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OCTOBER 1988

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volume 18, number 201

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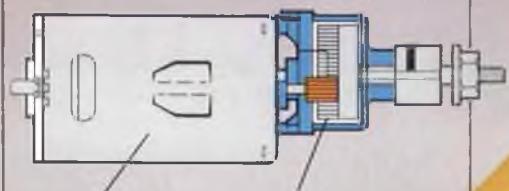
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# MODEL BUILDER

OCTOBER 1988

volume 18, number 201

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MODEL BUILDER (ISSN 0194 7079) is published monthly by RCMB INC., 898 West 16th St., Newport Beach, California 92663. Phone (714) 645-8830.

Subscriptions: \$25.00 per year, \$47.00 for two years. Single copies \$2.95. Subscriptions outside the US (except APO & FPO) \$38.00 for one year only. All payments must be in US funds, drawn on a US bank. Copyright 1988 by RCMB INC. All rights reserved. Reproduction without permission prohibited.

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COVER: Model Leslie Taylor, a former Miss Oroville, wades in with Jim Kyncy's '34 JF-2 Grumman Duck. Kyncy, also of Oroville, California, built the model from Smith Plans. It spans 59 inches, and is powered by a Webra 60. Photo: Skip Madson

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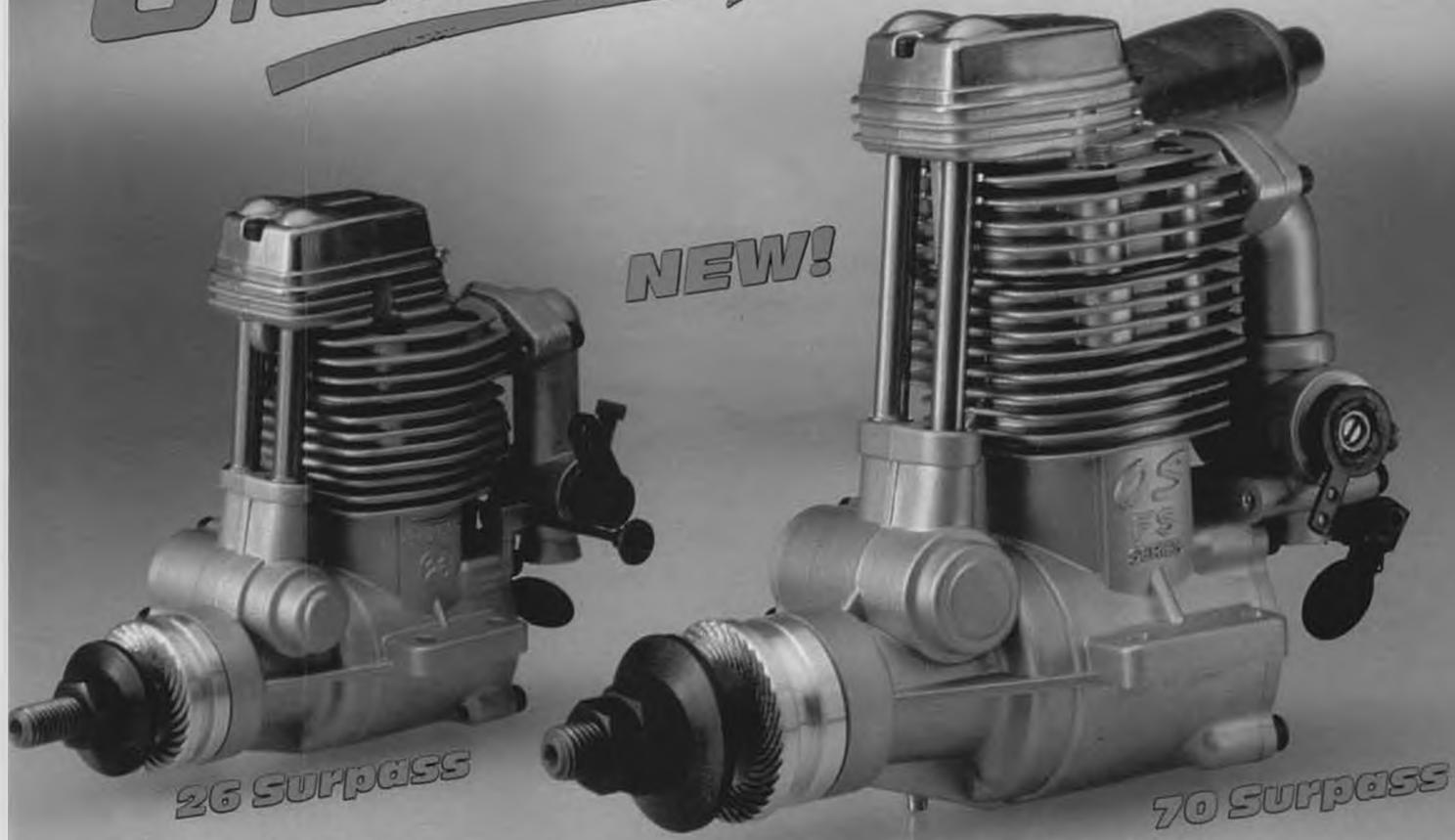


