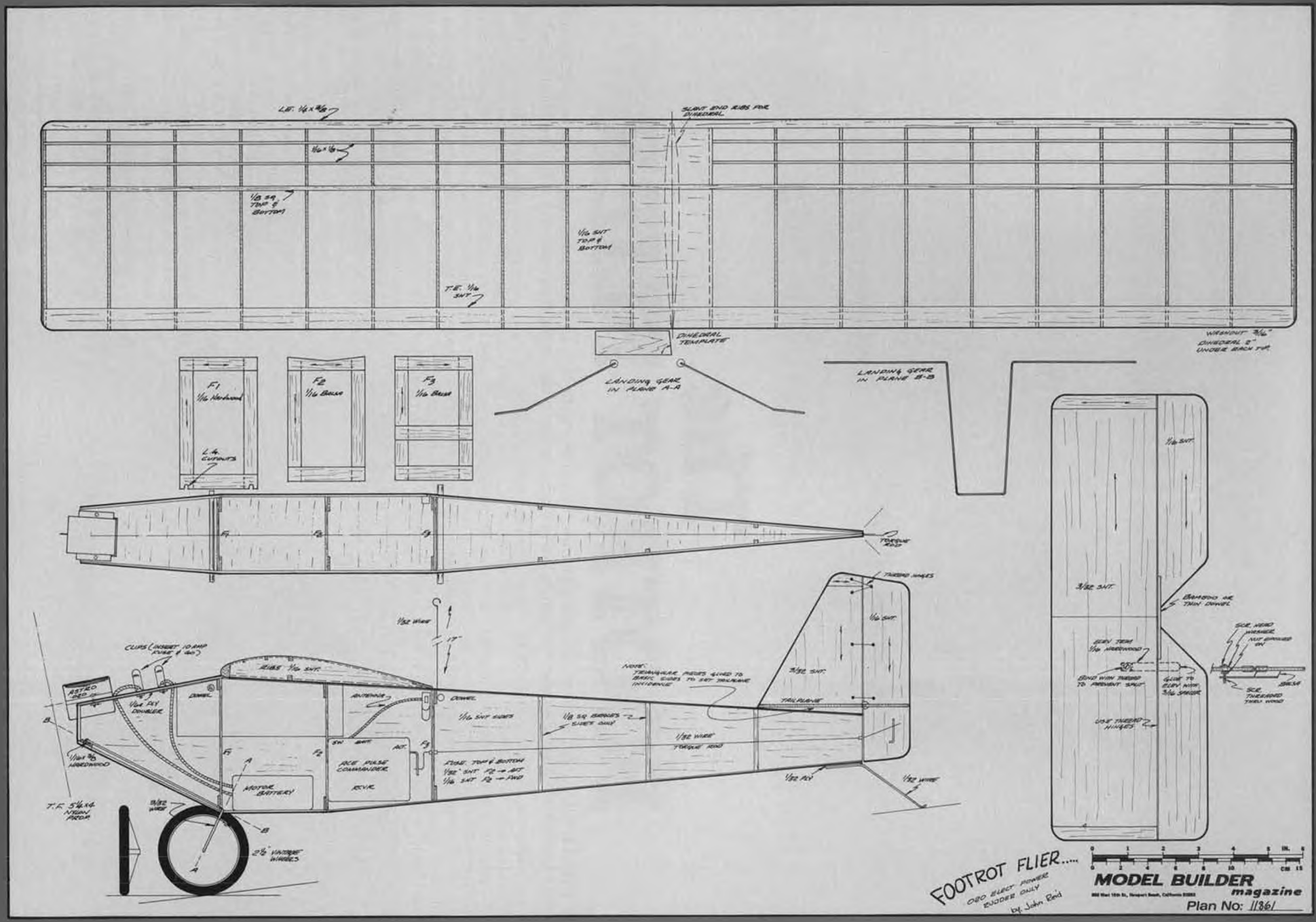
Power stalling was reduced in early R/C designs like the Rudderbug and Trixter Beam, by a high thrust line/low C.G. This is not quite the same as just adding downthrust! The effect of the low C.G. increases as the nose rises and speed drops—when a stall threatens, in fact. The Footrot Flier copies this layout. It can be trimmed to fly quite slowly and won't stall under power unless severely provoked.

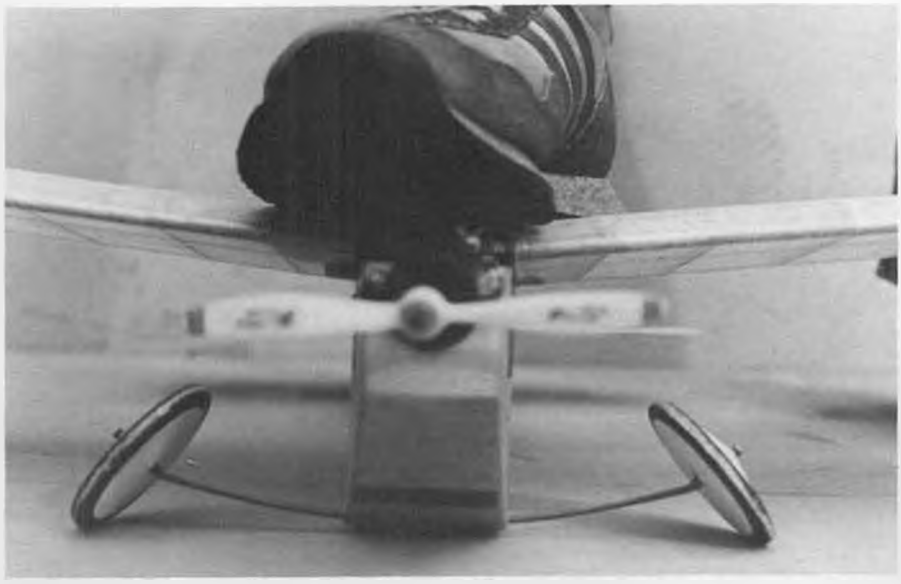


Motor is an Astro 020, connected to the circuit by a 10-amp fuse. This makes a simple on-off switch, and protects the motor armature as well. A simple and clever solution.

Some rudder-only models simply refuse to turn out of a stall. The rudder seems to stop working at the crucial moment. The cause is usually blanketing of the rudder by the turbulent slipstream from the nearly stalled center part of the wing. Washout only makes this condition worse, locking the aircraft into straight flight earlier. The rudder of the Footrot Flier is carried well down into the clean air beneath the tailplane. There is always plenty of rudder response. A "Findragger" layout would make even more sense, I suppose.

Rudder-only landings are a bit firm at the best of times. Wind velocity gradient near the ground is the reason. (Downwind landings are smooth with a nice flare-out!) So, to avoid bent landing gear and reduce loads on the fuselage (thus allowing lighter structure), a torsion-bar spring is incorporated. This sounds sophisticated but is the simplest, wire-bent landing gear you can imag-


L.E. 1/4 x 3/8
SLANT END RIBS FOR DIHEDRAL
1/16 x 1/8
1/8 SQ. TOP & BOTTOM
1/16 SHT. TOP & BOTTOM
T.E. 1/4 SHT
DIHEDRAL TEMPLATE
WASHOUT 3/16" DIHEDRAL 2" UNDER EACH TIP.
F1 1/16 Hardwood
F2 1/16 Balsa
F3 1/16 Balsa
L.G. CUTOUTS
LANDING GEAR IN PLANE A-A
LANDING GEAR IN PLANE B-B
F1
F2
F3
TORQUE ROD
1/32 WIRE
17"
CLIPS (ROCKET, 10 AMP FUSE & etc.)
RIBS 1/16 SHT.
ASTRO 020
1/64 PLY DOUBLER
DOWEL
ANTENNA
DOWEL
1/16 SHT SIDES
1/8 SQ. BRACES SIDES ONLY
NOTE: TRIANGULAR PIECES GLUED TO BASIC SIDES TO SET INCIDENCE
1/32 WIRE TORQUE ROD
TAIL PLANE
1/32 PLY
1/32 WIRE
1/16 SHT
1/16 SQ HARDWOOD
SW BATT
REC.
RCVR.
ACE PULSE COMMANDER
MOTOR BATTERY
STGS: TOP & BOTTOM 1/32" SHT. F2 → AFT 1/16 SHT. F2 → FWD
T.F. 5 1/4 x 4 HIGH PROA
1/32 WIRE
2 1/2" VICTORIE WHEELS
THREE HINGES
1/16 SHT.
3/32 SHT.
3/32 SHT.
BEARING OF THIN DOWEL
SCR. HEAD WASHER, NOT EPOXIED IN
GLUE TEAM 1/16 HARDWOOD
BEND WITH THREAD TO PREVENT SPLIT
GLUE TO ELEV. WITH 3/16 SPACER
SPACER
SCR. THREADED THRU WOOD
USE THREE HINGES
FOOTROT FLIER....
020 ELECT. POWER RUDDER ONLY
by John Reid
MODEL BUILDER magazine
Plan No: 11861



The Footrot Flier passes its torture test with flying colors. . .landing gear is capable of sustaining considerable force when subjected to the Adidas stress test, standard procedure in New Zealand.

ine. Look at the plan. This landing gear is so flexible that, earlier in its career, when the motor switch was located under the fuselage, the Footrot Flier would sometimes turn itself off when landing.

The model in the photos is over five years old. The tissue is faded and patched, but no structural repairs have ever been needed. After hundreds of flights, it still climbs up to thermal height on the original Astro 020 and cells. As far as my eyesight permits. Not that I manage to find thermals very often, but the Footrot Flier does 5 to 6 minutes anyway.

Construction is very simple, but you must always keep weight in mind as with any electric aircraft. Wood sections are fairly small so medium density balsa is O.K., except for the tail surfaces, which should be light, and the wing top and bottom mainspars, which should be very firm (or spruce if you intend to add elevator control). Please order some tissue before you start. It really is the only suitable covering material for this type of aircraft.

Be sparing with glue, which is heavy. If you use cyano the building sequence doesn't matter. Otherwise follow the sequence below to avoid delays while glue hardens.

CONSTRUCTION

Cut all the bits out first. Note that the fuselage sides fit very economically on a four-inch wide sheet. The tailplane mount triangles are added later so that the top edge of the sides can be aligned with opposite edges of the sheet. If the front ends of each side are at opposite ends of the sheet, the bottom rear edge of each side forms a common line. Think about it and save balsa! Just take care that there is not too much variation in density across the sheet, which will result in unbalanced sides.

Glue the tailplane mount triangles and the three 1/8-square rear stiffeners on each fuselage side. Make the bulkheads (ice cream sticks will probably be right for F1), and glue on the stiffeners for the tailplane and fin. Put all this aside to dry and turn to the wing.

WING

Make 18-inch washout templates with a straight taper from 3/16-inch to zero. This raises the rear of the outer ribs. Washout isn't usually needed with a low aspect ratio, rectangular wing planform. But it does make the stall even more gentle, which is welcome if the rudder is placed where it won't be blanketed!

Fasten the leading edges, the center bottom sheeting (leaving a gap for the lower mainspars which go in later), and the ribs to the building board. Tilt the center ribs using the dihedral template. The trailing edges glue to the top of the ribs; make sure that they are sitting right down on the washout template and the ribs. Now add the top spars, the main extending to the center rib, the small ones only to the edge of the sheeting. Fit the top sheeting now and let everything harden for a while.

I hope you used a length of cellulose tape on the plan at the leading edge, and along the washout template so that you can remove the wings from the board. If so, add the bottom mainspars (right to the center ribs), and the outer part of the wingtip ribs, which are not cut out for spars. Fasten the wings to the board and washout template again, while the glue hardens.

Sand the wings to remove glue lumps that would show through the covering. Cover each individual wing at this stage. Water shrink and apply three coats of thinned dope, elasticised with Castor oil. Fasten down the wings, for the last time, and leave until the rest of the construction is finished. Those wings won't warp. The two wings are epoxied together at the correct dihedral with no further bracing. The center section of the original model was a bit different, but the way shown here is lighter and simpler.

FUSELAGE

Now the fuselage. Join the sides at the bulkheads squaring carefully. Join the rear of the fuselage sides and sheet the bottom from 1/4-inch behind F1 (so that the landing gear can be fitted later), to the back, grain cross-ways.

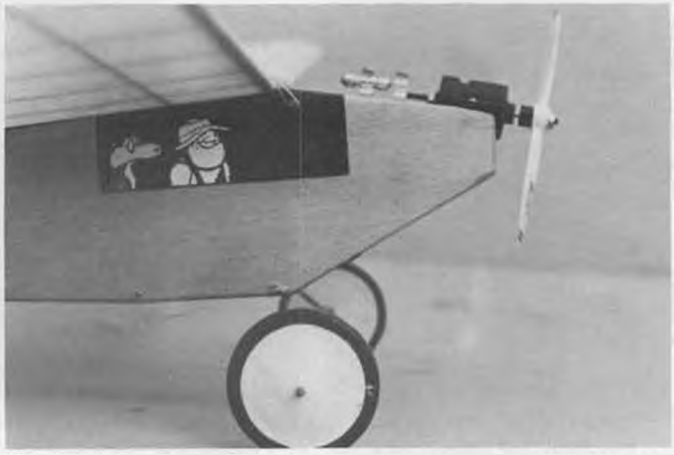
RADIO

This is the time to install the radio. I used the smallest Ace Pulse Commander outfit, for an installed weight of 2-1/2 oz. This gear is a delight, but I'm not sure whether it's still available. My disrespectful comrades at the flying field swear that the propeller is cosmetic; the flapping rudder providing the thrust.

The installation details on the plan are for this outfit. It is made into a "brick" which can be transfered from one model to another, in moments. The aerial plugs into a Fahnstock clip, that is epoxied to the inside of the cabin. A lump of plastic foam, under the wing, holds the whole thing in place. The slide switch is mounted sideways on

Continued on page 84

Rudder control on the Flier. Author used Ace Pulse Commander for control, on-board weight only 2-1/2 ounces. Keep it light!



Comic strip characters Wal' and his dog adorn the cabin of the Footrot Flier. Author taught himself to fly R/C with similar model.

Formula 1 fliers came from all over for the Nats. Dave Shadel, second from left in the front row, won with a perfect score.

AT THE NATS

By GEORGE P. BURDELL. . .Here's a casual look at the 60th National Model Airplane Contest, held this year at Lake Charles, Louisiana. Enthusiasm, along with the humidity, was high.

• This was the 60th National Model Airplane contest. It was held in late July and early August in Lake Charles, Louisiana, and we thought you'd like to see some of the historic model airplane action. This was smaller than the average Nats, partly due to the location, and certainly partly due to the site's notoriety for intense, humid heat. Maybe the sport fliers didn't all come, but there was plenty of competition and enthusiasm just the same.

And where will the 61st Nats be held? Locations being considered are: Indianapolis, Indiana; Sebring, Florida; Muskogee, Oklahoma, as well as the sites of earlier Nats.

Watching model builders at the Nats is exceeded only by flying and competing yourself; I think I'll start gluing sticks right now. . . how 'bout you? •

The FAI F3D R/C Pylon event had competitors from Mexico, Great Britian, and the USA. The moment of truth comes when the starting clock runs down and the starters bring the racers to life. Above left, Bruce Richmond, from Dallas, holds his model, a Super Tigre X-40-powered Li'l Toni from Prather Products, with a Rev-Up prop, and Pro-Line radio. The pilot was Brian Richmond from Orlando, Florida, who recorded a one minute, twenty second flight. With Dub Jett on the engine, the team won the event by over 100 points ahead of the second place finishers.

Tom D'Eville of New Orleans was the mechanic for his son, Greg Archer, who finished fourth in 1/2A speed. Son has been flying since 1982. Father has been model building since 1936; fifty years!

Dennis Duvalle, from Indiana, and his brother Richard, from Idaho, hadn't seen each other for over 10 years. Here they try to sort out problems in Dennis' Miss Dara UC stunt model. They did fix it too!

The end of a fast pit stop in U/C Rat Racing. The view is through the legs of Vic Garner, from Livermore, California. Fuel bottle is on the left. Left hand is electrified with the glow plug battery. This is precision teamwork, more demanding than pilot-caller relationship in R/C Pylon. Vic finished fourth in this racing event.

AMA President John Grigg congratulates Abbie Olson for her second place in Junior Slow Combat. Proud dad, Mike Olson has been a modeler for over 30 years. Mom holds 1/2A model overhead. At right, Aimie Olson has been flying combat for seven years. Angela Olson in front is seven. Olsons came from North Dakota to fly at the Nats.

We found Duke Fox at the Combat circles, signing large embroidered jacket patches. Whatta treasure to take home from the '86 Nats!

Right after clicking this picture, there was a snowstorm of foam as the two models hit nose-to-nose, completely breaking up.

Dorothy Odum, Marion, Illinois, with a gorgeous Outdoor Rubber Scale model of an Earl Stahl 0-57 Taylorcraft. It flew great, but Dorothy was losing static points because she couldn't find any scale documentation. Dorothy got her AMA license in 1981, began building models in 1982. She'll be 60 years young on her next birthday. Her great-flying Taylorcraft was using 10 strands of 1/8 FAI rubber.

Tony Hutchins of Portland, Indiana finished second in Junior Payload with this Danny Murphy designed, .020-powered model. Dad Bill Hutchins was Tony's mechanic. At right, Tony test glides his model before launching on an official flight.

Raymond Audet, right, of Simsbury, Connecticut, flew this Goldrush hand launched glider. His timer is Max Chernoff, who was at the 1933 Nats when Maxwell Bassett flew his Brown Jr.-powered model to revolutionize modeling. Max Chernoff is a retired computer scientist.

Bryan Shadel, of Carlsbad, California, turned 11 at the '86 Nats. Here he shows his CL model, which won him two second place plaques. It's a Cox TD .049-powered racer. Bryan's model was timed for ten laps in 1/2A Profile, and he went 70 mph in 1/2A Speed competition.

Bill Zimmer from Varna, Illinois flew this Barnstormer in Old Time Stunt. Used a '52 vintage Fox .35. Model was a Lew Andrews design.

James Lee from Topeka fires up his Trixter A-B Twin as son Todd holds. Twin Fox .19s really hummed in Old Time Stunt event.

Malinda Anderson, with her dad Fred, finished First in Senior C Gas. Her dad finished eighth in Payload. Check out dad's body english at launch!

Bob Schnieder of Houston, Texas, celebrated 50 years of modeling with this Monocoupe. Built from a Flyline kit of the Megowcoupe, its very first flight was an official. Model weighed 20 ounces.

Frank Thomas, of Niceville, Florida, helps six-year-old Jimmy Namey learn how to make a glider fly. Dollar gliders were very popular.

Orville Stuart waits to time Robert Placier's Starduster 900. Model used a Como .40, finished sixth in C Gas.

The Nats is a fine place to renew old friendships. Dale Kirn, left, and Stu Richmond were on the '53 Air Force Team, and hadn't seen each other since. They're sharing a Cox engine; Dale works for Cox.

RAMBLIN' THROUGH EUROPE With Richmond

By STU RICHMOND. . .We've just about used up our 15-day visa in Czechoslovakia, not to mention our cash and barter items! Saying goodbye to friends is always tough, and this is no exception. Read on, dear reader. . .

• Last month we took you through the MVVS engine manufacturing operation in Brno, Czechoslovakia. Visit arrangements had been made by Jan Garcic. Shortly after 4 p.m. the same day, Jan took us to the area's premier engine collector who was an R/C pattern flyer and who also worked as the pilot of a large 16-foot wingspan camera-carrying drone that was used for airborne study of insect infestation in crops. The three rolls of film I'd brought for the day were exposed, so I'll tell you what I saw.

The attention-getter in the apartment was a nine-cylinder radial engine, four-cycle, and about twenty inches in diameter. It had a streamlined fairing behind it with all sorts of instrumentation and looked like a quarter- or third-size replica of a Ford Trimotor's left or right outboard engine, except it swung a three-bladed prop. A good number of 2.5cc (.15) racing engines were on the shelf, and since I was an American, I was specifically shown his Ohlsson .60 with the round die cast tank mount from 1947. It was kind of beat up, but he owned it with pride. I wished I could have shown him the like-new O & R .60 I had in the car, but time was too short. Our host was one of two five-man teams who flew these surveillance models. I found it extremely interesting that the Futaba R/C system, or some of the components were ejectable from the camera drone in case of trouble.

Our host's pattern model was quite conventional; rear exhaust-piped engine with above-average workmanship, as I recall. The visit was brief, unexpected, and fun. We left to meet the women who window-shopped patiently as we had a truly super day. Everyone was tired as we sat in the hotel's lounge. We ordered drinks, mostly beer. Lynn longed for a bit of Jack Daniels on the rocks, but none was available. We were deep into beer country, and it was great! The subject of electric starters was brought up as I asked what items Jan and Bohumir might like from the United States. I told that I would send each of them a 12-volt Astro Flight 1/2A electric high speed starter...perfect for the tiny diesel engines they build and fly. Later I learned Bohumir does not have a car, and I now think Jan's Skoda had a six-volt battery like the early Volkswagens, rather than 12 volts. The starters are there as this is written and somehow I'm sure they're in use successfully.

Insignia of SVAZARM, the Czech equivalent of our AMA organization.

Stu and Lynn with some of the loot they brought in to trade with modeling friends. All was well appreciated and value well given for value received.

Bohumir gave Lynn an artistic scarf with scenes from his home. He gave me two 1/72nd scale MB-200 plastic kits. I brought one to my friend at the local hobby shop in Orlando; the other is kept for scale documentation as it would make a nice R/C simple twin-engined sport scale project.

Bohumir and I got along just fine; we spent the whole day together, but his time was mostly spent as my interpreter, rather than the two of us having a "one-on-one" conversation. We've since done that, as the day's meeting has led to a continuing pen-pal friendship. The day was long and mind-boggling for us all. Jan Garcic had planned and pulled it off with the same precision as he builds the "30 point" John engine. I'll never forget standing on the sidewalk, far from home, and not wanting to say goodbye to Jan and Bohumir. We made commitments among ourselves. We were ready to write them in brotherly blood, but that wasn't necessary. They formed their opinion of Lynn and me; I formed my opinion of them, and these opinions are non-changeable, as friendship among model builders crosses all economic levels, all color lines, all religious beliefs, crosses all political systems, and survives with strength! These are my beliefs.

As I arrived back in the USA some four weeks after this full day, I had nice letters waiting from Jan Garcic, Bohumir Krajca, and Josef Sladky. From Bohumir I share with you a paragraph that says:

"It was really a pity that you could not stay longer here. I was looking forward to discussing with you many topics attached to modeling, etc., but time was too short. But I highly esteem the fact that only a few hours spent together were enough to establish a true, beautiful friendship among us. No wonder that it was hard to both you and me to give farewell, realizing that the possibility of personal meeting in the future is practically next to none. But such is life. I only hope that your visit to Czechoslovakia has given you all you expected from it."

Josef Sladky from MVVS had his letter translated and then sent to me. It said:

"Many thanks for your photos and information about the CAM-AXIAL engine. I really was pleasantly surprised. I have not yet digested the engine fully, but the design is rather interesting. You definitely have caused me a great pleasure. I am about to spend three weeks of my holiday in Yugoslavia. When I return, we will have a careful look at this interesting engine and maybe we will give it a try. Many thanks again and kindest regards from me and from all the

An East German publication, the equivalent to Charles Hampson Grant's "Model Airplane Design and Theory of Flight"

A watercolor given to Stu by 9-year-old Kamil Jindrich, depicting Czechoslovakia's famous L-39 aircraft in various color schemes and attitudes. A cherished momento from the trip.

MVVS team, who were pleased by your photos."

A paragraph from Jan's letter reads:

"I still feel much sorry for your having not been able to stay longer here with us; I wanted to show you much more things which I believe you would be interested in."

We were about at the end of our 15-day stay in Czechoslovakia. I started to think out loud. . ."How can I bring these people to the United States. . . how can I get them to see our Nationals...what if I could get them to the IMS show in Pasadena, or to Toledo." One nice thing about model builders is that we always seem to dream ahead of things we'd like to do in the future.

Oh. . . I almost forgot! When I got back home there was mail from Doctor Zdenek Janacek (yes, he has his doctorate) who is so interested in electric-powered R/C models along with a neat plan from a German model magazine called *FLUG UND MODELL TECHNIK*. Over beer in his hometown of Gottwaldov where he teaches at the university he told Arne and me of 05-powered R/C pylon racers using inexpensive ferrite motors like Astro's 05 or Mabuchi's 540 sucking off of 7 Sanyo cells. They're reaching near 80 mph. The following is taken from one of Zdenek's letters. . . I thought you'd find it interesting due to quietness, speed, and streamlined model building:

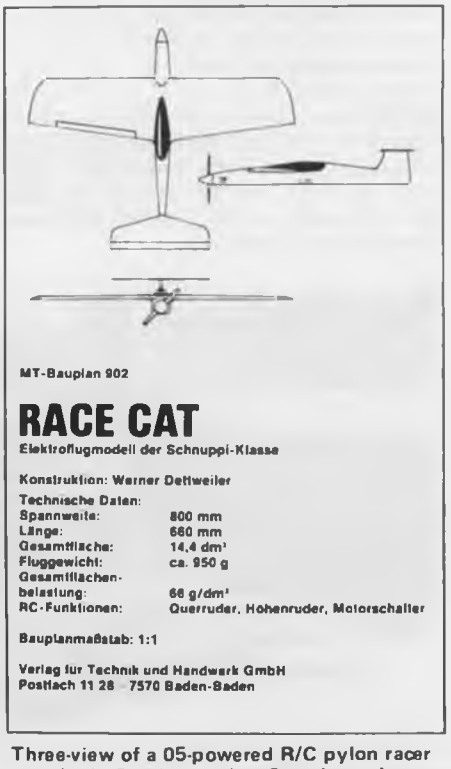
"This small devil is able to reach about 80 mph even with cheap ferrite motors. That means that the FAI course (10 laps of 400 meters) is flown in less than 150 seconds. With more expensive cobalt motors; e.g., Keller 25/sp, Geist 30/6, or Astro 05 Cobalt, flying time could be less than 120 seconds. I think it is amazing for such a small racer. This category seems to be replacement for the official FAI electric pylon racing which is more expensive (there is 2.5 kilogram weight limit which is 5-1/2 pounds—and that allows bigger cobalt motors and up to 22 cells)."

Along with Zdenek's letter came a 1:1 set of plans for a model called RACE CAT. . . 30-inch span, about 200 square inches, and 33 ounces with 2 servos and an electronic speed controller. . . it looks sleek as can be! Airfoil is only 6% thick and prop is shown at a 6-inch diameter, or about where I run my¼ midget props. No wheels. . . hand launch, and slide it in.

Now this is something the USA hasn't seen much of yet. . . .05 electric R/C pylon racing. I have worries about the 33-ounce weight with seven 1.2ah cells. . . and I'm known to build light. My Astro Cobalt 05

Continued on page 90

Jan Garcic gave Stu two of these 1/72 scale MB-200 plastic kits, one of which he'll use as scale documentation for a future R/C sport scale project.



MT-Bauplan 902

RACE CAT

Elektroflugmodell der Schnuppi-Klasse

Konstruktion: Werner Dettweiler

Technische Daten:

Spannweite:	800 mm
Länge:	660 mm
Gesamtfläche:	14,4 dm²
Fluggewicht:	ca. 950 g
Gesamtflächenbelastung:	66 g/dm²
RC-Funktionen:	Querruder, Höhenruder, Motorschalter

Bauplanmaßstab: 1:1

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Three-view of a 05-powered R/C pylon racer popular in Czechoslovakia. Speeds reach up to 80 mph!

Kenny Bryan, designer of the Byron BD-5J kit, and Dave Hoover, pilot of the full-size BD-5J.

BYRON'S FAN-FLY

By MARK FRANKEL. . .Byron's annual soiree for the jet set once again brought out the best in ducted fan flying craft. The weekend was filled with notable jet aircraft, many of which are pictured in this article.

• Although he couldn't have known it at the time, Jim Bede was providing the theme for the annual ducted fan rally at Ida Grove, Iowa, when he mounted a small turbojet in one of his BD-5 airframes. No fewer than six BD-5J's appeared at the Fan-Fly, ranging in size from Tom Sewell's small stand-off scale Dynamax-powered models to a full-sized, man-carrying example built and flown by Dave Hoover of Sussex County, New Jersey. In addition, the Byron factory displayed two prototypes of the forthcoming kit in 40% scale, and Kerry Sterner trucked in his huge 1/2-scale replica of the "J" used in the James Bond movie "Octopussy."

Tom Sewell's two examples of the "J" are built around wings that look like they were borrowed from a Kaos. Watching these models perform reinforces the Kaos illusion. They leave the ground quickly, they are highly aerobatic, yet very docile. At the other end of the spectrum, Kerry Sterner's 17-pound model is very majestic and stable. It seems to land at a moderate jogging speed and its top speed is about 560 miles per hour. The Byron BD-5J falls between Sewell's and Sterner's models in size. This design appears to be the best of both worlds. It has convincing speed and aerobatic ability, yet it is large enough to be graceful. Furthermore, at a scale of 40% full size, the model is large enough to carry a great amount of detail.

One functional detail that really impressed me was the use of a "clamshell" thrust reverser that actually stops the model during its landing roll. The Byron BD-5J kit is scheduled for release shortly, and I suspect that it will become one of their most popular models.

Several impressive scratchbuilt scale models were flown during the weekend. Ivan Munninghoff and his son Paul of Colorado Springs, Colorado, arrived with their F-16XL. The "XL" is a delta-winged vari-

Scott Forster's highly detailed F-16A from the Byron kit. This model features functioning gear doors, full cockpit detail, and a boarding ladder for static display.

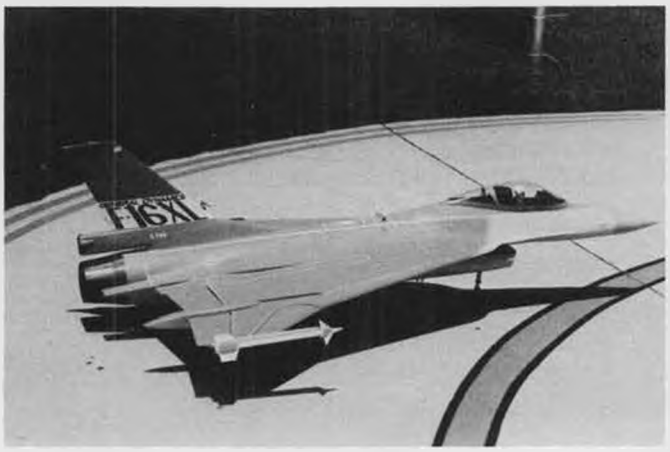
Col. Bob Thacker and his SAAB Viggen. This model is powered by a Byrofan/Rossi .81 propulsion unit. It represents a 10.5 % scale model, and flies at 13 pounds.

A lineup of Byron F-16 models that were flown over the weekend.

Bob Violett with some of the Sportshark models he markets. There were a good number of Violett 'sharks in the air all weekend.

Ivan Munninghoff's latest design, an F-102A delta fighter patterned after the Convair aircraft. Model featured functional speed brakes, completely detailed cockpit with opening canopy.

Mike Kulczyk's Gloster Meteor, an extremely fast twin-engined jet.



Ivan Munninghoff's F-16XL that began as a Byron F-16A kit. The XL has more wing area, assuming a different personality from its delta-winged counterpart.

John Carlson's MiG 21. The model is 1/7 scale, derived from a 1/32 Revelle plastic kit. The MiG wasn't ready to fly at the Byron Fan weekend, but should prove to be an excellent performer in the air.

ant of the F-16 Fighting Falcon. General Dynamics has built two prototypes which are currently undergoing flight test at Edwards Air Force Base. Ivan developed his delta from a Byron F-16 kit. With its huge wing the "XL" assumes a totally new flight personality.

Ivan and Paul also displayed another delta model that they are developing, the F-102. This is an early supersonic delta of the 1950s which they have modeled at 1/8.5 scale. While the F-102 was not quite ready for flight during the Fan-Fly, it was expected to fly by early July. It looks like this model will have excellent flight characteristics.

Another delta was brought by John Carlson of Richfield, Minnesota, a 1/7 scale model of the MiG-21. Unlike the Munninghoff deltas, the MiG-21 has a horizontal tail. John's model was scaled from a Revelle 1/32 scale plastic kit and it is powered by a Dynamax/O.S. 77 propulsion package. Like the Munninghoffs, John hopes to fly his MiG in the near future.

Yet another delta scratchbuilt subject which was displayed and flown at the Fan-Fly was Bob Thacker's Saab Viggen. This is a delta-winged fighter with a canard, a horizontal stabilizing surface mounted forward of the wing. Bob's Viggen is a large model powered by a Byrofan/Rossi .81 and it performs magnificently. The canard allows the nose to rotate early in the takeoff run, and the model breaks ground in a surprisingly short distance. Bob flies the Viggen smoothly and displays its rapid roll rate in a very prototypical fashion.

Another impressive scratch subject was flown by Mike Kulczyk of Austin, Texas, a Gloster Meteor. This is a twin-engined British jet of the late 1940s. The Meteor always seemed to be a daring model subject due to the outward placement of the engine nacelles. The loss of either engine in flight should produce horrible yaw problems. But this

A closeup look at Scott Forster's exquisite F-16A. This is such a realistic model, it should be in the movies!

A huge 1/2-scale BD-5J, designed and built by Jim Werst and Kerry Sterner. The model is powered by a Byrofan/Rossi combo.

A Bob Violett Sportshark used by the Cloud Dancers display team.

Scott Forster's Sportshark, quite a popular model!

characteristic doesn't seem to deter Mike who made sure that his engines ran reliably and in unison. The Meteor is a small model but it doesn't lack performance. Mike made several high-speed passes down the runway that were difficult to track with my video camera.

While the scratchbuilt projects are interesting, the majority of jets at the Fan-Fly were derived from kits. Bob Violett's Sportshark and Tom Cook's Starfire were represented by numerous examples. These models are superb non-scale aircraft that were designed for maximum performance. Either airplane flies well enough to be competitive in pattern events, yet they are easy to build and noncritical to fly. Both models offer an excellent introduction to jet flight.

John Carlson's MiG 21, a 1/7 scale from a1/32 scale Revelle kit. The MiG wasn't ready for flight, but should prove to be an excellent performer in the air.

Ivan and Paul Munninghoff's F-16XL, derived from a Byron kit of the F-16. Very impressive.

Dennis Crook's Starfire, from the Jet Model Products kit. A sleek and efficient flyer.

A closer look at Col. Thacker's Viggen. Flying recently in California, it suffered some damage in a crash, but is repairable.

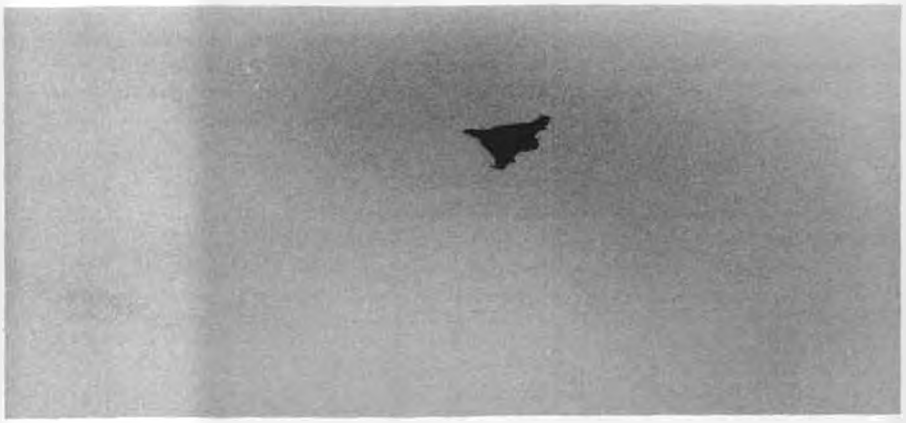
One of the factory F-16's rounding onto final approach at the Byron International airport.

Harry Wood's F-16 displays its smoke system during an aerobatic routine put on during the weekend festivities.

The most prevalent model at the event was the Byron F-16. I once remarked that the Byron F-16 was becoming the J-3 Cub of the jet field, and the F-16 attendance at this event certainly confirmed that statement. The F-16 kit has been in the field for more than six years now, and it is interesting to see its evolution. Some modelers, such as Scott Forster of Vermont, have built examples with intricate scale detail. Scott's current F-16 sports an opening canopy, full cockpit detail, complete rivet detail and panel lines, functioning drop tanks, highly detailed markings, wheel well doors and a boarding ladder used for static display. On the other hand, some modelers, such as Harry Wood of Long Beach, California, have undertaken the development of additional flight options. Harry's F-16, which is said to weigh nearly 16 lbs., has a smoke system which provides Thunderbird-type exhaust smoke on command. It was truly impressive to see Harry's F-16 streak overhead with a plume of thick white smoke which was turned on and off during aerobatic maneuvers.

One of the most interesting sights of the weekend was a glimpse of the new "mega-project" that the Byron group hopes to fly in August. It is a perfectly scaled 450-pound model of a B-29 powered by four gasoline engines swinging four-bladed props. While

Continued on page 72



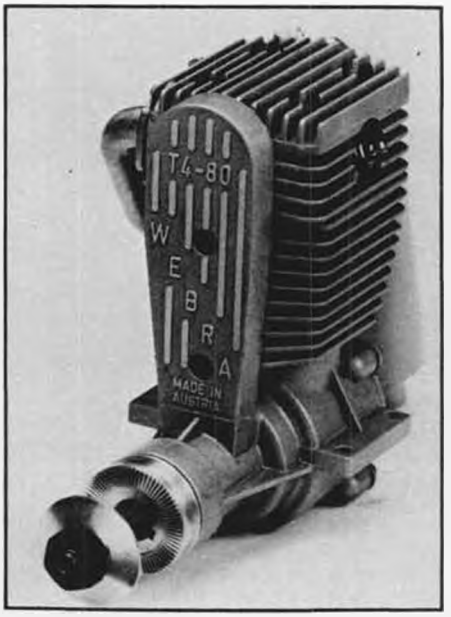
Ivan Munninghoff's distinctive F-16XL in flight overhead. The delta configuration makes this jet easily identifiable in the air. Substantially more wing area gives it a different flight personality.

Look out. . .expected to be flying in August, the Byron Factory's B-29 will weigh around 450 pounds when completed, with power by four gas engines swinging four-bladed props. Yoww!!

INSIDE ENGINES

WEBRA T4-80

By MIKE BILLINTON



The T4-80 is reliable, with a minimum of problems for the purchaser; it's durable, and easy to operate as well. A distinct value for the money.

• By their evident faith in the rotary-valve engine, both these well-known Austrian manufacturers of model engines—HP and Webra—make similar and interesting comment on the relationship between four-stroke valving systems and the "conditions of use" of the normal model engine. However, it is equally noteworthy that their view differs from that of the main thrust of Japanese model engine design which has placed total reliance on the much more widely developed poppet valve.

In the full-size field, the considerable attractions of the rotary valve (potentially very low friction and unrestricted rpm levels) have not proven sufficient to overcome the difficulties of valve sealing and consequent compression loss. The model engine, on the other hand, offers a far more favorable environment for the rotary valve: scale effects lessen thermal distortions, while the usual model engine fuel/oil mixture considerably reduces wear problems and at the same time enhances the compression seal at the rotary valve/cylinder head interface.

Putting their beliefs firmly into practice, Webra's T4 four-strokes (in 6.5, 10.0, and 13.3 cc. sizes), uniquely supplement these "model size" advantages by commandeering the highly effective ABC metallurgy (more normally used for the model engine piston/liner) for use in the rotary valve itself. With piston/liner also using the ABC method, it can be seen that the complete use of nonferrous and high-conductivity materials, all having very similar thermal expansion properties, is this manufacturer's route to successful application of the "Cross" rotary valve layout in the model engine.

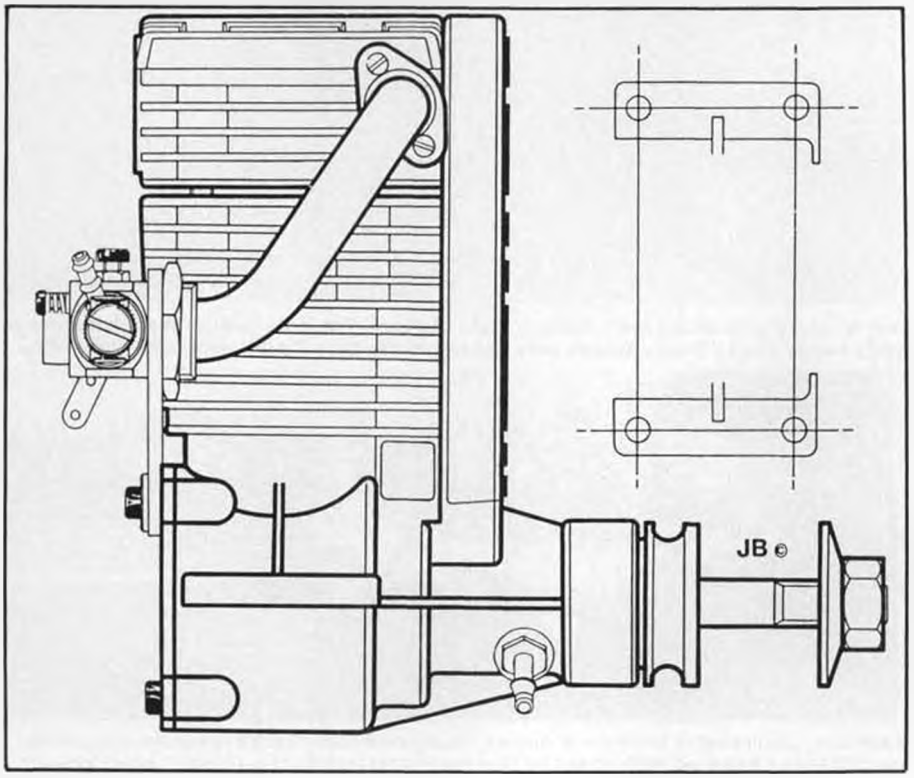
MECHANICAL DETAILS

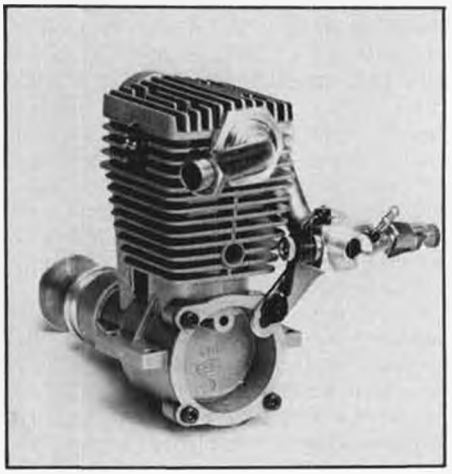
The crankcase is a one-piece cylinder/crankshaft housing finely die-cast in aluminium alloy. The cover for the rotary valve's rubber belt drive is also integral with this casting.

The cylinder-head is similarly cast in aluminum alloy. Its most dominant feature is the rotary valve housing running horizontally through the head and 1/4 inch above combustion chamber height. It seems probable that, thermally speaking, the rotary valve could run direct within the alloy head material, but for reasons of longevity and a more precise matching of expansion properties, Webra has opted to use an unchromed brass insert which doubles as part combustion chamber and part valve sealing area at the most critical point. Combustion shape is "wedge"-style with the plug set over at the side opposite squish area.

The rotary valve is also brass, but is, however, chromed externally along the length of its bearing surface. Inlet entry and exit is via milled slots in the periphery of the valve, while the exhaust leaves the combustion chamber via a similar milled slot and finally exits to the atmosphere axially through the valve end. The other end of the tubular valve is sealed by a steel plug which also secures the belt-driven, half-speed aluminum pinion and which, itself, ensures correct valve end float. Location of this pinion onto the valve is by a very small dowel pin, and is a vivid indication of the very low friction expected and obtained from this rotary valve.

The crankshaft is of hardened steel and finish ground. The crankweb is heavily counterweighed by much material removal from the crankpin side. The crankshaft pinion, which provides the initial belt drive to the overhead rotary valve, is, in fact, milled in one piece within the shaft material, and





The angled exhaust stub allows many different muffler outlet positions.

though complicated in manufacturing terms, simplifies subsequent engine assembly and keeps the half-speed pinion down to manageable size.

The piston/liner uses the ABC method, but to ease production and enhance engine life, the high-silicon piston is fitted with a cast iron Dykes piston ring set at crown height. The gudgeon pin is free-floating and is fitted with brass end pads. The free fit is necessary so that engine disassembly can proceed by prior withdrawal of the pin through the hole in the rear of the crankcase. Both ring and piston are turn-finished, and the piston is internally milled to reduce weight. The liner is a simple brass tube, internally chromed and honed, and has a thick flange at the upper end. No location pins are provided, so, before any removal, the liner should be marked to ensure correct realignment of running surfaces.

The connecting-rod is an aluminum alloy die-casting with phosphor bronze bushings at each end, each drilled with two lubrication holes.

Webra's conventional twin-needle (TN) carburetor at 6-1/2 mm bore size is used here, and is eminently suited to the low/medium rpm levels like with this engine when used in R/C scale applications.

Beyond 11,000 rpm, this carburetor size becomes an increasing restriction to depress hp levels below that which could be realized by allowing the rotary valve its head in rpm terms.