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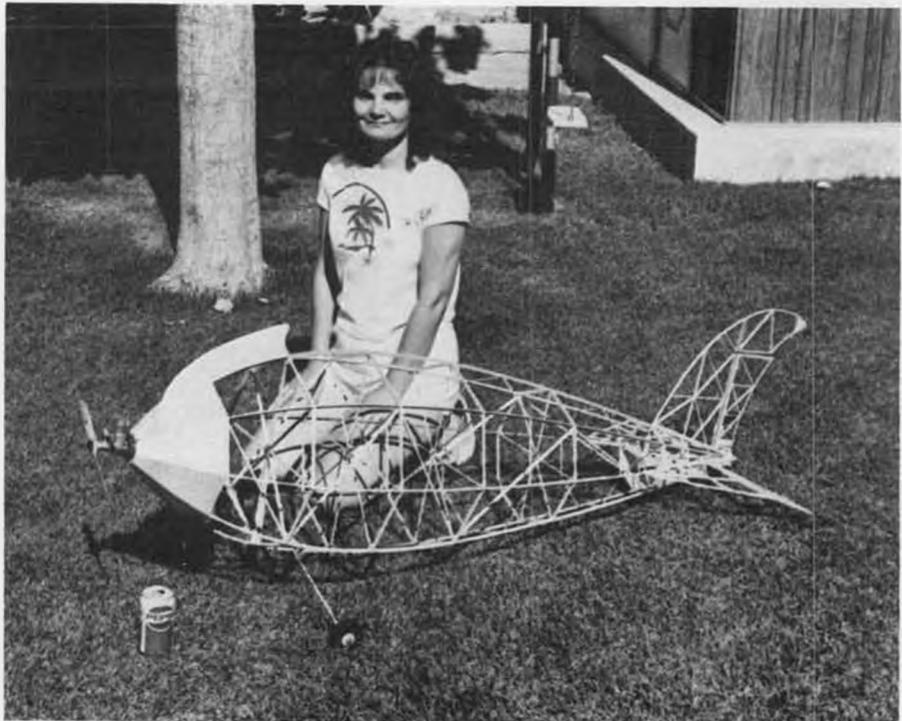


**from  
Bill  
Northrop's  
workbench**

• In the June issue of "Workbench," we put forth the challenge, kinda tongue-in-cheek, for someone to come up with an R/C version of Roy Clough's "Martian Space Ship." Bob Stalick had presented the MSS as the Mystery Model for April, and as might be suspected, it generated a lot of correct answers plus some interesting comments.

Well, we hadn't reckoned with the likes of Skip Ruff, a now-and-then contributor to *Model Builder* who already carries a reputation for a willingness to experiment with the unusual, rather than take the more comfortable path of conventional design with slight variations. Skip's best-known design, in case you're a late-comer to the pages of *Model Builder*, was the twin-rotor autogyro R/C semi-scale model of the Focke-Achgelis 61, published way back in our April 1975 issue. Although the original aircraft was, in fact, a helicopter, Skip's conversion to autogyro was totally successful; a three-channel R/C model that is as easy to fly as a medium trainer. It has consistently been one of our best-selling set of full-size plans. If you want to build and fly something unusual, you should try this one.

Anyway, getting back to the Space Ship, the photo on this page tells you part of the story. It shows Skip's wife, Debbie, with the framework of his five-foot long, R/C version of the MSS. We say, "part of the story," because since that picture was taken, the model has been completed, and the first flight has taken place. Skip says it would be better to state that it has been "in the air and safely returned to the ground, no thanks to its stability," rather than calling it a flight! That first...er...flight indicated that the balance point was way off...to the rear, and during the whole exasperating excursion, it was Dutch rolling, like 180 degrees! Skip managed to gain enough altitude to try various combinations of throttle and elevator, none of which improved the situation.



Meeting the challenge put forth in our June '88 issue, Skip Ruff, of Taft, California is at the flight testing stage with this R/C Martian Space Ship, shown with wife Debbie. See text.

He finally managed to get the ship headed into the wind, slowed down to almost zero forward speed, but still Dutch rolling like crazy, and stuck it on the ground just as the gear was in the midpoint of an oscillation. Whew!

Skip says the next step is to build a small, unpowered test model to make a whole bunch of glide flight experiments. If and when the R/C MSS becomes saddle broken, we'll present a construction article. In the meantime, wish Skip a lot of luck, not only with the Space Ship, but also with his other major offbeat project...the Vought V-173 "Pancake." This was an early experiment in the "flying body" concept, and Skip is belt-driving the two huge propellers on his model with a 60 cobalt electric motor.

S'funny... Skip seems like quite a normal guy....

#### IMS DATE CHANGE

Too late to change the ad appearing in the September issue, we discovered that the show dates were incorrect! The ad appearing in this issue is correct. The 1989 IMS Pasadena Model Sport and Hobby Show is on Saturday and Sunday, January 14 and 15. Friday, as in the past two years, is for industry members only...closed to the general public.

At this point in time, it is fairly certain that the Swap Shop will be moved to the second, or ground level, floor of the Conference Building. Special unloading and loading only parking will be available to swap table renters along Euclid St., making this more convenient for swappers than the Annex location.

The Annex area has been significantly expanded and will now hold as many as 50 exhibitor booths, connecting directly to the main floor of the Exhibition Building.

This will be the twelfth consecutive year for the IMS show, eleven in Pasadena, and, as in every previous year, the number of ex-

hibitors is expected to increase. Don't miss it!

#### MYSTERY SOLVED

The mystery of the identity of the flying wing model published here in the June '88 issue has been solved. Eui Tileston, of Carmichael, California, whose name often appears in John Pond's "Plug Sparks" column for old timers, hit the nail on the head. Picture No. 6 on page 24 of the November 1938 issue of the vintage *MAN* tells it all. This is another photo of the same aircraft, from a different angle, and being held by its designer/builder, Hudson Woeltgen. Can anyone give us information on this gentleman?

#### MYSTERY CREATED

In the June '88 issue, we reran the plans and brief article for the *Modelcraft Spook 48* from its first appearance in our September '73 issue as the Old Timer of the Month. In the article, it was stated that although the model did not appear in kit form until the spring of 1940, there was evidence available that the model was flying in 1938, making it "Antique legal." Now, along comes a letter from Don Chipman, of Arnold, California, who states rather emphatically that he bought his *Spook 48* kit in a hobby shop in 1938! He says it was his first gas model, and he powered it with a Madewell Mite that he bought on a lay-away plan, paying it off by cutting lawns, delivering magazines, and working in his uncle's bicycle shop.

Now then, just when the heck did the *Spook 48* first take the air, and when was it first available in kit form? Don says he paid a buck-fifty for his, and the Madewell was on sale for \$7.50, or five bucks off the normal \$12.50 price. Anyone care to reach back 50 years for that one? A time machine would sure come in handy once in a while, wouldn't it?



Another Ruff (Rough in this case!) project is this semi-scale model of the Vought V-173 Pan-Cake, with belt-driven, electric-powered propellers. See text.

## PRACTICAL SCALE

We've had lots of inquiries concerning the whereabouts of Practical Scale, the company in Germany that Cees Kaijim mentioned in his "European Scene" column a few months ago, especially concerning a belt reduction drive system for large R/C model aircraft. We had an address that turned out to be obsolete, so finally wrote to Cees for the information. The company, owned and operated by Britisher Tony Clark, is at Holzhauserstrasse 1, D-4990 Lubbecke, West Germany. We have already written to Tony for more information, and to find out if he is still manufacturing those super scale models that used to be imported to the States by former world R/C aerobatic champ, Dr. Ralph Brooke.

We'll keep you posted.