OTHER ENGINE POINTS

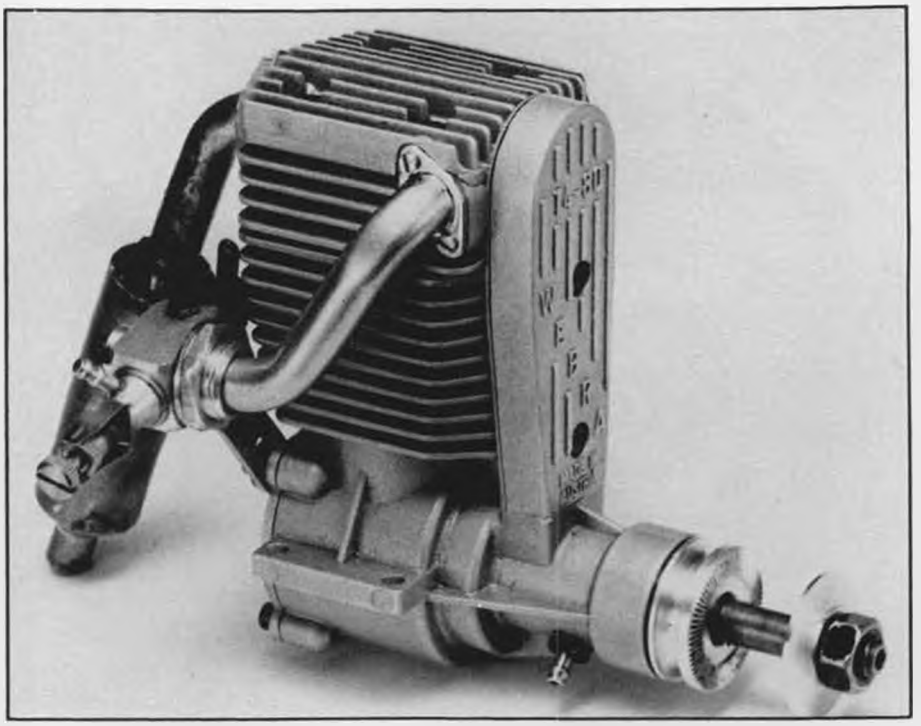
A large squish clearance of .062 inches is used in conjunction with a significantly low compression ratio of 6.8/1. This is a little surprising for a methanol engine and maybe is an indication of the occasional uneasy relationship existing between the four-stroke cycle and the glow plug. The importance of the combustion chamber design is recognized and continues to be the subject of much experiment in the model four-stroke. In this area, the rotary valve layout presents some problems but equally some advantages over the normal poppet-valve layout; i.e., it offers an unobstructed valve throughway area which can be made very large, and avoids the problem of poppet valve to piston clearance if extreme timings and/or high-compression ratios are used. However, the rather rigid geometric rotary valve alignment tends to restrict that flexibility of port positioning characteristic of the poppet valve.

Actual valve timings on the T4/80 are nothing extreme. At present, an inlet period of 260 degrees and exhaust of 248 degrees with an overlap of 38 degrees are quite usual for the expected speed range.

RPM CHECKS

A wide range of Graupner nylon propellers were used during this test. These are highly suitable for today's model four-stroke engines because their rigidity and mass perform a useful flywheel function to control the severe impulses from the single-cylinder four-stroke, and their consistency and quality are becoming legendary.

The rpm ranged from 12,050 down to an unexpected 3,043 on a 24 x 8 Zinger. At both these extremes, performance was more certain if the glow plug was continually lit (though apparently for quite different reasons). At the low rpm end, the plug was being given too much time to "cool off" between power strokes, whilst at the high rpm end, it was clear that the plug was not providing sufficient ignition advance for those speeds. Between 5,000 and 11,000 rpm plug performance was very steady.

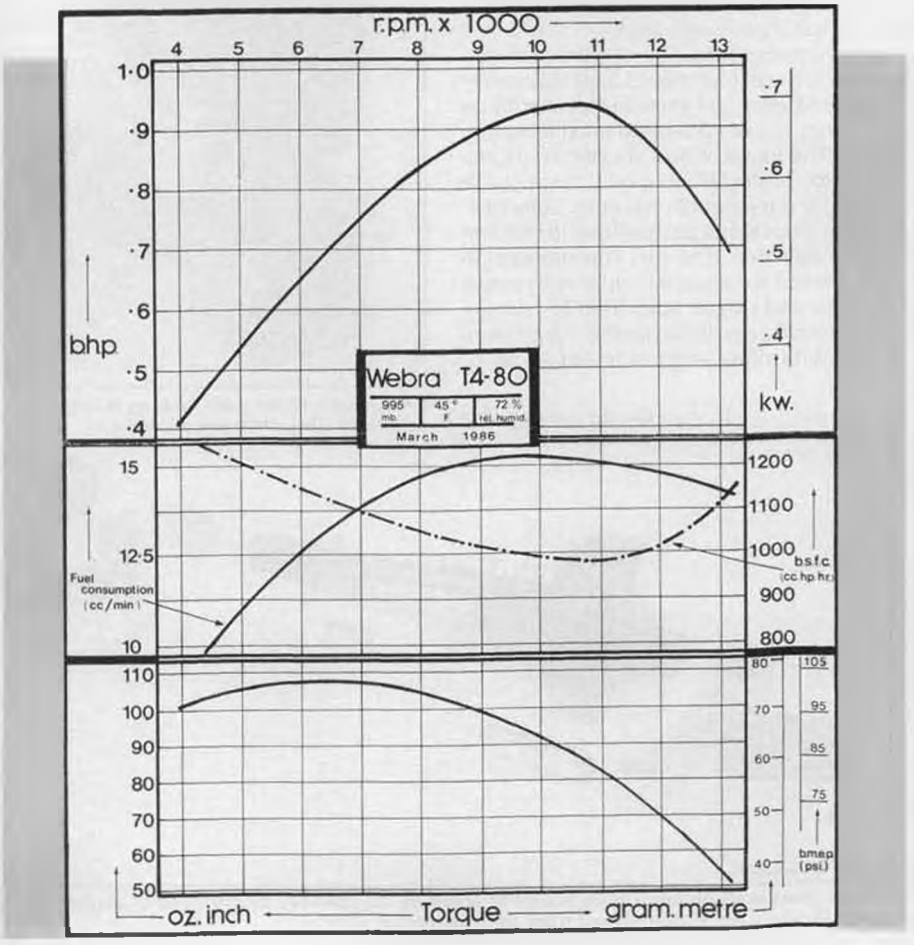


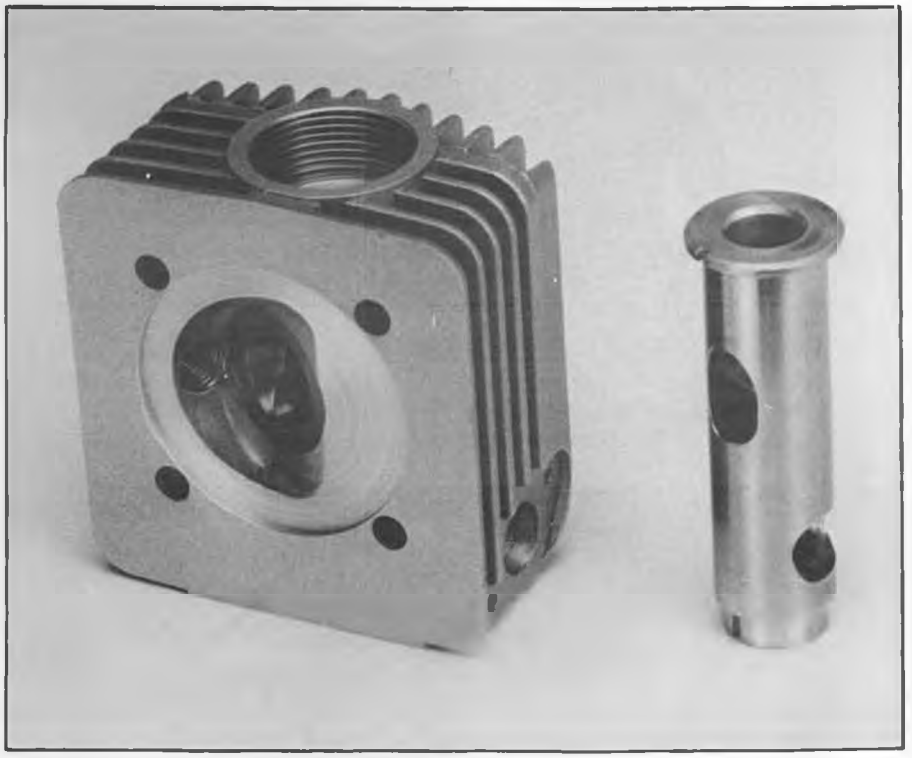
Webra's rotary valve four-stroke represents the simplest possible layout and fewest parts.

POWER TEST

Open Exhaust/5% nitromethane/10% Castor oil with 5% ML70 synthetic oil/Webra No. 3 plug.

The low speed pulling power of the T4/80 (as foreshadowed by that 24 x 8 Zinger performance) became evident during monitoring of Torque figures, in particular, the band



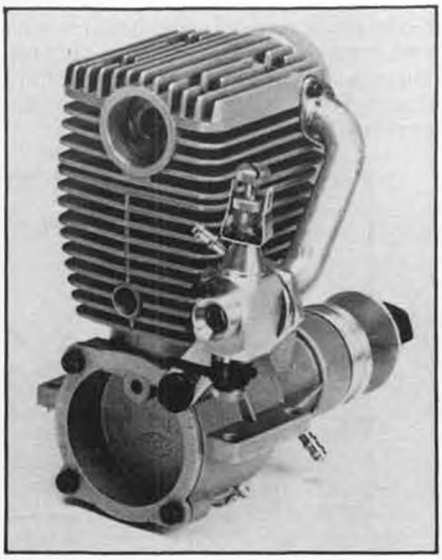


The T4's combustion chamber is wedge-head, squishing towards the glow plug. Note the circular brass insert at the center of the chamber--this insures similar thermal expansions against the brass(chromed) rotary valve shown alongside chamber.

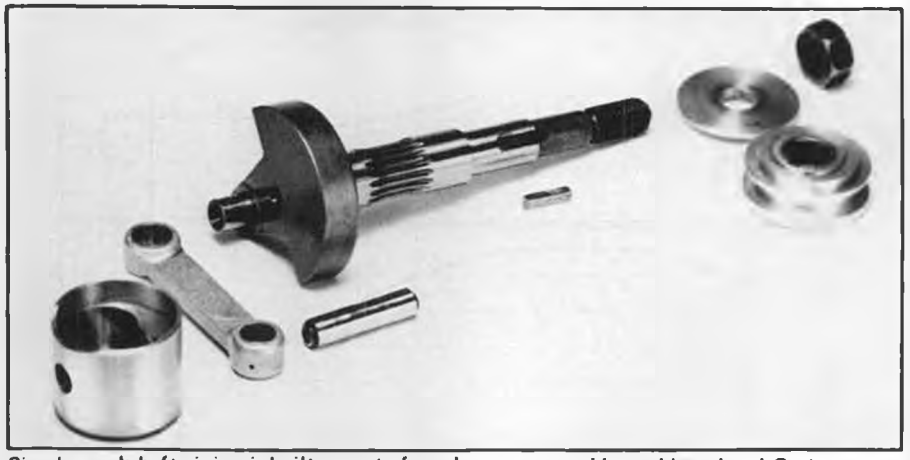
between 4,000 and 8,500 rpm. A peak torque of 107 oz. in. at 6,400 rpm was reached together with a final maximum bhp of .93 at 10,700 rpm. This figure is lower than the manufacturer's claim of 1.15 ps. (1.134 hp), but in the absence of information as to fuel used and rpm point, the comparison is less than meaningful.

Fuel consumption figures were recorded at the various rpm points (approximately 600 rpm steps), and showed that maximum efficiency occurred near to maximum bhp point. The figure of 860 Specific Fuel Consumption units (SFC) is a quite respectable figure for a methanol engine in "standard" trim, and not being pushed hard in that particular direction. The fuel consumption itself showed the usual variation with power increase and ranged from 10 to 15 cc./minutes pro rata, a quite economic figure compared with other engines tested so far by

Continued on page 72



Brass nipple under main bearing is the usual four-stroke breather and oil drain.



Simple crankshaft pinion is built as part of crank, so no assembly problems here! Gudgeon pin has brass end pads. Piston turned from solid aluminum alloy.

Webra T4/80 Four-stroke.

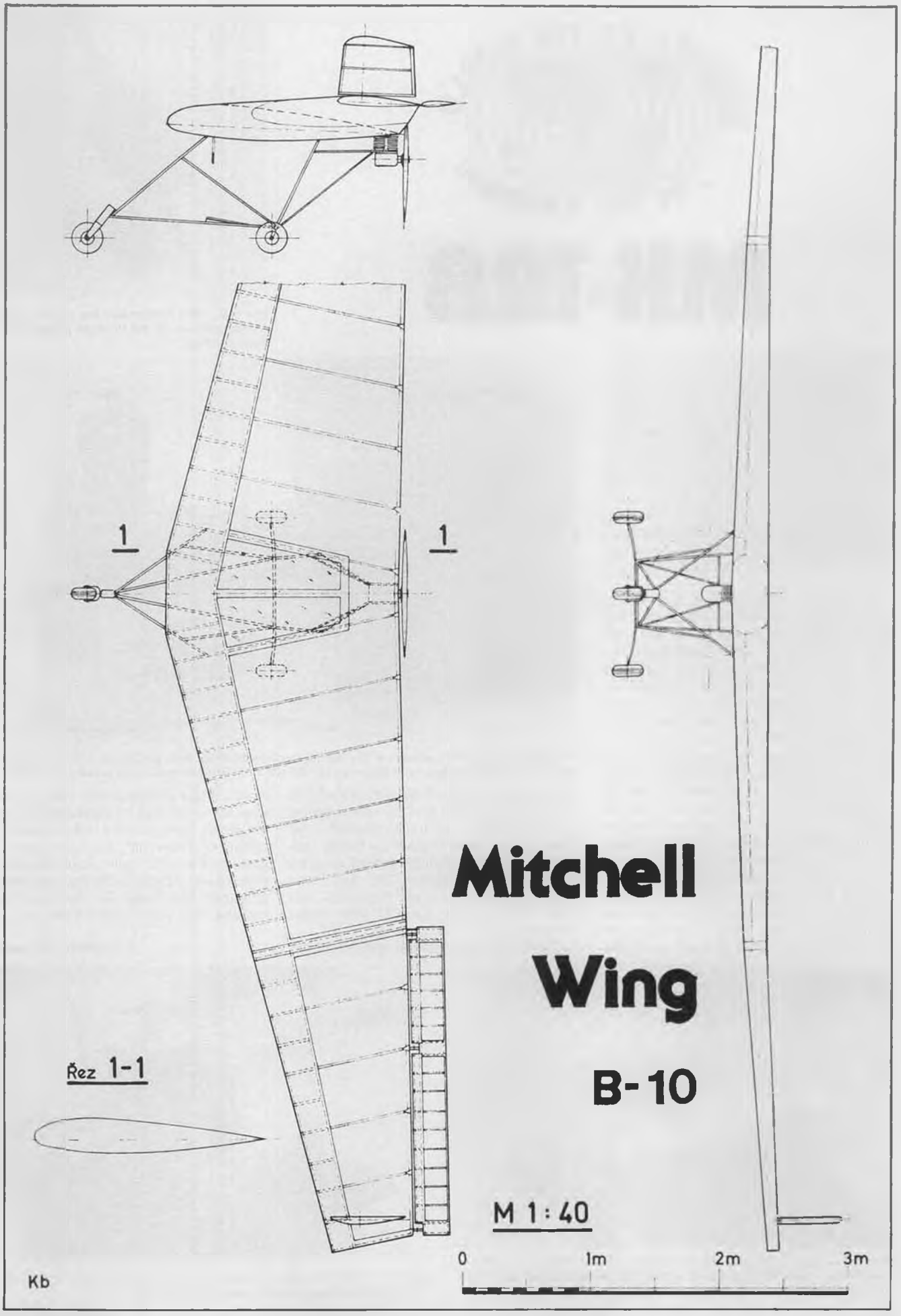
Dimensions & Weights:
Capacity—.813 cu. in. (13.32 cc.)
Bore—1.004 in. (25.5 mm.)
Stroke—1.027 in. (26.08 mm.)
Stroke/Bore ratio—1.023/1
Timing periods—Inlet—opens 12° BTDC
—Inlet—closes 68° ABDC
—Total period 260°
—Exhaust—opens 42° BBDC
—Exhaust—closes 26° ATDC
—Total period 248°
Combustion volume—2.3 cc.
Compression ratio (Geometric)—6.79/1
Squish clearance—.062 in. (1.57 mm.)
Squish area—.13 sq. in.
Squish angle—0°
Crankshaft dia.—.4722 in. (12 mm. nominal)
Crankpin dia.—.2751 in. (7 mm.)
Gudgeon pin dia.—.2362 in. (6 mm.)
Connecting rod centres—41 mm.
Crank nose thread—.3064 in. x 20 TPI (8 mm. x 1.25 mm.)
Carburetor bore—6.5 mm.
Height—4.52 in. (115 mm.)
Width—2.36 in. (60 mm.)
Length—3.38 in. (86 mm.)
Mounting holes—52 mm. x 25 mm. x 4 mm. holes.
Width between bearers—43 mm.
Frontal area—7.66 sq. in. (49.4 sq. cm.)
Crankshaft weight—3.55 oz. (100.6 gm.)
Piston weight—.45 oz. (12.75 gm.)
Overall weight (with silencer)—21.5 oz. (609.5 gm.)

Performance:
Max. BHP—.93 @ 10,700 rpm (Open Exhaust & 5% Nitro.)
Max. Torque—107 o. ins. @ 6,400 rpm (Open Exhaust & 5% Nitro.)

Rpm on Standard propellers:	Open Ex.	Silencer
24 x 8 Zinger	3,043	2,990
18 x 7 Mastro (OPS)	4,540	4,453
18 x 6 Graupner	5,255	4,957
15 x 8 Graupner	6,830	6,620
16 x 6 Airflow	6,910	6,695
12.5 x 7 Graupner (3 blade)	7,920	7,715
11 x 7 Graupner (3 blade)	9,860	9,500
10 x 8.3 Graupner (3 blade)	10,440	10,250
12 x 6 Graupner	10,600	10,400
10.5 x 6 Graupner	12,050	11,900

Performance Equivalents:
BHP/cu. in.—1.144
BHP/cc.—.07
Oz. in./cu. in.—131.6
Oz. in./cc.—8.03
Gm. metre/cc.—5.63
BHP/lb.—.69
BHP/Kilo.—1.52
BHP/sq. in. frontal area—.12

Manufacturer:
Webra Modellmotoren Gmbh & Co.
Eichengasse 572
A-2551 Enzesfeld
Osterreich.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1
Řez 1-1
Mitchell
Wing
B-10
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3m
Kb

ENGINES OF THE WORLD

...by Stu Richmond

MK-12B

The MK-12B's needlevalve has a soon-to-be patented hook on its end to catch pieces of dirt from the fuel.

VITAL STATISTICS: 2-3/4 inches long to the drive washer, 1-1/2 inches across the mounting lugs, 2-3/8 inches to top of cooling fins. Weight is quoted at 153 grams, plus or minus 5 grams (about 5-1/2 ounces). Bore is 15.5mm; stroke is 13mm; displacement is 2.46cc (it's a .15) made in the Soviet Union.

UNIQUE CHARACTERISTIC(S): Engine, when vigorously shaken, rattles internally. Engine is a P-O-S.

Packaging for the MK includes a 16-page instruction booklet with certificate of manufacture. Here Stu's friend Dwayne's engine number 02 sits with Stu's engine. Cost is about $12.00.

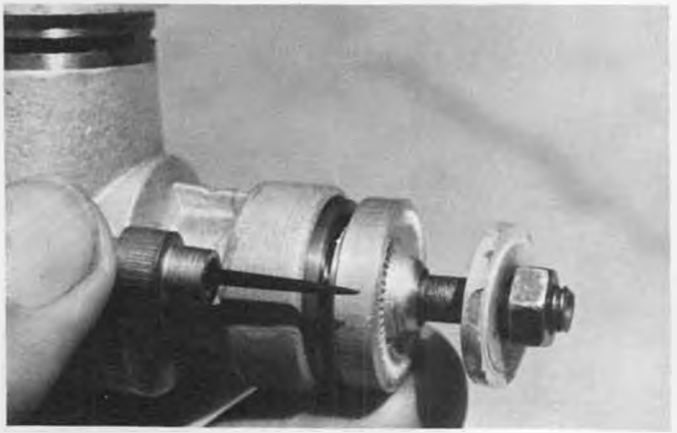
The Russian alphabet is all screwed up; some of their letters are upside down, some of their letters are backwards, some look both upside down AND backwards! But then they must think OUR alphabet is all screwed-up too. Except for this month's engine, we're probably even; we just haven't recently mass produced anything as bad as this month's engine.

The Russian letter "B" is equivalent to our letter "V," so this month's engine is really a Russian MK-12V. . .as in victory. . .but I'll stick with the "B" as in BAD, as this engine really is. It's one of the worst of modern Soviet production. It even took an American Sullivan starter and good ol' Yankee ingenuity to get it to run! Read on for details.

There truly is some great model engine designing and manufacturing taking place in the Soviet Union today. If you stay with this column long enough you'll see some real eye-openers like their mini-priced MK made for the masses and the latest version of the maxi-value, in-line Krasnorutkij .60 jewel. Both of these engines are highly successful and they parallel model engines likewise made in China, like the Silver Swallow for the masses and the world-class 2.5cc "CS" made for FAI free flight competition.

About a year ago, I started on this month's story using a slightly earlier version of this engine, but it broke its crankshaft while being gently broken in (I'd not even gotten a picture of it running), and I gave up in disgust. By the time I got a replacement engine, I'd lost interest in having a second engine possibly break in my face while running. The replacement came with red

Continued on page 85



Here's a closer view of the engine's needlevalve with its hook at the end. Stu awarded this engine a 1 in manufacturing excellence. Not too excellent!

After a lot of hocus-pocus, a squeeze here, a caress there, and a few unprintable phrases, and it runs! No mean feat!

PLUG SPARKS

By JOHN POND

• The 20th Annual SAM Championships were a resounding success according to George Armstead, Contest Manager, who stated better than 180 contestants registered for this four star meet.

As can be seen in Photo No. 1, we have caught George in the act with his stern outlook. The headquarters tent shown was located halfway between the free flight and radio control competition centers.

We snapped Joe Beshar playing hookey from his job as R/C Contest Director. Joe has been plugging .020 F/F Electric without too much success, so he felt he had to get out and show the boys what they are missing.

Photo No. 2 shows Joe recovering his model barely in front of the trees. Didn't remember the name of his helper (he has been around for quite some time) but he couldn't have had better coaching in the electric event than from a former winner.

Joe was fortunate to have help like Woody Woodman (traffic control in takeoff area), Mike Granieri (fuel allotment and timer), Don Garafalow and the Chief Recorder whose name escapes me, plus Dorothy Granieri who put in many hours on the frequency control board. A great gang who did a great job!

This columnist was lucky to get Photo No. 3 of Bill Schmidt, the announced winner of R/C Assist High Point, before he lost his good-flying 1/2A Texaco Sailplane. Bill claims the model just went out of sight right overhead before he could dive it back into sight. Didn't ask, but who puts return addresses on radio models?

While snapping shots and swapping lies, (as you know, the second liar hasn't got a chance), Pond ran across Walt Eggert with his stable of models. Most of these were designed and built as possible Megow gas kits. Seen in Photo No. 4 in front of Pond is the Megow Chief being documented for an old timer of 1940. Walt had some interesting stories of his days with Fred Megow and Paul Karnov (Quaker man). Several of Walt's designs like the Chief failed to make production as Walt left Megow's employment at that time.

One more picture of interest: Photo No. 5 shows part of the Fort Worth-Dallas gang on the runway. Holding the Lanzo Bomber is that generous and likeable doctor, "Bo" Buice with Joe Percy ready to crank up. The

1. Contest Manager George Armstead shows good form in how to be authoritive.

2. R/C Contest Director Joe Beshar took time to fly his .020 electric Playboy Cabin model.

Ft. Worth boys were so sold on the Chester Lanzo Bomber design after the Old Timer Events at the Reno AMA Nats, they have scaled and built Bombers to every imaginable class. This may sound like they are in a rut but the performance of the model does not appear to diminish when scaled. The results prove that!

Might also mention the weather was pretty fair although two of the days did suffer from high humidity and stiff winds. Two minute flights for free flight was truly the limit on that field as those trees loomed up very quickly when retrieving downwind.

In R/C assist, the boys have done their homework in the Limited Engine Events as all had flyoffs. The biggest was Class C with eight flying. I know, I wuz dere, Charlie! Rather than make you, the reader, wait until the end of the column for the results, we are putting them right up front. See for yourself what a good meet it was!

FREE FLIGHT

1936 WAKEFIELD RUBBER (16))

1. Peter Michel (UK)	(Copeland)	349
2. Reg Parham (UK)	('35 Light)	343
3. R. Thompson	(Wriston Diamond)	330
4. John Stott	(Copeland)	330
5. R. Moulton	(Lanzo Duplex)	306

NOSTALGIA GAS .01-.08(9)

1. John Bortnak (Can.)	(Y-Bar)	360
2. R. Lipori	(Zeek)	360
3. Jim Walston	(Hewitt Record)	338
4. D. McLeod (Can.)	(Y-Bar)	320
5. J. Barker	(Zeek)	261

3. Bill Schmidt, Topeka, Kansas, lost this good-flying 1/2A Texaco R/C Sailplane. Has not returned, as of this date.

4. Walt Eggert and John Pond look over the documentation for Walt's design, the Megow Chief(in center). Photo:Cortright.

5. The Ft. Worth boys, Bo Buice and Joe Percy take a second for a photo. Busy boys!

6. West Coaster Loren Schmidt (SAM 51) on the sticks for his Berkeley Buccaneer. Wife Miriam checks watch.

7. Part of the English Invasion, William and Adam Beales with Korda and Lamb Climber. SAM 35 sparkplug Dave Baker in background.

8. Reg Parham, England, with an excellent-performing Gordon Light 1935 Wakefield Winner. Photo: Johnson.

9. Don Knight holding an unusual Wakefield Canadian Winner, a Fred Rogerson design of 1935. Photo: Johnson.

OHLSSON 19-23 SIDEPORT (6)

1. Herb Wahl	(O.O.S.)	281
2. Bob Bissett	(Miss Valiant)	173
3. Elmer Jordan	(Coronet)	120

"SLAG" ENGINE (3)

1. Bob Edelstein	(Ranger)	291
2. Hank Ochsner	(O.O.S.)	182
3. Jim Walston	(Thermal Thumber)	120

JIMMY ALLEN RUBBER (4)

1. M. Moskow	(Bluebird)	238
2. D. McLeod (Can.)	(Bluebird)	170
3. J. Bortnak (Can.)	(Bluebird)	165
4. Bill Bell	(Bluebird)	157

COMMERCIAL RUBBER (15)

1. Ed Konefes	(Convertible)	360
2. Dick Sherman	(Convertible)	340
3. Stan Colson	(Korda)	245
4. T. Langley	(Pacific Ace)	200
5. John Stott	(Schnozzle)	196

LARGE PYLON GAS (6)

1. Tom Lucas	(Playboy/Atwood)	444
2. Bruno Markiewicz	(Sailplane/OR 60)	409
3. Woody Bartlet	(Alert/OR 23)	330
4. Bob Edelstein	(Playboy/OR 60)	294
5. Ed Rangus	(Zipper/Forster)	250

CLASS A CABIN GAS (12)

1. Bruno Markiewicz	(Cabruler/Arden)	360
2. Bob Edelstein	(So Long/Arden)	360
3. Elmer Jordan	(Coronet/OR 19)	352
4. Jim Walston	(Cabruler/Arden)	343
5. Mitch Post	(So Long/Hornet)	321

RUBBER CABIN (30)

1. R. Factor	(Korda)	500
2. J. Phelps	(Korda)	469
3. Sal Taibi	(Verdier)	443
4. Stan Colson	(Korda)	423
5. J. McCay	(Hi-Ho)	355

.020 REPLICA PYLON (15)

1. G. Martha	(Playboy)	348
2. M. Schindler	(Playboy)	343
3. G. Donahue	(Zipper A)	340
4. Frank Fay	(Kerswap)	281
5. J. Bocckinfuco	(Playboy)	266

.020 REPLICA CABIN (6)

1. Mike Cook	(Bombshell)	288
2. Barney Onofri	(So Long)	286
3. B. Oliver	(So Long)	279
4. Bob Bissett	(So Long)	270
5. Bob Edelstein	(So Long)	261

CLASS C PYLON (13)

1. Hans Ochsner	(Gas Champ/ OR 60)	508
2. Mal MacLean	(Meteor/OR 60)	399
3. John Bortnak (Can.)	(Zipper/OS 35)	360
4. Mitch Post	(Zipper/Torp 32)	351
5. G. Donahue	(Red Ripper/Brown)	336

TOWLINE GLIDER (8)

1. Stan Colson	(Floater)	360
2. E. Martinson	(Thermic 70)	338
3. John Bortnak (Can.)	(Beaumont)	307

10. Peter Michel, England, did Bob Copeland's design proud, winning the Wakefield event at Westover AFB. Photo: Johnson.

11. The old master, Henry Struck, turned out for the rubber event with his 1937 Wakefield design. Good-looking diamond fuselage.

12. Ed Konefes, (no, not brother Joe!) with a slick-looking compressed air-powered original design. A smooth and quiet flyer!

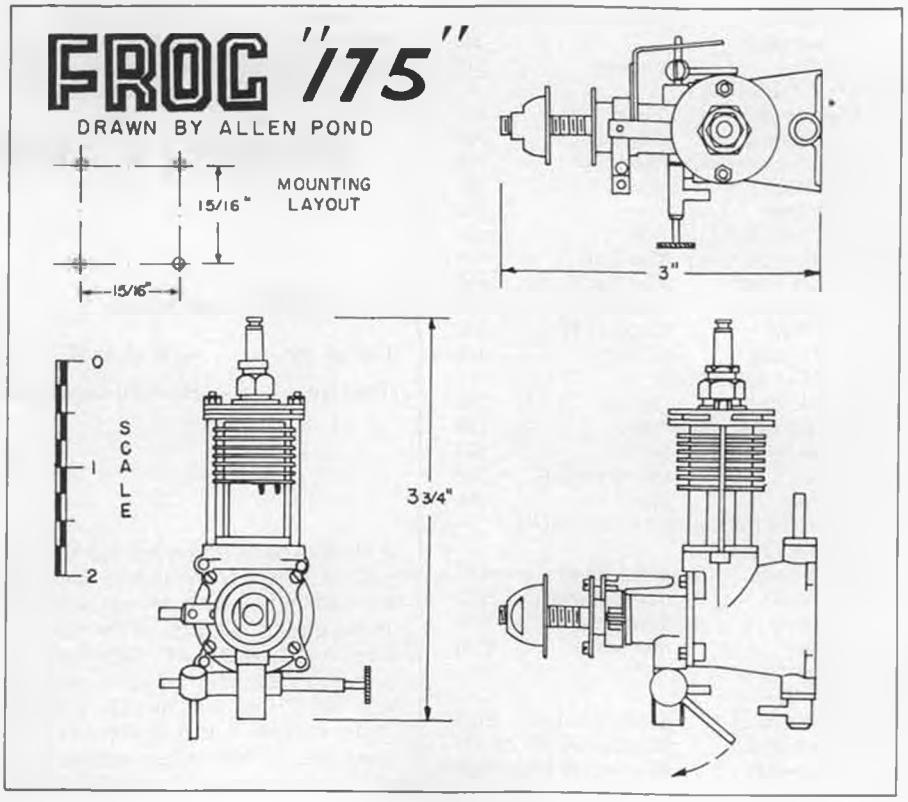
13. Georgia boy Jim Walston, with hot-flying, Atwood-powered Playboy Cabin. Would you believe he didn't place?

14. The Class B version of the Comet Interceptor as produced by Bob Edelstein. Photo: Johnson.

15. Bill Bell from Baltimore holding his Bluebird, a snazzy design for the Jimmy Allen event. Photo: Johnson.

4. Jack Jella	(Cosmo)	254
5. S. Landy	(Thermic 72)	234
SMALL CABIN GAS (5)		
1. Bruno Markiewicz	(Cabruler/Arden)	360
2. Jim Walston	(Cabruler/Arden)	360
3. Bob Edelstein	(So Long/Arden)	332
4. Frank Fay	(Spearhead Jr.)	189
5. Elmer Jordan	(Coronet/Arden)	186
RUBBER SCALE (14)		
1. T. Langley	(Taylorcraft)	264
2. Chuck Bokowski	(Puss Moth)	249
3. Joe Fiorello	(Puss Moth)	195
4. John Stott	(Curtiss Robin)	190
5. Ed Novak	(Curtiss Robin)	182
CLASS A GAS (13)		
1. Clarence Myerscough	(Ranger)	476
2. Bob Edelstein	(Ranger/Bantam)	458
3. Mitch Post	(Thermal Thumber)	454
4. Jim Walston	(Stormer/Arden)	353
5. John Bortnak (Can.)	(Interceptor)	319
BABY R.O.G. (Mass Launch)		
1. S. Ligarski	*(Cloud Chaser)*	*LMD*
HAND LAUNCHED GLIDER (24)		
1. Dick Sherman	(Hervat)	360
2. J. Langelius	(Huguelot)	276
3. Joe Fiorello	(Hervat)	233
4. B. Oliver	(Huguelot)	233
5. Walt Eggert	(Huguelot)	230
POWER SCALE (1)		
1. Ken Hinton (UK)	(DH Tiger Moth))	120
CLASS B CABIN GAS (9)		
1. Jim Walston	*(Dodger)*	*360*
2. Brune Markiewicz	*(Dodger/KB 29)*	*360*
3. C. Myerscough	*(Dodger/Remco)*	*358*
4. Hans Ochsner	*(Dodger/Remco)*	*259*
5. B. Oliver	*(So Long/OR 23)*	*236*

SMALL PYLON GAS (8)		
1. D. MacLeod (Can.)	*(Alert)*	*360*
2. Jo. Barker	*(Alert/Hornet)*	*300*
3. Frank Fay	*(Winged Yankee)*	*286*
4. W. Johnson	*(Thermal Thumber)*	*285*
5. Jim Coffin	*(O.O.S./OS 15)*	*284*



17. Old Timers never fade away, they just look that way! Carl Hatrak, kneeling, with Bert Pond, Mickey DeAngelis, and John Pond.

18. Englishman Ken Hinton comes over for the SAM Champs regularly. Won the gas power F/F Scale with DeHavilland Gypsy Moth.

CLASS C CABIN (12)

1. Mitch Post	(Playboy/Cyke)	360
2. C. Myerscough	(Playboy/OS 40)	355
3. John Bortnak (Can.)	(So Long)	347
4. John Lessig	(Super Quaker)	333
5. G. Martha	(Dodger/OR 33)	315

COMPRESSED AIR (5)

1. John Stott	(McMahon)	327
2. Karl Spielmaker	(Drone)	218
3. Ed Konefes	(Orign.)	308
4. Tom McCoy	(Robin)	43
5. Robt. Pattison	(Drone)	39

LARGE CABIN GAS (5)

1. Ed Konefes	(Bombshell)	324
2. D. McLeod (Can.)	(So Long)	315
3. Bruno Markiewicz	(Playboy)	308
4. Tom Lucas	(Playboy Cabin)	201
5. T. Lewis	(Powerhouse)	41

TWIN PUSHER (Mass Launch)

1. John Stott		*LMD*

.020 ELECTRIC (3)

1. Joe Beshar	(Playboy)	285
2. Bill Baker		178
3. Fred Koval	(Bombshell)	157

RUBBER STICK (24)

1. Bill Baker	(Lanzo)	818
2. R. Lipori	(Ritz)	645
3. Stan Colson	(Lanzo)	512
4. R. Thompson		510
5. J. McCay	(Stickler)	370

CLASS B PYLON (10)

1. Bruno Markiewicz	(Zipper)	655
2. Elmer Jordan	(Zipper)	360
3. John Bortnak (Can.)	(Diamond)	360
4. Herb Wahl	((O.O.S./OR 23)	355
5. Mitch Post		352

30 SECOND ANTIQUE (10)

1. John Bortnak (Can.)	(Gas Bird)	461
2. C. Myerscough	(Gas Bird)	455
3. B. Markiewicz	(Gas Bird)	360
4. Herb Wahl	(Clipper/OR)	352
5. Elmer Jordan	(Clipper)	346

NOSTALGIA (.081-.65) (10)

1. Bob Edelstein	(Spacer)	360
2. D. MacLeod (Can.)	(Y-Bar)	356
3. John Bortnak (Can.)	(Y-Bar)	323
4. S. Landy	(All American)	307
5. P. Nelson	(Kiwi)	286

RADIO CONTROL ASSIST OLD TIMERS

1/2A TEXACO (38)

1. Jim Reynolds	*(Interceptor)*	*1755*
2. Bob Walter	*(Lanzo Bomber)*	*1717*
3. Art Peterse	*(Swoose)*	*1652*
4. Joe Percy	*(Bomber)*	*1520*
5. R. Langelius		

TEXACO (36)

1. Tom McCoy	(Lanzo Bomber)	2535
2. Bruce Norman	(Bomber/OS 60)	1903
3. Jim Reynolds	(Bomber/OS 60)	1828

16. Dick Sherman with Gordon Light 1935 Wakefield Winner. Believe it or not, this old goat won the Hand Launched Glider event! Photo: Johnson.

4. Steve Boucher	(MG/OS 60)	1714
5. Bob Walter	(Bomber)	1704

CLASS A IGNITION (16)

1. Bill Schmidt	(Playboy/Arden)	1260
2. Eut Tileston	(Corsair/Elfin 2.49)	1116
3. Jim Reynolds	(Bomber/Elfin)	1109
4. Bruce Norman	(Bomber)	1078
5. Joe Percy	(Bomber)	1006

CLASS B IGNITION (18)

1. Bill Schmidt	(Playboy/McCoy)	1599
2. Jim Reynolds	(Bomber/Orwick)	1530
3. Bruce Norman	(Bomber/Forster)	1520

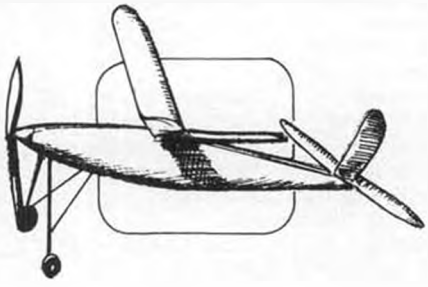
Continued on page 97

Bebe Contest Special

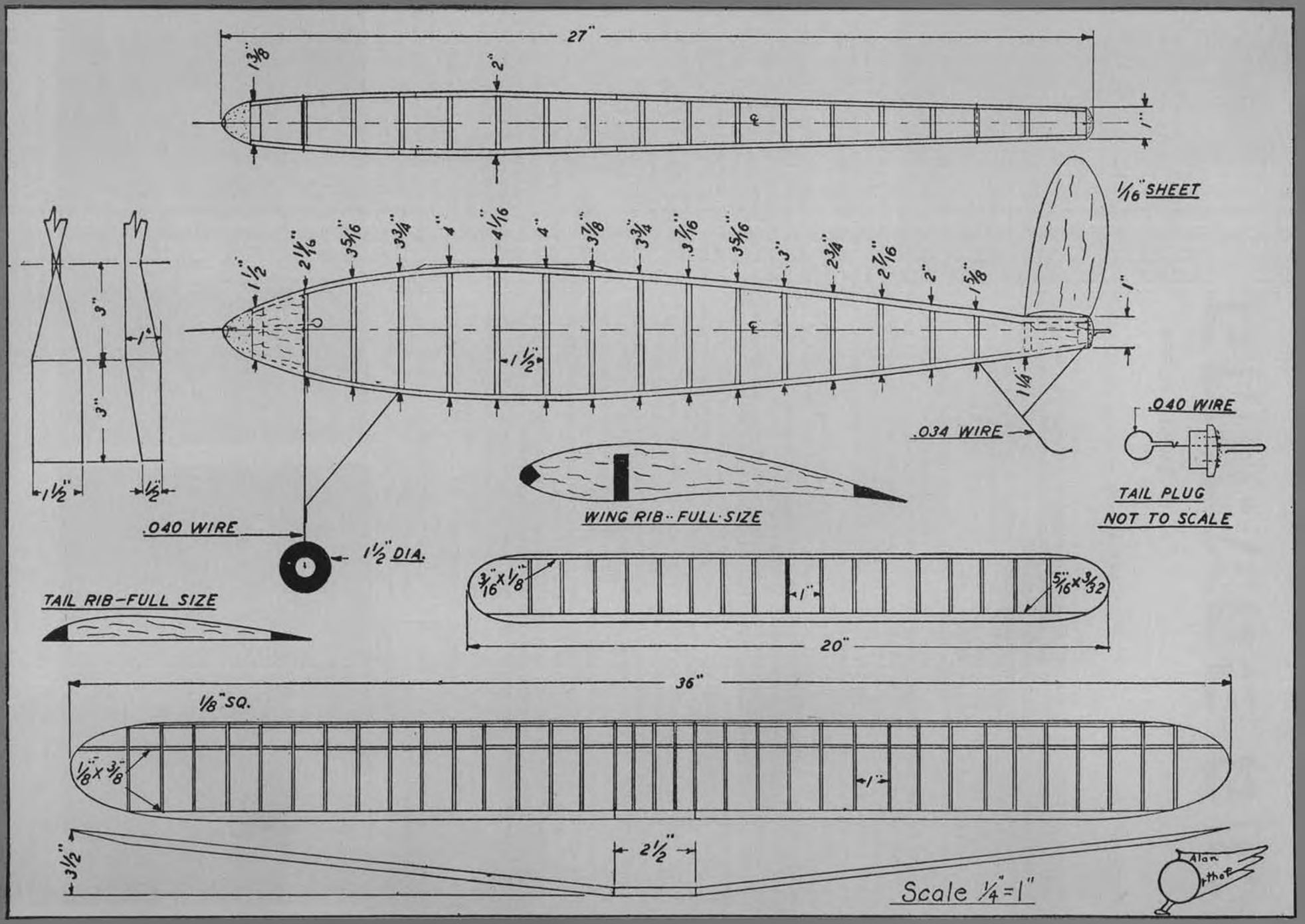
OLD TIMER of the Month

Design by: Alan Orthof

Text by: Richard Dowdy



• Here's a rubber-powered flyer from the July, 1939 issue of *Flying Aces*. Designed by Alan Orthof, the Bebe was described in the prosaic language of the day as "A lulu in any language!" Designed as a safe and sane craft for sane modelers, the Bebe Contest Special averaged flights of better than two minutes, with a wing area of 100 square inches, and a flying weight of three ounces. The wingspan is 36 inches. Power is 14 strands of 1/8-inch rubber. With a high aspect ratio wing and stab, the Bebe should be a fast, steep climber with a quick pullout on top, ending with long beautiful glides. Careful, the prototype was said to fly out of sight on several occasions! •


27"
1 3/8"
2"
1"
1/16" SHEET
1 1/2"
2 1/16"
3 5/16"
3 3/4"
4"
4 1/16"
4"
3 7/8"
3 3/4"
3 7/16"
3 5/16"
3"
2 3/4"
2 7/16"
2"
1 5/8"
1"
1 1/2"
1 1/4"
3"
3"
1"
1 1/2"
1/2"
.040 WIRE
.034 WIRE
.040 WIRE
TAIL PLUG
NOT TO SCALE
WING RIB - FULL SIZE
1 1/2" DIA.
TAIL RIB - FULL SIZE
3/16" X 1/8"
1"
5/16" X 3/32
20"
36"
1/8" SQ.
1/8" X 3/8"
1"
2 1/2"
3 1/2"
Alan Thor
Scale 1/4" = 1"

R/C SOARING

By BILL FORREY

Paul Carlson at the Great Race 10 with his two meter Prodigy sailplane. Took the Lee Renaud Memorial Trophy at the Nats with the best combined score in Classes B,C, and D with the Prodigy.

IT'S YOUR TURN

• This month's column is going to have a strong emphasis on what you guys out there have been sending in over the past few weeks and in some cases, months. It is my pleasure to turn over the thoughts and ideas of this column to you; for one reason, it's easier for me to simply edit ideas rather than originate them, and for another reason, it will pump a little additional fresh air into what *I hope* never becomes a stale column.

AIRFOIL OF THE MONTH: NACA 2409

A while back I received a phone call from a guy named Randy Hough. He lives in Belmont, California (about halfway from San Jose and San Francisco). He asked me for some data on the Gottingen 795 airfoil, and then we got to talking about an airfoil that he had tried on a Sagitta 600, the NACA 2409. This airfoil, said Randy, penetrated very well, appeared to have plenty of camber (2%), and flew "better" than his stock Sagitta wing with the Airtronics version of the Eppler 205. The wing loadings of the two ships, both of which were polyhedral by the way, was between nine and ten ounces per square foot for the stock Sagitta 600, and eight and a half for his NACA 2409 version. Both ships were two meters in span.

Because I haven't featured an "Airfoil of the Month" for the last two issues, I thought it would be best to lead off with one this time. If you decide to try this section on a glider, please let me know, and that goes for other sections that you've seen printed here previously.

The profile polars that I have for the NACA 2409 are not truly *profile* polars at all, rather the total lift, drag, and L/D polars for a *wing* of aspect ratio 6:1, and those at Reynolds numbers 3,110,000, a far cry from where we fly! For a nine-inch chord to reach a Reynolds number that high, it would have to fly around 440 mph!

The polars that I have for the NACA 2410 are profile polars, but again, at a Reynolds number of 3 million exactly. So even for this close relative of the NACA 2409, the data I have is useless. I hope you can forgive me for the omission of this data (You're probably thanking me!), and I'll try harder next time.

Additionally, wind tunnel data like that which I found above rarely matches the data generated by computer programs such as the famous Eppler program, especially when the wind tunnel data is fifty years old or older! It's kinda like comparing apples and oranges!