## THINGS TO DO

Over the past few years, groups in several European countries have put on events for R/C scale models of racers that competed in the famed Schneider Cup Races of 1913,

*Continued on page 107*

Dear Jake:

Do you ever answer a question as it was intended? I mean, you give advice and answers all the time, but none of it is ever relevant to the question you're supposedly answering. If somebody asks you how to fly, you tell them to make a buzzing noise and circle garbage cans. If somebody complains that their radio doesn't work, you tell them to switch to a cassette deck because the sound's better anyhow. Have you ever answered a question straight?

Fed Up in Philadelphia

Dear Fed Up:

Well, I've always thought that I answer every question straight, but now that you mention it, my wife wouldn't talk to me for the first six months of our marriage. Maybe it was because when the minister asked me, "Do you take this woman?" I replied, "With a grain of salt."

Jake

\*\*\*

Dear Jake:

When do propellers windmill?

Clayton in Paducah, Kentucky

Dear Clayton:

Whenever they see Don Quixote coming.

Jake

\*\*\*

Dear Jake:

I don't have any general complaint with Radio Shack, but I sure have had my troubles with their under-\$50 radio-controlled products. I bought my boy one of their Blitzkrieg Battle Tanks. It ran amuck and blitzkrieged three beefsteak tomato plants and a banana pepper in my garden. I also picked up one of their Malibu Beach Buggies for my nephew's birthday. It ran off out of control and kicked up sand on a surfer's fresh wax job, which started a fist fight that eventually involved the police and a gang of bikers. Finally, playing it safe, I bought one of their radio-controlled farm tractors. It only goes 5 mph tops, so I figured there was no way I could get in trouble with that.



## ADVICE FOR THE PROPPORN

—By Jake

I was right. It worked so well that I regained my confidence. I attached a sprinkler head to the tractor and used it to water my lawn by remote control from the comfort of a patio chair. But on the July 4th weekend it went berserk and doused four charcoal fires and hosed down a champion Siamese cat named Mei-Ling.

I don't understand it at all. These radio-controlled toys are really neat, some of them are very clever, and they're all under fifty bucks. So how come they don't work worth a rodent's rear?

Jesse in Fort Worth

Dear Jesse:

Why do you think they're under \$50? Because total parts, labor, and quality control engineering comes to about \$1.46, that's why.

Jake

\*\*\*

Dear Jake:

If I put a nice long tail moment, a

reasonably forward CG, and plenty of dihedral into my next project, would I be safe in calling it a stable design?

Roger in Rochelle Park, New York

Dear Roger:

No. A stable design would have to include stalls, watering troughs, a hayloft, and a saddle storage room. Instead of doing it yourself, maybe you better hire a professional architect to design your stable.

Jake

\*\*\*

Dear Jake:

Why do some two-wheel gear airplanes track very nicely during the takeoff run, while other tail-draggers are squirrelly and tend to ground loop all over the place?

Taxier in Texas

Dear Taxier:

It's all a function of wheel track width, fore and aft location of the gear, height of

*Continued on page 107*

# OVER THE COUNTER

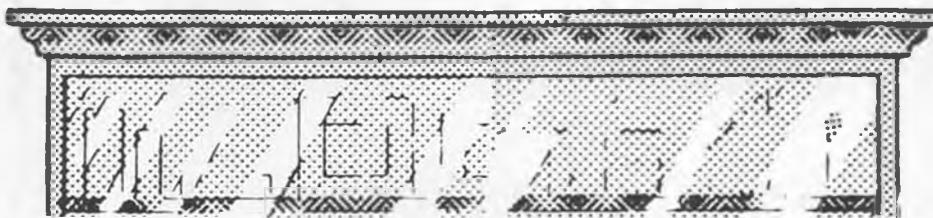
All material published in "Over the Counter" is quoted or paraphrased from press releases, furnished by the manufacturers and/or their advertising agencies, unless otherwise specified. The review and/or description of any product by MB does not constitute an endorsement of that product, nor any assurance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

• If it is as hot and muggy where you are as it is here, then you can understand our reluctance to do anything resembling work right about now. Nevertheless, our duty to report the latest in model airplane products transcends any personal discomfort or overwhelming desire to crawl into a hammock under a shady tree, so here goes.

Hobbico's Electric Fuel Pump is designed to be used with either a 6- or 12-volt power supply. It can also be used with its own internal batteries (four AA batteries, not included), and the three-piston switch allows simple draining and filling of your tank. You can find the Hobbico Electric Fuel Pump at retailers across the U.S.