If any of you out there have a good source of data for odd-ball airfoils and old NACA sections, please let me know.

SUNRISE HLG

A while back I wrote to a club officer of the Portland Area Soaring Society (PASS) inquiring about a hand launch glider which was showing up in the winner's circle quite frequently. It was only ID'd as an original design, not a kit. My curiosity was aroused.

The reply I got back came from the plane's designer and pilot, Craig Robinson, of Portland, Oregon. I quote from his letter:

"Dear Bill, I am very pleased with your interest in the PASS club, and would like to thank you for inquiring about my Sunrise R/C HLG design.

"The Sunrise was designed three years ago and has placed in every contest entered with three first places, one second, and two third places. This airplane was designed before the 1-1/2 meter rule and is over the wingspan limit for AMA (*Class A*) competition.

"The PASS HLG fliers have found that increasing the aspect ratio/wing area of the many good kits and designs available greatly improves their light lift performance for this type of flying. We feel that the 1-1/2 meter rule is overly restrictive, and serves no constructive purpose.

"I have sold many plans, and the kits are doing well. However, I am limited to producing my kits on a spare time basis, and I still have some jigs to set up. my goal is to produce a kit of highest quality, with guaranteed performance."

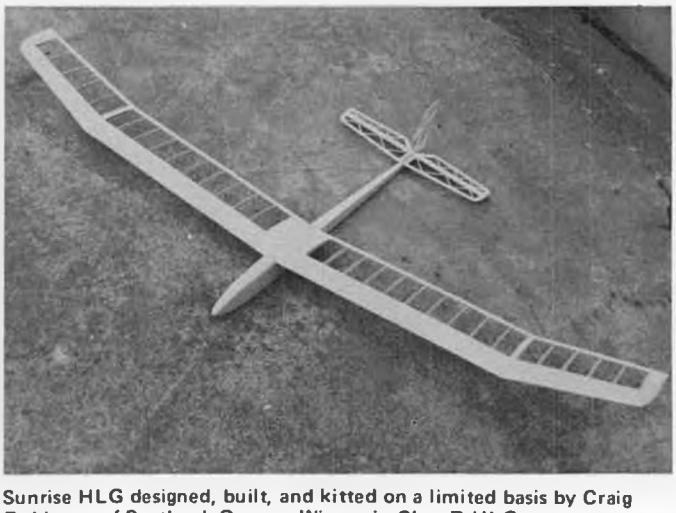
Sunrise specs followed:

Wingspan:	66.75 in.
Wing Area:	443 sq. in.
Flying Weight:	11-13 oz.
Airfoil:	E-387
Kit Price:	$34.00

"Thank you very much for your time and interest. Please call or write if you have any questions. Sincerely, Craig W. Robinson, 2105 S.E. 85th Avenue, Portland, Oregon 97216, (503)777-5250."

Craig's letter brings up a sentiment that I hear quite often regarding Class A wingspan limitations, namely, why have any? The argument goes: if bigger airplanes can't be thrown as high as the little ones (and

Bob Taylor built this Randy Wrisley-designed Whisper and claims that it is all as advertised, a real floater.



Sunrise HLG designed, built, and kitted on a limited basis by Craig Robinson of Portland, Oregon. Winner in Class D HLG.

they generally can't), then they have a built-in handicap which evens things out against their better L/Ds and sink rates. Also, the bigger the ship, the wider the minimum diameter thermal turn, which works against the bigger ships because of the often tightly cored low-level thermals, this further offsets some of the L/D-sink rate advantage.

I tend to agree with Craig and the PASS club, and I know of at least one other club in my area which feels the same way. However, I'm not in favor of changing the classification for one reason, I think that the span limitation forces you to improve your building, designing, and flying skills to be competitive. I find that challenging. Besides, there is nothing in the rule book which *forbids* you to have a hand launch contest for Class B, C, or D sailplanes, is there? As I see it, the Class A airplane (under 1.5 meters projected span), even though it is called "Hand Launch Sailplane" in the rule book, is only a definition of a limited span glider, that's all, just like two-meter, 100-inch, or unlimited span classes. Anyone for a Class D hand launch contest? I think I'd build a really lightweight, 90-inch Mirage!

If you have any opinions on this subject, I welcome them, and promise to air them here in "R/C Soaring."

A PROBLEM WITH SHRINKAGE

Over the years, I've been communicating with a modeler, gunsmith, antique model motor and firearms collector, mechanic, and jazz musician (whew, that's a lot of knowledge), by the name of Philip (Phil) Mahony of Lime Rock, Connecticut. The subjects are far ranging (as you might guess), but his original purpose in writing was to challenge me to an article on covering models with a covering material that he saw I had used in a product review of an Old Timer called the Lehmberg Feather Merchant. Well, that article may yet be written, but Phil's problem was solved early this year at the WRAMs Show. Evidently, a certain trio of colors of this brand of covering were turning up with very little ability to shrink. The other colors were shrinking just fine, so the manufacturer traded Phil out of his three colors and gave him three different ones. I had noticed that this material didn't shrink as much as I would have liked it to in these same three colors, but I managed to massage out nearly all of the wrinkles by stretching it taut as I sealed the edges, before shrinking it. I didn't mind the few wrinkles there were in the compound curves anyway.

Since this one model, I have covered two more using this material and encountered absolutely no problems at all, and one of the colors I used was the one I'd had trouble with before. The point to all of this is that if you encounter a problem with a product (any product) that in your opinion is defective, return it to the manufacturer. Nine times out of ten they'll fix you up with another product (any product) that in your opinion is defective, return it to the manufacturer. Nine times out of ten they'll fix you up with another product (or replacement) that is going to work for you. At the very worst, they'll return your product to you with a suggestion or two on how to fix what you bought. Don't do what a lot of guys do; give the manufacturer a chance, after all, they can't make money if their customers hate their products. Chances are they will want to stay in business! Thanks for being so persistent with your quest for an answer, Phil. We all learned a lesson.

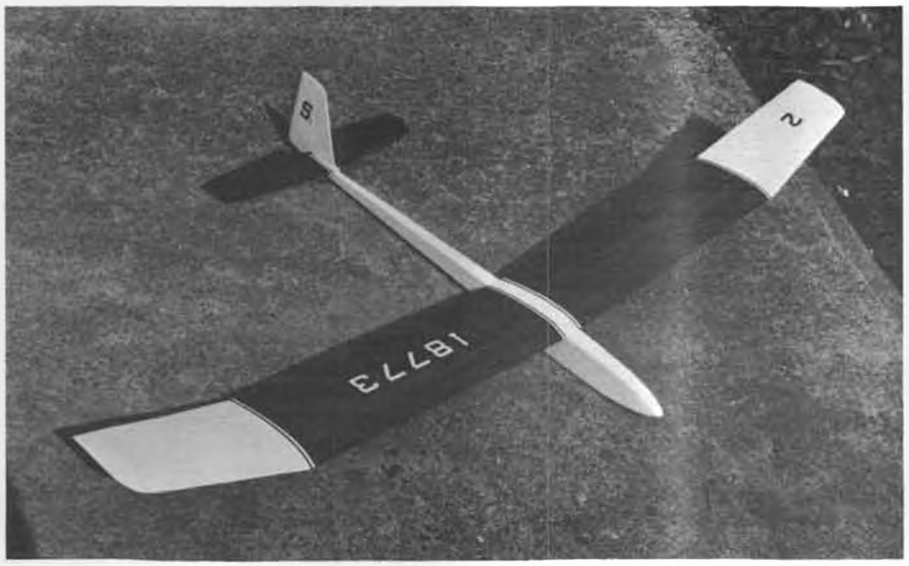
Paul Carlson again, this time with 100-inch Prodigy. Off the Ground Models may kit this plane as an Unlimited or Standard Class ship at builder's option.

WRISLEY WHISPER, WATTA WONDER!

'Way back in August 1984 issue of this magazine there was a construction article on a glider that at first I thought was a towline F/F model, and second, thought would never be able to turn if it was R/C. Well, in talking to its designer, accomplished model builder, Randy Wrisley, I inadvertently offended him by suggesting that it couldn't handle much with that kind of dihedral in just the tip panels (which were tiny!). He asked me if I was the betting kind, and if I would be interested in putting my money where my mouth was. I backed down. He invited me to fly the model at dawn the next day. I accepted.

To make a long story short, it did indeed fly as advertised: slowly and majestically, and it did turn rather well, if a lot *flatter* than any other plane I'd ever flown before! But it

Team Captain and pilot of the winning Great Race team Larry Jolly with the LJMP Comet.



The Sunrise, covered and RTF. High aspect ratio wing is very attractive and efficient.

Super Pieceadis held by Keith Shaw. E-387 airfoil, 20:1 aspect ratio, 15 oz/ft., with Ken Bates on the sticks, finished 76 km course in '83 to win.

Steve Grochowski and the Slope Master. Larry Fogel says it can really perform. See text for details.

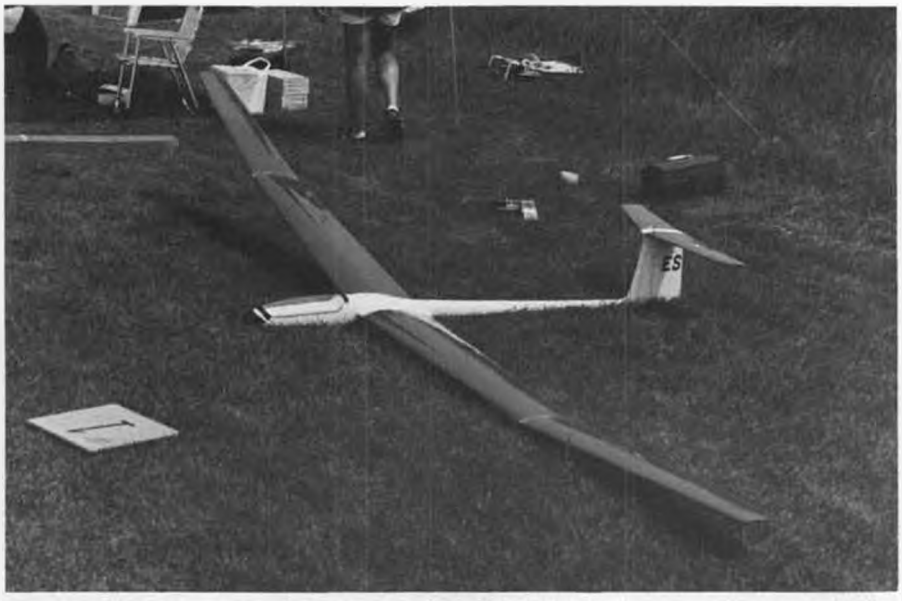
did fly well. I was making flights of three minutes from about 100 feet at 7:30 a.m. with no apparent lift. I was amazed!

Well, Bob Taylor, of Fullerton, California, was amazed enough by the article that he built one for himself. He sent me the photos to prove it. (I guess everybody thinks they need to prove something about the Whisper!) I quote from his letter:

"Hello Bill Forrey, do you see the picture? (*I do, I do!*) It's a Whisper out of *Model Builder* plans in the August 1984 issue. It takes me a while to get around to some projects. Actually, I didn't order the plans (*For shame!*), but scaled up the drawings in the magazine. I deviated in construction methods (*I promise not to tell!*), but the dimensions and shapes are all true to the plan. The fuse is not covered to save weight in the tail, and the fin is 1/16 sheet balsa, also uncovered. The wing and stabilizer are covered in yellow Micafilm. The all up weight is 10 ounces. I tried everything to keep the weight to eight ounces, which it is supposed to weigh. I don't know how they did it. The radio is a Futaba 4L with micro (S-33) servos and 100 mah battery.

"It flies fantastic. The *VERY* lightest lift it will fly in with ease. I have sloped it with almost dead calm conditions; i.e., two or three mile per hour breezes. At the slope where I fly, the other guys rub their eyes and shake their heads when they see me fly my Whisper, and they are all sitting around waiting for the wind to come up. It will do loops and inverted flight too!

"I agree with the article when it states the Whisper will do almost bankless turns with little elevator needed. It's a very stable plane too, as good as any I have built. I can't say enough good things about this plane. I consider it a good candidate for a hand launch model. The next one I build will be strong enough for a (*hand*) launch. Yours truly, Bob Taylor."



Stan Watson's Pegasus with modified NACA 4412-R412C. At 184-inch span it's one of the biggest; 22:1 AR; dry wing loading 16 oz/ft; no flaps or spoilders. Completed the Great Race 76 km course first time out during initial testing.

FLYING WING OVER TORREY PINES

Former *Model Builder* "R/C Soaring" columnist, Larry Fogel, dropped me a note two months ago to let me know of a new flying wing kit on the market. He thinks it's a "fine plane, worthy of the publicity," and from what I can see, I would agree. So with no more from me on the subject, I'll turn over this section of the column to my predecessor:

"Although not in print for some time,

Mark Stidham and fellow Rockford Skyhawks pose with Graupner Discus scale model. Fast, remarkable L/D, good thermal ship.

Airtronics Sagitta XC, a team-owned sailplane, with Rockford Skyhawks.

Larry Fogel is still very active in sailplaning. He reports a new addition to his aerobatic armada. And that doesn't happen unless the sailplane can *really* perform!

"It seems that Steve Grochowski enjoyed his Gryphon (*Flying wing from Bob Martin Models*), but he wanted it to be faster, more agile, and, of course, less clumsy in his Volkswagen. The answer: cut the wing to 51-inch span, thin the airfoil to 8%, and add two slightly toed-in vertical stabilizers. The resulting Slope Master zips through inside and outside loops, rolls, snap rolls, tail flips, and whatever else your finger commands. It weighs 17 ounces using Futaba S-33 micro servos and a mechanical sliding tray coupler.

"I'm usually skeptical of flying wings. No respectable airplane should go around without a proper tail. They're too short-coupled and therefore unstable. But here that's the very key to agility, and, if you balance your Slope Master properly, it stays straight and level, hands-off.

"You can find out more about the Slope Master in kit form by contacting Steve Grochowski, 4791 Neblina Drive, Carlsbad, California 92008, (619)434-4492."

The photos were sent by Steve himself, and he included a nice-looking business card with a line drawing of the Slope Master printed in raised blue ink with the name "Sun Fair Aircraft Design" on it. Looks like Steve means business!

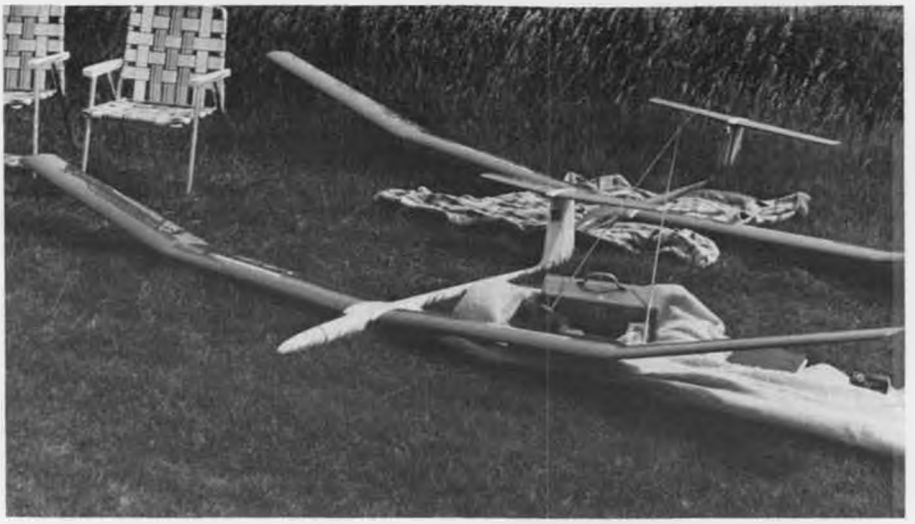
TERRY LUCKENBACK LSF LEVEL V #48

For the uninformed, LSF stands for League of Silent Flight. The LSF is a non-profit organization of worldwide renown devoted to the betterment of R/C soaring in general and the self-improvement of its member's flying skills in particular. The LSF has given level numbers of correspondingly more difficult achievement from Level I to Level V. The familiar LSF decal and roman numerals being somewhat omnipresent at soaring contest attests to the popularity of the program.

Well, in a letter dated June 11, Rich Border, Co-Editor of the Millstone Valley Silent Flyers' newsletter, the *Excess Ballast*, writes that we now can recognize Terry Luckenback as the newest Level V'er. To give you some perspective on the significance of an LSF Level V award, let me go over the prerequisites.

"Level V (Advanced): Level V is formulated to recognize advanced knowledge, skill, and determination in R/C model soaring. Skill in slope soaring is mandatory, as Level V is intended to delineate extensive experience in all facets of R/C model soaring. The earned silver 'V' will be displayed immediately above the red 'IV.'"

Ken Bates and his horse with no name. This 169-inch span, modified E-214 with no flaps completed the Great Race course in 1985.



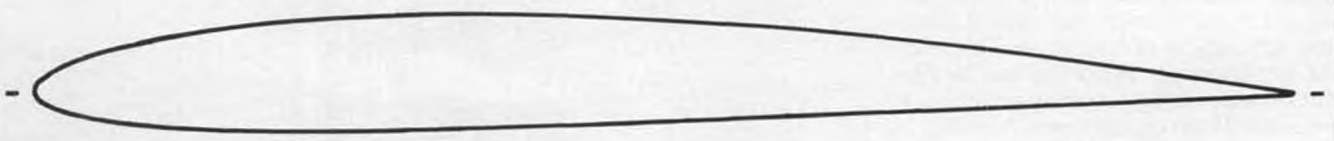
Dale Folkening's Dynasoar: E-193 section; 16 oz. loading; piloted by Jack Hiner. A heavy wind ship.

Under the watchful eyes of two witnesses of LSF Level II or higher, not related to the pilot, the Level V aspirant must do the following: complete a thermal flight of two hours; complete a slope flight of eight hours (oh, my aching bladder!); complete a goal and return flight out to 10 kilometers and back; and fly in six contests (minimum of 20 contestants) where your total points equal 12,000 (using the LSF points system) and you must win three of the six. Of course, you must finish all of the requirements of Levels I-IV before attempting V, but that's pretty obvious, right?

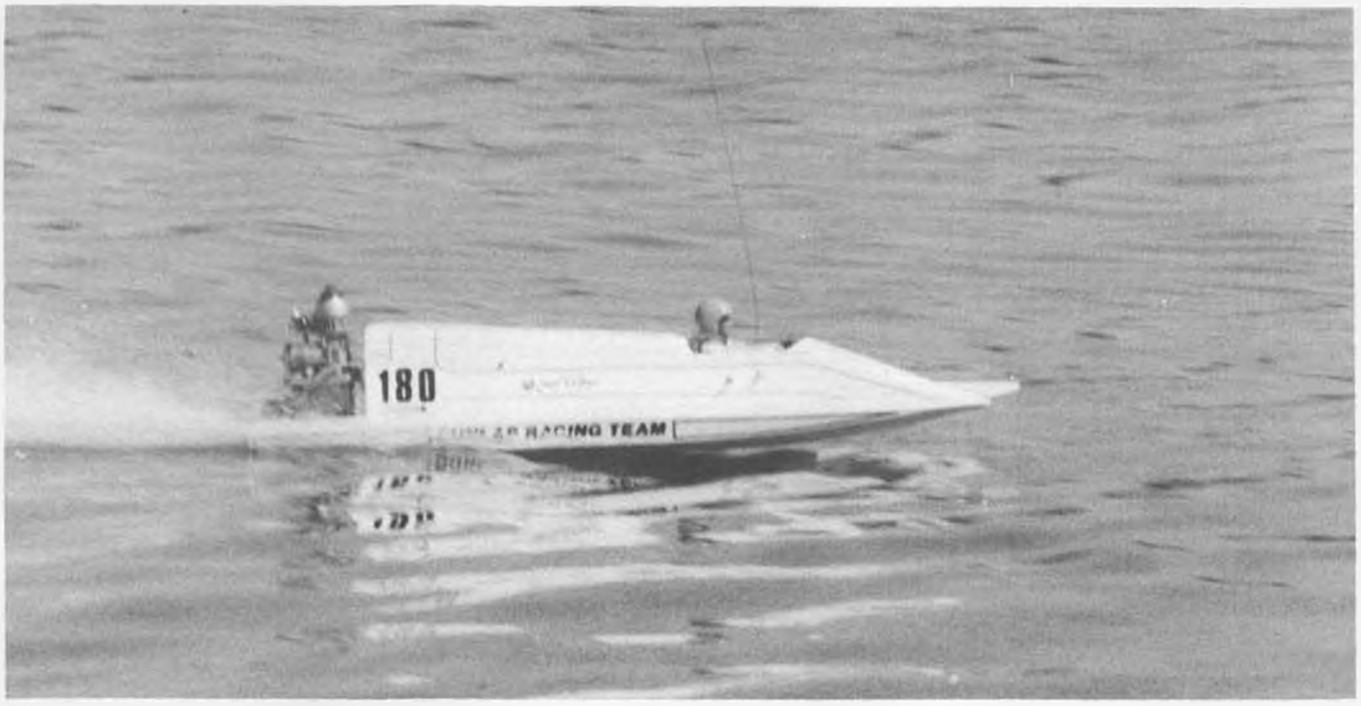
Well, if you are interested in the above mentioned LSF Soaring Accomplishments Program, you should contact the LSF at P.O.

Continued on page 70

NACA 2409



Sta.	0	1.25	2.5	5.0	7.5	10	15	20	25	30	40	50	60	70	80	90	95	100
Up'r	0	1.62	2.27	3.20	3.87	4.43	5.25	5.81	6.18	6.38	6.35	5.92	5.22	4.27	3.10	1.72	.94	.10
Lwr	0	-1.23	-1.66	-2.15	-2.44	-2.60	-2.77	-2.79	-2.74	-2.62	-2.35	-2.02	-1.63	-1.24	-0.85	-0.47	-.28	-.20



Building the Dunlap 11cc Tunnel Boat

By JERRY DUNLAP. . .Here's the solution to the "what to do with the K&B 11cc outboard" puzzle. This tunnel boat design has a scale-like appearance, and has nearly broken the 11cc oval record time.

• In the spring of 1985, K&B Manufacturing released the 11cc outboard for model boating use. The immediate problem for those of us with this "Big Fella" was what hull to use with the motor. The answer for most model boaters who had the 11cc OB was to simply bolt it on to their 7.5 tunnels. This rather simple solution seemed to work for those who had 7.5 tunnel hulls like the Prather 7.5 Tunnel.

However, it was my feeling that the 11cc OB deserved a hull of its own. I designed a 38-inch tunnel in 1985 that worked fairly well. In hopes of keeping the boat from flying off the water too easily, a narrow tunnel width was used. Well, the narrow tunnel width did seem to keep the boat from blowing over down the straightaways, but the boat occasionally rolled over in corners. My first attempt at designing a 11cc tunnel proved "sorta successful." The boat finished second in our district's 11cc Tunnel Class and was capable of running very close to the record time for 11cc tunnel oval racing. But because of the cornering problems, I felt some design changes were in order.

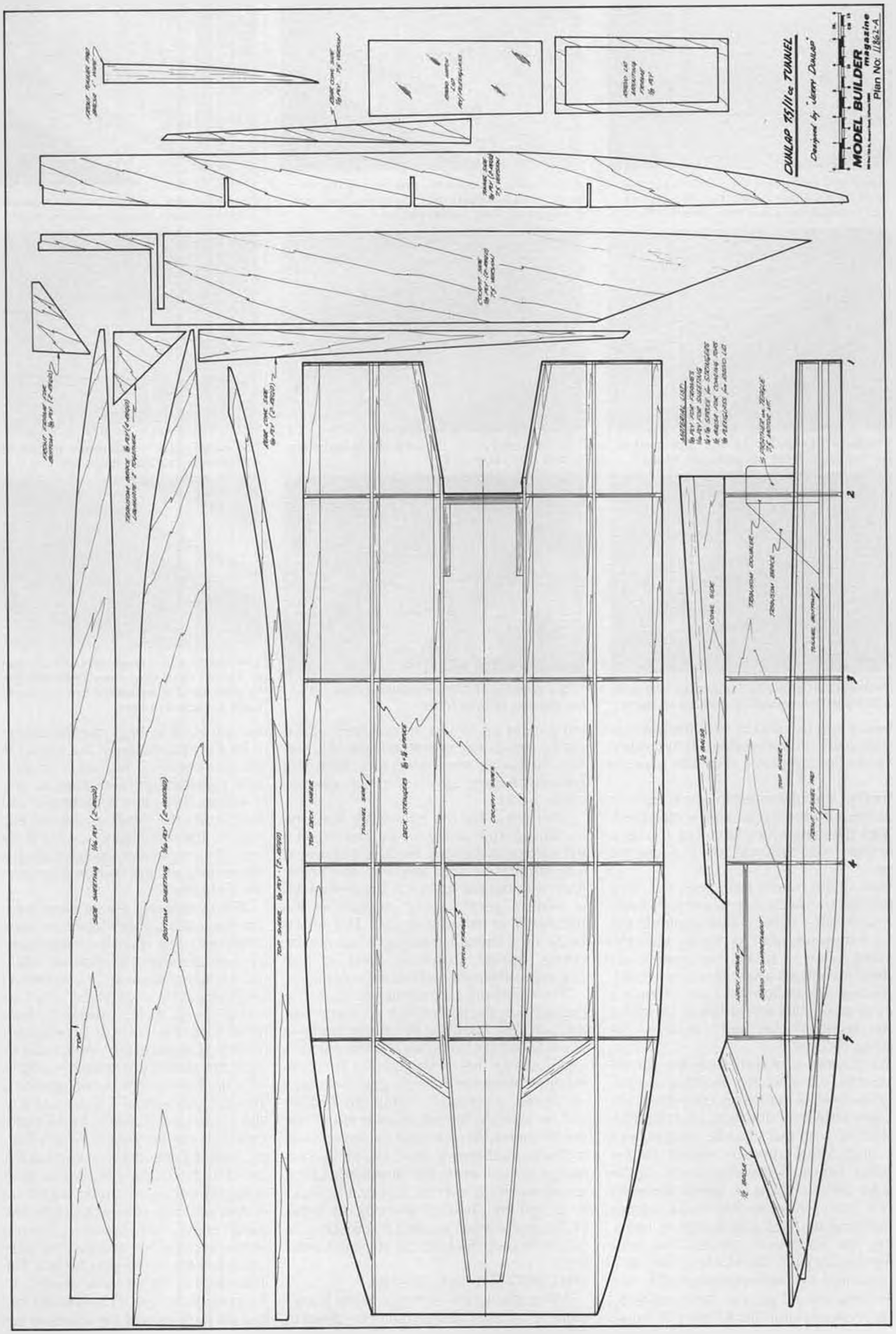
It was an unexpected November snowstorm that gave me the time to get back to the drawing board. The school district for which I work elected to close down for three days during the storm and the weather didn't allow much outdoor activity that wasn't related to playing in the snow. The new boat was shortened to 36 inches in length and the tunnel width was increased by an inch.

My latest tunnel designs incorporate things that have proven successful on model tunnel designs, especially those model tunnels designed by my friend, Rod Geraghty. Compared to boats I designed a couple of years ago, the 11cc tunnel features sponsons that are narrower and with increased sponson angle. The tunnel center section is much thinner. The engine is recessed forward in the hull. The cockpit extends farther forward allowing radio equipment to be moved forward in the hull. Scale-like appearance is something I've always attempted to incorporate into my tunnel designs. I feel the 11cc tunnel has a very scale-like appearance.

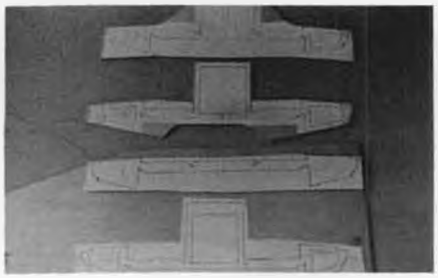
GETTING STARTED

It will be necessary to transfer the plans onto the plywood used for framework and sheeting. One method to accomplish this initial task is to make templates for all the parts. This can be done by affixing the plans to a heavy paper such as tagboard. Tagboard is fairly stiff yet can be cut with scissors. A product like 3M Super 77 Spray

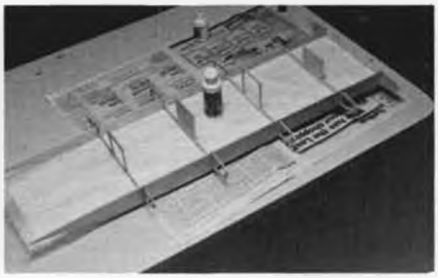
This 11cc tunnel boat was designed specifically for the K&B 11cc outboard motor. The tunnel boat has had considerable success, coming close to the 11cc oval record running time.



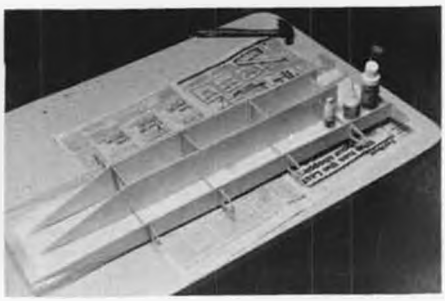
FULL–SIZE PLANS AVAILABLE–SEE PAGE 106



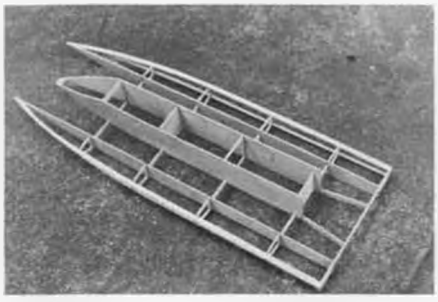
One way of transferring the plans to the plywood is to use a spray adhesive. The frames are cut out and the plans then peeled off.



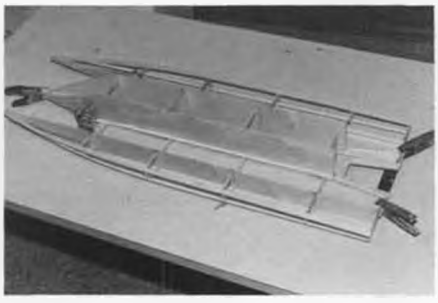
A flat surface is used for assembling framework, which is built over the plans. Sponson frames and cross frames shown here.



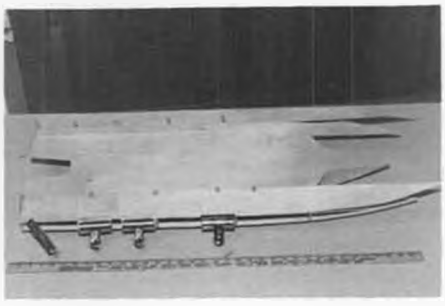
Cowling frame is added to the framework. Use of thick instant glues is recommended.



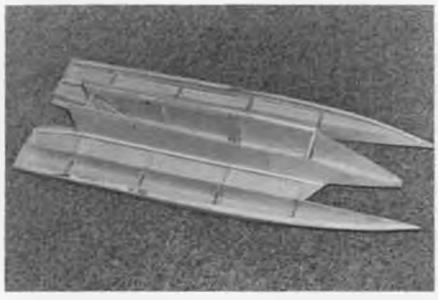
The completed framework. It's important to check framework for warps at this time.



The sheeting for the tunnel bottom being applied to the framework.



The sheeting for the sponson bottom attached and clamped to the framework.



The bottom half of the hull is sheeted and ready for sealing before attaching decking to frame.

Front cowling of 1/2-inch balsa shown ready for shaping to final form.

The radio compartment has lots of room. Use of a super heavy-duty servo like the World Engines servo is necessary for turning the 11cc K&B outboard motor.

Adhesive can be used to stick the plans to the tagboard. It is rather difficult to use just the plans for templates since the paper is thin.

Another way of transferring the plans is to stick them on the frames and scrape them off after the frames have been cut. It takes a little time to do this, and you also lose the plans.

After all the frames have been cut, they should be checked for fit where they interlock with other frames. Trial assemble the entire framework prior to placing it on the building fixture. It is very important to do the final framework assembly using a building fixture. The building fixture is simply a piece of wood the same width as the inside of the tunnel. I use 1-inch plywood for building fixtures.

Using spray adhesive, stick the tunnel framework plans to the building fixture. Place a sheet of waxpaper over the plans and assemble the framework on the building fixture. Map tacks can be used to hold the longitudinal sponson frames to the building fixture. Score the inside of the cockpit frame where it bends between frames 2 and 1. After the framework is properly aligned on the building fixture, begin gluing the framework pieces. The new thicker instant glues like Hot Stuff Special T are excellent for framework assembly because they will fill gaps in the framework. Using an accelerator like Kick-It will cause the glue to set almost immediately, allowing for very quick framework assembly. Before removing the framework from the building fixture, attach the top sponson sheer pieces.

After removing the framework from the building fixture, place the framework on a flat surface and check the hull alignment. The bottoms of both sponsons should be level with the flat surface. If the framework is twisted, gently apply pressure to the framework to remove the warp. The importance of a straight framework cannot be overly stressed. Continue checking hull alignment throughout the building process.

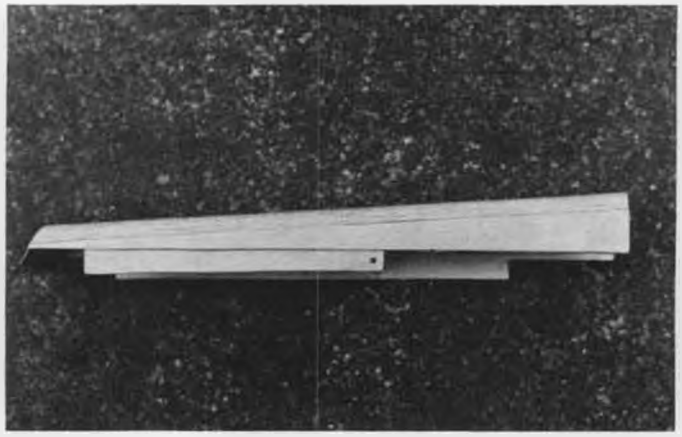
The framework can now be completed by cutting away the part of Frame 1 that needs removal. The frame for the motor mount is glued to the cockpit sides and the reinforcing pieces for this frame glued to the cockpit sides. In front of Frame 5, glue the pieces of 1/8-inch plywood to which the bottom will be glued to form the pickle fork. Glue the 1/4-inch x 1/8-inch spruce stringers used on the tunnel bottom, deck, and for the bottom sponson sheer to the framework. Using a sanding block, level the framework pieces to accept the plywood sheeting. Be especially careful when sanding on the sponson frames to keep the bottoms of these frames flat.

SHEETING THE 11cc TUNNEL

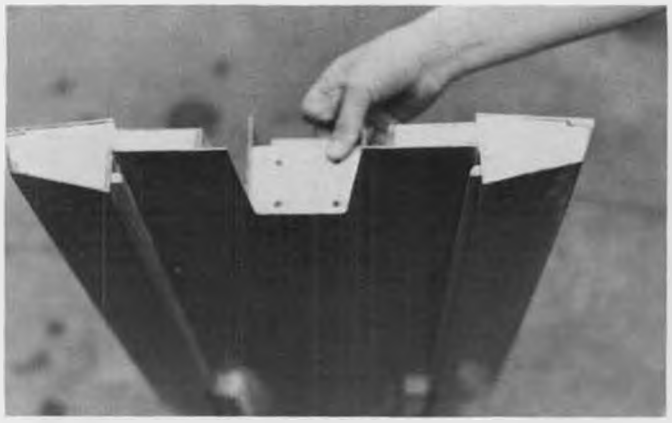
Before gluing any sheeting to the framework, it is a good idea to trial fit the piece to be sure of the fit. Begin the sheeting process with the application of the tunnel floor to the framework. The thicker instant glues will provide sufficient time to align the sheeting. If you feel confident in your ability to apply the sheeting, you can apply the glue to the framework, spray the sheeting with the accelerator, and slap the piece on the framework. Just be sure you have it right the first time.

Before applying the sponson bottoms to the framework, check again for framework alignment. The sponson bottoms are glued on next and then the sponson side pieces. Bill Hunter of Satellite City, providers of Hot Stuff products, once asked why I was still using clamps to hold pieces to the framework when the use of an accelerator makes clamping unnecessary. Well, I like to make sure the sheeting is properly aligned and you do have a little working time with a product like Special T if you use it without the accelerator. I've also found that the accelerator can be used to hasten the curing by spraying after the sheeting has been applied to the framework. Before gluing the sponson deck and center sections to the framework, paint the inside of the hull with clear epoxy. The sponson sheeting and center section sheeting are then applied to complete the sheeting to the hull. For those interested in saving some weight, it would be possible to use 1/32 plywood for sheeting all parts except the sponson bottoms.

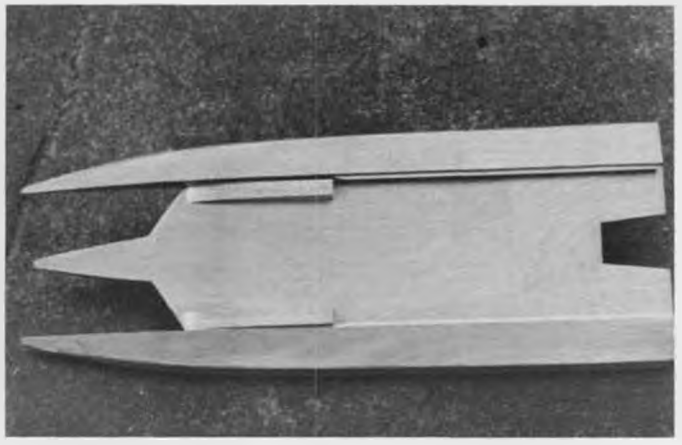
The rear sponson frames are attached to the rear cowl using 4-40 bolts and blind nuts. The top to the rear cowl is then glued in place.



Sideview of the rear cowling.



Spruce strips are glued to the inside of the tunnel sides. The inside tunnel strips are located 1/4-inch up from the tunnel bottom.



The tunnel bottom showing the inside sponson steps and sponson strips.

When trimming and sanding the sheeting pieces, take care to not round the inside and outside tunnel edges. All gaps and seams should be filled with a waterproof-type filler. I like to use automotive body filler and glazing putty. They work easily and are very durable.

MAKING THE COWLINGS

The front cowling for the 11cc Tunnel is very easy to make since it only requires gluing a piece of 1/2-inch balsawood over the cowl frame. Although balsawood is easy to work with, it might be a good idea to use basswood for the front cowl. Basswood works fairly easily and it is much stronger than balsa. The front cowl often seems to be the first part of the boat to meet something like a buoy or the beach.

Building the back cowling isn't too difficult. The cowling itself only has a couple of pieces. However, how the cowl will be held to the cockpit sides presents some choices. Some modelers like to use snap fasteners to hold cowls in place, other like dowels and sliding pin arrangements. Personally, I like to use a 4-40 bolt and blind nut arrangement. A piece of 1/8-inch plywood is glued to the inside of the rear cowling frame and a hole is drilled through the cockpit side and through this piece of wood. A blind nut is placed in the wood backing piece and the bolt holds the piece down to the cockpit side. I bolt both rear cowl frames to the cockpit sides and then glue the cowling top to the cowling frames. In this way, the framework is held in place while the top is glued to it.

INSTALLING THE RADIO EQUIPMENT

There is lots of room in the 11cc Tunnel for installing the radio equipment. A servo tray can be made from 1/8-inch plywood for mounting the rudder and throttle servos. The choice of a rudder servo is very important. It requires considerable servo power to pull the K&B 11cc OB through a corner. A standard servo just isn't going to get the job done. On my first boat for the 11cc OB, I tried coupling two heavy-duty servos together. I experienced more problems than it was worth. So, I got a super heavy-duty World Engine servo. This is a really large servo with lots of power. The size is no problem because of all the room in the radio compartment. I have found this servo and the IMS super heavy-duty servo to work just fine for the 11cc Tunnel. A standard servo will work fine for throttle control.

For through the hull seals, I have had good success with G&M Models' seals and Robart seals for connecting the rudder servo to the rudder linkages. Sullivan Products Flexible Cable-Type Stock #508 works well for the throttle linkage. All my tunnel boats are now using solid linkages for steering. 1/4 x 1/4 spruce stringers work fine, or 1/4 dowel can be used. If one wants to spend the money, it's possible to use arrow shafts for the linkages.

THE RADIO HATCH LID

Keeping water from the radio equipment is critical and the radio hatch lid is an area where this can occur if it is not built properly. There are three important parts to keeping water from gaining access to the radio compartment. The first is the wooden frame on the inside of the radio compartment that serves as the seat for the hatch lid. The plans show where this is located. Before attaching the frame inside the radio compartment, use it as a pattern for the hatch lid. The hatch lid can be made of 1/8 plywood, but I think plexiglass or lexan looks nicer. Drill holes through both the frame and hatch lid that will allow 4-40 bolts and blind nuts to be used to hold the hatch lid down on the frame. A minimum of 10 bolts evenly spaced around the lid is suggested.

Another important aspect of the radio compartment hatch is a good seal between the frame and the lid. There are a number of products that will form a seal. The foam tape used for sealing wings to fuselages on model airplanes works well.

The lid itself is important. I mentioned I like plexiglas or lexan. The reason, besides looks, is I think it seals better.

Assuming your hull doesn't leak, there are only a few places water can get into the radio compartment. These are through the seals and hatch lid. Careful installation of these items should go a long way in helping ensure a dry radio compartment.

FINISHING THE 11cc TUNNEL

Earlier in the article the need to paint the inside of the hull was mentioned. This needs to be reinforced because water will sometimes get into the sponsons. If the inside is not sealed with something the wood will absorb water. Another method I use to seal the interior of a hull is painting with

Continued on page 76

European Scene

BY CEES KAIJIM

• Without doubt, the famous Tournament of Champions has been the inspiration of a new competition class, now gaining popularity in several European countries. Aerobatics with large scale-like designs is the name, and the competitors are not only pilots who grew bored with their super fast and often screaming F3A ships, but this class attracts new blood too! In Germany and the Netherlands this new competition class is code-named RC 1/X, RC 1 being the former code of what's F3A nowadays.

In the Netherlands only very simple requirements are set up: the airplane must be a recognizable reproduction of a full-scale one, and in particular the shape of wing, fuselage, and rear surfaces must resemble those of the real one. Minimum span is 2 meters (6 feet, 8 inches) for monoplanes, and 1.80 meters (6 feet) for biplanes. Maximum weight, ready for takeoff, is 12 kg (26 lbs., 10 oz.). There are no restrictions with regard to engine capacity or power, and to stimulate diversification in airplanes entered, a bonus of 10% is given for biplanes. The list of maneuvers, to be executed in the given order within a box of 3 x 60 degrees is as follows:

01. Double Immelman k	= 3
02. Stall turn k	= 1
03. Adverse rolls k	= 3
04. Split-S k	= 1
05. Outside looping k	= 2
06. Split-S (from inverted pos.) k	= 1
07. Figure 8 (horizontal) k	= 3
08. Turn with½ roll k	= 1
09. Square looping k	= 3
10. 1/2 Cuban eight k	= 1
11. Cuban eight k	= 2
12. Immelman k	= 1
13. Spin 2 x 360 degrees k	= 2

For the experienced pattern pilot this Turnaround schedule won't look too difficult. In Germany they have an A and a B schedule, to cater both for the experienced and the novice competitors. Because of the lesser number of pilots in our small country, a single schedule was chosen, with the need to avoid discouragement of would-be competitors in mind with regard to the maneuvers listed.

Until now, the best pilot at the meetings has been Jan van Beek, who has been the Dutch F3A champion several times. He flies a 95-inch CAP 21 from one of Tony Clark's fabulous Practical Scale kits, powered by a 2.7 cu. inch Saito four-cycle twin. The 16-pound ship performs excellently, and the engine provides power to spare. Jan earns a living with his well-stocked hobby shop, and is the Dutch importer for both the Saito and the Tony Clark products. Other designs competing are the Diabolo, the Laser, and an interesting Reed Falcon biplane (92 inches), powered by a 4.8 cu. inch two-stroke. The realistic maneuvers of these large model airplanes attract considerably more spectator interest than the smaller .61 powered ships, but, more important, also a number of pilots who have never been interested in flying pattern before!

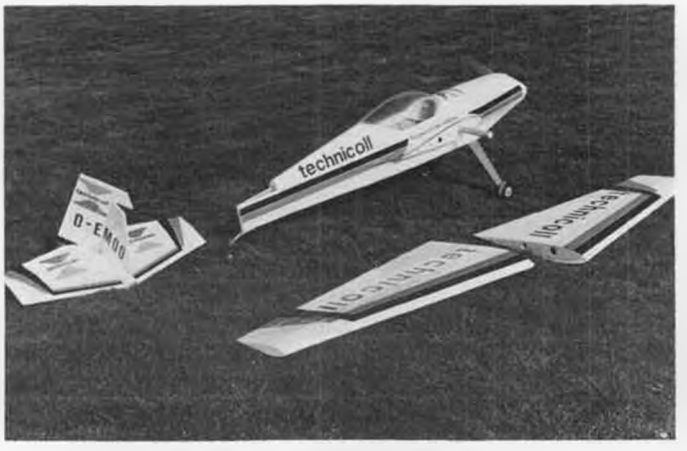
Menke Knol and Willem Wolterink, builders of the 92-inch Reed Falcon. Built from a 3-view from a German magazine, the ship weighs 26 lbs., is all wood, with foam ribs, and is powered by a 4.8 cubic inch engine. Colorful finish is Super MonoKote.