\* \* \*

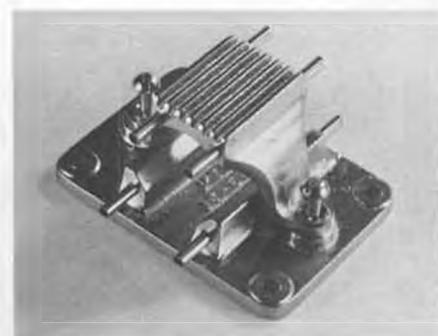
Futaba's Conquest 6NLK/FM two-stick digital proportional radio system comes with the Futaba R107N receiver and four S138 precision servos as standard equipment. With rudder and aileron dual rate control, servo reversing, and more, the Futaba 6NLK is a system that can be as ver-



satile as your flying desires. See it at your Futaba dealer.

\* \* \*

Sig Manufacturing has come up with an easy-to-use adhesive trim material called SuperTrim Self-Adhesive Trim. What this does is allow you to cut and apply any design your imagination allows with pressure-sensitive material that is fuel proof and



J'Tec water-cooled motor mount.

lightweight. With 14 different colors in a 13-x 36-inch roll, SuperTrim can help you give

Continued on page 72



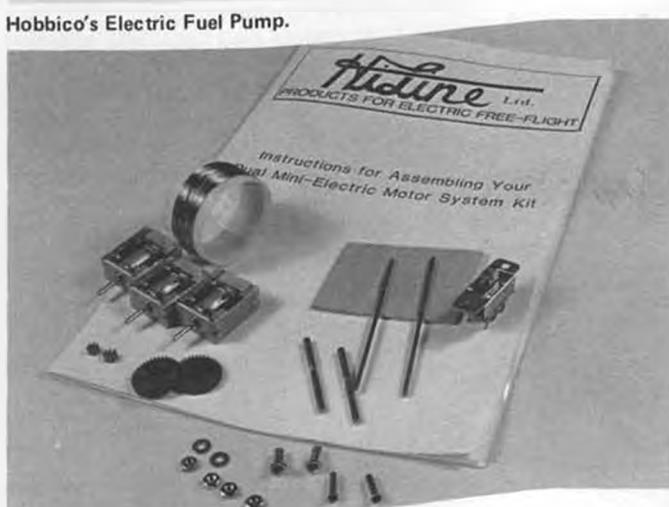
Conquest FM radio system from Futaba.



Hobbico's Electric Fuel Pump.



Sig's new Super Trim decorating film.



Mini-electric motors from HiLine.



R/C Extra's new Weeks Special biplane kit.



# R/C GUFF, *The Life Story*

By DR. WALT GOOD

## PART THREE

• Again, Bill was available for most of the summer of 1940, so we were able to join forces and go to the AMA Nats in Chicago for the R/C event. The R/C Guff was in top shape, and we had added a third escapement to give a hi-lo engine speed control for extra contest points. As we had only two channels in the radio, we would have to decide before the flight whether to use rudder and elevator or rudder and engine speed. If one of the receivers was not working that day, then it would be rudder only. That happened more often than we care to admit.

The morning after we arrived in Chicago for the 1940 Nats we found that our car had been looted, and among the missing items was the R/C transmitter! Bill went to the Newark Radio store with our problem, and the manager allowed Bill to build a new transmitter overnight! I spent the night repairing the wing which had been bashed by the looters.

### PHOTO 40

Here's the old transmitter which was stolen.

### PHOTO 41

Here's the "overnight" transmitter with one tube for each channel. Don't touch any bare wires; you'll get a 400-volt shock!

### PHOTO 42

This is at the 1940 Nats at Chicago show-



Photo 42.



Photo 40.



Photo 41.



Photo 43.



Photo 44.



Photo 45.



Photo 46.

ing the "overnight" transmitter in lower right. The R/C Guff now has lightning bolts on the top of the wing. I am on the left and Bill is on the right with the control box. See the newsreel cameras on the tops of the cars in the background?

#### PHOTO 43

Here Bill is in the process of tuning the receiver. Note the piece of yardstick for rear wing rubber hold-down.

#### PHOTO 44

Bill, under the helmet, watches as I check the engine.

#### PHOTO 45

Ken Davis and I are waiting for judges' signal to launch. Plywood sheets were used for the runway, which made a wingtip launch necessary. The picture shows maximum decorations used on the Guff. Note "RADIO" on side and Bill's Ham call "W8IFD" on fin. All the decorations are in turquoise blue. The plane was International Orange by Berryloid nitrate dope.

#### PHOTO 46

Bill is piloting while I cup my ear to hear if the engine has cut. Note Jim Walker as a very interested spectator on the left. Jim entered his first R/C Nats the next year in 1941. The man with the paper in his hand on the right is a judge. This was an official flight.

#### PHOTO 47

The 1940 Nats had 11 entrants who actually made flights which garnered points; the biggest R/C Nats yet. Well-known names, Siegfried, Raspante, Custin, and Shereshaw, placed in the first five. The Guff



Photo 47.



**Photo 48.**

won again, but with less margin than before. This time we both held trophies. This gave us two wins on the Roberts trophy.

I've often stated that Bill was the better pilot because he didn't worry about having to repair a damaged plane; that was my department. His department was the transmitter. . .and what could happen to that. . .except for being stolen once in a blue moon!

**PHOTO 48**

I just had to include a Good family photo, with (left to right) Walt, dad Lester, and me, at the end of the meet, and mention the constant support from our parents over the years. As a high school science teacher, Pop knew the value of learning through doing it yourself, and he gave us his quiet encouragement at every turn. He even did one winter when we first ran the engine in the living room! After all, we did have the window open, but we didn't realize that the smoke would be sucked down the cold air register and then be blown back through the whole house! We didn't think to take a photo that time. Just as well.

A few demonstrations were made in 1940, but the one in the fall, just before Bill and I left home for the last year of Graduate school, will be the best remembered. Steve Corbett, Director of the Detroit Recreation Department Model activities, invited us to give a demo of the R/C Guff at the Ford airport in Dearborn. The occasion was the annual model show which the Recreation Department arranged for the general public.

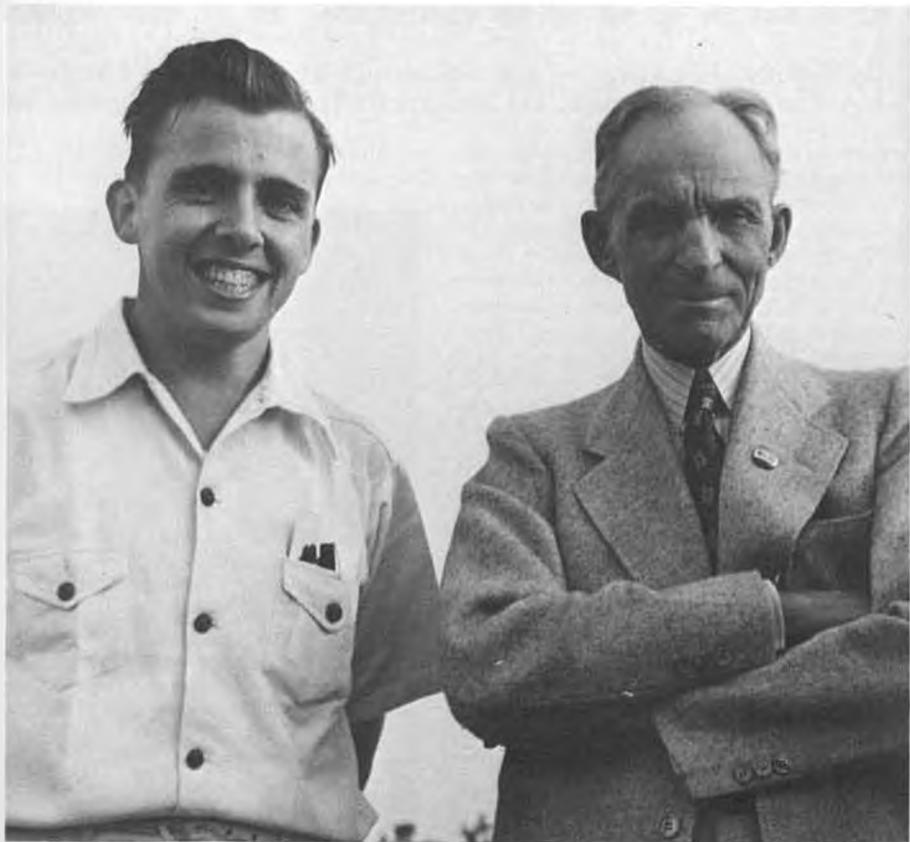
During the day we made our three demo flights and then proceeded to pack the Guff away for the trip home. We were almost ready to leave when a young lad ran up and asked if we would make another flight so his grandfather could see it fly. We hesitated for a moment before answering, and then he said his grandfather was Henry Ford!