ENGINES

In the May issue of *MB* I wrote about my positive experience with the longstroke OPS 30 Maxi engine. At 1.8 cu. inches, this glow engine performed very well with relatively large props. I also hinted at the possibility of an extensive test report by Mike Bil-

Continued on page 70

A 99-inch span Diabolo, powered by a 3.6 cubic inch AMT King. It weighs 18 lbs., and is suitable for aerobatics.



The Diabolo again, and no, it didn't crash! It disassembles easily for transport. All wood construction, except foam ribs, by Menke Knol.

FIZZ POWER:
More About CO_2

By BILL HANNAN. . .In Part Two we visit Bill Brown, who popularized CO2 power in America.

• We are privileged to present information and rare photographs this month, received from Bill and Dave Brown, of Brown Junior Motors, Incorporated, concerning a pioneering CO_2 engine.

During 1940, Bill Brown IV, well-known for his ignition engines, decided, as he put it: "half-seriously to make a CO_2 engine." A friend had taken him to see some indoor flying scale models being flown in a Philadelphia, Pennsylvania armory. Although Bill was impressed with the models, he felt they might offer more realism and fun if powered by actual engines, rather than twisted rubber strands. He conducted an informal survey among the model builders and they were quick to agree.

Brown next constructed an R.O.G. approximately the size of the flying scale models he had seen and conducted a series of tests with it to study the torque and duration characteristics of the rubber motor. Through an elaborate set of calculations, Bill arrived at the internal dimensions he felt would be required to achieve similar performance from a CO_2 engine. The "magic answer" was a bore and stroke of 1/8 of an inch. Such an engine was built, employing a timing valve in its crankshaft, but unfortunately it was not successful, and Bill returned to his drawing board.

It was about two years later when he arrived at the design shown in our photographs. Bill and his wife Dorothy were living in a small apartment at the time, and the engine was made on a tiny jeweler's lathe in one corner of their dining room. Featuring a spring-loaded poppet valve, it operated directly from a CO_2 "soda-fizz" capsule. When this engine was being demonstrated in a model aircraft to prospective share-holders in Campus Industries during 1946, it proceeded to disappear into the sky, never to be seen again.

Bill Brown seated at his drawing board during 1942. The small jeweler's lathe behind him was used in making his first CO2 engines.

Although everyone felt regret about the loss of the model and its historic little powerplant, Bill Brown calmly explained that it would have been much worse if the model had not flown! And, the audience must have been properly impressed, because Campus Industries did go into production with the A-100 as well as the larger Bee CO_2 engines. Both engines featured small refillable tanks, which eliminated the need for a model to carry the bulky and heavy soda capsule.

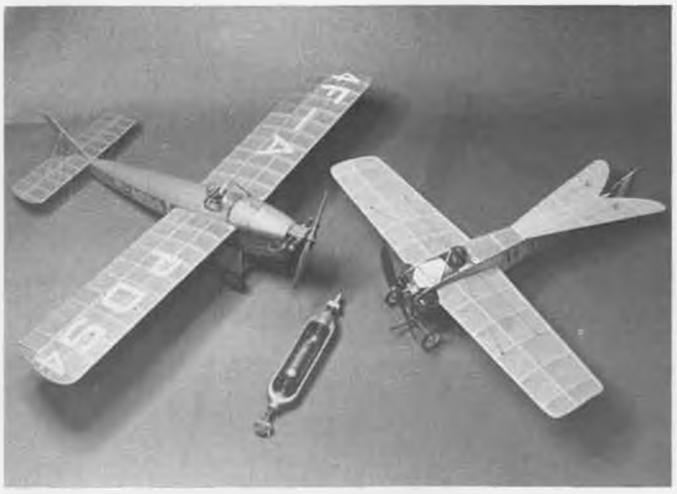
During the 1970s when Brown designed his metric series of CO_2 engines, the smallest of the line, the A-23 "Peanut" engine featured a bore and stroke of 3 millimeters. . . nominally 1/8 inch, reverting to the size Bill had selected for his first successful CO_2 engine, some thirty years previously.

FOREIGN ACTIVITY

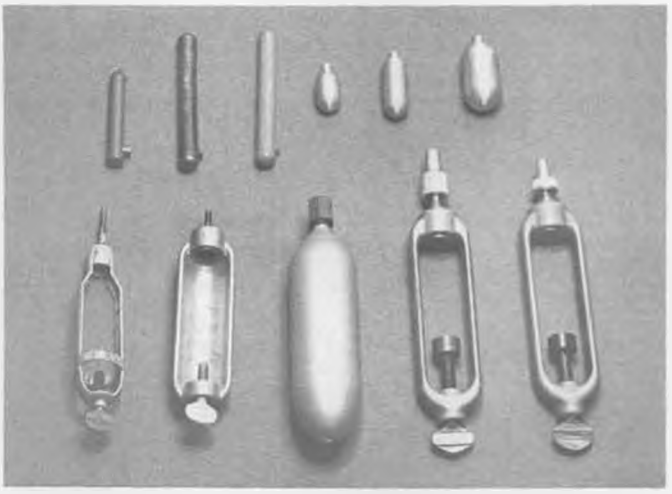
Of historical note is the advertisement from *Aero* magazine for April 6, 1912, which describes "NOMIE" brand rotary engines which could be operated from CO_2, compressed-air, or steam. It is assumed that the "NOMIE" name was derived from the "GNOME" brand of full-size rotary engines used during that era.

German enthusiast Klaus Jorg Hammerschmidt attended the Jiriho Smoly Memorial Contest conducted in Czechoslovakia. Featured were events for CO_2 powered models, and the turnout was about a dozen non-scale designs and some 18 scale types. In spite of breezy weather conditions, many good flights were made, with winning models achieving durations of about 100 seconds.

The winning Czechoslovakian scale modeler, Tonda Alfery, has written of his suggestions for extending duration in *Modelar* magazine, and thanks to translations by Fritz Mueller, we have some highlights: Alfery points out that the specific



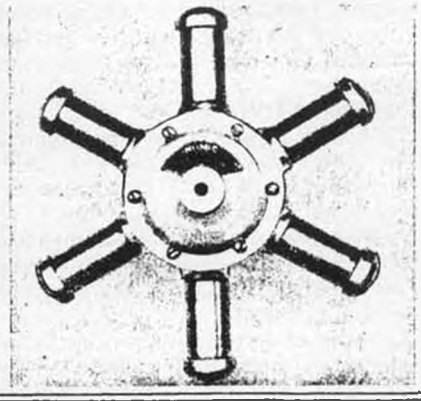
Two of the author's CO2 models. On the left is the Brown Junior .005-powered Farman F.451, winner of the Open Free Flight Gas Scale at the 1977 Nationals. On the right, a Nieuport monoplane powered by a Brown Junior A-23 Peanut engine. Between the models is the only ground support equipment needed: a CO2 capsule and charger.



Brown tank and filler progress over the years: from top left, a Campus A-100 steel tank, two variations of Campus Bee steel tanks, and three sizes of modern aluminum tanks. Second row: an early Campus charger made from sheet steel, next a cast version, then a large capacity CO2 storage tank, followed by two variations of cast chargers.

The early Brown CO_2 engine prior to assembly. Note spring and poppet valve, which was replaced on later engines by a pressure-loaded ball valve. Photo: Bill Brown.

Brown CO_2 engines, from left: A Campus A-100; A-100 with remote tank; Campus Bee; Brown designed O.K.; Micro-jet; an .005 engine; and at right, the Brown Junior Twin, since discontinued.



NOMIE MINIATURE ROTARY MOTORS

CARBONIC ACID GAS MOTOR FOR MODEL AEROPLANES

Can be used with compressed air, steam or liquid gas. Invaluable for Model Aeroplanes, Boats, Fans, Dynamos, Gyroscopes, etc.

LIGHTEST and MOST POWERFUL MINATURE ENGINES IN THE WORLD

Type "A" 3 cylinder, ¼ H. P. weighs complete 16 ounces, speed 2,500 R. P. M.
Type "B" 6 cylinder, ½ H. P. weighs complete 26 ounces, speed 1,900 R. P. M.

POWER, RELIABILITY, DURABILITY and EFFICIENCY GUARANTEED

Distinctive features are fully protected by letters of patent, our engines hold all records for power driven model flights. **GUARANTEE; Buy a "NOMIE" and if it is not all we claim in every respect your money will be refunded without question. Price—Type "A" complete $15.00, Type "B" $30.00, F. O. B.**

FOR SALE BY ALL LEADING MODEL DEALERS, OR WRITE US DIRECT

NOMIE ENGINE COMPANY (Ltd), Aviation Field, **Cicero, Ill.**

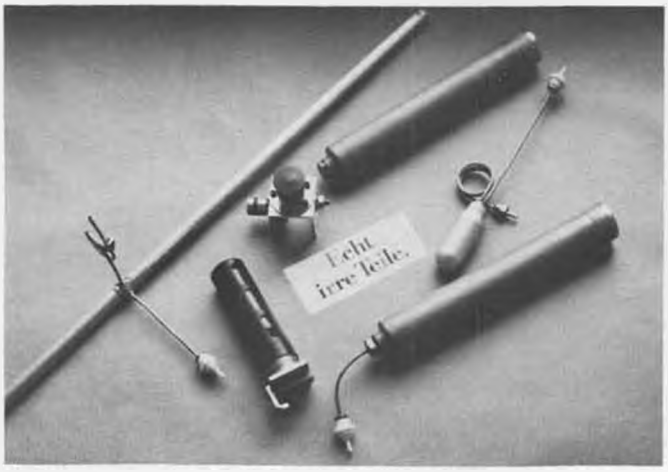
Advertisement from the April 6, 1912 issue of Aero Magazine offers the Nomie rotary powerplants for models, which could operate from carbonic acid gas(CO_2), compressed air, or steam. They were available in 3-cylinder and 6-cylinder form.

weight of CO_2 is substantially greater at lower temperatures, which means that in a given space more CO_2 can be stored when cold. Refrigeration handbooks can provide exact figures for the theoretical-minded; however, the idea is that the running duration of an engine is determined by the weight of the stored CO_2. A well-filled tank contains gaseous as well as liquid CO_2 and must be cooler than 87 degrees Fahrenheit, because that is the critical temperature above which CO_2 will not remain in liquid form.

It is obvious that CO_2 is heavier when liquid, but even then its specific weight steadily increases as the temperature is lowered. Thus, best flying temperatures are between 59 and 77 degrees Fahrenheit. Simple implements, such as a thermometer, refrigerator, a sensitive weighing scale, and a stopwatch will enable experiments to be conducted.

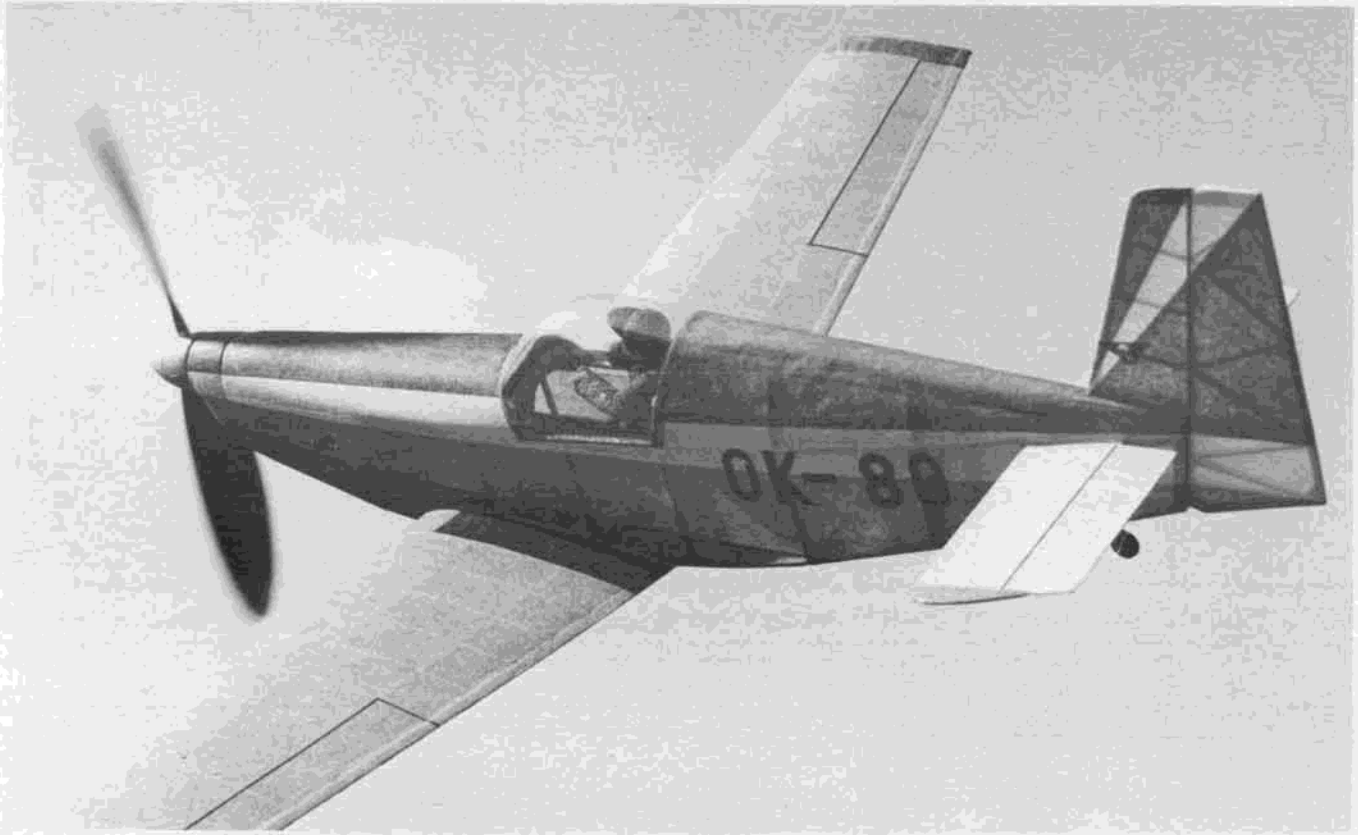
Another simpler way to extend CO_2 engine duration is to employ larger diameter propellers. With a suitable propeller, engine duration may be increased from 30 seconds to over 50 seconds, and with the proper propeller and temperature conditions, running times up to 100 seconds are possible.

With the many advantages of CO_2 engines, why are they not more popular? K.J. Hammerschmidt explains that there is a shortage of them in the marketplace. Further, some brands were sold with serious defects which prevented proper operation. He feels that if substandard engines continue to be marketed: "...young people will never come back to aeromodelling after a lot of trouble—these people have it easier to switch on a TV set or a home computer or a girl friend!" •



A selection of fuel tanks tested with the modified Hitek CO_2 engine, by K.J. Hammerschmidt. Long tubular tank at left can be placed in-

Some of the many scale model flown in the Czechoslovakian CO_2 power contest. All employed the Czech Modela engine.



RACEK R-7

By LUBOMIR KOUTNY. . .This Czechoslovakian import is a Peanut Scale replica of an aerobatic aircraft that didn't get beyond the first prototype. As a model, it is a great flyer; 70-second flights indoors are possible.

• The winners of the First World Aerobatic Championships all flew ZLIN-26 trainers; these planes were merely modified versions of the normal flying school trainers only.

A new, special aerobatic plane, the Racek R-7, designed by Z. Rublic made its official roll-out on March 7, 1964. The experimental workshop of Brno-Melanky had made a very fine ship; Rublic used all-wood construction and the same airfoil he used on his famous M-1D Sokol, powered by an in-line Walter Minor 6-III 160 hp engine, and a constant-speed V500s propeller.

The new plane was a better trainer in most respects from the Zlin, but there was no interest shown, and the Racek never got beyond the first models.

BUILDING THE RACEK

Our system of building the peanut version of the Racek is very much like the full-scale plane, and isn't very complicated.

WING

We use light, but strong balsa and very light glue; I use Czech Kanagom glue thinned one to one. The ribs are cut from 1/32 balsa, using the aluminum pattern as shown on the plan.

RUDDER AND ELEVATOR

Both the rudder and elevator are built on the plan.

FUSELAGE

Both sides of the fuselage are built on the plan as a basic box. Glue the half-formers in place, then glue sheeting over them to form cowl and area behind canopy. Make an instrument panel and glue to former 3, and make pilot figure from styrofoam or soft balsa and glue in place in cockpit. Canopy is molded from .15mm celluloid and glued over cockpit.

PROP

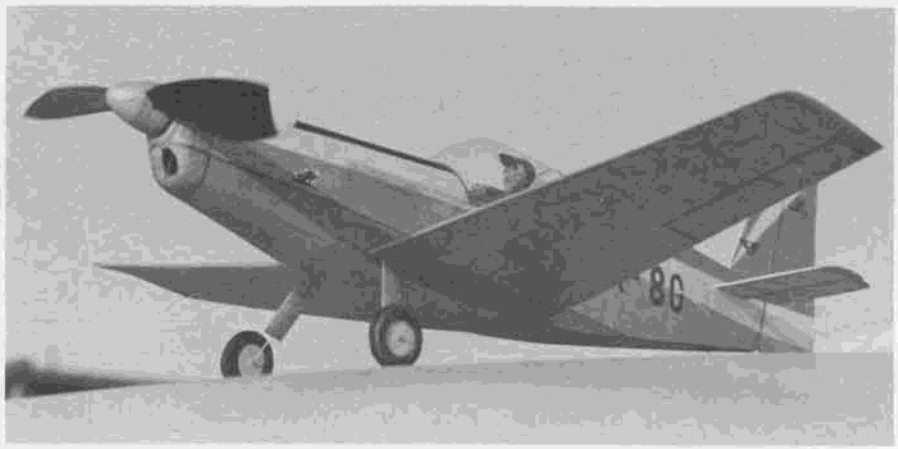
Make the propeller from hard balsa, 1.5mm thick. Blades are formed on a hot, flat iron. The blade joiners are made from 1.5mm bamboo and glued to the spinner. Or, to simplify the system, a plastic prop can be used.

MOTOR HOOK

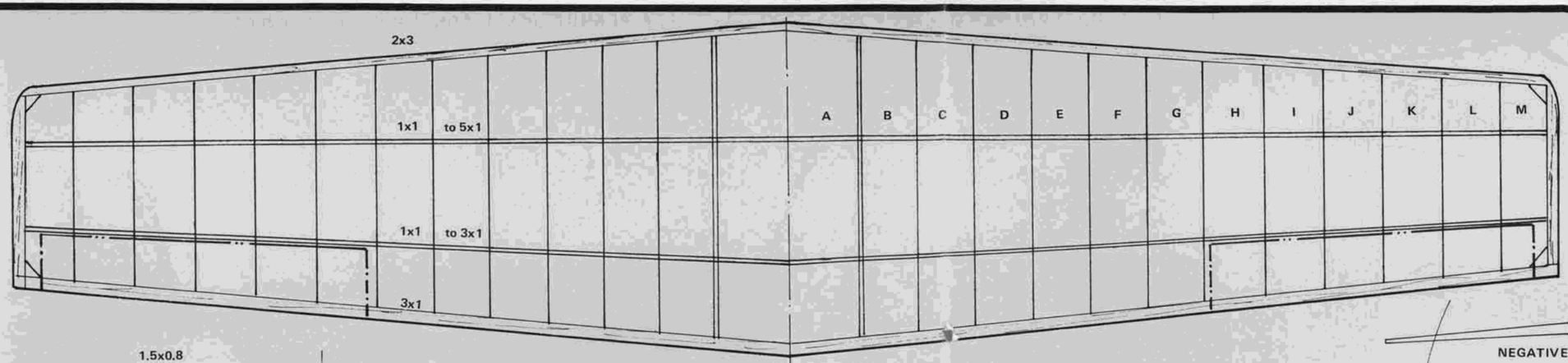
Use .5mm steel wire (music wire) for the motor hook, formed on the plan pattern. It is wise to use a bit of plastic tubing over the hook to save your rubber from damage.

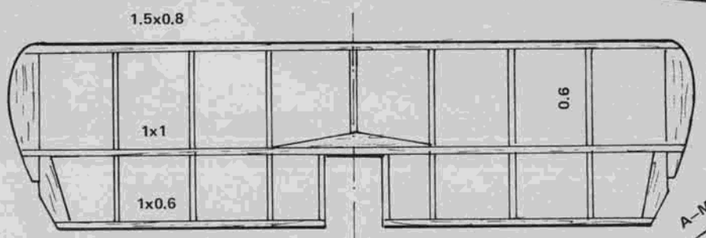
UNDERCARRIAGE

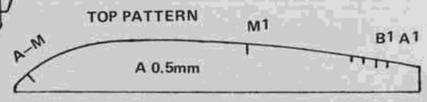
Make landing gear from very light balsa

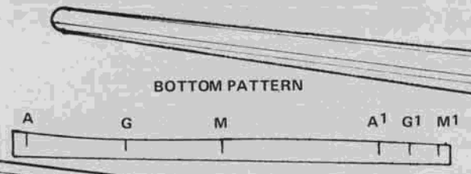


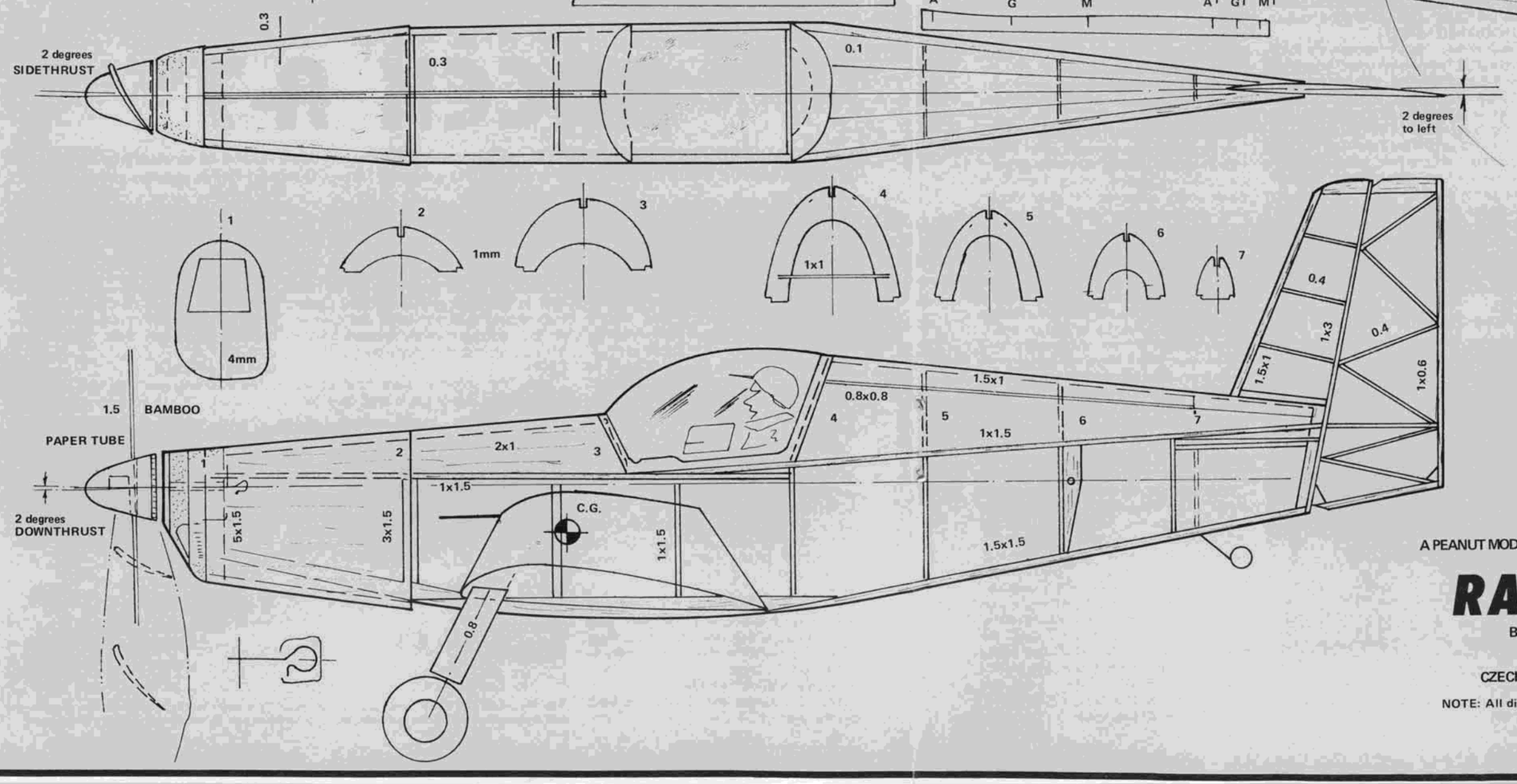
The R-7, in its red, white, and blue trim is a good flyer when built to the plan's specifications; it is a replica of an aerobatic plane designed for competition but never put into full production.











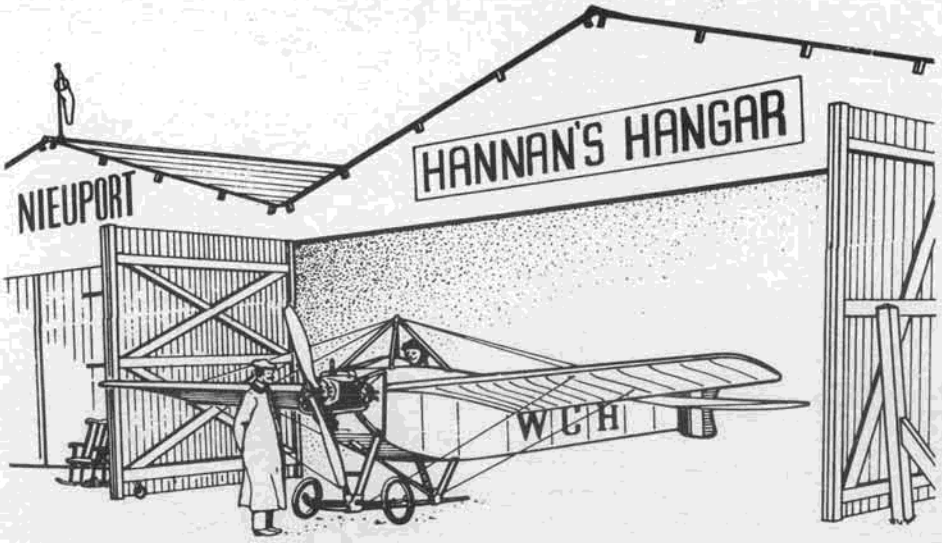
A PEANUT MODEL

RACEK R-7

BY LUBOMIR KOUTNY

CZECHOSLOVAKIA 1986

NOTE: All dimensions shown are in millimeters



". . .if you can nail together a packing crate, you can construct an aeroplane."

• This month's lead-in line, by Henri "Flying Flea" Mignet, was shared with us by Jerry Bokius via Frank Scott.

VOYAGER SETS NEW RECORD

The Rutan Voyager long-distance flyer has established a new non-stop flight mark of 11,857 miles. Averaging 103.5 miles-per-hour for four-and one-half days, the craft landed with sufficient fuel remaining to have permitted a flight from New York to Paris!

Pilot Dick Rutan, brother of designer Burt Rutan, and co-pilot Jeana Yeager expect to attempt their nonstop round-the-world flight later this year. This is a private venture and any donations would be welcomed: VOYAGER, Hangar 77, Mojave, California 93501.

BRITISH BUILDERS

A sizable contingent of British modelers (model*l*ers!) completed a far-ranging tour of aviation museums and model flying fields in the U.S.A. recently. It was our pleasure to meet some of them, and through the courtesy of Assistant Curator Cory Crowell, we were treated to a fascinating behind-the-scenes tour of the San Diego Aerospace Museum, which is becoming respected for its splendid model collection as well as its many full-size aircraft. Although our chance to talk to the U.K. visitors was quite limited, it is obvious that aeromodeling in all its forms is universal in appeal. With goodwill ambassadors such as these gentlemen, the hobby is indeed in good hands.

SCHOOLYARD SCALE?

Small radio-controlled models are sometimes called "schoolyard scale" because of their minimal flying-site size requirements. But how often does a full-size "scale model" actually land in a schoolyard? Recently, in Escondido, California, Ms. Debbie Schmidt landed her Piper Cub in a local high school athletic field, following an engine malfunction. After repairs were made, the Piper was successfully flown out, and our thanks to Warren Shipp for supplying newspaper confirmation of this happening.

We don't know the dimensions of this field, however we do know that our free-flight Peanuts have occasionally flown out of their boundaries. . . .

FORE!

Less fortunate was the pilot of an out-of-gas Cessna 152 which landed on a New York golf fairway, according to reports from Mark Fineman and Florence Bakken. Although he was unhurt, the flier's Cessna suffered landing-gear and propeller damage. Meanwhile, the single-minded golfers continued their game, apparently undistracted by the visitor. . . .

The British are coming! The British are here!! Aeromodelers and their American hosts during a visit to the San Diego Aerospace Museum in Balboa Park.

Janice Tidwell and Japanese Peanut F.R.E.D. by Jiro Sugimoto and Pietenpol by Yoshihito Harata which were successfully proxy-flown in California contest recently.

TOM SWIFT AND HIS CURTISS CLONE

According to a *Los Angeles Times* article sent in by Ken Hamilton, author Howard Garis who wrote a long series of Tom Swift youth books, patterned the hero after pioneer aviator/inventor Glenn Curtiss.

ONE MORE TIME

Memories of the pre-war silk and wire models continue to surface, this one from Ced Galloway: "Can you stand another Japanese silk and wire model story? Way back in the early '20s my aunt was a teacher at the University of Hawaii and on one of her summer trips home she brought me a silk and wire glider. There was a small hook on its nose and it was quite a trick to launch it without hitting its wire slingshot launcher. I remember shooting stones with the slingshot and they glided just as far as the heavy glider. Guess that proved that the glider flew like a rock!"

4TH OF JULY BOSTONIANS

Walt Mooney, of the San Diego Scale Staffel Club, sponsors an outdoor Bostonian model contest each 4th of July, and this year's meet was conducted near the Mexican border under a beautiful thermal-filled sky. By meet's end some 105 official flights had been recorded, and four Bostonians had flown out-of-sight in the direction of Mexico, including Dave Linstrum's entry. Labeled the "TOP GUN BAD CAT," the model was skillfully (too skillfully?) proxy-flown by Junior Jeremy Booth. The highest single flight duration of the contest was achieved by Walt Mooney's own Bostonian with a time of 293 seconds.

WHILE ON THAT SUBJECT

Don Typond offers this comment: "Now that I'm grayer and mellower, I'll relax and fly Bostonians *indoors*."

STATIC SHOW & SWAPSHOP

Wade Johnson Jr., director of the North Carolina Model & Hobby Expo, tells us that all manner of miniature aircraft, ships, boats and cars will compete on November 29th and 30th for trophies in 15 different static display events. To be held in the Charlotte Merchandise Mart, the show will feature as special guest, World War II fighter ace Robert S. Johnson. Information is available from Carolina Model & Hobby Expo, 3452 Odell School Rd., Concord, North Carolina 28025. Please tell 'em *Model Builder* sent you'all. . . .

QUETZALCOATLUS KINGKONG!?

The 1933 motion-picture *King Kong* appeared on local television recently, and among the creatures who threatened actress Fay Wray was a pterodactyl, which attempted to fly away with her. This particular prehistoric bird was a short-necked variety who flapped quite convincingly until plucked from the air by gorilla King Kong.

THE COLONEL SAYS

Explaining a decline in local R/C scale contest participation, Colonel Bob Thacker modestly suggests: "Some fellows won't enter if they know they can't win. In my case, I'm so famous it doesn't matter if I win or not."

CLIFF ROBERTSON TESTS WHITEHEAD

The Whitehead #21 full-size reproduction testing continues amid a flury of political controversy and media coverage. One of our photos shows the craft in tethered flight above its trailer, where it remained for about a half-mile under the guidance of test-pilot Andy Kosch. Model builder Bill Wargo also piloted the craft successfully.

On July 11th, film and television star Cliff Robertson (also a former modeler!) took over the helm for three public demonstrations of the Whitehead, and expressed his delight with the reproduction's performance.

We were fortunate in visiting with project leader Bill O'Dwyer in person, and with Mike Cartabiano, chief of engineering and flight testing, by long distance telephone. Both men were enthusiastic about progress to date, and have found the design much more advanced than originally realized. For example, the "living wing" apparently was equipped for lateral control via wing-warping, and the rigging mechanism responds perfectly to such actuation. Another remarkable discovery was Whitehead's familiarity with a reflexed airfoil for the wing, which contributes importantly to pitch stability.

Both O'Dwyer and Cartabiano are very safety-minded and are well aware of the fragile nature of the pioneer design. Thus, testing is proceeding with great caution to minimize risk to the pilots. Modern controls have been installed for safety reasons, however they will be employed only as emergency overrides in the planned series of performance evaluations when preliminary testing is finished. Initial power experi-

Continued on page 92

Philosopher/author/modeler Richard Miller celebrates his 62nd birthday, showing he has not lost his indoor glider launching technique.

Jeremy Booth shortly before he proxy-flew Dave Linstrum's Top Gun Bad Cat Bostonian over the border into Mexico.

The Whitehead reproduction in tethered flight during pitch and roll stability tests at about 35 miles per hour, behind tow car. See text for details. Photo: O'Dwyer.

Now you see 'em: Bill Warner shows the landing gear of his Crocodile Airlines Embryo Endurance model in extended position.

Now you don't see 'em: Warner's Embryo model with its landing gear in retracted configuration.

Free Flight

By BOB STALICK

• I first ran into Don Zipoy at the Harts Lake Prairie Free Flight site just south of Tacoma, Washington. The year was 1963 or so. Don was the contest director of one of the larger meets in the area. The contest was well organized and all pertinent rules were enforced in a friendly but firm manner; it was a Zipoy trademark. In later years I became more appreciative of the efforts that Don expended on behalf of the free flighters in the Northwest. His directions to the fliers were concise and tinged with humor. For ten years or so he was the C.D. of the famous Boeing Management Association Scholarship contests. Once again, the organization was impeccable as was the contest operation.

Don rarely flew in these contests. On the rare occasions that he did take a model out of the car and put it into the air, it was usually a well-preserved ship that he had built years earlier and kept in excellent condition. My memory serves up only two models until last year. One was his unique Crispy Critter, FAI power ship. The other was an O&R .23-powered old timer that was called The Victory, as I recall.

Just last summer, Don built one of Phil Hainer's Air Express 330 kits. He trimmed it out one day in the rain and proceeded to get himself in a flyoff, winning second place.

During the summer of 1985, a number of the area free flighters, spearheaded by the efforts of Bill Giffen, decided to honor Don's dedication to the local contest scene. Don was presented a classy engraved silver serving tray with matching cups. This award was presented to him at the end of the annual Autumn Thrash, just weeks after we all learned that Don had contracted cancer.

After hospitalization and chemotherapy, Don appeared to be on the recovery trail. I saw him at a contest in June and he looked better than he had for several months. On July 16, 1986, Don Zipoy went searching for his final thermal. He was 57 years old. For those of you who did not have the pleasure of knowing him, you will never know what you missed. For those of us who knew him, his passing leaves a tremendous void. Another of our best has gone leaving a larger responsibility to those of us who remain.

Don, all of us enjoyed you while you were here. You left us much too soon. May your last flight be the greatest of all, my friend.

OCTOBER THREE-VIEW—The Turkey Buzzard by Don Zipoy

I know that many of you may have seen this drawing in an earlier day. It seemed appropriate to share Don's sense of humor with the current readers of the *Model Builder* Free Flight. Needless to say, this three-view just needs to be studied, as no explanation would do it justice. Enjoy it, just as Don intended.

NOVEMBER MYSTERY MODEL

This is a true nostalgia model and an international winner as well. As yet, I haven't seen one flying in the Nostalgia meets here in the N.W., and maybe it's because the available plans are both difficult to understand and poorly printed. It may also be because the ship is not easy to build, due to a completely planked oval-sectioned fuselage. Whatever the reason, this ship could be just the ticket for you if you are thinking about something a bit different and still competitive in the Nostalgia events in your area. But before you set out to build one, you'd be well off to identify it. If you know the name of the model, drop a card or letter to Bill Northrop, *c/o Model Builder* magazine. The winner will receive a free subscription to my favorite magazine.

DARNED GOOD AIRFOILS—Bill East's Hybrid Power Section

Some time ago, Australian Power flier, Bill East, presented a paper to the Australian Free Flight Symposium detailing a system that he uses to develop his own airfoils. This system has allowed him to prepare a special section utilizing the best characteristics of airfoils that he likes. This month, and again next, I will present two of Bill's airfoils. This month is his hybrid Power section, next month, his A-2 section. Here's Bill:

"Sometimes I find it difficult to decide what airfoil should be used when designing new models. Recently I have combined airfoils to provide a single hybrid airfoil to give me desirable performance on a few models. In this paper I have included two such airfoils which I have plotted. These airfoils are, in effect, the average of several successful airfoils. The camber lines on these airfoils are the mathematical average of the top and bottom coordinates of the three basic airfoils used to produce the hybrid airfoils of each type.

"I make no claim of better performance from these hybrid airfoils compared to the basic airfoils; innovation is used and no reference will be made to airfoil theory

L. Payne preps his Sparky for an official flight at the SAM 1 meet in Colorado. Photo: David Ramsey.

SAM 1 members pose with Sparky models. All configurations of Ed Lidgard's classic design were present. Meet was held in the Denver area recently. Photo: David Ramsey.

relating to entry angle, nose radius, etc.

"For those wishing to plot hybrid airfoils (a calculator is handy to speed up calculations), these airfoils can be produced very quickly provided, of course, pencil, rule, and curve are available.

Basic Airfoils Used

"For the two hybrid airfoils shown (A-2 next month) the following basic airfoils were used, these being selected by popular choice.

A-2: 1. Hacklinger HA 12
2. Benedek 6456F
3. Kaczanowski GF 6

Power: 1. Rhode St. Genese 28
2. Rhode St. Genese 29
3. Neelmeyer

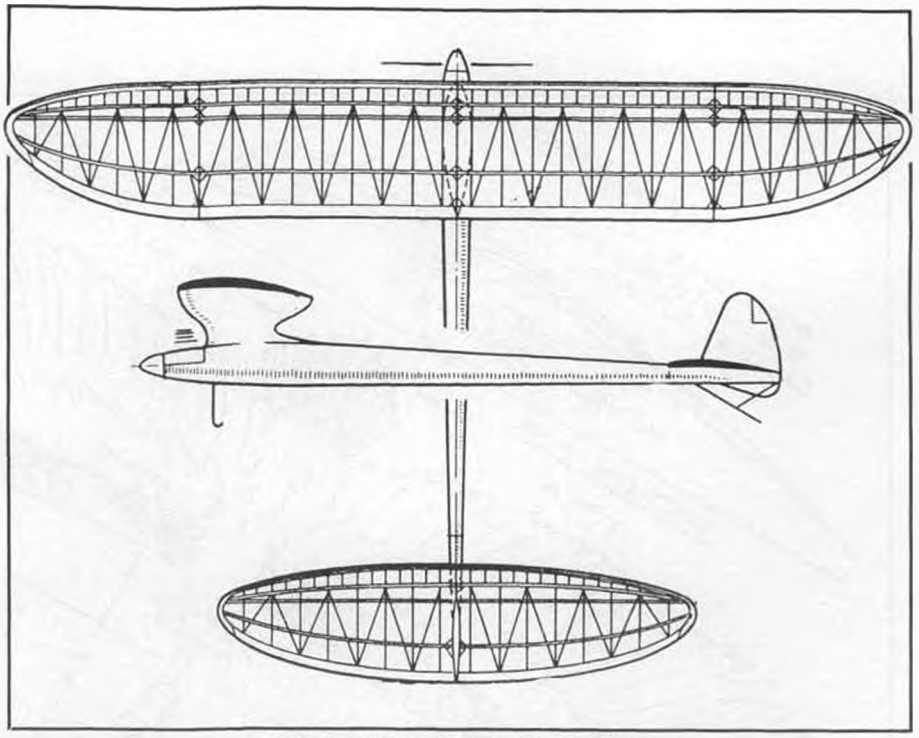
"Most airfoils can be used to plot hybrids; however, it is best to group suitable airfoils together; i.e., undercambered, flat bottomed, for A-2 and power respectively. The hybrids are similar in appearance to the original airfoils used; however, the coordinates are quite different. Many different hybrids can be designed to give such desired features as smaller nose radii, thicker trailing edge, more camber, etc. Using John Malkin's collection of airfoils, approximately 80 hybrids can be plotted.

"Another useful method which I use to modify is the thickness percentage error development method. This is a simple method to either increase or decrease the thickness of airfoils for a particular need; i.e., tailplane companion. To illustrate: assume that an 8-inch chord airfoil is to be plotted, and the thickness is to be increased 2.5% above the original. First, take a 1/10-inch division rule and divide the 8-inch chord into 10% stations (.8-inch divisions), then divide the first 10% into smaller division: .2=2.5%. Then plot the top and bottom coordinates as a percent of a 10% chord. The foregoing example is simple, but for other chords it is just a matter of applying some arithmetic.

"For thin airfoils, work in reverse; i.e., a 5-inch section stretched to 10 inches will yield an airfoil half the thickness.

"The hybrids I have shown and the methods used to obtain them could be of some use to those scratch designing new models."

So, dear reader, if you are still with me, take a look at Bill's hybrid power section. As he indicated, it is a mathematical combination of the R. St. Genese 28 and 29 along with the Neelmeyer sections. All of these airfoils are long time standards in the power model field.



NOVEMBER MYSTERY MODEL

Next month, Bill's A-2 (FIA or Nordic) section. Stay tuned.

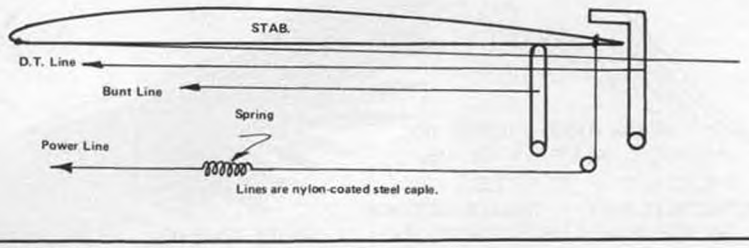
LYMAN ARMSTRONG STRIKES AGAIN

One of my most persistent and generous correspondents is Lyman Armstrong, who lives in Yuba City, California. Lyman is one of the old timers in modeling, and frequently submits comments on recent columns (none of which will be reprinted here). Lyman recently made me an offer that I couldn't refuse—he offered a collection of vintage English model magazines and annuals. These will undoubtedly appear as future three-views and mystery models. For those of you who look for these features in the Free Flight Column, hone your memory of things English.

BUNT SYSTEMS REVISITED

The bunt system for FAI Power (F1C) models has become the standard for international competition. Recently, I have been experimenting with various systems myself in an attempt to obtain a lightweight, yet foolproof bunt arrangement. To inform those readers who might not be familiar with the bunt system, it is a timer-actuated

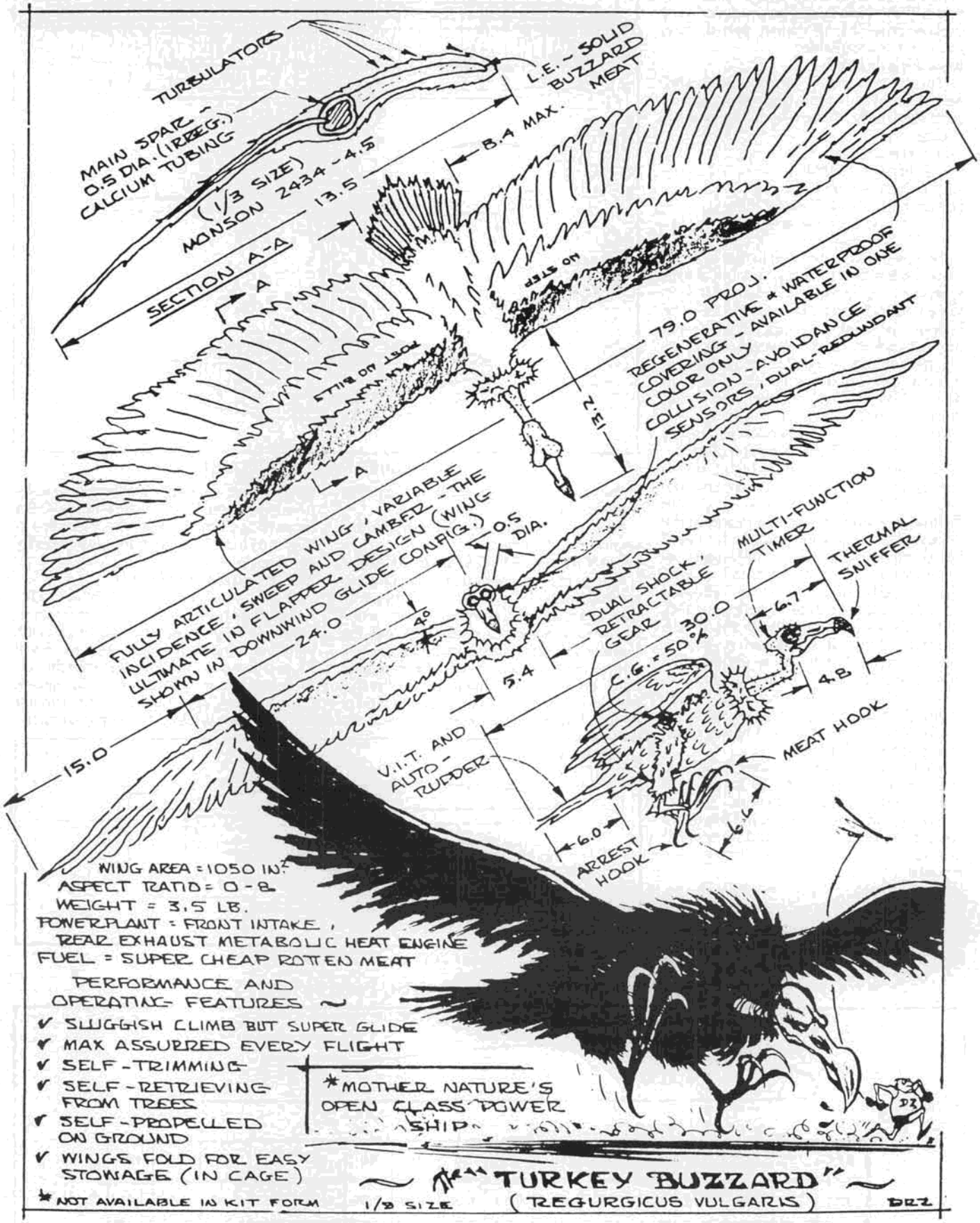
FIGURE 1



Schematic of Ralph Cooney's VIT system with bunt.

NOVEMBER AIRFOIL— Bill East's Hybrid Power Section

STA	0	1.25	2.5	5.0	7.5	10	20	30	40	50	60	70	80	90	100
UPR	1.8	3.57	4.12	5.08	6	6.69	8.13	8.38	8.01	7.35	6.31	5.03	3.48	1.79	0
LWR	1.8	.88	.239	.19	—	—	—	—	—	—	—	—	—	—	—


TURBULATORS
L.E. - SOLID BUZZARD MEAT
MAIN SPAR - 0.5 DIA. (IRREG.) CALCIUM TUBING
(1/3 SIZE) MONSON 2434 - 4.5
13.5
8.4 MAX.
SECTION A-A
A
A
79.0 PROJ.
REGENERATIVE & WATERPROOF COVERING - AVAILABLE IN ONE COLOR ONLY - AVOIDANCE COLLISION - AVOIDANCE SENSORS, DUAL-REDUNDANT
13.2
FULLY ARTICULATED WING, VARIABLE INCIDENCE, SWEEP AND CAMBER - THE ULTIMATE IN FLAPPER DESIGN (WING SHOWN IN DOWNWIND GLIDE CONFIG.)
0.5 DIA.
MULTI-FUNCTION TIMER
THERMAL SNIFFER
DUAL SHOCK, RETRACTABLE GEAR
24.0
4°
30.0
6.7
C.G. = 50%
5.4
4.8
15.0
V.I.T. AND AUTO-RUDDER
MEAT HOOK
6.0
ARREST HOOK
WING AREA = 1050 IN.²
ASPECT RATIO = 0-8
WEIGHT = 3.5 LB.
POWERPLANT = FRONT INTAKE, REAR EXHAUST METABOLIC HEAT ENGINE
FUEL = SUPER CHEAP ROTTEN MEAT
PERFORMANCE AND OPERATING FEATURES ~
✓ SLUGGISH CLIMB BUT SUPER GLIDE
✓ MAX ASSURED EVERY FLIGHT
✓ SELF-TRIMMING
✓ SELF-RETRIEVING FROM TREES
✓ SELF-PROPELLED ON GROUND
✓ WINGS FOLD FOR EASY STOWAGE (IN CAGE)
* NOT AVAILABLE IN KIT FORM
* MOTHER NATURE'S OPEN CLASS POWER SHIP
~ "TURKEY BUZZARD" ~
1/3 SIZE
(REGURGICUS VULGARIS)
DRZ

The late Don Zipoy with his latest model, an Air Express. Don's passing leaves a large void with free flighters in the Northwest.

In October, 1985, Don Zipoy was presented a plaque by the free flighters of the Northwest for his years of selfless servise as Contest Director par excellence. Presenting the engraved silver platter to Don is Bill Giffen.

device that increases the positive incidence of the stabilizer at the conclusion of the power run to bring the model into a horizontal flight condition during the transition from vertical climb to glide. The tailplane angles for Mario Rocca's latest FAI Power model as detailed in the February 1986 NFFS Digest are as follows: Power = −.20 inches; Bunt = +.41 inches; Glide = −.35 inches. Simple mathematics will show you that the change from power to bunt is a total of .61 inches and from bunt to glide is .76 inches.

Recently, I took a good look at Ralph Cooney's Summerwind derivative model and his power to bunt change was approximately .3 inches and from bunt to glide was about .45 inches. Ralph's model balances in the 60% range; whereas Rocca's model balances at 48 inches. This difference in balance points helps to explain the difference in the incidence angles needed for the transition from power to glide in these two models. The farther forward the C.G., the greater the change in incidence needed to effect a change in the flight characteristics.

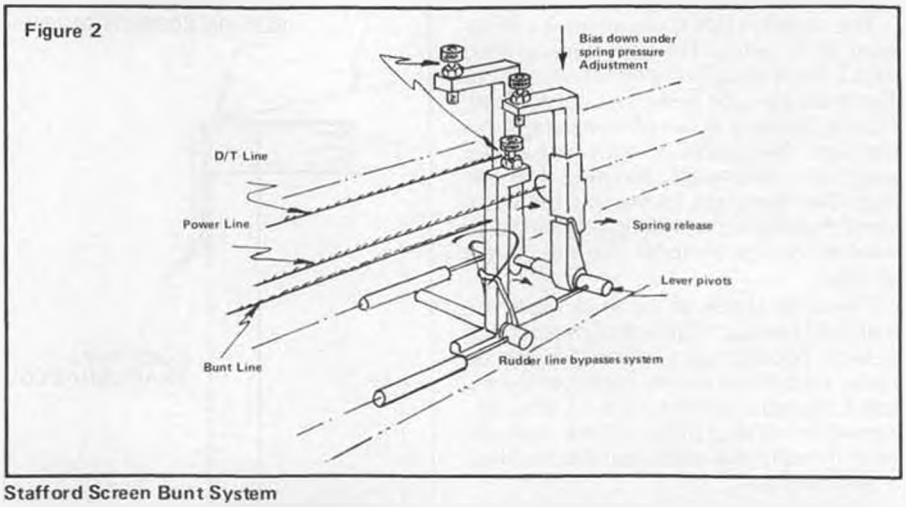
Ralph Cooney's bunt system uses a spring-loaded line to pull the stab into place for the bunt (see Fig. 1), which when released, allows the stab t.e. to raise to the glide position. Although the system works well, it does put a great deal of pressure upon the timer arm which carries the other end of the spring loaded line that forces the stab into the bunt mode.

It struck me that a better system might be to use a spring-loaded arm that would not require the timer to carry such a load. As I began to work on different systems to carry out this scheme, I ran across the same kind of gadget as developed by the Englishman, Stafford Screen. This system appears as Fig. 2.

For your information, the system designed by Screen weighs in at 10.5 grams, in my version. This is compared to a similar but non-bunt system that I use that weighs in at 8.5 grams—so the device does not add a big weight penalty.

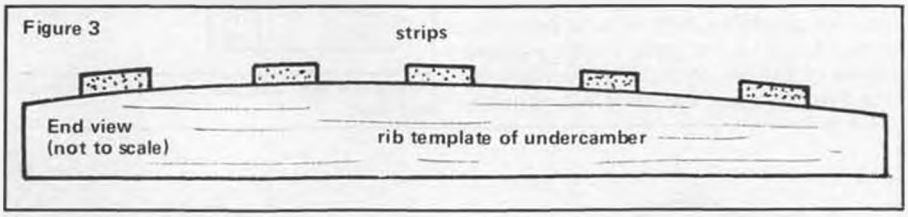
Continued on page 75

Figure 2



Stafford Screen Bunt System

Figure 3



Undercamber wing jig

Jim Booker readies his 1/2A Maverick, a Tom Hutchinson design, for an official flight in pursuit of a Category II record.

Free Flight Scale

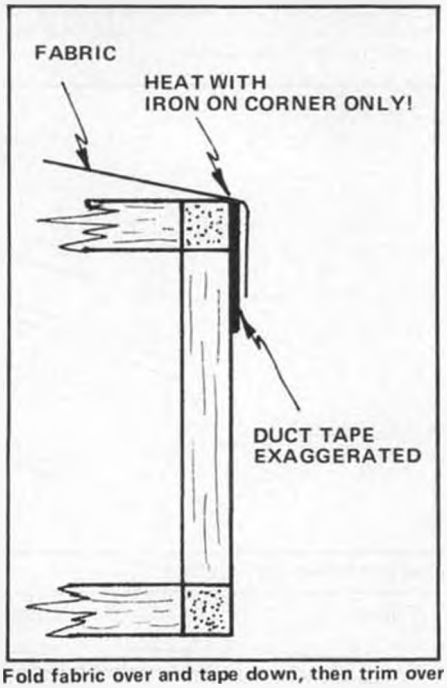
By FERNANDO RAMOS

• There isn't any better way to start this column than to report about a brand new product on the market! Dave Diels certainly needs no introduction in this column since he has been furnishing us with rubber scale plans at an incredible rate! Well, Dave has out done himself by coming out with a terrific kit of the Boeing F4B4.

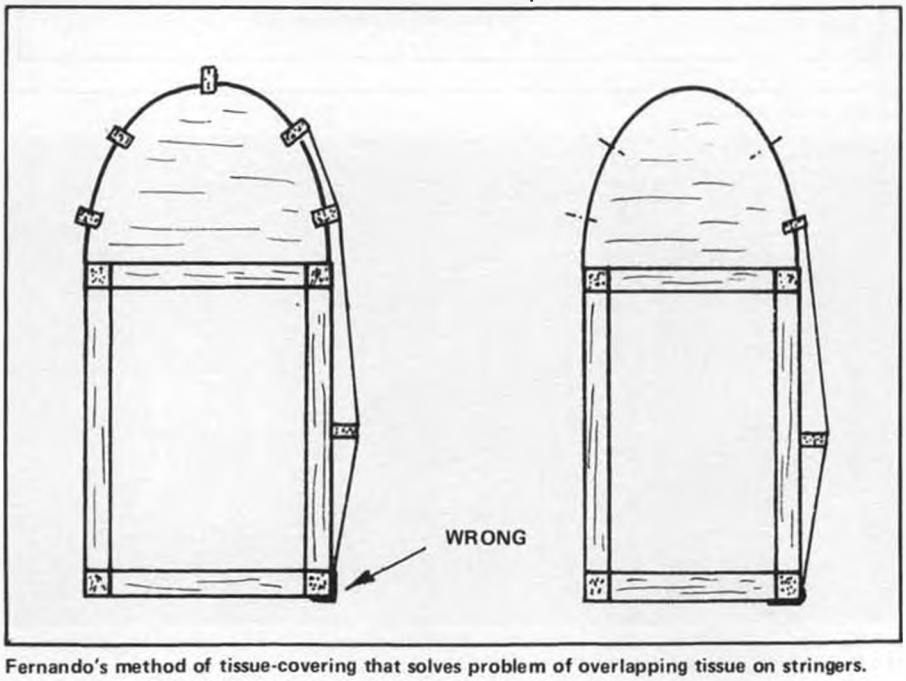
The model is 1/24 scale, giving it a wingspan of 15 inches. The kit features printed wood, the printing being done with an iron. The lines are a bit heavy but not too bad. Dave is planning to use silkscreening on future kits. The quality of the wood is very good and lightweight. However, the one item that really got to me was the decal sheet. It contains everything you would ever want to put on a model like this. . . real quality!

The construction of the model uses the half-shell method. This type of construction is fairly popular, ala Guillow, but can be made a whole lot easier, if you use the fixture I designed some time back. (I've discussed this several different times over the years. It really makes the half-shell method a breeze to use.)

At any rate, I think Dave is on the right track for providing us with an opportunity to build one of the great classic military planes of all time. With all of the information that Dave sent me, there was no mention of price. Obviously, this was an oversight on his part. For further information, drop Dave a line. His address is, Diels Engineering, Inc., Box 101, Woodville, Ohio 43469. I might add that Dave sends along a survey sheet to see what you like or dislike about the kit, and what can be done to improve it. . . also what other airplanes you would like to see kitted. Dave wants to please!!



Fold fabric over and tape down, then trim over duct tape.



Fernando's method of tissue-covering that solves problem of overlapping tissue on stringers.

Here is an update on the use of Solartex. For those of you who may not know, Solartex is a superior fabric covering material used primarily on powered models, specifically R/C models. It is an iron-on heat-shrink fabric that easily goes around severe compound curves. It is relatively light in weight, and finishes up quite nicely.

I decided long ago, that I would never again cover a powered model, .020 size included, with tissue again! I had built a model of the Avro 504 which had an inordinate amount of lettering on the fuselage and wings, and after a few test flights, there were punctures where the lettering was. The weight difference can be measured in a couple of ounces. I have found that the antique color has the least, if any, pigmentation, therefore should weigh the least. I expect that white probably weighs the most of the colors available.

Of the several models that I have covered with this material, I have always brushed on a couple of coats of clear prior to spraying the color. No matter how careful I was brushing the clear, brush marks could be seen on the final finish. Needless to say, this was quite disconcerting. The solution to avoid this from happening, is an easy one. Just spray the clear dope instead of brushing. I would recommend that you start by thinning 50/50 dope and thinner. This is done so that the dope can penetrate into the fine weave of this material. You will never get the dope to soak through, which is so typical of silk and other similar fabrics. There are two reasons for this. One is that the weave is very close, and the other is that the adhesive used for attachment is uniformly distributed on the backside. Even thinner cannot flow through.

One major criticism I have with this material, is that over large sheeted areas, it tends to trap bubbles. By poking the bubbles with a pin, and then applying heat, the bubble disappears, but then returns. There is a new tool on the market that looks a lot like a flower frog (A gadget for holding flowers in a vase), except this has fewer spikes. The object is to perforate the surface with many fine holes, then the air cannot be trapped. A friend of mine bought one and tried it on both balsa and foam surfaces, and commented that it worked perfectly!

While covering a fuselage with Solartex recently, I encountered the same problem I have using Japanese tissue. That is, trimming the material on a stringer that already has tissue attached to it. I found a solution for trimming tissue, so I figured the same principle can be applied to fabric-type materials. For those of you who may not know what I'm talking about, I'll review it for you momentarily. (See Fig. 1.) The idea here is to attach the material properly in order to get the proper contour, and to be able to time it neatly and precisely. The first thing to consider is attaching the material

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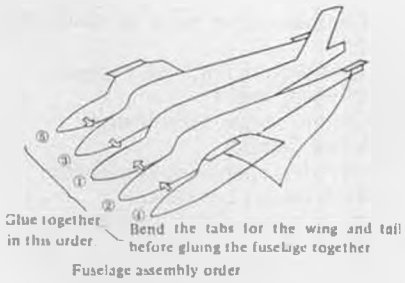

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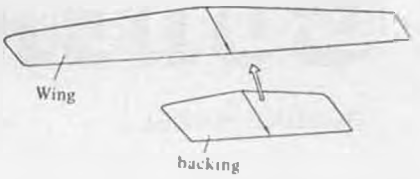


By RAY ROBERTS

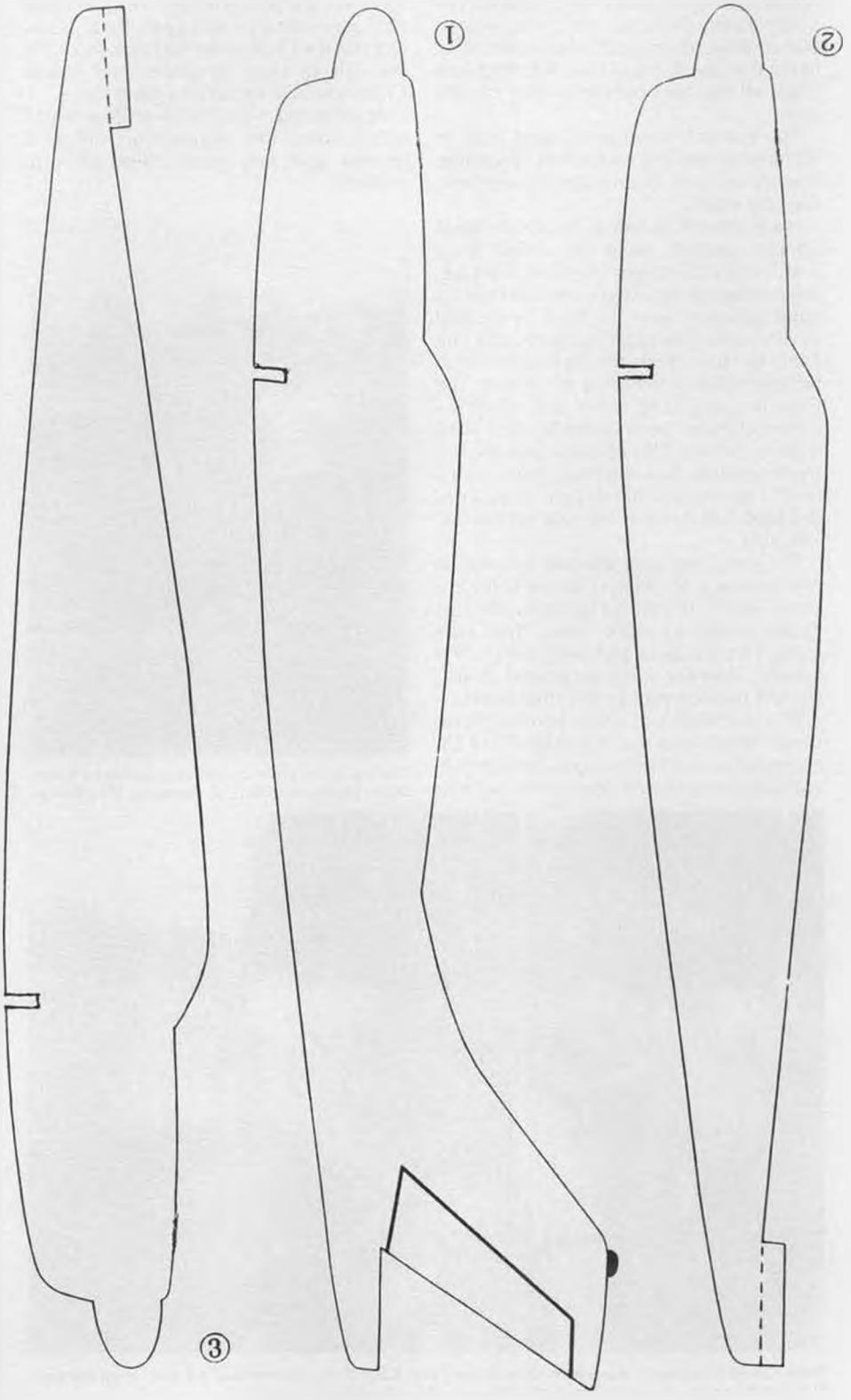
Dear Fellow Teachers,

This month I have the instructions for building up the CESSNA 210 wing and fuse. If you want a strong model that flys well, you must glue the parts together carefully. The fuselage part numbered 1 will be in the center, with numbers 2 and 3 on its left and right. Glue the parts in order as shown in the drawing.

INSTRUCTIONS

8. Coat with glue all of the surfaces to be joined, and fit them together quickly and accurately.
9. Next put these parts between two pieces of wax paper!
10. Place the laminated parts with the wax paper inside a stiff book. Again make sure the wax paper covers the parts to protect the pages of the book.
11. Stand on the book for 15 to 25 minutes.
12. Let the parts dry overnight.
13. Place small pieces of wax paper between the wing and horizontal holding tabs. This will keep the parts from gluing together while pressing.
14. Glue the wing and wing backing parts together. Keep the arrow marks forward to the leading edge.
15. Place the wing and wing backing parts inside some wax paper.
16. Place in a book for pressing as was done with the fuse, and let dry overnight.

NEXT MONTH: How to put the parts together, balance and adjust the Cessna 210. (How to make the catapult will also be included.)



Control Line

By MIKE HAZEL PHOTOS BY THE AUTHOR

• Your wandering columnist meandered up to British Columbia on July 21-24 to take in the Canadian National Championships. All three control modes were featured, but unfortunately there was not a site secured that could accommodate all activities. That being the case, Control Line, R/C, and Free Flight all had their own individual contest sites.

The Control Line events were held in Richmond, which is a suburb of Vancouver. The site was very nice, and adequately handled the entry.

Having the Nationals in this locale was a unique situation, as it has always been more centrally located. This being the case, the number of expected contestants was a large question mark. The Expo, being held in Vancouver, was expected to be a drawing card. As it turned out, the Expo appeared to be somewhat a deterrent for a few. The Expo is a very large event, and while accommodations were available, they were quite expensive. This probably kept the entry down more than anything. There were a few CL pre-entries that did not show. I understood that this was the case on the R/C site, also.

The entry was also affected by another phenomenon, for which I do not know the name. That is, it is always farther for the East Coast people to come West, than vice versa. This has been typical of the US Nationals. Someday some geography professor will perhaps explain how that works.

This year there was a new wrinkle. Since it was anticipated that the majority of CL contestants would come from stateside, US competition rules were used in the majority of events. This turned out quite well, which I understood was contrary to the wishes of the overall Nationals administration which was basically R/C oriented. Despite some silly administrative and operational obstacles that the CL segment had to put up with, the officials from Vancouver Gas Model Club were able to put on a good show.

As expected with the lower than anticipated entry, the competition ran at a relaxed and easy pace. Here are your winners:

Racing pilots have at it at the Canadian Nats: John Thompson, Roy Andrassay, Rich Salter.

Slow Combat winners, from left: Dick Salter, and Kelly Crozier, first and second, respectively, flanked by their pit crews. From the Canadian National Championships.

.15 Combat (same rules as AMA Fast Combat)
Phil Granderson, Portland, Oregon
AMA Slow Combat
Dick Salter, Seattle, Washington
AMA Fast Combat
Gary Byerley, Spanaway, Washington
Stunt (all classes combined)
Randy Schultz, 509.5 points, Seattle, Washington
Scale (sport class)
Orin Humphries, Spokane, Washington
Profile Carrier
Bob Parker, 228.6 points, Renton, Washington
Class I & II Carrier
Richard Wallace, 303.6 points, Sequim, Washington
Mouse Race (class II)
Paul Gibeault, 10:24, Edmonton, Alberta
Goodyear
Paul Gibeault, 8:09, Edmonton, Alberta
NW Sport Race
Henry Hajdik, 8:40, New Westminster, British Columbia
AMA Rat Race
Dick Salter, 5:46, Seattle, Washington
A Speed
Ron Salo, 164.92 mph, Burnaby, British Columbia
Formula 40 Speed
Paul Gibeault, 150.69 mph, Edmonton, Alberta
Record Ratio Speed
Paul Gibeault, 149.82 with Formula 40, 90.76%, Edmonton, Alberta

* * *

NEW PRODUCTS DEPARTMENT

Fox Manufacturing has just released a new glow plug, which should be in your local shops by the time you read this. It is being targeted towards the four-cycle engine users, but should also have other applications as per the press release:

"Fox Manufacturing is proud to introduce the new Fox four-cycle special glow plug as an addition to its fine line of motors, glow plugs, and accessories. The new four-cycle special, the 'miracle plug,' is a totally new concept in glow plug design, with several new features that enhance its ability to retain heat and boost performance. The miracle plug has an extra heavy rhodium and platinum element enclosed in a restricted-entry cavity to protect it from cooling. These features combined with a built in pre-combustion chamber eliminate the need for an idle bar while providing maximum power and reliability. Also, the nose is extended on the miracle plug to permit easy installation in motors where access is restricted.

"We call this new plug the miracle plug because it is much more than just a four-cycle glow plug. The miracle plug has the ability to ignite the fuel in your two-or four-cycle motor at the proper time under a wide range of conditions regardless of heat input. The miracle plug does this better than any other plug we have tested. It is a superior glow plug for two-cycle operation and it will provide smoother throttle response, increased reliability, and better performance even with low nitro fuel. With its special heat retaining capacity that makes it a great

four-cycle plug, the miracle plug has the ability to prevent flame-outs in two-cycle motors even under the most adverse conditions. Tests also show reduced fuel consumption in many cases."

Hokay, this product is going right to the testing department, and we should have some results to report next month. I don't have any four-cycle engines to try this in, but some of the two-cycle applications may prove to be useful. It sounds like Scale and Carrier planes may benefit here, as they do run throttles and sometimes suffer from flame-out problems. Several of the Stunt fliers also use an idle bar plug for a smoother transition and steadier engine runs. This new plug may also be of benefit here, too. More later.

* * *

Are you West Coasters looking for a big meet to attend to wrap up the season? You may want to consider hitting the big AAA affair in El Monte, California on October 18 and 19. This will be held at the Whittier Narrows site, and will feature just about every Control Line event. For more information, send a self-addressed-stamped-envelope to: Morrie Leventhal, 1788 Niobe Avenue, Anaheim, California 92804. Better hurry!

* * *

The newsletter from the Orbiting Eagles club in Omaha, Nebraska is always chock-full of good stuff. Here's an interesting piece that was written by George Lieb:

"Wonder why getting hit by a prop hurts so much and can cause so much damage? Prop blades are very thin and are going a very high rate of speed. Some racing props are also very sharp. Occasionally FAI speed planes have the prop tips go supersonic! *(Rpm of 34,000+ . . .* mwh) Many bullets are slower than this! Here is a chart of prop tip speeds for several sizes of prop and rpm.

"Diameter	10,000 rpm	5,000 rpm	20,000 rpm
6 inches	178.6 mph	267.7 mph	357.2 mph
7 inches	208.3	312.5	416.7
8 inches	238.1	357.1	476.1
9 inches	267.9	401.9	535.8

"The reason prop tips seldom go above about 550 mph is that drag increases rapidly near supersonic speeds."

These figures give one some thought as to the occurrence of a prop shedding a blade. Prop blades seldom go very far, but do move a short distance very rapidly. George's figures serve as a sobering reminder to exercise great care around running engines. Always pay close attention to prop condition, and avoid reaching around a running engine. Think safety!

Backtracking to that chart, how close have you come to having a prop go supersonic? Methinks the only way I will ever achieve it is to put the prop in the baggage section of a jet fighter.

* * *

Ever have the experience of your engine losing the prop while it's running with the resultant high rpm scream? The cause can be the prop coming apart, or simply coming loose. When that happens, and the engine keeps running, there is a hellacious scream and a cloud of smoke emitting. This, no doubt, is very harmful to your engine, right? Wrong! Very seldom is any damage done. Let's take a look why. First, let's take a look at that cloud of smoke. Actually it's always there, but during a shaft run you have little, if any, prop blast to blow it away. Also consider that with the engine running high rpm it is consuming more fuel, thereby throwing out even more exhaust.

Ooops! Mouse racer has just bounced off pitman Paul Gibeault's hand during high-speed catch.

Bob Parker's profile Bearcat is just a couple of inches away from snagging arresting cable during landing phase of Carrier Event at the Canadian Nationals in British Columbia recently.

What's wrong with this picture? Note direction of lines! Mel Lyne and Phil Granderson mix it up with a line tangle during hot combat flying at the Canadian National Championships.

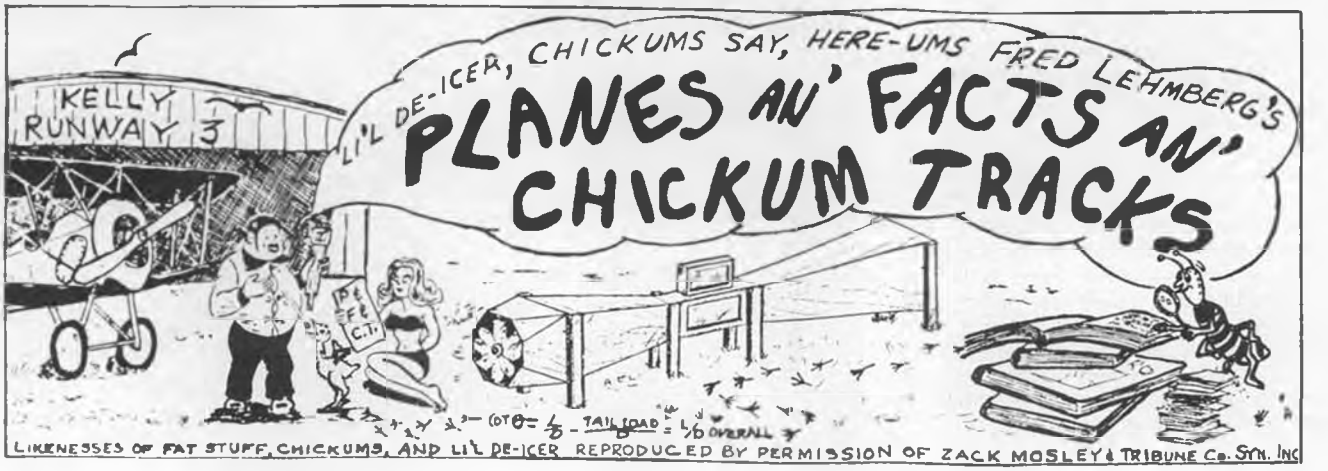
Next, consider the fact that the engine is running with almost zero load. That engine running during a shaft run is probably more happy than a fresh new green engine being "broken-in" with an oversize prop. Please don't misunderstand this discussion as saying a shaft run is a healthy thing, it isn't. I have had engines break when it happens, but more often than not, everything is OK afterwards.

The thing that you do not want to do is to panic, grab the plane and stuff the nose end into the ground in an attempt to stop the engine. This will do more damage than anything. What you do want to do is to either pinch the fuel line, or get your finger over the carb. A tuned pipe speed plane can be instantly shut down by blocking the exhaust outlet in the rear.

A shaft run will usually induce a bit of vibration, so for that reason it is a very good idea to check out the airplane structure. Engine mounting bolts and control systems have a bad tendency to loosen up. Also look for any stress cracks that may have surfaced in critical areas.

That's all for now, fly safely!

Mike Hazel, 1073 Windemere Drive NW, Salem, Oregon 97304. •



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• The latest effort of the lads has been the design of a flying laboratory to test all sorts of things in flight, using a down-link to send data back to the ground crew. This aircraft will do its thing in much the same way as the Remotely Piloted Vehicles of Israel and the US—which have been used with outstanding success. The aircraft has already been named PAYPOD and will be published in *Model Builder* in the coming months, MNWAITCDR (Mr. Northrop Willin' And If The Crick Don't Rise). It is a really interesting project and uses available products of Ace R/C, Radio Shack (some equipment is modified, of course) and other suppliers. There are no problems with PAYPOD, and those with the down-link are, for the greatest part, generally solved. Perhaps the lads might be induced to give us a status report update! They are in the Hangar hard at work on this sterling and Highest Priority project!

As I entered Hangar 3, I was most pleased to note that Chickums and Sillie were deep in serious consultation. I picked up a piece of paper from the floor and pretended to study it as I listened to their conversation. (A useful trick learned in Management Class.) Chickums was talking.

". . .and it follows that this is the most efficient and, therefore, the design best utilizing the work potential available for the two options under consideration!" Sylvestor nodded his head sagely in agreement. I could not contain myself and broke into their conversation. This, of course, is always Management's droit de sire, which means this action, and others that do not apply at this time.

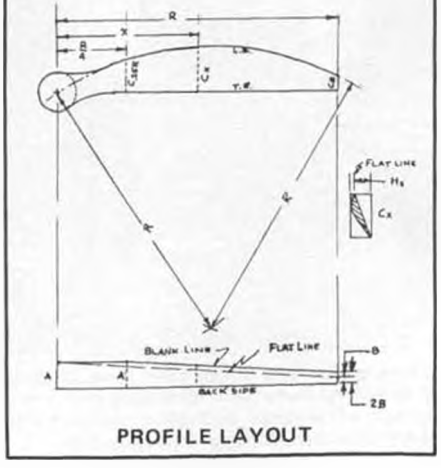
"I could not help but overhear your conversation with Sylvestor." I interjected. "Have you made a breakthrough on the altimeter problem with PAYPOD or the problems with the down link frequency-to-voltage analog problem with the ground support equipment? I think you lads are doing an absolutely superb job on this project!" I thought about the Management Ground Rules about praise without a Catch 22. "Of course, with the money you have been spending you should come up with something!" My bases were covered!

"Actually, Jefe," drawled Chickums, "we were discussing a problem given us by a friend who is involved in the Channel Islands Harbor to Anacapa Island Outrigger Canoe Race. He asked us whether it is best to use paddles with a small area and a large number of strokes per minute, or use paddles with larger area and fewer strokes per minute. This is an interesting prob. . ." I broke in again, yelling this time. Sillie broke for the water-cooler.

"You guys don't seem to realize that we are running a Top-Priority project! We have to get PAYPOD and her informative payloads in the air as soon as we can, or ASAP, as they put it in governmentese! Why aren't you working on. . .on. . ." I was looking at the piece of paper I had picked up ". . .this propeller research!" This picked up my relay again! "How do propellers relate to Project PAYLOAD?" I sat down heavily in my Director's chair without bothering to brush off the pin feathers.

Sillie had gulped down his third glass of water. Chickums looked at the ceiling and calmly replied, "Let's call the paddle episode an effort to improve public relations. Let's call the propeller research an effort to improve relations with Mr. Northrop. He likes this sort of thing and you have only one P&F&CT in his editorial offices at the moment. There will be a delay in getting any kind of article off on PAYPOD. Jefe, you should have figured this out. To get right down to it, of late you haven't been sailing with a full sea-bag, and it looks as if what you do have in it isn't rolled and tied right!" Chickums went over to the cooler, Sillie moved aside, and Chickums drew a long, cold one.

FIGURE 1



PROFILE LAYOUT

These remarks drew heavily on my management reserves. I fell back to my withdrawal position, studied my fingernails while humming an off-key tune, brushed an invisible mote off the creased knee of my Brooks Brothers jumpsuit, looked up at Chickums from the tops of my eyes and calmly requested him to explain the value of the alleged propeller research. I continued the humming and fingernail examination, knowing the Brooks Brothers crease will stand alone. After all, this product offers something in return for the fact that you can't buy a pheasant under glass lunch with the savings gained by buying your jumpsuit from C & R.

Speaking a trifle loudly to offset the tune I was humming, Chickums began, "Chief, modelers want to try special props from time to time and often can't find them available. Sillie and I did a little thinking about prop design and developed some very simple equations and some offsets to draw a blank from a 6-inch diameter to a 37-inch diameter in increments of 1 inch. Frankly, Sillie and I were going to confine our calculations to a diameter of 16 inches, but Dennis Stimson dropped by—you know Dennis, we have been trying to talk him back into the hobby—and he promptly disappeared when he saw us punching our calculators. He returned before too long with the offsets from 6 inches to 25 inches. He had plugged our equations into his computer and that is what we will show in a little bit as Table I! Denny saved us a lot of fingerwork on the computer and we are most grateful! We think you should give him a break on a kit!" This made me start humming a littler louder! Chickums continued, "Sillie did a lot of this work, so, Old Chum, why don't you take the stick?"

Sillie paused a moment. "Obviously, if the pitch angle G was constant for all values of x, the pitch would increase as the section moved out toward the top; and each blade

element would advance at different rates, resulting in a very confused propeller and performance very similar to that observed when a gang of monkeys have designs upon a football! Therefore, one of the options available to us is to design a propeller with a helical pitch, or a propeller where every blade element advances an equal distance p in each revolution. Such a propeller is shown in Figure 1. If values of x are chosen in multiples of .1R between 0 and R, the pitch angles G may be constructed for each. For each value of x the horizontal component of the blade width, or chord, will be C_X and the vertical component is H_X. The chord line for the majority of the sections, or blade elements, will coincide with the flat propeller backside, so H_X is called the 'flat line,' which we shall talk about shortly."

Sillie paused, again, for so long that I was about to say something (I had stopped my humming sometime ago and forgotten my fingernails) when he began again. "This gets a little sticky. Obviously, the position of any section will determine the blade shape, and the propeller must be tapered in such a way to give both a proper flat line position to insure helical pitch and maintain the desired blade shape." Chickums suggested that we "freeze" some design parameters so that we could maintain a standard blade design and prepare a blank that insures the carving of a true propeller. I think we will not go into the derivation of the design, for the resulting equations can be easily screwed up before you read them. There is an award at the Annual Typesetter's Convention that is given to that craftsman who has demonstrated that he has best set type to completely change the meaning intended by the writer and thoroughly confuse the reader. The donor of the award, who was a disciple of Ben Franklin, was named Murphy and was honored in his own time by having a law named after him. Therefore, we shall discuss the achievement of the design objectives and omit their development.

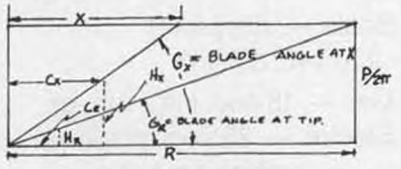
"The trailing edge of all sections contributing to thrust will lie on a straight centerline passing through the center of the shaft. All taper shall be on the front side, which, with the position of the trailing edge, establishes the arc of radius R passing through the shaft center and the tip leading edge. This is shown in Figure 2. Placing the taper on the front side only also provides a stiffer configuration, for the propeller thrust tries to bend the propeller forward, which places all the wood in compression, rather than some in tension. This is using the maximum strength of the wood. Also, run the grain of the wood parallel to the centerline. This is for reasons of maximum strength and it will also make the blades easier to carve."

Chickums broke in at this point. "The 'flat line' is the line that defines the pitch. The 'blank line' determines the blade thickness in the area of the hub. In Figure 3 the point where the blank line becomes constant thickness at a value of A (at Station .25R) will provide a slightly thicker blade. If you prefer a thinner blade, this point may be moved toward the shaft, but no closer than Station .07R. Remember, blade thickness near the hub is required for strength at high torque operation or larger diameters."

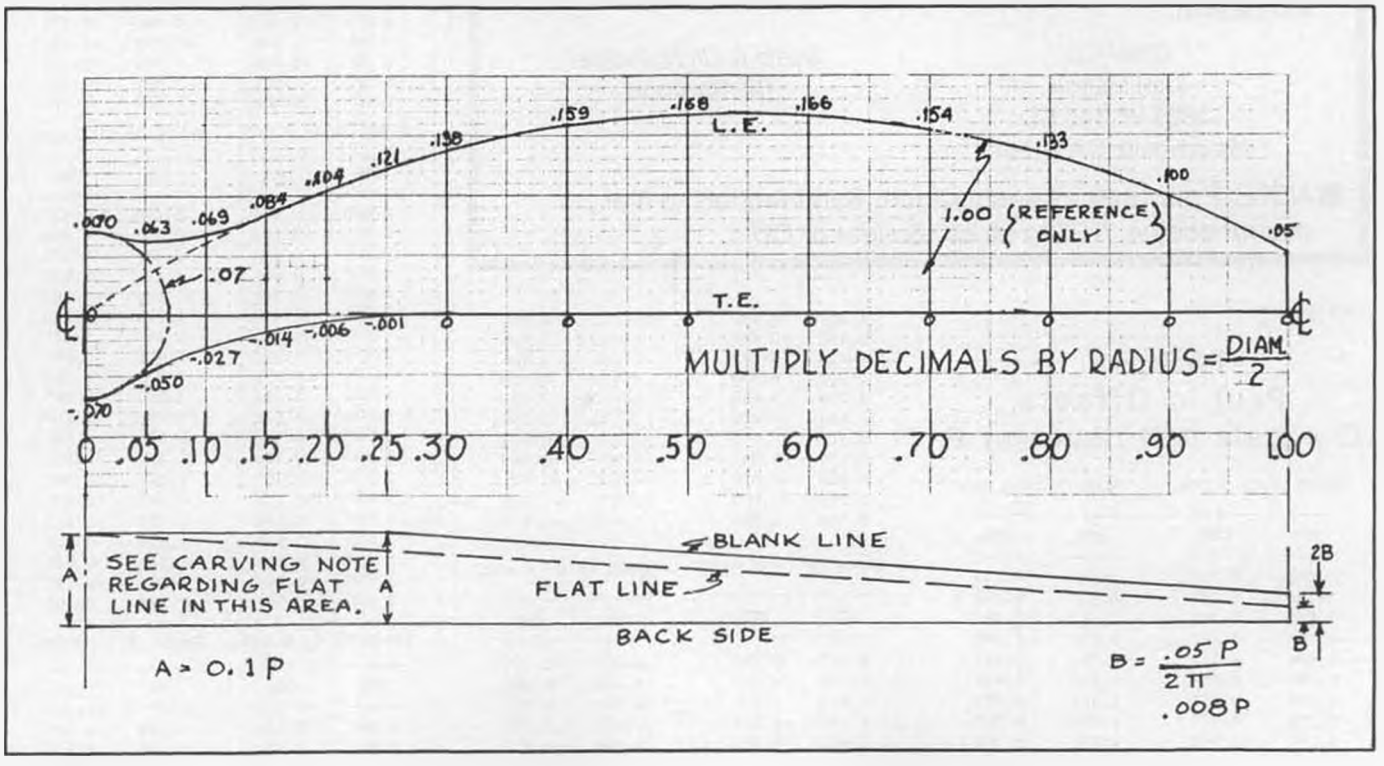
"I'm glad you brought that up, Chickums—I'm afraid I was going to overlook it!" said Sillie. "The only thing left to define in Figure 2 and Figure 3 are the dimensions A and B. B sets the flat line for the pitch desired and 2B sets the blank line, which controls the blade thickness. B is calculated as .008P. The block line maximum thickness A is calculated as .1P and at the shaft controls pitch and at the noted Station, blade thickness. In Table I are the coordinates, or offsets, defining propeller profiles for diameters from 6 inches through 37 inches. Dennis saved us considerable time on our calculators by his generous assistance, Chief!" I went back to my humming and the study of my nails. "Chickums, would you have a few words regarding the layout and carving of these propellers?"

"The first thing to do," said Chickums, "is to determine diameter and pitch desired. A 'normal' propeller has a pitch half its diameter. Above this is considered high pitch; below is low pitch. The second thing to do is select the wood. Use wood like maple and 'real' mahogany from Africa or Honduras, not the light Luan, or Philippine mahogany. Do not use oak or you will bend shafts and crack cases. Be sure the grain runs parallel with the block centerline inside and profile views. It is assumed that you have calculated the dimensions A, B, and 2B. The size of the wood must be of minimum thickness, .1P; minimum width, .34R; and minimum length, 2R. Draw a centerline for the length of the face side. Using offsets from Table I, plot the desired profile on the light cardboard, marking a sharp center line, and cut out the blade pattern. Drill a hole equal to or smaller than the shaft size in both the block center and the pattern. DO THIS ACCURATELY!! Place the drill in the block hole, slip on the pattern, line up the pattern and block centerlines and draw the profile. Turn the pattern about the drill, line up the centerlines, and draw the other profile. Remove the pattern

FIGURE 2



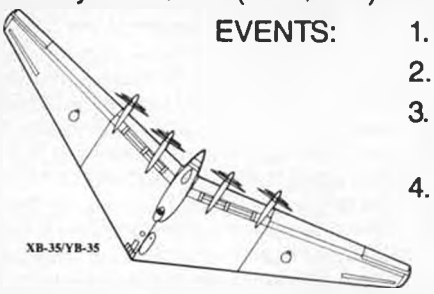
PITCH DIAGRAM



20TH ANNUAL NORTHROP FLYING WING CONTEST

NOVEMBER 2, 1986

- Sponsored By: *MODEL BUILDER* Magazine
  Bill Northrop, Publisher
- AMA Sanction #787 — AMA License reqd.
- Site: Mile Square Park, Fountain Valley, CA
- Time: 8:30 a.m. to 1:00 p.m.
- Jr., Sr., & Open combined in all events
- Entry Fee: $3.00 (Jr. - $2.00) each event



EVENTS:

1. Rubber Power
2. Glider (164 ft. towline)
3. Scale — any power
   (20 sec. official)
4. Gas — 15 sec. eng. run, or
   Electric — 25 sec. motor run

• combined event •

In case of controversy, opinion of Contest Director and Judge will be final.

Chief CD
Carl Hatrak
3825 W. 144 St.
Hawthorne, CA 90250

Scale & Flight Judge
Bill Stroman

● *NOTE:* Proxy entries encouraged. Send models to flier of your choice, *NOT* to *Model Builder* or CD's.

and pivot."