By the time that young William Ford returned with Henry, the plane was back together and Bill had checked the batteries to see if we could squeeze out another flight. The flight went well except the landing was so close that I almost had to pull Henry out of the way. He didn't flinch and apparently thought such close landings were normal. We didn't tell him otherwise.

Henry toured us through the nearby hangars, where he showed us old aircraft and engines destined for his museum, which



**Photo 49.**



**Photo 50.**

was yet to be built. His last words to us were, "Boys, keep on experimenting," which is what we're still doing almost 50 years later.

**PHOTO 49**

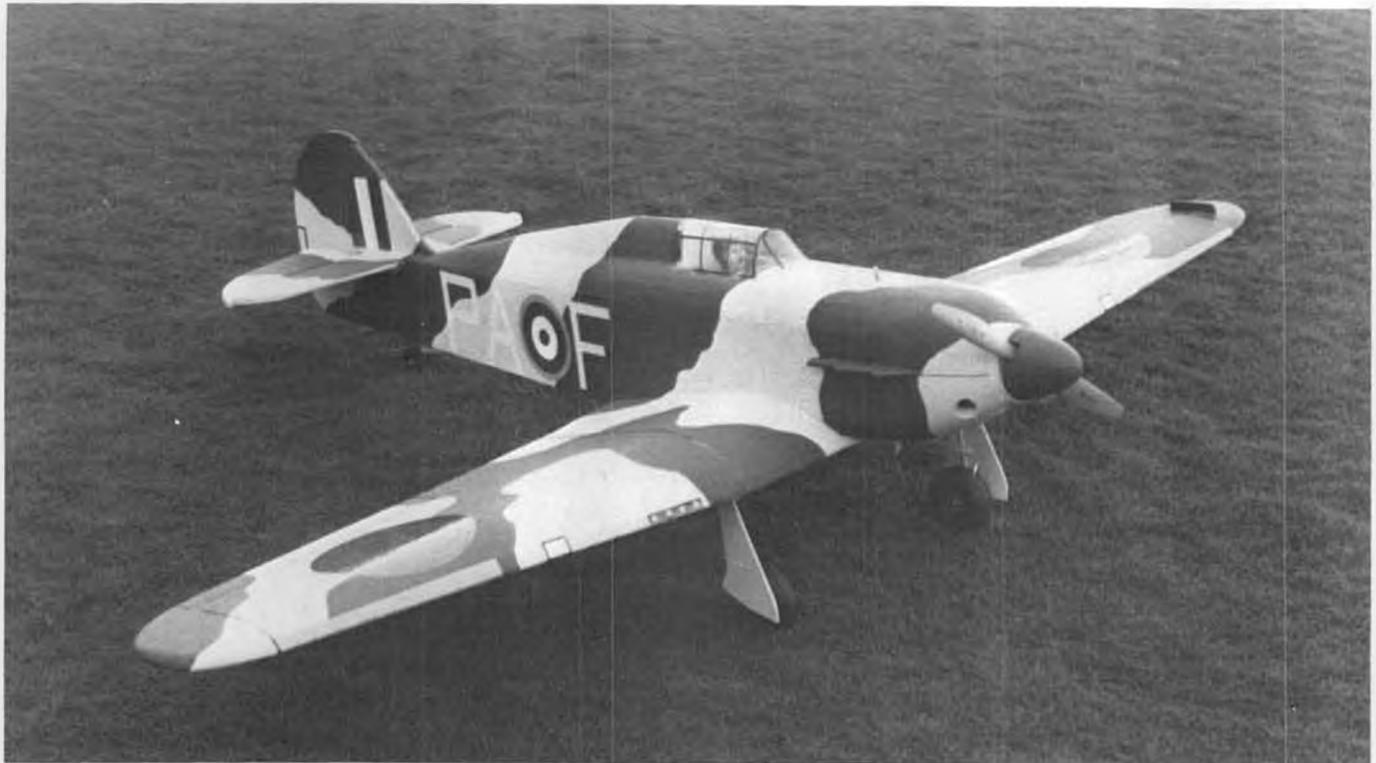
At the Ford airport August 1940 are (left to right): Me, (?), Steve Corbett, Henry Ford,

(?), and Bill. The (?) are Recreation Department personnel, I think.