TABLE I
Profile Offsets
C equals half diameter R

VALUE OF C: 3.000

STA	ORD
0.000	0.210
0.150	0.189
0.300	0.207
0.450	0.252
0.600	0.312
0.750	0.363
0.900	0.414
1.200	0.477
1.500	0.504

VALUE OF C: 3.500

STA	ORD
0.000	0.245
0.175	0.221
0.350	0.242
0.525	0.294
0.700	0.364
0.875	0.424
1.050	0.483
1.400	0.557
1.750	0.588
1.800	0.498
2.100	0.462
2.400	0.399
2.700	0.300
3.000	0.150
0.150	-0.150
0.300	-0.081
0.450	-0.042
0.600	-0.018
0.750	-0.003
0.900	0.000

VALUE OF C: 4.000

STA	ORD
0.000	0.280
0.200	0.252
0.400	0.276
0.600	0.336
0.800	0.416
1.000	0.484
1.200	0.552
1.600	0.636
2.000	0.672
2.400	0.664
2.800	0.616
3.200	0.532
3.600	0.400
4.000	0.200
0.200	-0.200
0.400	-0.108
0.600	0.000
0.800	-0.024
1.000	-0.004
1.200	0.000

VALUE OF C: 4.500

STA	ORD
0.000	0.315
0.225	0.284
0.450	0.311
0.675	0.378
0.900	0.468
1.125	0.545
1.350	0.621
1.800	0.716
2.250	0.756
2.700	0.747
3.150	0.693
3.600	0.599
4.050	0.450
4.500	0.225
0.225	-0.225
0.450	-0.122
0.675	-0.063
0.900	-0.027
1.125	-0.005
1.350	0.000

VALUE OF C: 5.000

STA	ORD
0.000	0.350
0.250	0.315
0.500	0.345
0.750	0.420
1.000	0.520
1.250	0.605
1.500	0.690
2.000	0.795
2.500	0.840
3.000	0.830
3.500	0.770
4.000	0.665
4.500	0.500
5.000	0.250
0.250	-0.250
0.500	-0.135
0.750	-0.070
1.000	-0.030
1.250	-0.005
1.500	0.000

VALUE OF C: 5.500

STA	ORD
0.000	0.385
0.275	0.347
0.550	0.380
0.825	0.462
1.100	0.572
1.375	0.666
1.650	0.759
2.200	0.875
2.750	0.924
3.300	0.913
3.850	0.847
4.400	0.732
4.950	0.550
5.500	0.275
0.275	-0.275
0.550	-0.149
0.825	-0.077
1.100	-0.033
1.375	-0.006
1.650	0.000

VALUE OF C: 6.000

STA	ORD
0.000	0.420
0.300	0.378
0.600	0.414
0.900	0.504
1.200	0.624
1.500	0.726
1.800	0.828
2.400	0.954
3.000	1.008
3.600	0.996
4.200	0.924
4.800	0.798
5.400	0.600
6.000	0.300
0.300	-0.300
0.600	-0.162
0.900	0.000
1.200	-0.036
1.500	-0.006
1.800	0.000

VALUE OF C: 6.500

STA	ORD
0.000	0.455
0.325	0.410
0.650	0.449
0.975	0.546
1.300	0.676
1.625	0.787
1.950	0.897
2.600	1.034
3.250	1.092
3.900	1.079
4.550	1.001
5.200	0.865
5.850	0.650
6.500	0.325
0.325	-0.325
0.650	-0.176
0.975	-0.091
1.300	-0.039
1.625	-0.007
1.950	0.000

VALUE OF C: 7.000

STA	ORD
0.000	0.490
0.350	0.441
0.700	0.483
1.050	0.588
1.400	0.728
1.750	0.847
2.100	0.966
2.800	1.113
3.500	1.176
4.200	1.162
4.900	1.078
5.600	0.931
6.300	0.700
7.000	0.350
0.350	-0.350
0.700	-0.189
1.050	-0.098
1.400	-0.042
1.750	-0.007
2.100	0.000

VALUE OF C: 7.500

STA	ORD
0.000	0.525
0.375	0.473
0.750	0.518
1.125	0.630
1.500	0.780
1.875	0.908
2.250	1.035
3.000	1.193
3.750	1.260
4.500	1.245
5.250	1.155
6.000	0.998
6.750	0.750
7.500	0.375
0.375	-0.375
0.750	-0.203
1.125	-0.105
1.500	-0.045
1.875	-0.008
2.250	0.000

VALUE OF C: 8.000

STA	ORD
0.000	0.560
0.400	0.504

VALUE OF C: 8.500

STA	ORD
0.000	0.595
0.425	0.536

0.800	0.552	0.850	0.587
1.200	0.672	1.275	0.714
1.600	0.832	1.700	0.884
2.000	0.968	2.125	1.029
2.400	1.104	2.550	1.173
3.200	1.272	3.400	1.352
4.000	1.344	4.250	1.428
4.800	1.328	5.100	1.411
5.600	1.232	5.950	1.309
6.400	1.064	6.800	1.131
7.200	0.800	7.650	0.850
8.000	0.400	8.500	0.425
0.400	-0.400	0.425	-0.425
0.800	-0.216	0.850	-0.230
1.200	0.000	1.275	-0.119
1.600	-0.048	1.700	-0.051
2.000	-0.008	2.125	-0.009
2.400	0.000	2.550	0.000

VALUE OF C: 9.000

STA	ORD
0.000	0.630
0.450	0.567
0.900	0.621
1.350	0.756
1.800	0.936
2.250	1.089
2.700	1.242
3.600	1.431
4.500	1.512
5.400	1.494
6.300	1.386
7.200	1.197
8.100	0.900
9.000	0.450
0.450	-0.450
0.900	-0.243
1.350	-0.126
1.800	-0.054
2.250	-0.009
2.700	0.000

VALUE OF C: 9.500

STA	ORD
0.000	0.665
0.475	0.599
0.950	0.656
1.425	0.798
1.900	0.988
2.375	1.150
2.850	1.311
3.800	1.511
4.750	1.596
5.700	1.577
6.650	1.463
7.600	1.264
8.550	0.950
9.500	0.475
0.475	-0.475
0.950	-0.257
1.425	-0.133
1.900	-0.057
2.375	-0.010
2.850	0.000

VALUE OF C: 10.000

STA	ORD
0.000	0.700
0.500	0.630
1.000	0.690
1.500	0.840
2.000	1.040
2.500	1.210
3.000	1.380
4.000	1.590
5.000	1.680
6.000	1.660
7.000	1.540
8.000	1.330
9.000	1.000
10.000	0.500
0.500	-0.500
1.000	-0.270
1.500	0.000
2.000	-0.060
2.500	-0.010
3.000	0.000

VALUE OF C: 10.500

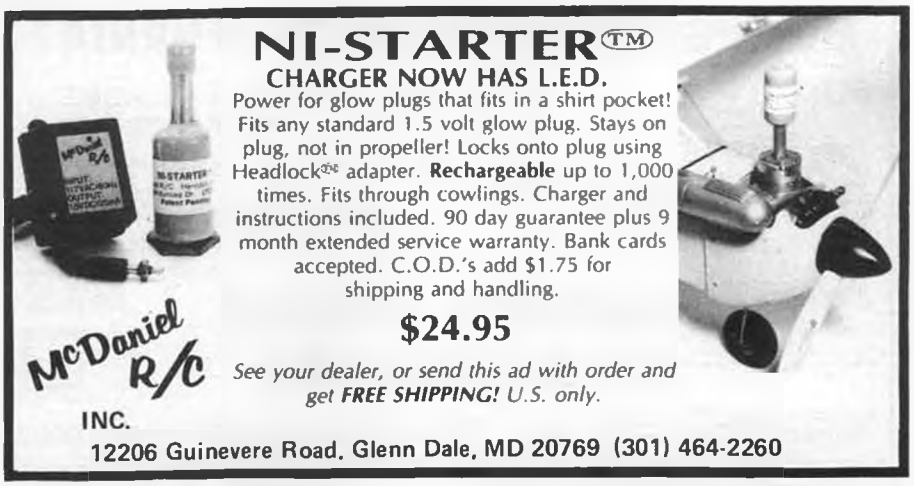
STA	ORD
0.000	0.735
0.525	0.662
1.050	0.725
1.575	0.882
2.100	1.092
2.625	1.271
3.150	1.449
4.200	1.670
5.250	1.764
6.300	1.743
7.350	1.617
8.400	1.397
9.450	1.050
10.500	0.525
0.525	-0.525
1.050	-0.284
1.575	-0.147
2.100	-0.063
2.625	-0.011
3.150	0.000

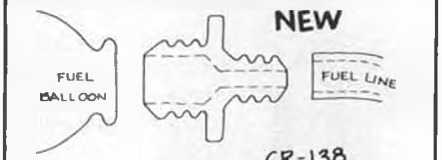
VALUE OF C: 11.000

STA	ORD
0.000	0.770
0.550	0.693
1.100	0.759
1.650	0.924
2.200	1.144
2.750	1.331
3.300	1.518
4.400	1.749
5.500	1.848
6.600	1.826
7.700	1.694
8.800	1.463
9.900	1.100
11.000	0.550
0.550	-0.550
1.100	-0.297
1.650	-0.154
2.200	-0.066
2.750	-0.011
3.300	0.000

VALUE OF C: 11.500

STA	ORD
0.000	0.805
0.575	0.725
1.150	0.794
1.725	0.966
2.300	1.196
2.875	1.392
3.450	1.587
4.600	1.829
5.750	1.932
6.900	1.909
8.050	1.771
9.200	1.530
10.350	1.150
11.500	0.575
0.575	-0.575
1.150	-0.311
1.725	-0.161
2.300	-0.069
2.875	-0.012
3.450	0.000





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VALUE OF C: 12.000

STA	ORD
0.000	0.840
0.600	0.756
1.200	0.828
1.800	1.008
2.400	1.248
3.000	1.452
3.600	1.656
4.800	1.908
6.000	2.016
7.200	1.992
8.400	1.848
9.600	1.596
10.800	1.200
12.000	0.600
0.600	-0.600
1.200	-0.324
1.800	0.000
2.400	-0.072
3.000	-0.012
3.600	0.000

VALUE OF C: 12.500

STA	ORD
0.000	0.875
0.625	0.788
1.250	0.863
1.875	1.050
2.500	1.300
3.125	1.513
3.750	1.725
5.000	1.988
6.250	2.100
7.500	2.075
8.750	1.925
10.000	1.663
11.250	1.250
12.500	0.625
0.625	-0.625
1.250	-0.338
1.875	-0.175
2.500	-0.075
3.125	-0.013
3.750	0.000

Chickums assumed his "now, get this" look. "Here is where you can goof! You are ready to mark the blank line. The part to be removed is on the front side, which for a tractor, normal rotations; is under the profile just drawn. The backside is the unmarked block side. From the backside locate the stations where you want the dimension A, and set it off. From the backside at the tip, set off 2B. Connect these points with straight lines and saw the block lines. Spot-glue the piece just sawed off back into place, and saw out the profile. Remove the spot-glued piece and draw the flat line on the blank. Remember to draw this line in the proper place—which is the bottom of the leading edge. In both Figure 2 and Figure 3 the blank line is shown dotted because it is on the other side of the object drawn. Don't screw up at this point, for most of the work has been done! The blank is ready to carve!

"Hangar 3 has several nice Swedish carving knives, and a good blade makes the job a lot easier. With long shaving strokes, remove wood from the backside, working for a flat backside from the trailing edge to the flat line leading edge. Leave a little material at the trailing edge for sanding later. Work

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on both sides. Fair the hub area into the flat line, but don't overdo it. You can take material off later a lot easier than adding it!

"Turn the prop over and carve the front side. The block line will be the point of maximum camber, which should be about 1/3 the section chord. Working both blades carve WITH CARE until the prop 'looks right.' Starting with about #100 aluminum oxide paper and a small sanding block, begin the finishing—progressing to lighter paper grades. Start checking balance when you first start sanding. Be careful with the leading and trailing edges until you get to the lighter paper grades. Balance throughout the entire shaping of the blades—it's easier in the long run. Finish with several with #400. Fine-balance with dope." Chickums went over to the cooler. "That's it!" he said over his shoulder, "You've drawn it, you've carved it, go spin it!"

This was quite an output for the lads! I couldn't help but think back to the SAGMA (San Antonio Gas Model Association) days and the props that Mr. Moore (was it Tom?) carved. They were expensive, $1.00 for any diameter, but they were GOOD. We used them in contests and reworked .25 cent Modelcraft props for funsies. I remember W.L. Vavricka (we called him W.L. and never wondered what the letters stood for) took a bunch of Moore Props to the Nats one year and tried them on the Flo-Torque test stand in the manufacturer's booth. The Moores were by far superior! The booth was shut down! When it reopened, the fans shouted, "Try a Moore!" and the stand would close again. I think that was '39, '40, or '41. W.L. could be a nasty one at times!

"Well, lads, let's send it off to *Model Builder*—you did a good job!" I praised them. "By the way, which of the outrigger canoe paddles were the best?" I questioned.

"The little ones paddled best, Jefe, of course," said Chickums. "Sillie, Old Chum, let's toddle off to the Long Jump and see if Willie has a new and cold Aussie Import in, like she's been promisin'! See ya around, Jefe!" The lads went out into the bright sun.

See ya in the Chicken House, y'hear? •

Euro Scene. . . *Continued from page 50*

linton. The other day I received a friendly letter from Mike, in which he told me that he already tested this engine before he joined *MB*, but that he was working on a report on the twin cylinder 3.6 cu. inch OPS 60! He expected to finish the dyno-tests within a few weeks, so you won't have to wait too long to be informed about this very interesting European engine.

Certainly not European, but definitely also very interesting is the Zenoah 62, the big brother of the successful Zenoah G38. It's being imported here now by Tony Clark, and demand was such that I haven't been able yet to lay my hands on one of them. Weight is said to be only 2200 grams (under 5 lbs.), which is extremely light for the capacity (just over 3.6 cu. inches). It features self-contained CDI-ignition with only a very small flywheel, and comes complete with muffler, at 1.5 the price of the G38, which is not too bad.

I hope to be able to try one in the near future; this one should enable my Big Bird to climb straight up out of sight! •

Dear Jake. . . . . *Continued from page 7*

my scale Japanese Toni, it turned into an Astro Hog. Second, and probably more important, objects that you did not intend to coat, but accidentally came into contact with the aerions due to spillage or overspray could suffer disastrous side effects. As I write this, my daughter is sitting on a stepladder, practicing her lessons on our piano, which is floating near the ceiling.

Aerions are a natural phenomenon, not to be tampered with by man. Take a lesson from Icarus. Why do you think he flew too close to the Sun? It was all those aerions he pressed into his wax wings.

Jake

* * *

Dear Jake:

I've got a 72-inch Mosquito with twin Super Tigre 40s. It looks nice and it only weighs a little over 19 pounds, but it doesn't fly all that well and I've been trying to unload it. I put it up for sale in the club newsletter, but no takers. It didn't go at the auction either, so I hung it up in the local hobby shop to try and generate some interest. Still no nibbles. Any idea how I can get rid of it?

For Sale in Fargo

Dear For Sale:

The only way I know of to get rid of a six-foot, twenty-pound Mosquito is with a fifty-five gallon drum of Raid.

Jake

R/C Soaring. . *Continued from page 45*

Box 647, Mundelein, Illinois 60060. They will send you all the info you need to join, along with the appropriate aspirant's form.

Rich wrote a short letter describing Terry's goal and return ship. I quote from it now:

"Dear Bill; enclosed is a picture of Terry Luckenback with the plane that he finished Level V with. I understand that he is number 48.

"The plane is a scratchbuilt of his own design. The fuse is glassed light ply to the back of the wing. From the wing back is glass boom molded over a male plug. The fin is wood over foam. The stab is 200 sq. in. wood over foam, carbon fiber, Kevlar, glued with epoxy, and vacuum bagged. The stab weighs 2 oz. and is fixed to the top of the fin with two bolts and uses a movable elevator of about 25% of the total. The wing was lent to him by Glenn Gold; it is 11 feet, about 1200 sq. in., with a E214 airfoil. The plane was flown at about an 18 oz/sq. ft. wing loading. Good lift, Rich Border.

"P.S. I really like the airfoil of the month. How about printing some of the best airfoils at about ten inches so we can copy them?

Thanks."

That's a good idea, Rich. Any interest out there guys? Your response may determine where you see the airfoils published.

TOM GRESSMAN REPORTS: GREAT RACE & PRODIGY

I sure appreciate all the good info Tom Gressman sends my way from the Midwest region of our great country. If I were to give him a nickname, it would be easy, he's Mr. Grapevine! From his listening post in Wisconsin, Tom hears just about everything there is to hear in the world of R/C soaring. His latest communiques, a letter from early July and a phone call from early August, revealed much info on two fronts.

The Great Race X in or around Oswego, Illinois, on the weekend of June 21, was quite an affair with high winds of around 15 mph and high temperatures of around mid 90s. Larry Jolly and team won with Larry's F3H World Championship winning Comet X-country ship. When you're hot, you're hot! And there's no denying Larry is hot! His winning distance was 33 miles of the 76 kilometer course, a remarkable feat considering the fact that there seemed to be a "ceiling" at approximately 3,000 feet which no one could punch through.

The accompanying photos tell a great deal of the story, so I'm going to close about the Great Race 10.

Continuing with the "when you're hot, you're hot" theme, Tom mentioned flying the Off The Ground Models Prodigy 2-Meter sailplane at the Great Race. I too have flown a Prodigy, and like Tom think it is a remarkable design. Quoting from Tom's pre-AMA NATS letter:

"Bill, in addition to the great Race data, I want to pass on some information on a remarkable new design-kit.

"At the Great Race, I was fortunate to be able to fly the Prodigy, twice. This sailplane has an incredible L/D, it changes speed quickly and smoothly, and it has a very wide speed range. Even at low speeds, the Selig S4061-096-84 section (see MB *"R/C Soaring." April 1986, page 43.*) remains efficient. The airframe is capable of zooming off a 12-volt cross country ship class winch.

"At the NSS contest in Madison, last Saturday in June, Paul Carlson (*OTGM founder and designer*) took first place overall (2M and Unlimited Classes) with the 2-Meter Prodigy. The larger Prodigy will be available in about six months and probably will allow for 100-inch or three-meter construction (118 inches).

"I did most of the timing for Paul, and he is a very good stick—but the Prodigy has it all—it can be zoom launched *hard*—top L/D and still slow down to ride out that light, small diameter thermal or now well-defined lift. I've also heard that one of these gems took first in 2M in Grand Rapids (number of entries in 2M? but about 70 contestants total).

"My suspicion is that this design will become the one to beat in AMA/NSS thermal competition—I'll have one!

"Take care, Bill. I hope these photos and/or observations are of value. Thomas M. Gressman."

Well, Tom's suspicions turned into prophecy. A month later I got a phone call from Tom. He had news from the 1986 AMA Nats. Paul Carlson had taken first in 2-Meter, second in Standard, and third in Unlimited Classes!!! All with his little Prodigy 2-meter.

I called Paul to confirm, and it was all true. The Prodigy's L/D was crucial in the wind and heat (108 degrees!). There evidently was an area downwind that was generating some ridge or wave lift, and typical "gas baggers" were unable to get back to the field from it, not so the Prodigy. His performance with his Prodigy earned him the prestigious Lee Renaud Memorial Trophy awarded to the flier who racks up the highest total score in the three classes (B,C, and D). A remarkable feat, Paul, congratulations!

The first place winner in Class D (Unlimited) and winner of the Hi Johnson Memorial Trophy was Leon Kincaid who was flying a 3-Meter Scooter. Second place in this class was Tom Brightbill and his Windsong. First place in Class C (100-inch, Standard Class) was Jack Hamilton flying a slicked-up Legionair-type sailplane called the Skyjack. Beyond these, I don't know anything, and would refer you to official AMA press releases.

JOE WURTZ, WEST COAST WINNER

Joe Wurtz has one of the hottest winning streaks going out here on the West Coast. He took first place at the SBSS International Slope Races, first place at the Western States Soaring Championships, and first place at the Western Great Race hosted by the Thousand Oaks Soaring Society. Congratulations, Joe! Give somebody else a chance at the glory.

NEXT MONTH . . .

I've still got a bunch of stuff to share with you from the mail bag, some of it is well worth waiting for too, so be patient. I've got enough to fill another column yet, and I want to thank all of you guys who spend the time to drop me a line. I can't always answer your letters right away, but I eventually get caught up with everybody.

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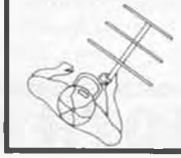

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Inside Engines. *Continued from page 34*

this writer.

SILENCER OPERATION

Subsequent rerun of the above tests, but with the standard Webra silencer fitted, resulted in a small average loss of 200 rpm at each point and small reduction in maximum hp down to .91 at 10,200 rpm. Equally, fuel consumption was slightly reduced. In many cases the various figures proved too similar to the open exhaust ones, and so to prevent visual confusion, the silencer figures have been omitted from the power graph. At rpm about 11,000, security of the silencer fitting was marginal, and continual retightening proved necessary.

IDLING SPEEDS

The TN carburetor allowed the following idling speeds with good transition to mid-range rpm and above:

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Fan-Fly. . . . . . *Continued from page 31*

it is not a jet project, the B-29 captured the attention of everyone at the Fan-Fly, and it served to illustrate Byron's dedication to engineer, produce, and demonstrate the outer limits of the scale modeler's art. In a similar vein, the plug of a B-1 fuselage was on display. Maybe next year we will be treated to the sight of a huge four-engined jet bomber with variable geometry wings.

The BD-5J theme of the Fan-Fly was reinforced each afternoon when Dave Hoover lit off the Microturbo in his full-sized "J" and taxied out to take the active at Ida Grove International. Dave's cockpit microphone was transmitted to the announcer's stand at the Fan-Fly site so that all remarks from the cockpit were heard by the crowd. This was a particularly interesting touch, since Dave is a very glib individual and does an amusing job of describing his airshow routine as he is flying the maneuvers. The routine is very precise, and Dave made excellent use of the Iowa terrain by following the hills at very low altitude, appearing in front of the crowd unexpectedly.

The BD-5J demonstration was followed by an expanded version of the now famous WWII air battle reenactment, "Striking Back." This display has achieved worldwide recognition. Many non-modelers have been made aware of the sophistication of our hobby through this demonstration. The display is so realistic that several movie production companies have expressed interest in using the Byron's aircraft and pyrotech-

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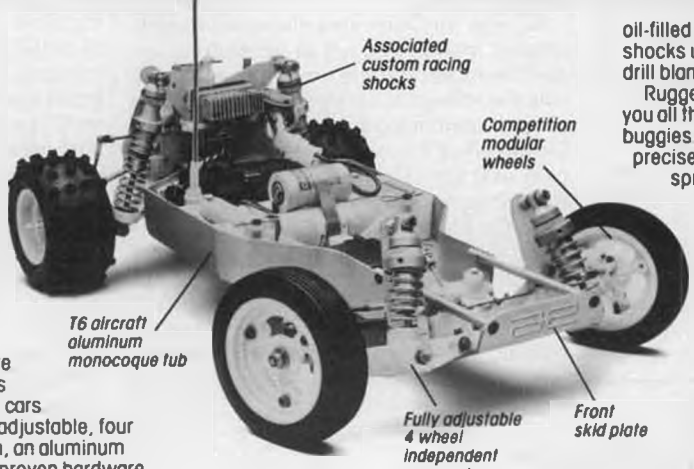

oil-filled racing shocks. These custom shocks use machined alloy cylinders and drill blank shafts for silky smooth action.

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nics for future film sequences.

I understand that the Fan-Fly and the Giant Scale events may be merged into one, week long program next year. This sounds like an excellent idea since it will allow more modelers to attend both events. •

Electric Power. *Continued from page 17*

all hope it comes back!

Don Hughes and I have been writing back and forth a lot lately, his planes have been featured in earlier columns. Don is one of those rare types that can clearly see the logical and simple answer to a problem. After he tells you, you say, "Of course, why didn't I think of that!" Anyway, the subject this time was the ferrite motors and the loss of magnetic field over time. When these motors are driven hard or stalled out and get hot, they lose some of their magnetic field, and this continues till the motor is really only 70% or so of its former self. This gets very frustrating, especially when you try to prove it is something else causing the lack of power.

So, now for Don's idea: these permanent magnet motors also act as generators. So, spin the motor at some fixed rpm, and measure the voltage at the motor leads (the motor is disconnected from any battery pack). Do this when the motor is new, and periodically as it ages. Don did not say, but I think the voltage will go down as the magnets get bad. You will probably need a digital voltmeter for this, or an ESV. I have not tried this yet, but I will and let you know of the results. I think a common 1/4 or 3/8 shop drill will provide a handy source of constant rpm. By the way, cobalt magnets do not deteriorate with heat.

Don also talked about magnets, a new type of magnet is the neodymium magnet. *Popular Science*, in the August 1986 issue talked about these magnets in motors designed for a hybrid gas-electric car. There they are used in an eight-pound motor that produces 20 horsepower. This is double the power possible with samarium cobalt magnets ("cobalt motors"). An eight-pound motor capable of 20 horses is fascinating, it would make full-scale electric ultralight planes quite practical, even with the nickel cadmium batteries of today.

Don may try some of these super magnets, but in the meanwhile he has been doing some neat stuff with the ferrite 035. One of the big problems with the present ferrite motors (and some cobalt motors too!) is the brush/commutator system. They are too small, and they "choke" the motor. Don lets the motor breathe by installing larger commutators and brushes. These modified motors really scream; he turns them at up to 22,000. It is bound to come! Move over, hopped-up Tee Dees! The motor and his custom gear drive weigh four ounces and run on eight 450 cells. This turns a Top Flight 9 x 6 cut to 8-1/2 x 6 nylon prop at 7,300 on a 13-39 gear drive. But then the next question that Don posed! Is it progress when you finally overpower your model and cause it to crash? It happened at Fresno, Don plane went into a loop, shattered the wings, and stuffed into the ground. Speed kills! Thanks for the info, Don, and with that, let's go out and electric fly, fly, fly! •

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F/F Scale. . . . *Continued from page 62*

properly in order to get the proper contour, and yet be able to trim it neatly and precisely. Whatever you do, don't do it as illustrated, because your efforts will look just awful! To avoid this, do the following: The bottom of the fuselage should be covered first, followed by the sides, then the top. The reason is simply to have all the seams down-

ward rather than the other way around. The same technique is used on full-size aircraft.

Once the bottom has been attached and trimmed, cut a piece of Solartex to be used for one of the sides. Leave enough width at the bottom that can be used to hold the material while pulling around the bottom corner. Attach along the top edge and at either end. Before attaching the bottom side, take a piece of duct tape the length of the side, and tear it so it is about a half-inch wide. (Duct tape tears very easily.) Lay the tape on the bottom edge as shown in Fig. 1. Next, take the extra material along the bottom, and pull it around the bottom corner. At this point, apply heat on just the corner itself, and nowhere else! Fold the extra material around the bottom and tape it down. You will be cutting over the duct tape. At this point, you may be asking why duct tape? Any tape will do providing it is thick enough so that you will not cut through the fabric underneath. You can probably use masking tape, but care has to be taken. Possibly two layers of masking tape would be better. . . but I had a roll of duct tape on hand!

There's a trick to putting down the edge just trimmed. Never hold the iron so that it is over the unsealed edge. The fabric could shrink and pull away from the structure before the edge was completely sealed. So, hold the fuselage with the bottom facing you, and run the iron in downward strokes along the seam until it is completely sealed. The rest of the fuselage is done similarly. Using this technique gives the seams nice, straight edges.

Getting back to the tissue issue! One of the major reasons I do not build many WWII rubber models is that the covering of the fuselages is such a pain. They usually have to be covered in individual strips between stringers. Sometime back, I developed a method which has minimized the agony and time consumption associated with these type of models. As stated before, start at the bottom and work up. I like to put my strips of tissue on moist. This virtually eliminates getting any wrinkles in the covering. I also like to use thinned out white glue for attachment. (60% glue to 40% water.)

Putting on the first strip is a breeze! When dry, trim and apply a coat of 50/50 nitrate dope and thinner. If you prefer not to dope at this stage, don't worry about it. After cutting out the next strip of tissue, lay a piece of low-tack masking tape right down the center of the stringer which the strip of tissue will attach to. This can be a bit tricky since most stringers are only 1/16-inch square. Brush a coat of the glue onto the stringer with the tape on it and to the adjacent one. Again, apply the moistened strip of tissue onto the glued surface and pull taut in all directions. When this strip has dried, take your sharp razor blade, and cut right along the edge of the tape. The tape acts as a guide, making trimming a snap! Pull the tape back on itself when removing. This truly simplifies a rather tedious task. Keep in mind as you go up the sides to alternate left and right. You don't want to take a chance on distorting your fuselage.

When you get to the last strip of tissue, you'll obviously need to put down two pieces of tape, but handle as before. If you have been doping the first coat as you go along, take a piece of Scotchbrite pad, and go over the whole model, particularly along the seams before doping again. If you haven't been doping before, do so now and use the pad between coats. It removes any fuzzies that might show up without tearing into the tissue.

* * *

At a recent Flightmasters meeting, Mac MacJunkin showed up with an interesting test bed. He had made a model of the XP59 for rubber power. It is a combination jet/prop airplane. Before he did any test flying, he made a quickie of the same airplane out of foam exactly the same size as the built-up model. He made the tail plane adjustable, and what was really clever, he used a nail poked into the top of the model for ballast. Naturally, he was able to move the nail fore and aft until he got the best glide, along with tail adjustments. Once Mac established this good information, it was transferred to the built-up model. This, in turn, made testing the more fragile model an easy task.

In closing this month's column, I want to thank those of you who take time to write. Many of you want specific information. If you do not enclose a self-addressed envelope, the chances of a reply are slim or none. I hate going to the post office for any reason, and when I am forced to do so, my blood pressure goes out of sight!

I'm off to Geneseo...!!!

•

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Free Flight . . *Continued from page 61*

By the way, normal bunt timing sequence is as follows: Engine flood off at 6.9 seconds, bunt actuates at 7.5 seconds, auto-rudder actuates at 7.5 to 8.0 seconds, glide actuates (and bunt de-actuates) at 9.0 to 10.0 seconds, d.t. actuates at 3.0 minutes. Some folks actuate the bunt and the auto-rudder at the same time using the same lever on the

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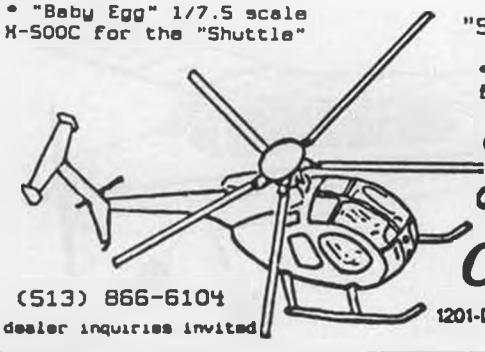

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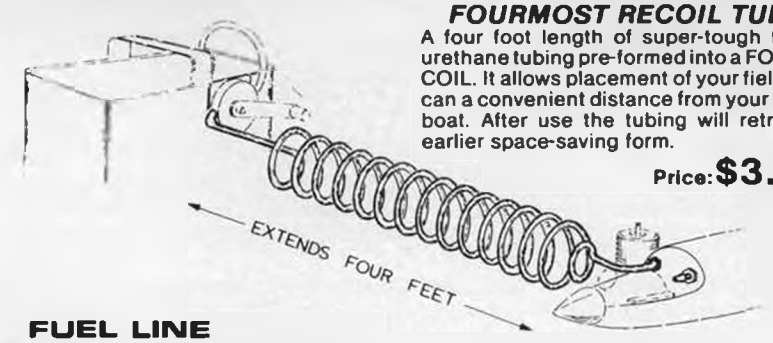

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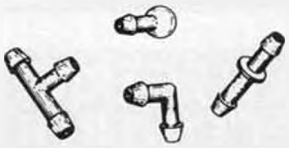

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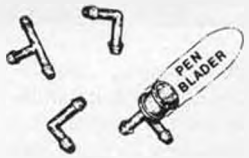

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seelig timer, others use a modified Seelig 5 function timer which is available from Doug Galbreath for $28.50. Doug's address is 707 2nd Street, Davis, California 95616.

BUILDING TIP—FROM THE BUGS BUZZ NEWSLETTER

"John Bonang developed an undercamber jig for wing building; this jig was very simple in construction: Take some 1/8-inch to 1/4-inch hard balsa and cut ribs whose tops are the same as the undercamber of the ribs that the wings will have. Make enough ribs to cover the wingspan, spaced at about 3-inch intervals. Now take some more 1/4-inch to 1/2-inch strips long enough to make the longest wing panel that you intend to build—attach the strips to the ribs at about 1-inch intervals. This will form a lattice work, and VIOLA! You have a jig that has enough flexibility so that you can skew it for wash-out or wash-in, but sturdy enough to serve as a foundation for your next undercamber project. Now, use it just like you would any other undercamber jig." (see sketch).

NEW KIT MANUFACTURER—SIERRA NEVADA MODELS

Recently, I received a very nice kit from Sierra Nevada Models, P.O. Box 6195, Incline Village, Nevada 89450. The kit was the scale model D.H. Puss Moth, a 24-inch rubber-powered ship. The kit featured selected printwood, stripwood cut to size and length, Williams Brothers wheels, plastic prop, tissue, rubber motor, and a two-page set of plans complete with building instructions. Other models in the series include two other 24-inch scale ships—the Sopwith Dolphin and the Standard—all at $11.95 postpaid. Three peanut scale kits are also available, a Caudron, The Wiley Post, and a Fokker D-VII. You should be interested in these quality products. Try them out.

SOME WORDS OF WISDOM IN CLOSING

How to estimate your salary: To estimate your salary from your hourly wage, double the wage and change the decimal point to a comma. Thus, $3.00 per hour becomes $6,000 per year. This figure is about 4% low, but with taxes the way they are, it doesn't make much difference.

Estimating the temperature: Count the number of times a lone cricket chirps in fifteen seconds and add thirty-seven. This gives the temperature in Fahrenheit. (Now, where is a cricket when you need one?)

Selling things door to door: After knocking, stand at least four feet back from the door.

Playing Poker: Don't enter a poker game unless you have sixty times the betting limit in your pocket. when you have doubled this amount, quit!

So, with these words of wisdom in mind, I'll quit too! •

Tunnel Boat. . *Continued from page 49*

Hobby Poxy Formula II that has been heated with a heat gun. When heated, the Formula II becomes easy to brush. This not only seals the boat, it also strengthens the hull.

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Through proper preparation, it is possible to achieve a glass-smooth finish on a wooden hull. The key to a smooth finish on a wooden hull is filling the grain. Before getting to filling the grain, let's consider filling gaps and seams. As mentioned earlier, I like to use automotive fillers. These products are readily available and are often cheaper than model products sold for the same purpose. Automotive fillers set quickly and work easily.

After the hull has been filled and sanded, I recommend a couple of coats of K&B Super Poxy Clear Paint be applied. Thin the clear about 25% so it penetrates the wood. After the coatings of clear, apply a heavy coat of K&B Super Poxy Primer. Don't worry about runs, as this paint sands very easily. After this first primer coat, it is easy to see any areas that need additional filler. Fill any cracks and then sand. Another coat of primer is now applied and sanded. The wood grain on the hull should now be filled. If it looks like another coating of primer is needed, shoot it.

If these preparation steps are followed, the hull should be ready for final painting. I am not one to spend great amounts of time doing "trick" paint jobs on my race boats. My 11cc Tunnel is painted with K&B Super Poxy white and then trimmed with decals, rub-on letters, and numbers. Clear paint is sprayed over the rub-on letters.

When spraying more than one color on a model, I find it works best to spray the entire model with a base coat of the lightest color. Darker colors are then sprayed on the model. The 11cc boat I ran in 1985 was painted like the "O'Grady's" tunnel raced by Bob Herring during the 1984 Formula I V-8 tunnel series. That boat did look as nice as a scale model. The 11cc Tunnel would certainly lend itself well to many scale tunnel boats. When it comes to painting, the limits are set by the painter.

RUNNING AND RACING THE 11cc TUNNEL

I have had the opportunity to test and race my 11cc Tunnel for half of the 1986 season and feel it is very competitive with other hulls. I haven't been able to beat Ed Fisher and his Geraghty Tunnel, but then not too many others have done that either. I have turned in some fairly fast heat times, coming withing six seconds of Ed Fisher's NAMBA record 1:28 for the .9 mile oval.

I have found the Octura X457 works very well when the weather is cool. On very hot days or at higher elevations, the X455 seems to do better. There's no way this boat can be trimmed effectively without the use of a motor mount like the Prather or Teague 7.5 outboard motor mount. I have placed an 8-ounce fishing sinker in the very front of the front cowl. This helps to keep the bow down and improves the cornering.

The 11cc Tunnel will corner without the aid of a turnfin. It will also turn to the left without tripping like many tunnels with turnfins tend to do. Although I haven't yet

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raced the boat in wind and rough water, I have done some testing in these conditions. The boat handles them as well as any other boats I've seen under similar conditions.

Achieving maximum performance from a model of any type takes many hours of experimenting with different props, engine heights, and engine angles. What works on one day under certain conditions may not be the best setup for another day and a different set of conditions. From what I have been able to determine, the 11cc Tunnel has the potential to be a very competitive boat in the 11cc outboard tunnel class. As far as I know, this is the first construction article on a tunnel for the K&B 11cc Outboard. By the way, the boat doesn't work too badly with a 7.5 outboard.

SO GET STARTED

The 11cc Tunnel will make a fine winter building project. Start making sawdust now, and you'll have your 11cc Tunnel ready for those first races in 1987!

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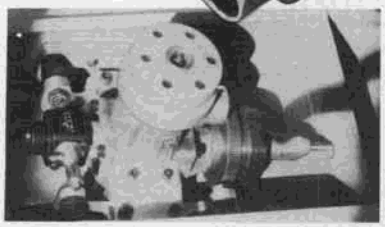

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Choppers. . . . *Continued from page 13*

the compression point of the engine. If the clutch, shaft, or pulley is not true, your eyes will pick up that "to and fro" movement of the assembly. There is probably nothing you can do at the flying field if this is the problem. You will have to pull the engine and clutch assembly, and align it. Don't run the helicopter in this condition. You may think the vibration isn't too bad because you can't see it as readily. It, of course, creates a much higher frequency vibration because the engine rpm is almost ten times that of the main rotor. This vibration does a lot of insidious damage such as cracking the main frames, and will cause the start shaft to gradually enlarge the hole where it is press-fit into the clutch so that eventually it will separate from the clutch.

(5) *Tail rotor wire.* Look where the tail rotor drive wire engages the couplers at each end. Turn these and see if you can notice a wobble that may be causing the wire to "whip" inside the tail boom.

(6) *Rotor shaft.* With the rotor head removed, spin the main gear while watching the tip of the main rotor shaft. If it is bent, your eye will pick up that wobble even if it is very slight. If the rotor shaft is out of the helicopter, simply roll it along a flat table top. If you see a sliver of light underneath it that flashes on and off as it rolls, you know it's bent.

These are all empirical methods of discovering alignment problems in your helicopter. *They are no substitute for careful building* with accurate instruments, but they sure are good in a pinch!

SHUTTLE UPDATE

I have plunked one of Don Chapman's V-Tech tuned mufflers on my O.S. 28. This is actually a tuned pipe, and properly the engine should be bench run with a prop, and a tachometer used to determine the proper

pipe length. However, in my case, the engine was already in my Shuttle and I had no way to tach it. I started an inch longer than Don's recommended length, and ran it. I didn't sense any substantial rpm increase, so I cut the header one-half inch. It seemed to pick up, so I went another half-inch. I also took a little pitch off the top end, bringing it down to 7-1/2 degrees, and adjusted the pitch curve so I had very little change in pitch from ¾ to full throttle. This was just the ticket! The engine came onto the pipe and really started to sing. That Shuttle really tears now, and it pulls through those loops with power to spare. The extra weight hanging behind the CG allowed me to put a 1200 mah battery up front without disturbing the balance. It also fits neatly inside the Shuttle Jet Ranger fuselage made by Great Lakes. At this point you will have to determine if it's worth the money. We know that the last 10% of performance takes 90% of the time and 90% of the money. If you need a different muffler for a scale fuselage, this may be just the ticket, and the fact that it can be moved around somewhat gives you some flexibility in installation. Remember that *extra power in a helicopter helps prevent crashes*—that is its primary purpose. You don't have to feel that you're a "hot rod" when you soup up that engine. Call or write Don Chapman Design Corp., 6223 Taylorsville Road, Dayton, Ohio 45424, (513)236-8853.

NOSE-IN HOVERING

A new flier came up to me once and said he had learned to hover successfully, and was now trying to learn nose-in hovering, and having a terrible time of it. I gently told him that nose-in hovering was not step two in the learning process. He could first go on to forward flight, loops, rolls, autorotation —and then tackle nose-in hovering. This is not to minimize the importance of this technique. It is basic to all the FAI and AMA hovering maneuvers. However, it is much more difficult to do than simply flying a helicopter towards yourself. It is balancing the helicopter in reverse-almost like learning to hover all over again. Here's how you do it:

(1) Trim and balance your helicopter. If it's nose heavy, or if you have a lot of forward trim to help you in forward flight, these will work against you because the helicopter will want to come in toward you and you will have to keep pushing it away with back cyclic.

(2) To get started, fly around in a circuit and bring it in toward you as if you're going to land, nose into the wind. When the helicopter is still about 30 to 40 feet away, and 15 to 20 feet high, apply back cyclic and reduce the throttle slightly to bring it into a hover. Now it's just a matter of keeping it in a hover. All your controls are reversed except throttle and collective. Keeping it high enough and far enough gives you more margin for error. If you get confused or disoriented just give it full power and forward cyclic to get it flying, and turn it sharply to get it heading away from you. The hardest part for me was in continually giving it back cyclic to keep it away from myself. Be sure and give yourself plenty of empty space to practice. You'll need it!

* * *

I will be manning the *Model Builder* booth at the Chicago Model and Hobby Show October 10-12. This has become one of the best shows in the country in one year. Catch it if you can. •

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Peanut . . . . . *Continued from page 53*

and wire, with .5mm paper covering to simulate the gear.

NOSE BLOCK

This part is made from light balsa, with the radial bearing from 1mm plywood. Prop shaft must go 3 degrees down, and 1 degree to the right for proper flight.

COVERING

Modelspan or thin Japanese tissue is best for this model. I used white modelspan, and colored it with blue as on the original craft. The color scheme on the final version of the R-7 was red, white, and blue stripes with black trim in front of the canopy. The wing was blue on top, and red on bottom. Other color schemes included all white, with green on cowl, during its initial testing at the Brno-Slatina airfield. When Mr. Souc was training in the R-7 for the Magneburg Championships, the colors were all-yellow, with cowl in red, the prop silver with red edges and blue spinner.

RUBBER

I used my best orange Pirelli rubber, weighing 1.2 grams. Maximum turns were 1800, when the rubber was new. You must find the best rubber and prop pitch you can for contest flying.

FLYING

The Racek is an excellent flyer. It doesn't have any problems when all is in accordance with the plan. Look at the downthrust, rudder, c.g., etc. once more before you test fly to be sure everything is proper.

The best contest flights I obtained were

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70 seconds in a Prague hall 30 feet high, on 1400 winds of the motor. It can fly in a small space, because its turning diameter is small. But in a larger space you can increase the flying circle, and the Racek will climb, giving you longer flying time. I am sincerely hoping that you are finding this an enjoyable project. Good Luck! •

Simply Scale. *Continued from page 15*

ing that something is getting lost in their translation of the FAI rules. Watch out for them in the future!

Our Control Line Team from the United States didn't fare much better. Most popular on the team was young Julie Abel. As expected, Julie's picture graced the front page of the local paper on the first day! Julie's flying was solid with her Clipped Wing Cub, but a low static score held her to tenth place. Jeff Perez was the high U.S. finisher, ending up in seventh place with his B-17. Jeff had a very high flight score, but a low static kept him out of the top places. Ron Sears was prepared to take his new C-123 "Provider" when only one week before we were ready to leave, he crashed it during a practice session. Ron ended up competing with his Stearman PT-17, which had received fifth high static of 2550 in Paris in 1984. This time around, a lower static, 2257, made it tough for him to finish any higher than his ninth place.

Once again the Russians walked off with the first three places individually and first place as a team. Their models are good, but I really feel the statics received were disproportionate to the quality of the models present. In addition, I had occasion to watch the flying this time, and I was not as impressed as I had been in the past with the flights by the Russians, even though they received top scores.

R/C INDIVIDUAL STANDINGS, 9TH WORLD SCALE CHAMPIONSHIPS

1	M MERKENSCHLAGER	GER	BRISTOL "SCOUT"
2	H ZELLER	SUI	88 COMET
3	K OETIKER	SUI	133 C "JUNGMEISTER"
4	C FOSS	GBR	DALOTEL DM 165
5	D MASTERTON	AUS	DE HAVILLAND DROVER
6	P AMONDS	BEL	F15C "EAGLE"
7	J STEINBERGER	GER	BE 2E
8	KA ELOFSSON	SWE	82 "TIGER MOTH"
9	C MAPELLI	ITA	SORREL "GUPPY"
10	S SAUGER	USA	STINSON A3

U/C INDIVIDUAL STANDINGS, 9TH WORLD SCALE CHAMPIONSHIPS

1	V FEDOSOV	USSR	ANTONOV AN 28
2	V BULATNIKOV	USSR	AIR-1
3	A PAVLENKO	USSR	LI-2
4	M KAZIRDO	POL	ZLIN 50L
5	M REEVES	GBR	Z526 "ACROBAT"
6	R TRUELOVE	GBR	HEINKEL HE219
7	J PEREZ	USA	B-17 "FLYING FORTRESS"
8	I PODGORSKI	POL	9B "MOSQUITO"
9	R SEARS	USA	STEARMAN PS17
10	J ABEL	USA	PIPER J3 "CUB"

9th FAI WORLD SCALE CHAMPIONSHIP R/C Team Results

1.	Swiss	16252.9
2.	Germany	16224.9
3.	G. Britain	15670.6
4.	Italy	15338.7
5.	USA	15025.8
6.	Sweden	14420.1
7.	Belgium	14414.4
8.	France	12644.6
9.	Norway	12607.8
10.	Denmark	12565.3
11.	Japan	12250.3
12.	Poland	11534.8
13.	Australia	10441.4
14.	Netherlands	8112.9
15.	Austria	7438.4
16.	Finland	6931.3
17.	Canada	6807.9

9th FAI WORLD SCALE CHAMPIONSHIP U/C Team Results

1.	USSR	18410.1
2.	Poland	13845.1
3.	G. Britain	13490.5
4.	USA	13297.0
5.	Norway	1999.0

This could be the last World Championships for F4B, Control Line Scale. To make this competition legal, the Norwegian club entered as the fifth team, "competing" with a profile P-51 without even a throttle. Interest internationally has dropped in this event, and unless something happens soon to generate more participation or a waiver is made on the number of teams required to

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make a World Championship in an event official, there will be no future C/L World Championships.

Overall, although we weren't tremendously successful in the competition, we all enjoyed the trip. Norway is a beautiful country and the people are extremely friendly and make you feel welcome. The hotel accommodations were excellent, and it's obvious that the Norwegian Aero Club put a lot of effort into making the ninth World Scale Championships a success.

One last time I would like to thank all those fine people who unselfishly contributed their time and resources to assist the U.S. Team in our trip to Norway. Thanks to Hazel and Maxey of Sig Manufacturing for our shirts, jackets, fuel, etc., etc. Thanks to Airtronics for their support and contribution of the radio to our raffle. Thanks to Scandinavian Airlines System and Nino Dironza of the AMA Travel Service for making the travel arrangements and handling our model boxes in the most economical manner. Thanks to all those folks in Detroit; the Skymasters, the Flying Tigers, George South, Henderson's Hobbies, and Tom McCoy for their moral and financial support. Thanks to the Mid-Hudson R/C Society and their generous contribution to the Scale Team Fund. Thanks to Al LaFamina, Director of Component Overhaul at Pan Am in New York, for the tour through the Pan Am maintenance facility. Thanks to Bjorne Minge for the tour through the Norwegian Air Force C-130. And thanks especially to Tony Ristuccia and Nick Capriotti for helping see us off in New York, storing our vehicles during our trip, and greeting us again on our return. Gears don't turn smoothly without a lot of greasing from people like Tony and Nick!

After competing in three World Championships, you might ask, "Will you do it again?" We'll see.

* * *

That's about it for this column. I'm heading out the door to the Nats at Lake Charles. Perhaps I'll have a new perspective on the Nats for you, since this year I'll be doing static and flying judging and not competing.

Flight maneuvers continue next column with the loop! •

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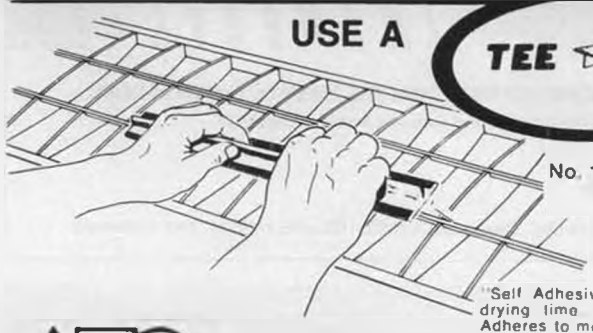

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Electronics. . . *Continued from page 18*

named "Varta." This is a name that we R/C'ers are not too familiar with. It is a German company, but with worldwide representation and not unknown in the electronic industry here in the US. It manufactures just about all kinds of batteries made, from the old-fashioned zinc-carbon to lithium. Anyway, its Ni-Cd replacement for the 9-volt so-called "transistor" battery is rated at 100 milliamps. Obviously, this means that any pack assembled from the individual cells will also have that same capacity.

There is more good news in connection with this battery, which is officially known as the VARTA TR7/8. It can be charged at the usual C/10 rate; or ten mils in this case, but is also rated for rates as high as C/5. This means that you can charge it in half the time, at 20 milliamps. There is no information given by Varta about yet higher charging rates, but I am sure that it can be done. The question is just how high, and what will it do to cell life.

Actually, the matter of quick and fast charging is seldom addressed by the battery manufacturers, other than mentioning that such charging should be done only with voltage and/or temperature monitoring. Rates such as used by the electric flyers and R/C car guys are unheard of anywhere else and one battery representative that I attempted to talk to about this subject told me frankly that they didn't even want to know that their cells were being subjected to such treatment.

Anyway, the Varta representative in this country is Varta Batteries, Inc., 150 Clearbrook Rd., Elmsford, New York 10523. I have seen these batteries at electronic suppliers locally, but unfortunately, I do not know of a mail order retail supplier. I will research that possibility, and report on it later if I come up with one. In the meantime, if any of you know of such a source, please let me know and save me some time, I can use all I can get.

BATTERIES ARE VERY IMPORTANT to us R/C'ers, and the subject of a lot of my mail. Included this month is the following letter from Don Springer, of Columbia Falls, Montana. He writes:

"Sure enjoy your column in *Model Builder*. Though electronics is strictly Greek to me, I still enjoy reading your column and getting new ideas or better insight on this hobby.

"I have a question for you that I hope you can answer for me. I would like to put an on-board ignition system on some of my planes. I do not want to use a Ni-Starter for my power supply. Would it be feasible to use a 9-volt battery with the voltage stepped down to 2 volts. If so, how is the voltage stepped down, and can the voltage be adjusted between 1-1/2 and 2 volts?"

Well Don, since you threw that word "feasible" in there, I have to tell you right off that the answer is, "No!" But I'm not going to leave you like that; I'll attempt to explain why not.

The reason is simply capacity! Electronically, dropping a high voltage down to a smaller required value is quite common, and requires only the addition of a series resistor. The value of the resistor can be calculated divided by I (Current). We know the voltage to be nine: from previous experience, we know that a glow plug draws about two amps of current. Our answer then, 9 divided by 2, is 4.5. Ohms, in this case! There is also a wattage requirement in the case of a resistor, which can be just as simply calculated using another form of Ohm's Law. However, all of this is simply for the sake of discussion, and so that you will have the information in case you need to

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apply it somewhere else.

The point is that at two amps drain, the 9-volt battery, which in an alkaline version only has a capacity of 500 milliamps, would last less than fifteen minutes in this application. Probably even less, as such batteries are made to provide their rated capacity at very low rates, such as needed by a transistor radio or calculator. Generally speaking, the harder a battery is asked to work, the shorter its life span.

If asked for a recommendation, I would vote for Ace R/C's "Nilite III" on-board ignition package. The $32.95 kit includes everything needed, from the Ni-Cd cell to the plug connector. I especially like the switch box through which the throttle linkage runs, allowing you to set the turn-on point exactly where you want it. Another nice feature is that a charger is included, and finding one for a single Ni-Cd cell can be a little frustrating. Keeping a little fire on that plug at idle sure does help some engine installations!

STILL MORE ABOUT BATTERIES

We have another battery supplier on the scene, which looking from my viewpoint as a consumer, is great. A little competition should not only provide us better products, but should do so at lower prices. Anyway, this month, we want to introduce B&P Associates to you EC readers. It can supply you with any size Ni-Cds from AAs to Fs, either singly with or without solder tabs, and in any configuration you need or can dream up.

To refresh your memory, a size F cell is the same diameter as a size D, the large flashlight cell, only about 1-1/2 times as long. It is rated at 7000 milliamps; the D Ni-Cd is rated at 4000. Included in the list are the popular 1200 milliamps sub-Cs, and if you need a tad more, an 1800 mil C. As I said, ALL sizes.

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ber of great weekends contesting in Guadalajara, Mexico. Max, I expect to see you in Costa Rica next May—and I won't accept no for an answer.

Speaking of Costa Rica, finishing this month's efforts, I have to start packing for a two-week adventure there and in Panama. I expect to have the time of my life. . . but I'll be here next month! See you then. •

Footrot Flier. . *Continued from page 21*

the "brick" and is operated by pull threads that poke out of holes in the fuselage sides.

I don't think you should consider using radio equipment weighing more than say 3 oz., unless you are somehow still able to keep the overall weight under about 17 oz. In particular, the linkages to the rear must be light. Perhaps you're thinking that an Astro 035 would handle more weight. But then you would have to reinforce the structure which would add even further to the weight. Then more wing area would be desirable. You've designed a new model! Not that I'm trying to put you off. It might turn out very nice!

If you're still building the Footrot Flier, the top sheeting goes on between wing and tailplane, grain crossways again. The top forward sheeting has the grain fore and aft and incorporates a 1/64-inch ply doubler to reinforce the motor mount. This will break in a crash, of course, but is easily fixed, and your motor will survive. Add the little bit of 1/16-inch sheet across the nose, the built in headwind, and cut a hole for the motor.

LANDING GEAR

Bend up the landing gear. You may wish to change it from the plan, to bring the wheels back in-line with the wing leading edge. As shown, there is a slight tendency to ground loop if there is no wind at all. I wouldn't change it myself. The low C.G. and side stance mean no tipping, even in a moderate crosswind. The long tailskid lowers the ground angle, which helps to reduce the ground looping tendency induced by the forward position of the wheels.

Bind and glue the landing gear wire to the forward hardwood crosspiece (another ice cream stick). Set it in place in the fuselage, notched into the fuselage sides, and prop everything up to check alignment. The inner end of each axle should be off the ground about 1/8 inch, and toe-in should be 2 to 3 degrees. Thanks to Euclid, the toe-in should just appear automatically, if you bend the landing gear according to the plan.

Glue the forward crosspiece in place followed by a further crosspiece (yet another ice cream stick), beneath F1, to retain the landing gear. Complete the bottom sheeting.

Cover fuselage and tail surfaces with tissue, give three coats of thinned and elasticised dope and decorate to taste. Only odds and ends left to do now.

Fasten the elevators temporarily in place with masking tape to maintain alignment and join with dowel or the bamboo sold as kebab skewers. Then sew in place to form a hinge. The adjustment device shown on the plan is fiddly to make, but aids trimming. Complete tail-surfaces, tail-wheel or skid, fit main-wheels and wing retaining dowels. The prototype Footrot Flier used home-made balsa main-wheels, but I think the Williams Bros. type would be fine.

Motor (not engine) bearers are made of hardwood (something a little more substantial than ice cream sticks this time) and epoxied to the sides of the motor. Epoxy nuts under the mounting plate and install motor with sidethrust as shown on the plan.

The wiring shown on the plan is effective and light, though somewhat crude. The charger is connected by alligator clips to the apropriate terry clip and motor terminal. If you use the neat, but heavy, charger socket and switch supplied with the Astro 020, fit these to a 1/64-inch ply panel under the forward part of the fuselage. In any case, do make provision for a 10-amp. fuse. Mitch Poling has recommended this on many occasions. The fuse will save your motor armature when you run off into the long grass during takeoff.

May I remind you to stick the wings together now? Fit small 3/32-inch sheet locating pieces under the wing center section. These should fit neatly into the corners of the fuselage opening to prevent the wing moving in flight. In case you think the struc-

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ture looks a bit flimsy about the wing opening, remember that when the wing bands are in place, the wing center section becomes part of the fuselage.

I think that's all. Now the trick is not to destroy the whole thing during initial trimming.

TRIMMING FOR FLIGHT

Support the Footrot Flier with a finger under each mainspar, near the fuselage. In ready-to-fly condition, with batteries discharged, it MUST balance with the top rear edge of the fuselage level. Move motor batteries to achieve this.

The procedure for trimming a free flight model, which the Footrot Flier basically is, has been published thousands of times. However, I would suggest before going to the flying field, some hand glides in the back yard from a kneeling position are in order. This devout pose will probably not bring you divine assistance, but you will find out if anything is horribly wrong, and the model has less distance to fall. Leave the propeller off for the hand glides, so that the motor shaft won't get bent if you drop the whole thing on its nose.

FLYING

At the flying field, if you have a smooth runway, the following procedure seems to minimize the risk of damage to the model: Set the elevator about 1/16 inch down, with the adjuster. Now give the motor batteries a short charge, sufficient for a run of about 15 seconds. Gradually increase charges, and keep each hop strictly straight ahead. At first the down elevator will probably prevent take-off and will certainly prevent a stall. Reduce the down elevator and increase the charge until you are ready to go for broke. I taught myself to fly R/C this way, with one of the Footrot Flier's ancestors.

Here is the geneology of the Footrot Flier. Overall appearance is my hazy recollection of a sweet little, Bostonian-like, rubber-powered design by Sherman Gillespie. I wish I had access to the plan now. It appeared in *MAN* in 1948, I think, and was called "Yard Bird." That name really meant something then, to jazz fans anyway. Surface outlines are more or less Pietenpol.

The name and crew members are from a comic strip farm created by New Zealander, Murray Ball. This may be a local curiosity and hard to find at the newsagent, but you are in for a treat if you do stumble on it.

I would like to hear from anyone who tries the Footrot Flier, and help if any problems arise. If you write, please enclose a self-addressed envelope and International Reply Coupon.

Good Luck and Good Fun. John Reid, Teal Valley, Nelson, R.D. 1, New Zealand.•

THE ASTRO CHALLENGER

1984 nats winner

Bob Boucher's **Astro Challenger electric powered sailplane**

was the sensation of the 1984 RENO NATS. Its fantastic rocket like climb and floating glide put it way out in front of the competition. The distinctive wing planform with elliptical tips maximizes aerodynamic efficiency and at the same time gives this contest champion a very gentle nature that is perfect for beginners too. The deluxe kit features all balsa construction with precision machined wood parts. The kit is designed for the **Astro Cobalt 05** geared system (**#6505**) including seven 800 mahr nicad cells. Wing span is 72 inches and wing area is 620 sq. in. Bob's original model weighed 39 ounces complete with **astro 05 cobalt system**, electronic motor control (4023), and three channel radio. **Challenger Kit #1020**

The **Astro Cobalt 05** world class competition motors provide the highest possible power in the smallest possible size and weight. The cobalt 05 direct drive motor weighs only 5 ounches but turns a 7 x 4 prop at over 14000 rpm! The geared 05 turns a 12x8 folding prop at 5500 rpm! This tremendous power makes electric flight truly exciting. All **Astro Cobalt** motors use precision machined modular construction, twin ball bearings, rare earth samarium cobalt magnets. Super high temperature wire, silver brushes and gold pin connectors. Gear boxes use precision machined housings, twin ball bearings and stainless steel gears. **Astro Cobalt** motors are truly a breakthrough in the state-of-the-art.

Item #6605

Bob's Challenger uses the **Astro Electronic Motor Control #4023** to turn the motor on and off by radio command. The motor control is specially designed for electric sailplanes and old timers has a built in dynamic brake to stop the prop when the motor is turned off. Dynamic braking is needed to stop the prop and allow it to fold. The high power 30 amp relay handles up to 40 size motors.

Item #4023

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EOTW..... *Continued from page 36*

anodizing on the cylinder jacket, spinner, and prop washers and a neat near-1/16-inch deep blow hole in the casting above the left engine mount. Its serial number is 82663, indicating high volume production . . . and it had loud internal rattling noises (not the prop washer on the shaft) when shaken vigorously! I put it in a plastic bag and filed it away.

Fellow club member, Dwayne Brown, recently showed me a new-in-box Russian engine he'd bought in a Dallas hobby shop awhile back for $12.00, and it was complete with printed instructions, a stamped black steel wrench (it fits nothing on the engine), four mounting bolts, and the thinnest-walled fuel line I've ever seen, and it carried serial number 02. Interest renewed! Dwayne's engine *had internal rattles too,* and it too was a MK-12B! I was still sure the "B" still stood for "BAD," and testing resumed!

The decision was made to photograph the innards of Dwayne's and to run mine. Photographing Dwayne's was easy; getting mine to run was sumptin' else! It was easy to find the source of the rattling. You can see the bottom of the connecting rod's hole is too big for the shaft's crank. The top of the rod is loose too. The rear disc rotary valve fits loosely on its pressed-in-place pin; there's a rattle there too! And wonder of wonders revealed a steel drive pin that's part machine-made and part filed by hand to fit. Its long end loosely fits in the inside of the crank and its short end loosely fits a slot in the rotary valve and drives the valve around as it all rattles.

We photographed the steel drive pin up close, and put my engine's needle valve in the picture so you could see it was evidently shaped by holding (by hand) the end of the needle to a spinning grinding wheel and turning to get it sort of tapered. Dwayne's engine was certified as being produced on

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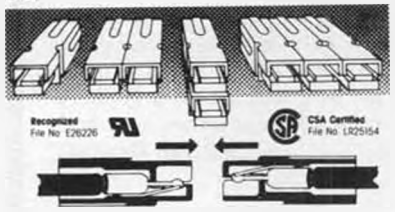

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February 23rd, 1980 (I think). There's a close up shot of Dwayne's number 02 engine. Fingernails were used to slide out the front ball bearing so you could see it more plainly. Dwayne's needle valve didn't get the personal grinding attention mine got, but it *does* have a soon-to-be-patented hook (it shows better in its shadow) on its pointed end that's designed to catch pieces of dirt from the fuel. Just check that front prop washer too! The needle valve on both engines rock back and forth about six total spray bar. If it wasn't for the spring steel detent pressing against the needle valves, they'd rattle too!!

The translation of the box's panel facing the camera is:

compression
MICRO ENGINE 2.46cc
for models
type 1 price 8 rubles

They'd like to think the ruble is worth one dollar. . . so the price is about $8 in Russia. $12 in Dallas is a very modest price indeed.

The instruction manual (16 pages) shows a drawing of the earlier engine I'd had break. . . but *pasted over* the picture is a drawing of this slightly later MK-12B. The earlier engine was rated for peak power at 18,000 rpm, but that figure is crossed out and 14,000 has been written in by hand. I personally felt the engine if run at 14,000 rpm (or 18,000 rpm) would be kinda like a hand grenade with its pin pulled, sitting there on my test stand waiting to "go off" and scare the hell out of me again! Power is rated at .28 Kw. Can anybody out there tell me the conversion?

Specified fuel is one-third technical ether (the kind used for priming diesel-engined trucks in Siberia on cool mornings), one-third kerosene (like the same trucks burn), and one-third oil, half the oil is specified to be bean oil, like castor. I used my standard Florida diesel mix, the Master Airscrew 9-4 for .15s and had one bad time getting this thing to run.

Regular readers of this column have learned that model diesel engines have a slug-like, tight-fitting, well-machined piece of metal that is called a contra piston and it fits in and seals the top of the cylinder and is driven down by the threaded screw on the cylinder head to reduce combustion volume above the face of the piston. When the screw is backed up, the contra piston slides up (driven by compression) against the screw's bottom surface. With proper fuel/air and proper combustion volume, the engine will run. On this engine, as the adjusting screw was turned while starting was attempted the engine would occasionally lose all compression. That meant the contra piston was a lousy fit in the cylinder; fuel and air would squirt out of the threads for the adjusting screw. I was wondering if the contra piston was contributing to the rattle! Then with a slightly different setting the contra piston would seal and compression would return and the engine would fire. After a bunch of handcranking, it was obvious I needed help in the form of my Sullivan starter. Turning the needle mixture lean with the hand-ground needle valve was stupid. It would go from full rich to too lean in less than a quarter turn of the needle, since the needle wasn't round in cross section. A bit of Yankee ingenuity and R/C pylon racing experience got me to squeeze the fuel line as the MK-12B started. That way I could squeeze a little more and lean the engine out for best running. Much fiddling/turning with the needle found a spot where no squeeze was required, and that's where the damn thing sprang to life and ran!

I had the ProTach turned "on" and the camera was all focused and ready as I got near that ready-to-run setting. When it ran I got the rpm reading and the picture both in the first ten seconds and moved back a safe distance. I couldn't believe how steady it ran—it didn't miss a beat—no wavering rpm figures (there's nothing tight enough inside the MK-12B to bind!), no sputtering, it ran out the whole tank! I did it three more times, the rpm stayed rock steady at 10,750 and there was no vibration! Each time I moved the needle valve a click or two to try for more revs, it quit. Each time I moved the compression screw, it almost quit. It was an experience. All they gotta do is put a good ol' American Sullivan starter in with every Russian MK-12B manufactured. I wonder how many of the other 82,662 MK-12B's (remember my serial number?. . .82,663) ever got started!!!

RATINGS: Please remember I rate 10 as excellent and 1 as poorest. The MK-12B gets no points for design, as it's a direct copy of the German Webra Mach 1 engine. It gets 1 point for manufacturing excellence (the spinner fits the crankshaft nicely). It gets 5 performance points for being a uni-speed engine. Value is $12 for mine, as it has been run. Dwayne's is worth $25 or more. Igor, I'm sorry! •

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

degrees off center. High compression or flooded engines start with ease with the Sure Start, which has an adapter to convert all cone start systems to the Sure Start System. Made of aluminum and steel, the Sure Start is for you! See your hobby dealer, or write to Du-Bro Products for more information. They're at 480 Bonner Road, Wauconda, Illinois 60084.

* * *

Astro Flight, 13311 Beach Ave., Marina Del Rey, California 90292, has announced the availability of the new Astro Cobalt 60 FAI flight motor. This special super power motor is designed to win in FAI F3E electric sailplane competition. This motor will turn a 14x7 carbon folding prop at over 10,000 rpm, and was used by Mike Charles at the FAI team selection trials, consistently scoring 50 to 100 points over the competition.

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For more information about Bentom models contact: California Model Imports, P.O. Box 1695, Dept. B, Garden Grove, CA 92642 (714) 991-1720

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The Astro Cobalt 60 is available in three windings: the FAI-F3E eight-turn winding is specially designed for maximum power from thirty Sanyo mah NiCds. The FAI Pattern 10-turn winding is designed to produce maximum power for the three or four minutes necessary to complete the FAI aerobatic schedule. Twenty-six to thirty Sanyo 1200 mah cells are used, and the Cobalt produces about one horsepower at 10,000 rpm. Quarter scale fliers can order the twelve-turn motor, which produces a bit less power than the pattern winding, with a slower rpm and longer run. Typically, it will turn a 15x8 prop at 8,000 rpm for six to eight minutes. These motors are built in the USA to exacting standards by Astro Flight. See your hobby dealer, or contact Astro Flight directly. And be sure to tell them you read about their products in *Model Builder.*

* * *

If you enjoy building and flying small free flight planes, here is a propulsion system designed just for you. VL Products has created a new mini electronic propulsion system, called the EPS, for small free flight models. With the HY-70 motor, you can fly most anywhere. The HY-70 weighs only 1-1/4 ounces, including the B-52 flight battery. It will power planes with up to 30-inch wingspans. Easy to install, the battery just snaps into place for instant starting, with no wiring needed. The battery can be given a fast charge with a VL EFC-500 or other fast charger and in two minutes it's ready for another flight. The gear ratio on the HY-70 motor is 7 to 1. The VL system includes the B-52 "snap in" flight battery, two props, charge plug connectors, and accessory pack with extra screws and spacers, all for $24.95. From VL Products, 7871 Alabama Ave., –16, Canoga Park, California 91304.

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* * *

Chopper fliers, attention! Here's a new product designed by helicopter fliers that you'll love! It's called Yale Weight, a non-metallic, two-part epoxy compound for adding tip weight to your main blades. The Yale Weight kit includes a complete set of instructions, a mixing cup, stick, and approximately 80 grams of epoxy compound, enough to do one set of blades, for only $4.25. Yale Weight complies with AMA/FAI rules for adding weight to your blades; it cannot be detected with a metal detector. Most important, Yale Weight is formulated so that it does not delaminate from the rotor

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1941 BROOKLYN DODGER, 56" Cabin*****NEWEST* Retail, $52.95**INTRODUCTORY PRICE* $39.00
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Leisure PLAYBOY SR 67" for Gear 05 Elect. $30.00
Astro ASTRO SPORT 37" for Direct 05 Elect. $22.50
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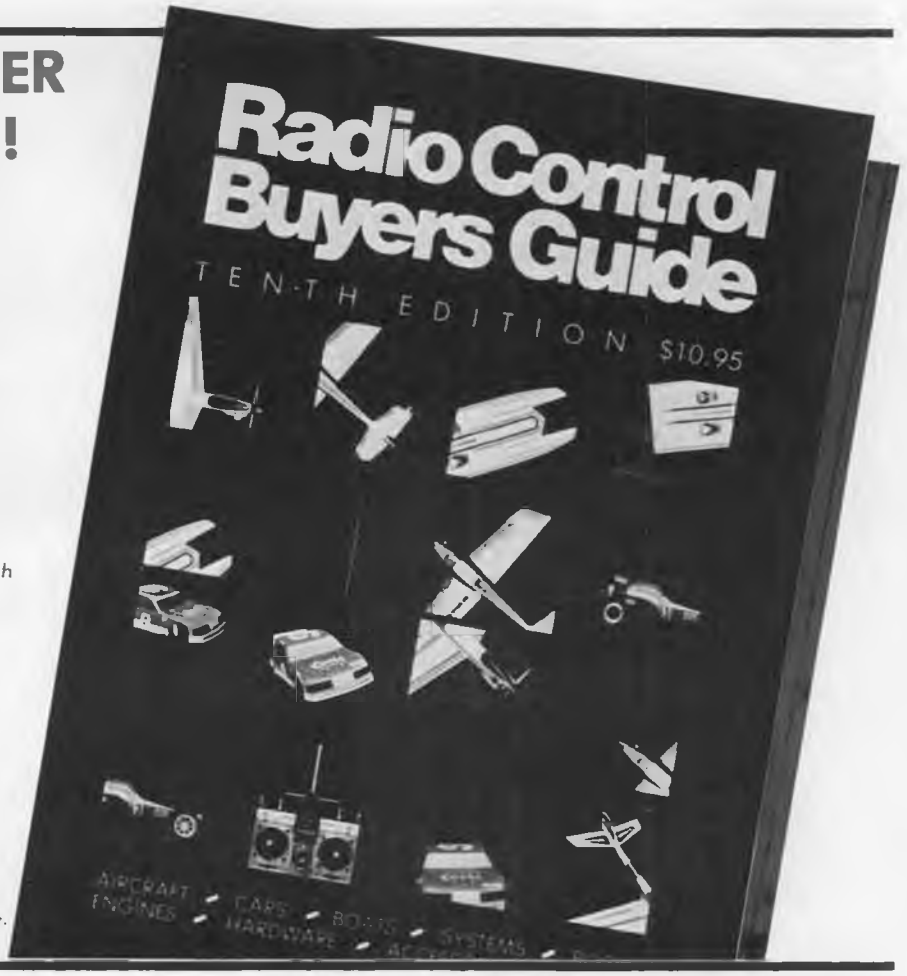

blade during flight. The size of the slot determines the amount of additional weight of the epoxy, and Yale Manufacturing will slot your blades for 32 grams of weight for $3.00 per set. For more information, contact Yale Hobby Manufacturing, Inc., 20 Holly Lane, Wallingford, Connecticut 06492.

* * *

Altech Marketing has introduced a new boat to the Billig Boat line, the U.S. Coast Guard 44-foot Lifeboat. Designed for the modeler of average ability, the kit is easily assembled, with an ABS hull, suitable for R/C installation. The detail includes side stakes, marker lights, radar, horn, searchlight, winch, door with porthole, latch and hinges, as well as a handrail. There are at least 60 fittings alone, not including the plastic detailing. See the new Coast Guard Lifeboat at your favorite hobby dealer now.

* * *

For the offroad racer, Parma International announces the exclusive introduction of the PB Mini-Mustang 1/10 scale offroad racer. The car is available in three fully upgradeable versions; 4WD, including 2-speed gearbox; 4WD single speed; and 2WD single speed. The PB Mini features a high-efficiency single belt secondary drive using one high torque belt to drive the two differentials, and the option of a two-speed automatic gearbox, offering optimum acceleration and higher top end speed. Caster and camber are independently adjustable on all four wheels and the kit comes with full ball bearings. The rear wheels may be adjusted to give no roll-induced steeering, roll-induced steering for maximum turnability, or roll-induced stabiliing for beginners. The glass-filled, molded chassis monocoque with epoxy undertray gives maximum chassis stiffness and strength with minimum weight. An added bonus is a low component count; each "corner" of the car uses identical parts. Contact Parma International, 13927 Progress Parkway, North Royalton, Ohio 44133 for more details.

* * *

Offroad enthusiasts should take note of this new Big Bear Datsun truck from Model Expo/Euro Imports. With a foot-wide wheelbase and a chassis that rides two inches above the ground, the Big Bear with heavy-duty rear spring suspension and independent coil spring front suspension should be able to roll over most any terrain with ease. The high-powered Mabuchi RS-480 motor provides enough torque to tackle most any incline, and the four gigantic semi-pneumatic tires with deep "V"-shaped treads provides traction for any situation. The 1/12 scale Big Bear is easy to assemble, and comes with good-looking decals to complement your custom paint job. The Big Bear truck is available at hobby shops everywhere, or through the mail. Contact Model Expo/Euro Imports, 23 Just Road, Fairfield, NJ 07007.

* * *

Cox Hobbies, Inc., has a way to introduce you to R/C flight the easy way; it's called the Eagle II Sailplane, an affordable, single-

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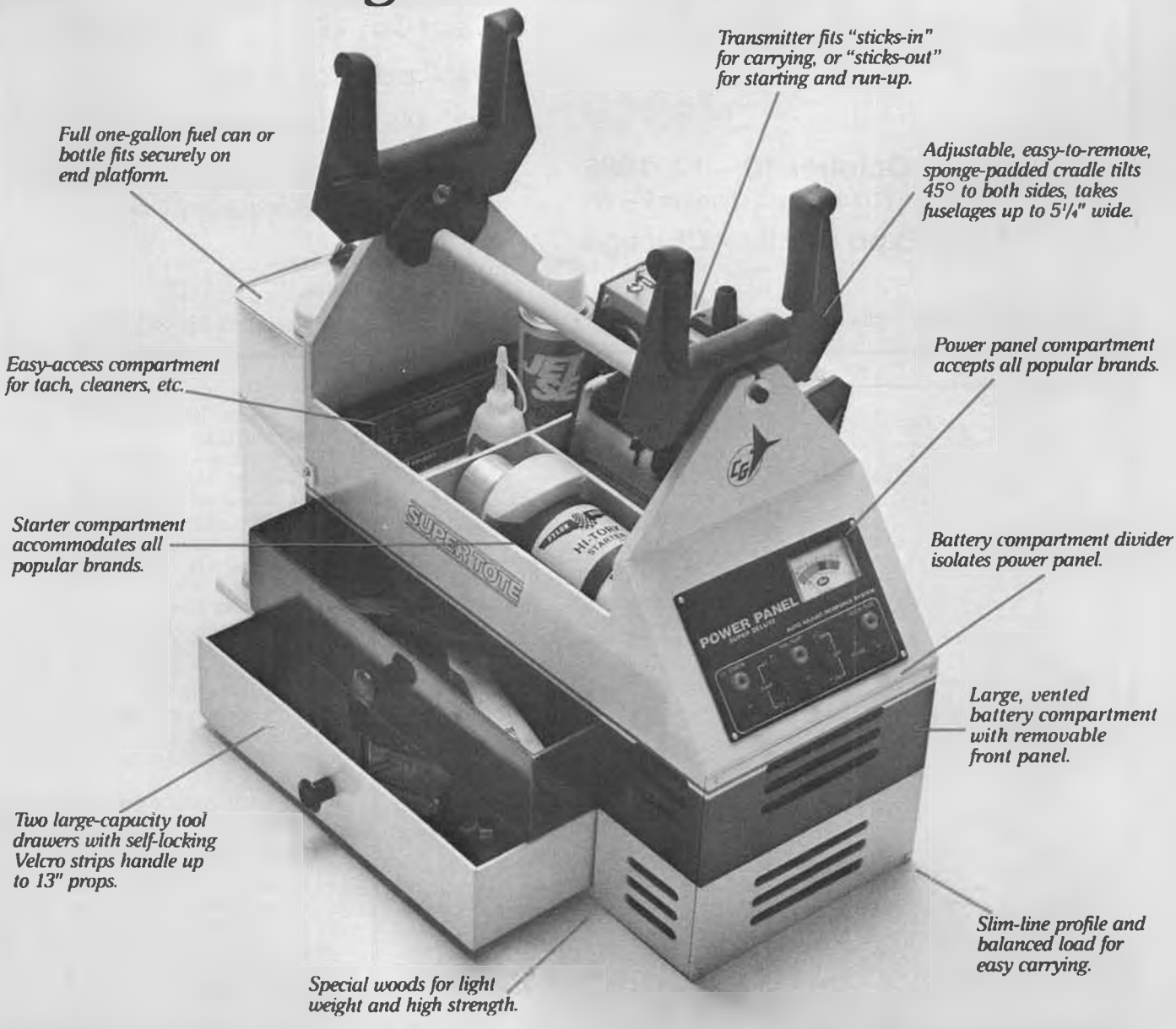

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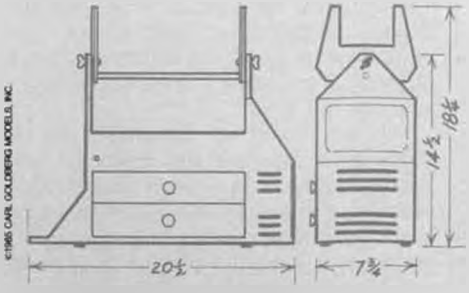

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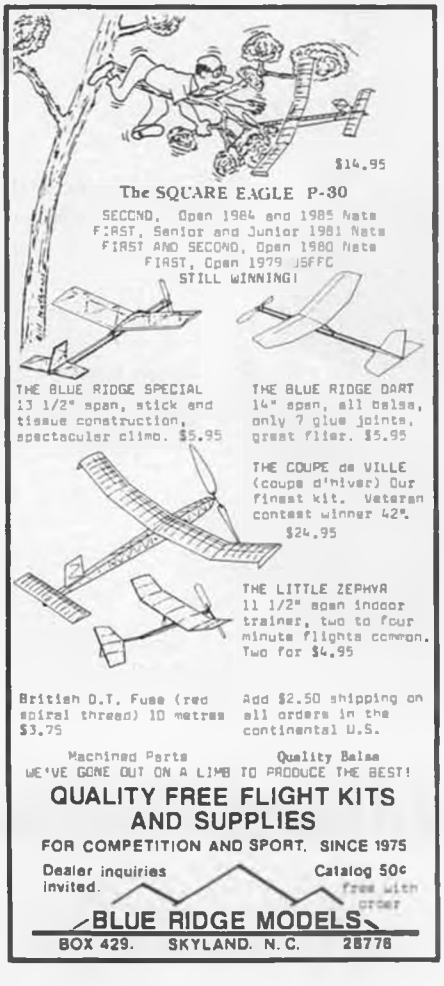

channel R/C sailplane with a high-start launching system included. Aerodynamic stability is assured by the new computer-design technique with optimum Reynolds number used as a design criteria for best overall performance. A newly developed single-channel radio with greater selectivity comes installed in the fuselage. The Eagle II is constructed of smooth, low-density polystyrene foam, with a wingspan of 55 inches. See the Eagle II at your nearest hobby shop, or for more information, contact Cox Hobbies, 1525 E. Warner Ave., Santa Ana, California 92705. Be sure to let them know you read about it in *Model Builder.* •

Ramblin'..... *Continued from page 27*

with seven 800mah cells weighs over a pound, so weight looks like it could be tight . . . but they're doing it in Europe and it sounds like fast fun! Another quote from Zdenek's letter says:

"Electric pylon racing attracts me but, on the other hand, I know my nervous system will hardly sustain it. It is good for excitation rather than for relaxation."

My old Astro ferrite motor and a new Astro charger was sent to flying Professor Zdenek when I got home . . . and along with this manuscript I've sent our editor the RACE CAT plans the three-views and specifications. Earlier we brought the free flight flyers the A3 FAI small glider class that was unknown in the USA . . . maybe we're bringing something new home for the R/C pylon flyers . . . and those who like something small, something quiet, and something FASSSSST!

But meanwhile, our visa or permit for the 15-day stay in Czechoslovakia is getting close to expiring . . . we must be out of the country on schedule. We're tired because we probably averaged 300 to 400 miles a day and we've done so much each day. We retreat to G.H.Q., our hotel, late June 25th with plans to cross out of the country into Austria early on the 27th, our 15th day. On the 26th we lay back, repacked the trunk of Arne's five-cylinder Mercedes, check our Czech finances and realize we have enough (just) money to pay our bill, eat on the 26th, buy six quarts of Mobiloil and a Purolator filter for the car. Leftover Czech money will be worthless in Austria. Arne had pre-bought enough diesel fuel coupons to get us to Austria. Nowhere in Czechoslovakia do you, as a foreigner, drive into a station and say, "fill 'er up."

We reminisced on the 26th . . . let me share some exciting fun moments with you . . . my name has been Stuartu Richmond; my wife has been Lynn Richmondova. Among things I'm bringing out is a modeling text book from Berlin, German Democratic Republic (East Germany) which is a modern day counterpart of Grant's famous *Model Airplane Design and Theory of Flight* with graphs, charts,

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1019A	Miniboy Main Blades—Comp. Airfoil, Lam. 16 9/16	12.25
1019B	Miniboy Main Blades—Comp. Airfoil, Lam. 18"	12.25
1020	Miniboy Main Blades—16 9/16, Laminated	12.25
1011	Miniboy Tail Blades, Laminated	3.95
1028	Star Ranger Main Blades*	20.95
1031	Star Ranger Tail Blades	4.00
1012	Baron-60 Main Blades, Laminated*	15.09
1013	Baron-50 Main Blades, Laminated*	14.09
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1037	Miniboy	25.75
1038	Baron-50	25.95
1039	Baron-20	24.95

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photos, drawings, upper/lower airfoil coordinates, thermal theory, slope soaring, balsa structures, prop carving, and more printed as *Theory and Practice of Model Flying*. I have a watercolor artwork by nine-year-old Kamil Jindrich of the country's famous L-39 jet military aircraft. We have a Christmas caroling scene by 13-year-old Iveta Patrman. We saw Arne change a flat tire in two minutes flat near a Russian Army camp. Arne and I got "smashed" in a workingman's bar on 12 cents a pitcher of draft beer. I bought a pair of summer-weight shoes with Velcro fasteners. My United States Postal Service cap, with a nice long visor was left with Jiri Patrman. An "Arne-ism" sez it's better to be rich and healthy than poor and feeble. We find a Skoda car showroom, and want to go in to look and touch and raise the hood (bonnet), but there's a policeman standing in there and we don't want to interface, but we can see a new Skoda costs about 10 years' wages! Frequently we got slightly lost while driving. One time Arne stops and asks a pretty young thing in his best Czech, "Where are we?" She shrugs and replies she doesn't know. Arne hollers out in straight English with Swedish accent . . ."If you don't know where we are, how in hell do you expect us to know where we are?" Lynn and I roar with laughter at the frustration and comment. Another time while thoroughly lost, it became quite apparent we were passing a Russian ICBM installation.

Then there's the night in Babylon when we walked a short distance through the woods and along a path from our hotel to the "Hunters' Hut" which is a bar/lounge/dance hall with a live band. If you like the music to "Roll Out the Barrel," that's typical Czech folk music; you'd love the evening. We loved it! It's gay, rollicking music and we ordered a bottle (Imperial quart) of Russian champagne for the three of us and a big bottle of red wine for the band. The champagne cost about 90 cents. Sometime during the second 90 cent expenditure I learned to lead the band, and Lynn was dancing with the nice young fellows at the next table who were about the ages of our three sons. Sometime during the third 90 cent expenditure it was fairly obvious that I was NOT a Czech but was either British or American . . . nobody seemed to care. Since I was now the band leader, I tried and tried to get them to play the tune for my alma mater that goes with "I'm a ramblin' wreck from Georgia Tech and a helluva engineer." (Now you see where the title for this series comes from). If we hadn't bought them that big bottle of red wine, they may have made it . . . but they kept picking up what sounded like the music to "Lili Marlene," which was a Nazi marching song and is and forever will be banned and illegal to play in Czechoslovakia, I'm told! Anyhow, after the third 90 cent expenditure it was closing time . . . everybody left, but we couldn't find our way home!

And please remember, all this fun and adventure happened through model airplanes and a chance meeting at a model trade show.

The evening before we drove out to Austria our hotel dining room was near empty as we ate. Arne's Mercedes, by this time, was almost conspicuous . . . we probably were too. We had a friend with us for dinner, and the friend identified a lone diner in the far corner as the chief of the secret police in the area. In walks another man who is identified as the retired head of police for the whole area. Our pulses raced to 20,000 rpm although we think we've done nothing wrong. Why are they here? They talk quietly, and we swallow with difficulty. Indigestion is imminent. After 10-15 minutes they both get up and leave. We idle back to 1850 rpm, pay our bill, and get the hell out. During the 15 days, we saw R/C flying once, on a Sunday, at the end of the longest real airplane runway I've ever seen in my life.

Remember I was awarded a bronze friendship medal and a diploma of attendance at a U-Control championship meet, and I told you they'd turn out to be diplomatically important? We go to our hotel rooms upstairs, but Arne tells me to be sure and wear the medal in the morning, and have the diploma handy, we will be driving out of Czechoslovakia very early on the 15th day and heading to Austria and the Hirtenberger Products factory, where we have an afternoon appointment to see how the world-famous HP model airplane engines are made. It's a great manufacturing operation and I think you'll like the many pictures in the next section of "Ramblin' Through Europe." •

Hannan. . . . *Continued from page 57*

ments will employ modern ultralight engines, however eventually a reproduction of a Whitehead unit is scheduled to be constructed.

Bill O'Dwyer, a former Air Force instructor, B-24 and B-17 pilot, emphasizes that he and his group are *not* trying to detract from the work of the Wright brothers, but merely seeking rightful recognition for another creative individual who worked so diligently in helping solve the mysteries of aviation.

FAREWELL

Al Mooney, founder of the Mooney Aircraft Company, is no longer among us.

Well-known for the design of such classics as the Eaglerock biplanes, the Culver Cadet and his extremely efficient lightplanes, Mooney had also worked for Lockheed-Georgia for many years.

The modeling world also lost two important contributors recently, with the deaths of Gertrude Guillow and Joe Ott. According to the July *Hobby Merchandiser*, Mrs. Guillow, widow of Paul K. Guillow, served as president of the Guillow Model Airplane company until her retirement in 1977.

Joe Ott, much-admired model aircraft designer and kit manufacturer, passed away during June, according to the AMA publication *Cloud 9*. We shall miss them all.

UNUSUAL AIRCRAFT

Bill Young is expanding his line of scale drawings and photos. We're viewed sample drawings including the Stephen's Akro (Bill won a recent R/C electric power meet with a smoke-trailing version of this), a Culver Dart drawn by Carlo Godel, the Northrop N9M-A flying wing, the Northrop JB-1 "Bat," and the Granger Archaeopteryx, flying wing. Bill's photos include such rare birds as the Ford Flivver and Pitcairn PCA-2 Autogiro, and are top-quality prints ideal for proof-of-scale purposes. Why not drop a stamped, pre-addressed envelope for a complete listing? Bill Young, 8106 Teesdale Ave., N. Hollywood, California 91605.

DAEDALUS DOINGS

George Ardwin forwarded more details regarding the Massachusetts Institute of Technology scheme to fly a human-powered aircraft from the island of Crete in the Mediterranean to the Greek mainland, a distance of 69 miles. The proposed craft will have a 102 foot wingspread and weigh about 68 pounds. The flight is expected to require more than four hours, and among the potential pilot/engine candidates tested thus far, a girl has demonstrated the best athletic duration.

A year's study of the problems involved, funded by the Smithsonian Institute and MIT, is expected to cost $74,000. Construction and testing of a prototype aircraft will require at least another $99,000, to be donated by Anheuser Busch, and the actual project vehicle and associated expenses may account for another $195,000. Additional sponsors are being solicited. . . .

STEALTH MODEL STEALS SPOTLIGHT

Seldom do model airplanes attract the attention of nationwide television and newspapers, however the recent release of the Testor Corporation's F-19 Stealth fighter plastic model kit was an exception! The remarkable publicity afforded this pumpkin-seed-shaped model with a wing platform reminiscent of the 1937 Strela, has created a demand that keeps the injection-molding machines running 24 hours per day, 7 days a week trying to catch up with hobby shop orders.

So how did this happen? With the permission of John Dewey, we have abstracted the following from the *Testor Topics* newsletter:

"What a Tuesday! Tuesdays around the office are normally uneventful. Mail is usually light, orders tend to trickle in after weekend business has been tabulated.

"But this May 27, 1986 Tuesday was different. We suspected it would be a different kind of day right after the first CNN (Cable News Network) phone call concerning the Testor F-19 Stealth. Seems a story about our Stealth fighter written by a Dayton, Ohio journalist had crossed the AP (Associated Press) wires and attracted some attention.

"Shortly after that phone call, a local TV station just appeared. . . .at our front door . . .with cameras and lights in hand! They wanted a scoop.

"Of course we were more than delighted to oblige. Even though they didn't uncover the story they were hoping to find about 'leaks' or secret documents, the reporters were fascinated with the model and produced a very nice piece for local broadcast.

"As they were wrapping up, WMAQ TV from Chicago called. Their big tractor-trailer 'Up-link' (for satellite transmission) was on the way. The guys from ABC Rockford nearly fainted. This was turning into a bigger deal than they imagined possible.

"The 'Up-link' never made it thanks to late-breaking news, but our John Dewey traveled to Chicago for a story broadcast on the NBC station's 5 o'clock report.

"The next day, radio stations began calling. San Francisco, Denver, Philadelphia, Phoenix, Cleveland, New York, Sacramento, and on and. . . . Both KABC and KNBC in Los Angeles featured Stealth on their May 28th evening news. No major market was left uncovered.

"The *big* news, however, came from CBS. On Wednesday June 4, 1986, Testor and Stealth were featured on the *CBS Evening*

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News with Dan Rather. There were fabulous shots of our model and interviews with its designer, John Andrews, and John Dewey. How many millions watch Dan Rather each night?

"We are thankful for all the publicity because it's the kind money can buy. Good press (and lots of it) makes our job easier. Yours too. And it's good for plastic modeling. We can't remember the last time plastic kits made the headlines.

"Now, what can we do for an encore?"

PROXY PISTACHIO PLANES

Results arrived from the Third Annual World Inter-Gnats, which attracted entries from Belgium, England, Japan and Switzerland as well as several places in the United States. The contest site was the Pelota Room in the Miami, Florida Jai-Alai Fronton, thanks to publicity director Kevin Koffman.

Curiously, the flight durations were slightly less than those achieved last year, prompting Contest Director "Doc" Martin to conclude: ". . . maybe we thought we knew more about Pistachios than we really do. They are tricky, inconsistent, and hard to trim, so don't build one if you have a short fuse. . . Pistachios are not for everyone. But boy, what a thrill when they behave!"

The Inter-Gnats featured five divisions this year, and results were:

Category I event (Under 2 gms.) Proxy-Flyer*	Static Score	2-Flight Average	Total Score
1 Mark Allison (USA) (A) Pilatus Porter	84.5	50.2	134.7
2 Butch Hatfield (England) (W) Sayers Mono	74.0	53.9	127.9
3 Millard Wells (USA) Huntington H-12	63.5	max63.5	127.0
4 Iwo Sugimoto (Japan) (D) Dornier Komet	59.2	max59.2	118.4
5 Al Gcard her (Swiss) (H) J-3 Cub	82.8	32.6	115.4
6 Dave Aronstein (USA) Hosler Fury (A)	45.6	33.5	79.1
7 John Martin (USA) Farman Sport	48.2	23.8	72.0
8 Dave Aronstein (USA) Bleriot VII (A)	57.9	9.0	66.9
Category II event (2 to 3 gms.)			
1 Nick Peppatt (England) (W) Beer Cat	81.6	45.2	126.8
2 Bill Hannan (USA) (A) Farman Moustique	99.3	26.5	125.8
3 Nick Peppatt (England) (W) Contestor	84.0	40.6	124.6
4 Millard Wells (USA) Wee Bee	72.8	48.8	121.6
5 John Martin (USA) Polish Canard	90.0	32.6	121.6
6 Millard Wells (USA) Lacey M-10	68.0	50.7	118.7
7 Jim Longstreth (USA) Aeronca C-3 (I)	83.6	10.5	94.1
8 P. Van Meurvaert (Belgium) Wee Bee (A)	57.0	33.9	90.9
Category III event (Over 3 gms.)			
1 John Martin (USA) Dornier 212	84.0	32.0	116.0
2 Shiro Takeuchi (Japan) (M) Smith biplane	101.6	9.7	111.3
3 John Martin (USA) Mauboussin PMX	75.6	35.4	111.0
4 Iwo Sugimoto (Japan) (E) Folkerts SK-3	80.4	27.5	107.9
5 Millard Wells (USA) Waco E	74.8	30.5	105.3
6 Philip Matla (Belgium) Lace M-10 (K)	63.6	38.2	101.8
7 Millard Wells (USA) SE-5	70.1	29.7	100.0
8 Stan Hunt (England) (M) Eastbourne mono	77.9		96.1
9 Tomoshi Nishina (Japan) (G) Andreason	87.3	7.8	93.1
10 Shoichi Uchida (Japan) (H) Henkel 100	76.8	15.4	92.2
11 Shoichi Uchida (Japan) (H) Mr. Mulligan	78.4		90.4
Model of a Model Class			
1 Walt Evenson, Manhattan Midget	80		2:52.5; 3:02.4
2 Millard Wells, Riverrider	82		1:29 1:49.7
3 Jim Longstreth, Manhattan	80		36.0, 22.0
4 Jim Longstreth, Bostonian	87		52.7.2

Rebato smallest plane to fly 30 seconds

1 Dave Aronstein, Hosler Fury Span in mm	114	30.8
2 Millard Wells Wee Bee	153	36.1

* PROXY FLYERS. (A) Mike Arak, (E) Walt Evenson, (H) Carl Hedley, (M) Doc Martin, (W) Millard Wells, (G) Dave Keiler

Mark Allison, of Murietta Hot Springs, California, whose Pilatus Pistachio was proxy flown to a first-place by Mike Arak said: "I was shocked by my win in Category I especially amidst such prestigious and intimidating company! I only expected to be listed under 'those who also entered.' " Mark had not constructed a scale model for some 23 years, but obviously had not lost the knack.

Our congratulations to the M.I.A.M.A. club, who promise another Inter-Gnats next year.

SIGN-OFF

Frank Zaic favored us with this quotation attributed to astronomer Nicolaus Copernicus (1473-1543): "And since a property of all good arts is to draw the mind of man away from the vices and direct it to better things, these arts can do that more plentifully on account of the unbelievable pleasure of mind which they furnish." (Frank says that means if your mind is on models there will be no room for anything else!) •

Big Birds. . . . . *Continued from page 11*

more of a diplomat than I am, got to those jerks first, explained what was going on, and had them out of there in less than five minutes with a minimum of flying time lost

to our pilots.

Unfortunately, ultralight fliers once again reenforced the bad impression I have of them. Yeah, I know, there are some good guys flying those things but, quite frankly, most of the ultralight people seem to be so irresponsible and inconsiderate, I get the impression that they're all related to the Hell's Angels of the late fifties and early sixties.

We don't charge any landing or registration fee because we don't have to; our radio raffle brings in close to $1,000, and that's what keeps us solvent and able to extend the courtesy of no fee to our guests. The proceeds from the raffle also allow us to afford only ten dollar yearly dues, a control tower, new sanitary facilities, rolling the field every spring, and having it mowed every week throughout the grass-growing season.

And even if we weren't touting raffle tickets, we'd still make an effort to get as many people out there as possible...because a fly-in is very much a spectator sport, and you've gotta have that interaction between pilots and onlookers to make it click.

Only two birds pranged that weekend...and neither was due to radio problems or interference. The hot weather adversely affected their airfoil, propeller and engine efficiency, literally putting them "behind the power curve." Fortunately, neither aircraft was badly damaged.

Even though we've always marked the routes to our field with the traditional paper plates tacked to trees and/or posts every mile or so, this year we also put a 3- x 4-foot A-frame sign (you know the kind...like many markets have out front to tell about their specials) on the main road so pilots would know where to turn. And it paid off! Not only did this sign help incoming fliers and spectators to find us, but it also brought in a lot of "walk-ins."

And our 120 percent effort paid off, because the scattered few complaints we did hear were about the lack of clouds, and within the next two weeks we received a dozen letters from folks who'd been spectators, thanking us for our hospitality and the great time they'd had. Can't think of a better way to get your cockles warmed!

Since we were rewarded with such good strokes, I strongly suspect that there's gonna be a unanimous vote to start planning for our 5th Annual BIG Bird Bash . . . immediately.

HANGAR ONE HOBBY

I guess because their advertising budget is kinda small, quarter-scale kit manufacturer Hangar One Hobby, 1402 Madison Avenue, Montgomery, Alabama 36107, (205) 262-8235, isn't too well known . . . which is a darned shame because they turn out quality stuff.

I couldn't fault their work two years ago and, after looking over a Bearcat kit yesterday, I found that quality still is Hangar One honcho Tom Wilkinson's top priority.

They specialize in making kits for many of Nick Ziroli's plans...so, if you've been turned on by, say, the Bearcat, P-40, or Fokker DR-1, but don't have the time to scratchbuild, then you should get in touch with Tom. And if your druthers are for something of Nick's that not been kitted yet, Hangar One can handle that, too.

Although he thoroughly enjoys test-flying all kit prototypes, Tom confessed, "the DR-1 is the most fun airplane I have owned."

But not every bird he builds ends up being kitted, a good example here being his A-36 Apache. According to Tom, "it would cost too much to kit, but it is a fine flying machine...and contrary to what many people think, it's not a P-51." This particular prototype spans 107 inches, weight 36 pounds, has Annco retracts, and does well with a 3.7 Sachs-Dolmar up front.

So, if the lack of time precludes you from scratchbuilding one of Ziroli's biggies, Hangar One Hobby can probably help you get your dream machine flying. Give 'em a buzz; they're good guys!

QUADRAS

The Quadra people are on the move with a hot Q-40, a hot Q-65, a Q- retrofit opportunity for older Q-35s, and a one year warranty.

There must be untold older Quadras out there, and many have probably been sitting on a shelf for a while...so, here's a chance to upgrade your aging Q-35 to a Q-40 series engine. The instruction sheet says:

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straightforward and only a few simple hand tools are required."

I read over the eight-step conversion, and if you're reading this then you shouldn't have any problems with the upgrade. And you can have the ignition your way...either points or capacitive discharge.

According to one of Quadra's charts, the Q-40 puts out 2.8 hp at 9,000 rpm compared to the Q-35's 2.3 hp at the same rpm. Unfortunately, Quadra, like most other engine manufacturers, doesn't tell you what size props they used to obtain those 9,000 readings, and I suspect that neither were a practical size. However, the .5 hp edge the Q-40 has should make your BIG Bird more nimble.

For pricing and more specs, contact: Quadra Aero Engines, P.O. Box 958, Uxbridge, Ontario, Canada L0C 1K0, (416) 852-3500.

COLORED HEAVY-DUTY CONTROL HORNS

Have to admit that I'd never heard of DP Precision Molding (Dept. C, P.O. Box 20639, Columbus, Ohio 43220) before, but couldn't help being impressed with their different colored heavy-duty control horns. Here's what DP's Dean Poeth, II, told me:

The horns are molded from 6-6 nylon, and each horn comes with four stainless steel Phillips head bolts. These bolts self thread into the horn base providing an antivibration mounting. The bolt heads mount up to give the installation a neater appearance.

"We mold the horn in any of seven different colors (blue, yellow, orange, red, white, black, or gray). You may notice that our yellow matches the Cub yellow used on quarter scale J-3s. Our colors were chosen to compliment the most popular model color schemes.

"We also manufacture horns with a chrome-looking metal plate. These are designed specifically for those of us who show our planes. As you can see from your samples, this is not a 'chrome paint.' Each part is placed in a vacuum chamber and aluminum is vaporized onto the prepared nylon surface. The part is then dipped in a tough polyurethane topcoat. This is to protect the aluminum plating. By the way, this is the same process used to plate parts in plastic model kits, and is called Vacuum Metalizing."

I just received the horns this morning so I haven't had a chance to use them yet...but I certainly like what I see. They've definitely got more "beef" than standard horns, yet don't have that "obese" look about them. I also like having a choice of colors, especially when these colors won't wear or chip off.

WARTHOG CAMOUFLAGE

Hobbypoxy has just come out with formulas for "European One," the three-color scheme used primarily on the Fairchild A-10 "Warthog" Thunderbolts operating in Europe and have also included some interesting background info from "U.S.A.F.E., A Primer of Modern Air Combat in Europe," by Michael Skinner.

"The aircraft's camouflage scheme is another example of the designers devoted to making everything exactly right. They started from scratch; after all, the USAF had no experience in painting battlefield jets.

"Their first efforts were shades of gray, dozens of them. These worked well in theory, but in practice the pale A-10 'sausage' stood out prominently against the thick green forests of central Europe. The designers went back to the drawing boards and came up with the mottled green and gray European One, the 'Lizard' camouflage now on the aircraft.

"The A-10 was also one of the first aircraft to have its red, white, and blue national insignia replaced with the new low-visibility black outline, the current standard."

And here are the European One formulas (remember to use HO5 Flat Hardener):

FS 34102 Light Green
- 4 parts H65 Bright Red
- 3 parts H49 Cub Yellow
- 3 parts H81 Black
- 2 parts H33 Stinson Green
- 1 part H70 Gray
- 1 part H10 White

FS 34092 Dark Green
- 4 parts H33 Stinson Green
- 4 parts H81 Black
- 3 parts H47 Bright Yellow
- 2 parts H70 Gray

FS 36081 Dark Gray
- 6 parts H81 Black
- 5 parts H70 Gray
- 1 part H47 Bright Yellow
- 1 part H66 Dark Red

FS 37038 Black (Markings)
- Hobbypoxy H81 Black

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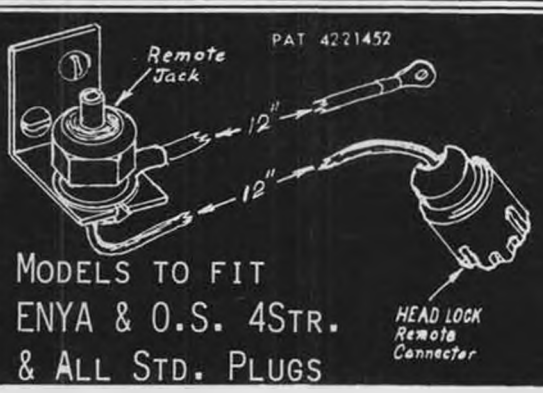

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Now you're all set to do a Warthog, or any other warbird that's operating in Europe. In fact, this mottled camouflage would probably look just as good on any scale-like bird where you're not concerned with documenting the paint scheme.

COROLLARY OF THE MONTH

If a cluttered workbench is the sign of a cluttered mind, what does a empty workbench suggest?

Al Alman, 605 168th Street, East, #95, Spanaway, Washington 98387, (206) 535-1549. It's just about the building season for most of us, so get next years project planned well and go to it...and please be careful while using those tools. Pain hurts! FLYING SAFETY IS NO ACCIDENT! •

Plug Sparks. . *Continued form page 40*

4. Bob Walter	(Bomber)	1461
5. C. Thuet		1197
CLASS C IGNITION (28)		
1. Art White	(Bomber/ Hornet 60)	2089
2. Bruce Norman	(Bomber/Ohlsson)	2039
3. Bob Walter	(Bomber/ Forster 35)	1993
4. Jim Reynolds		1642
5. Buck Zehr	(Sailplane/ Hassad)	1581
CLASS A GLOW (25)		
1. Bill Schmidt	(Playboy/KB 19)	1260
2. Jack Ross	(Bomber)	1256
3. Bruce Norman	(Kerswap/ST 19)	1252
4. Buck Zehr		1223
5. Joe Percy	(Bomber)	1187
CLASS B GLOW (29)		
1. Art Peterse	(Swoose/K & 29)	1479
2. Eut Tileston	(Lanzo/Enya 40)	1442
3. Bruce Norman	(Bomber/OR 29)	1429
4. Ralph Turner		1404
5. Joe Percy	(Bomber)	1176
CLASS C GLOW (35)		
1. Jim Reynolds	(/ST35)	1794
2. Ralph Turner	(MG/HP40)	1623
3. Joe Percy	(Bomber/ST 35)	1556
4. Eut Tileston	(Lancer/OS 40)	1502
5. Bruce Norman	(Bomber/OR 60)	1425
ANTIQUE, IGNITION (21)		
1. Bill Schmidt	(Bomber/ McCoy 60)	2496
2. R. Thompson	(Bomber/ OR 60)	2060
3. Jim Reynolds	(Cumulus/ Orwick)	1802
4. Steve Boucher	(MG)	1731
5. Buck Zehr		1671
ANTIQUE GLOW (28)		
1. Bruce Norman	(Bomber/ ST 60)	2097
2. Joe Percy	(RC-1/ST60)	1989
3. Ralph Turner	(MG/HP40)	1743
4. M. Granieri	(MG/ST60)	1435
5. H. Layser		1420
ELECTRIC .050		
1. Fred Koval	*(Playboy)*	*420*
2. E. Thomas		*380*
3. A. Sheppard		*243*

ANALYSIS OF THE MEET

Although the meet was a resounding success with 180 contestants, the financial burden was apparently carried (again) by the radio control boys as entries were 277 as compared to the free flight entries of 296. The latter, of course, does not include the mass flyoffs of the Twin Pusher and R.O.G. Events.

Based on 28 events (not counting the mass launch events) for Free Flight, this breaks down to 10.57 entries per event while the R/C events (only 11) show an average of 25.18 entries per event.

The sad part on behalf of the R/C contingent, was that someone, in procuring the trophies, failed to remember that the R/C Events were voted in as Basic Events three or four years ago. This meant only three trophies instead of five were available for

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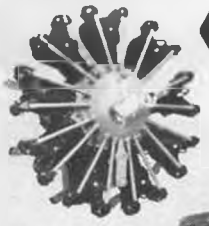

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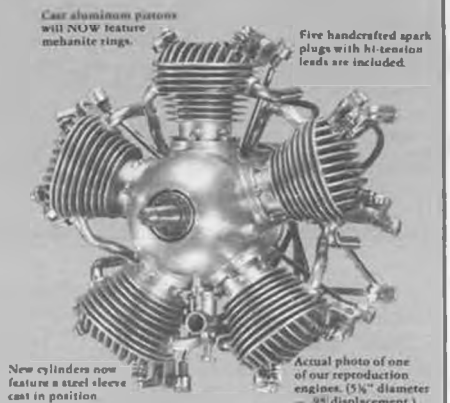

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presentation. Contest Manager, George Armstead, did apologize for the oversight at the Awards Dinner adding the additional trophies would be mailed out.

The Texaco Event was marred by a protest at the Awards when Bruce Norman claimed to have won. When this columnist introduced and sponsored the first Texaco Event at the SAM Champs, Lakehurst NAS, the idea was to win the meet in only one flight (a long one) to win all the marbles. Many of the competition-minded boys say this makes Texaco a luck event, but you can't argue the point this type of meet would draw over 100 contestants for one event!

Joe Beshar, R/C Contest Director, always a stickler for the printed rules, stated the winner of the Texaco Event was based on the total of two flights. Just the thing we wanted to avoid as it would take all day plus half the night to fly everyone for two flights.

Somehow or another in the re-write and reprinting of rules, the Texaco Event was lumped under the Section IV, Rule 5, leading one to believe that two flights were required. All that one had to do was to go back to the definition of the Texaco Event under "Special Events," wherein it definitely states, "Longest of two flights scores." In the future, the C.D. should spell this out carefully.

Based on the foregoing controversy and resulting protest, the R/C Overall Championship Trophy was not awarded, this based on a notice issued by George Armstead, Contest Manager.

On the other side of the coin, the Free Flight Championship Trophy was won by Bruno Markiewicz who set a remarkable record of winning three first places, two seconds, and two thirds . . . a total of seven trophies! Wotta arm load!

Before we overlook the Carl Goldberg Award, Willard ("Buck") Zehr, won the high time in R/C Assist with a Hassad Red Devil-powered Sailplane. Fine combination!

ACKNOWLEDGEMENTS

Before we go much further, we would like to acknowledge the hard work of our "Official" SAM photographer, Harold Johnson of Minneapolis, Minnesota. Harold brings one or two models but spends most of his time taking excellent photos of the free flight boys for this columnist and Jim Adams, Newsletter Editor of SAM Speaks.

Besides the photos taken by this columnist, he also received pictures from Charles Cortright of Easton, Pa. Talk about making decisions, there must be at least 50 good photos of which the best that can be used is 18 for this column!

This is not to say we won't use the photos as some are so good we spread them over the year where a spot is needed to describe a model pictorially. So, as Lawrence Welk used to say, "Keep those cards and letters coming." We can always use photos and comments.

Now a quick pause for the Engine of the Month section and we will continue with the pictures.

ENGINE OF THE MONTH

For this month's subject, we are indebted to the Australian boys for several engines, one being the English FROG 175. That's quite a way to go to borrow an engine!

The FROG (this is an acronym meaning Flying Rise Off Ground) 175 engine was first introduced to the English modeler in December 1947 issue of *Aeromodeller.* Marketed by the International Model Aircraft, Ltd., Merton, London, this engine was intended to compete in the new glow plug engine market. The similarity to the FROG 100 diesel is more than a coincidence as the manufacturer was simply taking a well

accepted diesel design and converting it to a glow plug operation.

Having a bore of 0.5 in. and a stroke of 0.55 in., this gave a displacement of 1.75 cc (0.10 cu. in.). At the time of introduction, the 175 was the smallest glow plug engine in a production status. Price was announced as 70 shillings complete with coil and condenser, plus propeller (the British call it an airscrew), a not unreasonable price at approximately 15 dollars American.

Hoping to take advantage of the small plane market, the FROG people also offered a casting kit known as the FROG 45 for those who liked to do their own work and save money at the same time.

By the end of 1948 it was fairly obvious the competition had caught up and passed the FROG engine for performance and price. Noted in the April 1949 issue of *Aeromodeller* was a special announcement by Henry J. Nichols offering the FROG 175 at reduced prices to sell off the unsold lot presently in stock at the factory. The engine had a rather short-lived manufacturing history.

The engine had quite a few good features such as a non-spill breather-filler cap, detachable cylinder head, an updraft intake and rotary valve, lever control for the fuel regulating valve plus a special plug for clearing the jet. The lever valve could be used to shut off the engine for free flight operation (most early 1945-48 engines incorporated a feature similar to this setup.)

The FROG 175 could be operated either upright or inverted with no problem other than reversing the locations of the filler cap and the fuel outlet fitting. Running weight of the 175 was six ounces. Performance figures with a nine-inch propeller gave 6,000 rpm and static thrust output of 0.75 lbs.

The FROG 175 came complete with an integral fuel tank, a feature started by Colonel C.E. Bowden in many of his early designs dating back to 1936. This feature was also carried in some of the American designs such as the O.K. Cub, Fox .075, etc.

ANNUAL SAM BUSINESS MEETING

Held at the Quality Motel (formerly The Rodeway) on July 4th at 8 p.m., President Taibi opened the meeting by announcing two new officers, Jack Bolton as Eastern V-P, and Bob Angel as the new Western V-P.

Inasmuch as there was no old business, Joe McCay submitted a proposal on behalf of the midwest vice-president, Bob Larsh, to host the 1968 SAM Champs at Lawrenceville, Illinois. This was officially accepted. Dates will probably be over the Fourth of July weekend.

After several proposals, a motion by Eut Tileston to freeze the R/C rules for five years was passed by a vote of 31 to 11. (Ed. note: With only 42 votes participating in a membership of 1800, Pond has subsequently called for a referendum to poll the membership for approval/disapproval of the five year freeze action. A voting sheet has been issued by Sal Taibi).

Woodman announced twelve new SAM Chapters consisting of two Canadian (69 & 86), one English (1066), one Italian (62), one Australian (1788), two California chapters (00 & 02), one Pennsylvania chapter

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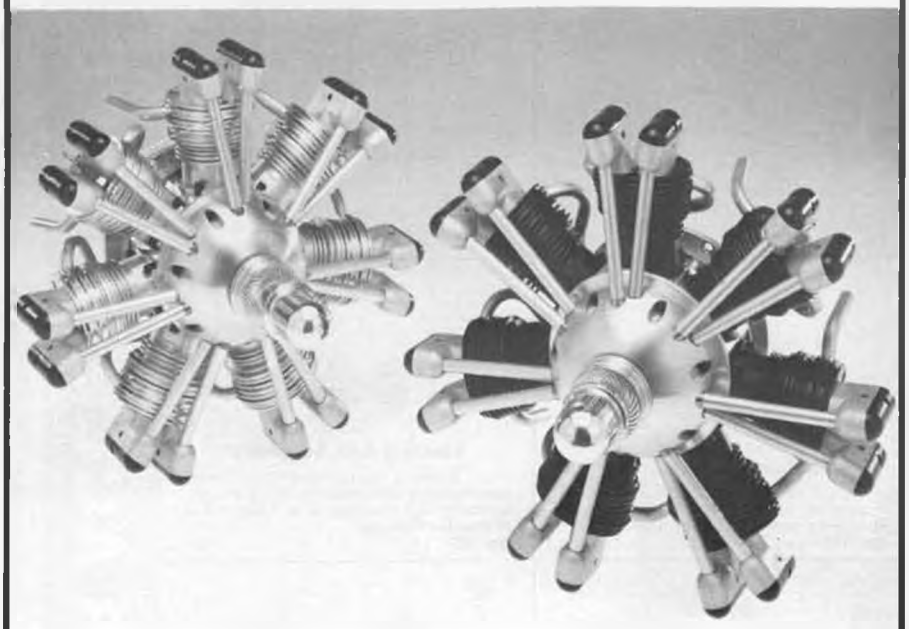

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(66), one New York chapter (61), one Oklahoma chapter (205), one Louisiana chapter (59), and one Florida chapter (77).

An announcement was made that the 1987 SAM Champs would be held at Seguin AFB, Texas and run by SAM 29 and associated chapters from Houston and San Antonio. The Fourth of July weekend has been selected for the contest dates.

SAM CHAMPS (cont'd.)

Getting back to photos (and we have a flock of them), let's look at some of the characters who annually attend the Champs. Seen in Photo No. 6 is Loren Schmidt who formed the contingent of seven West Coast members at this meet. Those in attendance were Loren Schmidt, John Pond, Bill Bowen, and Eut Tileston, representing the R/C portion while three flew free flight: Sal Taibi, Clarenece Myerscough, and Jack Jella. A very good showing for that distance!

Loren is seen with a Buccaneer; the original, not the Super Buccaneer as there are significant differences in wingspan, fuselage structure, etc.

This Champs had the best representation from England thanks to David Baker who organized the "safari" to the 50th Wakefield Champs at Taft and then the subsequent trek to Massachusetts. Seen in Photo No. 7 are some of the English lads, the Seales brothers, William (l.) and Adam (r.) with a Korda Wakefield and a Lamb Climber respectively. Seen in the background is the spark plug, Dave Baker.

Ken Hinton of Bury St. Edmonds, Suffolk, makes a yearly habit of attending all the American SAM Champs. Ken is shown in Photo No. 18 with his winning gas-powered DeHavilland Gypsy Moth. Fine flyer! Ken has a son that is a real competitor in English SAM contests.

More of the English group! Photo No. 8 depicts Reg Parham, one of the early pioneers of English modeling. Reg is 69 and doesn't look a day over 59!! Haw! Parham is holding a 1935 Gordon Light Wakefield Winner that flew so well at the Fairey Aerodrome at that time. The design is still a fine flyer as attested to by the numbers built!

Behind that bewhiskered visage in Photo No. 9 is Don Knight of London holding a Fred Rogerson biplane that won the Canadian Wakefield eliminations in 1935. Don reports the model flies well. Unfortunately time did not permit this writer to communicate with Don about the time we went flying with Dave Baker north of Barnet. Nice day, nice flying, nice company. . .what else could you want?

To round out the competition on the field, we feature Photo No. 10 of Peter Michel also of England, with his excellent replica of Bob Copland's 1940 Wakefield. Pete showed the boys how Bob would have done it as he beat out Reg Parham by six seconds, winning the Wakefield rubber event.

With the advent of good FAI rubber again available, the amount of entries in the rubber events is no less than astonishing. Even the grand old master, Henry Struck, came out for these events. As seen in Photo No. 11, Hank is holding his 1937 Wakefield design. No, it's not the original model al-

though Henry does have quite a few of his old designs stuck away in the rafters. We'll have to get him to dig up a few of those old designs after the success of the Cabruler and Ho-Cat.

Getting away from the rubber-powered models for a photo or so, Ed Konefes, brother of the well-known Joe Konefes, is quite a modeler himself. Ed built a very neat-looking, original design compressed air model as seen in Photo No. 12. Ed believes in taking it easy as he uses a foot-actuated pump instead of the old-fashioned tire pump. Although he only placed third in this event, the writer thought Ed has a very smooth flying model. However, in that wind, anything was liable to happen and generally did!

You would never know that Jim Walston comes from the Atlanta, Georgia area as he is always up north for most of the big contests. Over a period of time, Jim has built up a stable of good flying models. The Playboy Cabin seen in Photo No. 13 is a real performer with a red hot Atwood Champion turning up. Not too many modelers use this engine as the rear induction tube does present mounting problems, but one of those Atwood Champs properly set up with the right prop, won't take a back seat to any other engine of that era.

One of the interesting gas model designs is the Goldberg (Comet) Interceptor. There are actually two distinct model sizes offered on the original plans. Although not built in as many numbers, the five-panel wing offers more wing area and a consequently lighter wing loading. However, there is no free lunch as the added wingspan makes the model more fragile, as the power of an Arden is enough to fold those thin wings. Bob Edelstein poses with this particular version in Photo No. 14. Bob was smart enough to drop the single wheel landing gear and add an extra wheel to insure smooth takeoffs in gusty weather. Would you believe it? Another good model that failed to place!

We are rapidly running out of space but wanted to run a few more photos like Photo No. 15 of Bill Bell with the most popular Jimmy Allen design of all, the Bluebird. As can be noted in the results, everyone flew this design. Perhaps we should give bonus points for Jimmy Allen designs other than the Bluebird.

Photo No. 16 is a decoy. Dick Sherman is seen with his neat flying Gordon Light 1935 Wakefield Winner. Dick confounded the expert by winning the Hand Launched Glider event. Watch out, there is life in that old bird yet!

Talking about old goats, Photo No. 17 is the living end. Seen are Carl Hatrak in the front with Bert Pond, Micky DeAngelis, and John Pond. Yes, that is "old slim" after a nine week bout with walking pneumonia. That's taking off twenty pounds the hard way! The model? Oh yeah, the twin pusher is August Ruggeri's World Record design of 1933-34 out of New York City.

We could go on and on with photos but we have to stop somewhere and simply say we (and I mean "we") all enjoyed another tremendous SAM Champs. All of us are making plans for Seguin AFB next year in Texas. Now for a couple more items and we will wrap this column up.

MECA "GRANDO" COLLECTOGETHER

Got back from a picnic in time to see the end of the MECA "Grando" Collectogether after opening it up before going off to Meriam Schmidt's sister party. The MECA affair was held at the Quality Motel which made it extremely handy for all SAM members.

Met quite a few of the fellows that one doesn't get to see, being on the East Coast. Mike Cook, one of the pioneer MECA boys was there with this usual swapping material. Woody Bartelt, who has been concentrating on producing those hard to find small items for the old ignition engines, has increased his stock even more. No longer will one have to hunt high and low for ignition timers, driver washers, etc., Woody has them in all varieties. Give him a try at Micro Model Engineering, 1301 West Lafayette, Sturgis, Michigan 49091.

Also was greatly pleased to see his old friend, Marty Schindler win the prize for

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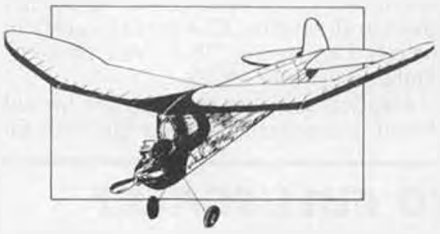
PLANS CATALOG

ILLUSTRATED LISTING OF MODEL BUILDER PLANS

Continuation of our complete Full-Size Plans List, with an illustration of each model listed.

See the regular Full Size Plans advertisement for ordering instructions and special sales.

No. 1861 TOSSETTE **$5.00**
A 58-inch span R/C glider for schoolyard or slope soaring fun. Ed Depue.



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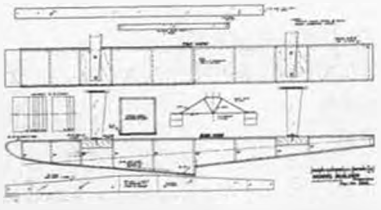

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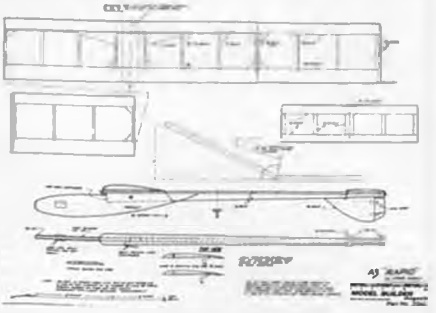

No. 3862 RAPID, A/3 **$3.00**
Easy-to-build, one-meter span FAI free flight towline glider. Jaromir Jindrich.

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Cute little 44-inch span 1938 parasol for .06 to .10 engines, by Ken Willard.

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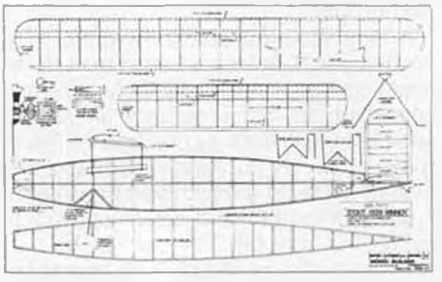
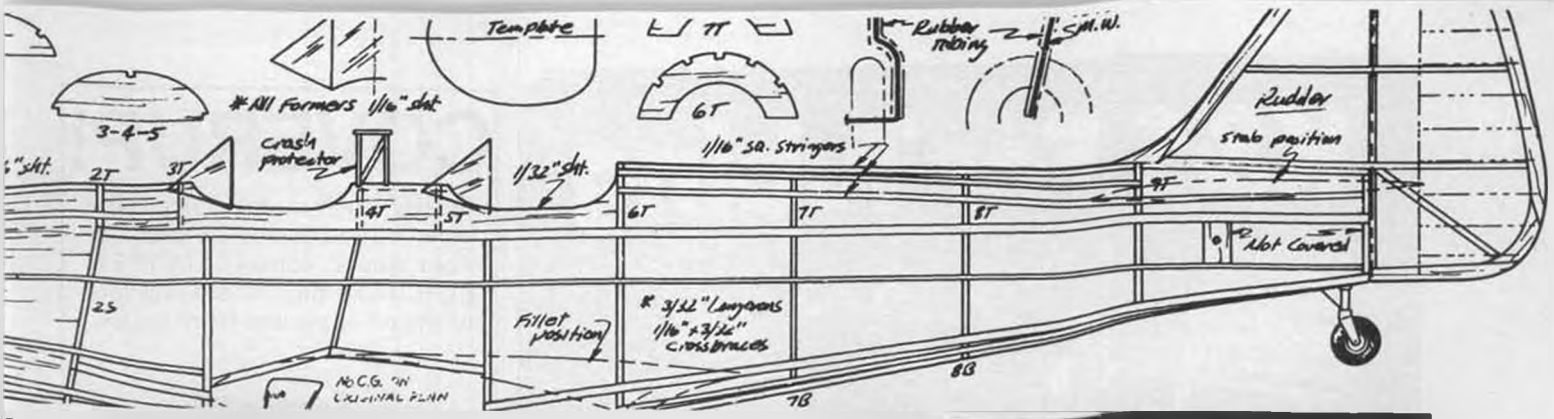


No. 486-O.T. STOUT WINNER **$4.00**
Winner of '39 Stout Trophy, 41" span, diamond-fuselage rubber, by Bob Toft.



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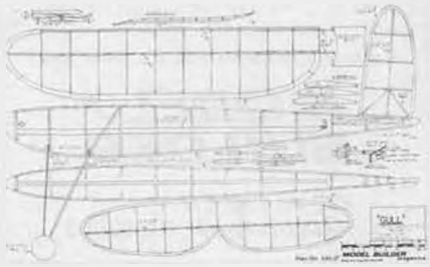

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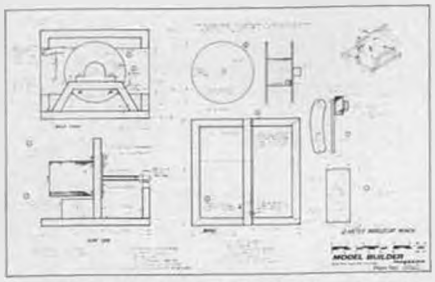

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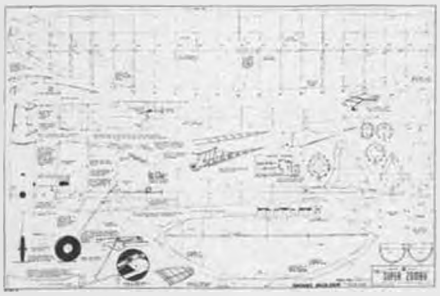

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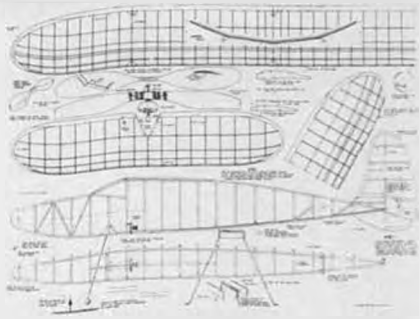

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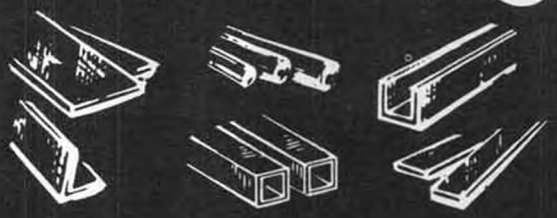
Hi-tech, Cobalt 15-powered aerobatic electric. 'Glass fuse avail. Les Adams.

No. 886-O.T. SNUFFY VI $5.00
Sharp pod/boomish pylon Cl. A/B gas, 50" span, '40-41 design by Bob Toft.

K&S For Tubing



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STOCK NO.	SIZE	PRICE EACH
100	1/16	.25
101	3/32	.30
102	1/8	.30
103	5/32	.35
104	3/16	.40
105	7/32	.45
106	1/4	.50
107	9/32	.55

ROUND BRASS TUBE (12")

125	1/16	.30
126	3/36	.30
127	1/8	.30
128	5/32	.35
129	3/16	.45
130	7/32	.50
131	1/4	.55
132	9/32	.60
133	5/16	.65
134	11/32	.70
135	3/8	.75
136	13/32	.85
137	7/16	.90
138	15/32	.95
139	1/2	1.00
140	17/32	1.05
141	9/16	1.10
142	19/32	1.20
143	5/8	1.25
144	21/32	1.40

COPPER TUBE (12")

117	1/16	.25
118	3/32	.30
119	5/32	.40
120	1/8	.30

SOFT BRASS FUEL TUBING (12")

121	1/8	.40

RECTANGULAR BRASS TUBE (12")

STOCK NO.	SIZE	PRICE EACH
262	3/32x3/16	1.10
264	1/8x1/4	1.20
266	5/32x5/16	1.30
268	3/16x3/8	1.40

BRASS STRIPS (12")

230	.016x1/4	.20
231	.016x1/2	.30
232	.016x1	.50
233	.016x3/4	.40
234	.016x2	.90
235	.025x1/4	.25
236	.025x1/2	.40
237	.025x1	.70
238	.025x3/4	.55
239	.025x2	1.30
240	.032x1/4	.30
241	.032x1/2	.50
242	.032x1	.85
243	.032x3/4	.65
244	.032x2	1.60
245	.064x1/4	.60
246	.064x1/2	1.00
247	.064x3/4	1.25
248	.064x1	1.70
249	.064x2	3.00

SQUARE BRASS TUBE (12")

149	1/16 Sq.	.50
150	3/32 Sq.	.55
151	1/8 Sq.	.60
152	5/32 Sq.	.70
153	3/16 Sq.	.80
154	7/32 Sq.	.90
155	1/4 Sq.	1.00

BRASS STREAMLINE TUBE 12"

122	Small	.75

SHEET METAL (4" x 10")

STOCK NO.	SIZE	PRICE EACH
250	.005 Brass	.70
251	.010 Brass	1.10
252	.015 Brass	1.50
253	.032 Brass	2.70
254	.008 Tin	.50
255	.016 Alum.	.50
256	.032 Alum.	.80
257	.064 Alum.	1.35
258	Asst. Brass	1.30
259	.025 Copp.	2.60

BRASS ANGLE (12")

171	1/8x1/8	.45
172	5/32x5/32	.50
173	3/16x3/16	.55
174	7/32x7/32	.60
175	1/4x1/4	.65

BRASS CHANNEL (12")

181	1/8	.55
182	5/32	.60
183	3/16	.65
184	7/32	.70
185	1/4	.75

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159	.020	.08
160	1/32	.08
161	3/64	.12
162	1/16	.20
163	3/32	.25
164	1/8	.40
165	5/32	.50

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the best-looking engine display. Now that Martin is retired, he doesn't get around as much as he formerly did. Based out of Fairfax County, Virginia, Schindler can be seen at most of the local Eastern functions.

LYKENS BROWN

Had a great time interviewing Herb Wahl of Herb's Engines at the Collectogether regarding the status of Lykens Brown engines. Herb, who himself is a very successful manufacturer of engines (Brown Jr., Hurleman, Ohlsson), is not directly involved in the manufacture of the Lykens (that is Bill Brown's middle name!), Brown, other than to help produce on a subcontracting basis a few miscellaneous parts such as tanks, goxes, and periodical announcements.

Wahl has been acting as Bill Brown's agent in advertising the Lykens Brown. Only in the capacity of taking orders and shipping same, Herb informs this writer all monies have been turned over to Bill, of course, less postal costs.

At present, Bill Brown has built the major parts, crankcases, crankshafts, machined cylinders, (cylinders not brazed but bypasses are done.) Items such as needle valves, other small items, have not been produced as of this date. Bill also promises to provide V-2 spark plugs with each engine. So, if you have a problem, Herb suggests you write to Bill Brown at Box 77, Pine Grove Mills, Pennsylvania 16868, or better yet, give him a call at (814) 237-7504.

GONE WEST

For the wrapup of the report on the 20th SAM Champs, we close on a rather somber note. At the Victory Banquet, 34 names were read of those who had died since the last banquet. That is quite a number, just something to remember, we aren't getting any younger and it is time to pass the torch of Old Timers unto the younger set.

The banquet was further saddened to hear that Bruno Markiewicz had collapsed on the field at the close of the contest. The Air Force patrol found Bruno around six o'clock in the evening beside his errant model and motorcyle. What a way to go!

The evening was further depressed as the winners in the free flight events were read. Bruno's name came up seven times. The trophies won by him were placed at the end of the table and all appeared like ghostly spires commemorating his death.

In a newspaper clipping sent by Chet Kowalik, the official autopsy revealed Bruno had died of a heart attack. Bruno was 63 at the time. According to his wife, Mildred, Bruno had spent the last three weeks prior to the Champs working from morning to midnight getting his models ready. It certainly showed in the results!

Bruno didn't enjoy his retirement too long as a carpenter foreman as he only "graduated" from the Detroit Board of Education in February. This writer is going to miss that old gruff man! •

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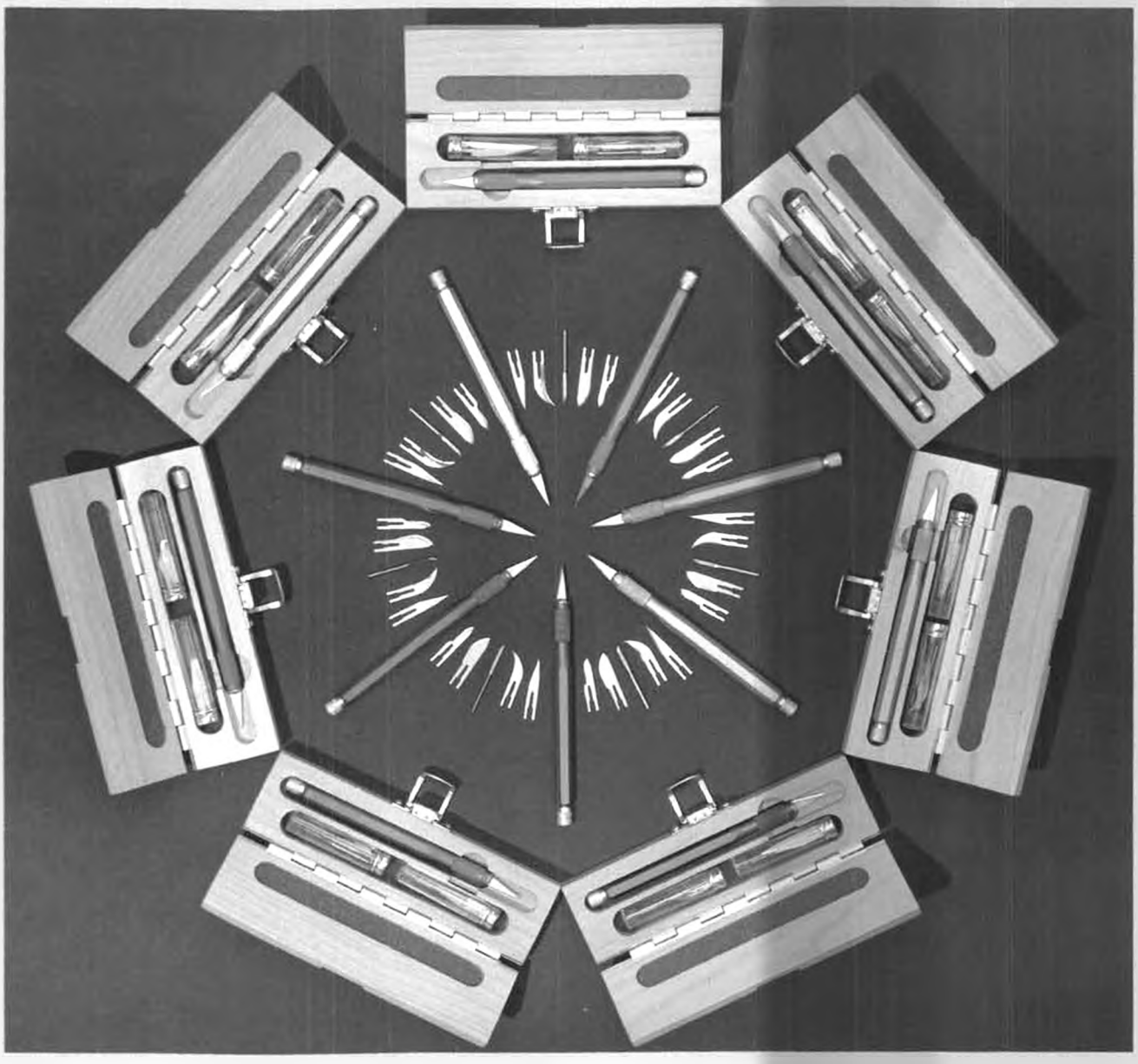

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SUPER HOT SUPER SHOT

Introducing the new MRC-Tamiya Super Shot. The 4x4 off-road racer that puts the heat on the competition.

All the "options" are standard

With the introduction of the new shaft driven 4x4 MRC-Tamiya Super Shot, you'll find Tamiya has designed this racer with all the most popular "options" as standard equipment.

The result? A precision built, all-wheel drive buggy that's practically ready-to-race right out of the box.

Ball bearings, Technipower and other things to go

We went all out with this one. We designed a totally new buggy from the ground up, and built in all the best hop up features MRC Tamiya has to offer. Like extra ball bearings, to help make the Super Shot one of the smoothest running, all-powerful R/C buggies to date. We didn't stop at three or four, though. We put all 24 ball bearings in all the key areas. The rear gearbox has seven, the front has nine, and the front and rear drive shaft mounts have eight. You just can't add any more!

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Of course, the Super Shot uses BEC (Battery Eliminator Circuitry . . . not included) that reduces weight for more speed and faster acceleration.

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So get super hot. Get the Super Shot.

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