**PHOTO 50**

Here's Bill and Ford. Henry is wearing a Willkie button in favor of the U.S. Presidential candidate.

What a special experience that was! •



# HAWKER HURRICANE

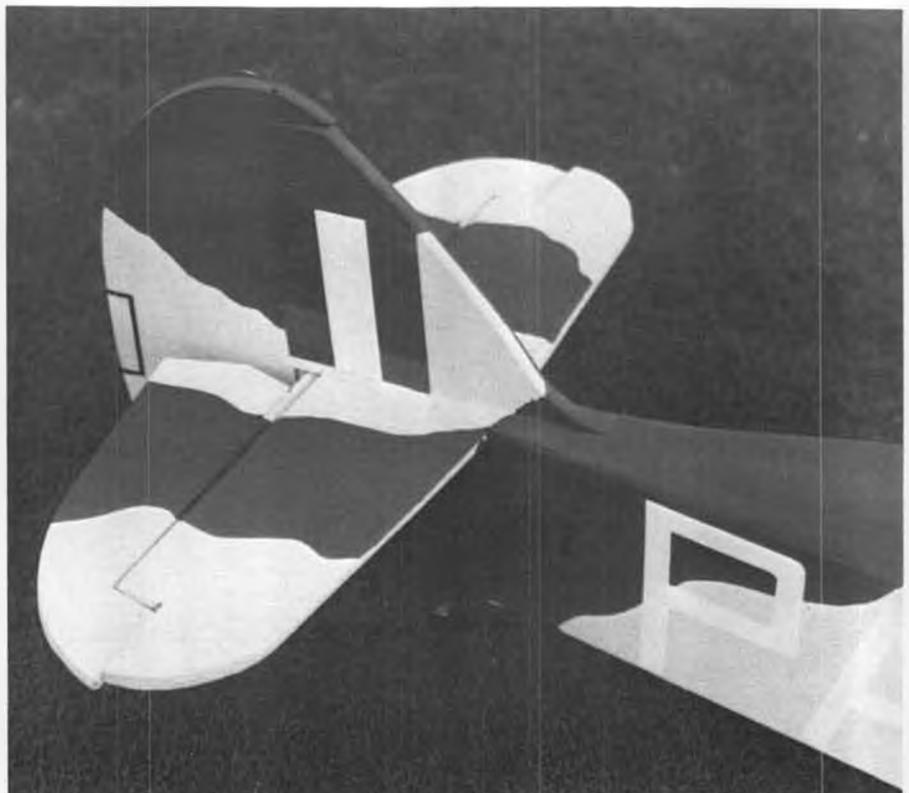
By CHUCK FELTON. . .Take a close look at this control line model. It may be hard for you to believe, but it is made from plain old cardboard! The author explains his techniques for producing a fine model.

- The Hurricane was the first eight-gun monoplane fighter in service with the RAF and the first to exceed 300 mph. The design was not as advanced as that of the Spitfire or the German Bf 109, as it utilized metal frame-and-fabric construction. Never receiving the glamour treatment lavished on the Spitfire, the Hurricane nevertheless provided the bulk of the defenses during the dark days of 1940, when the fighter squadrons were up against the might of the vastly superior Luftwaffe. In fact, until well into 1941, the Hurricane was by far the most numerous of the RAF's combat aircraft, and it bore the brunt of all the early combats with the Luftwaffe over France and England. In the hectic days of 1940, the Hurricane was found to be an ideal bomber destroyer, with steady sighting and devastating cone of fire. The sheer aggressiveness of the British squadrons tended to nullify any performance shortcomings of the aircraft in combat, and it should be remembered that a single-seat fighter armed with eight guns was still a big innovation by 1940 standards. The psychological effect of streams of fire aimed at the rather poorly protected bombers so unnerved many German crews that they broke formation, making them easy targets for the defenders. By the end of the daylight phase of the Battle of Britain, Hurricanes had accounted for 57 percent of all German aircraft shot down in combat.

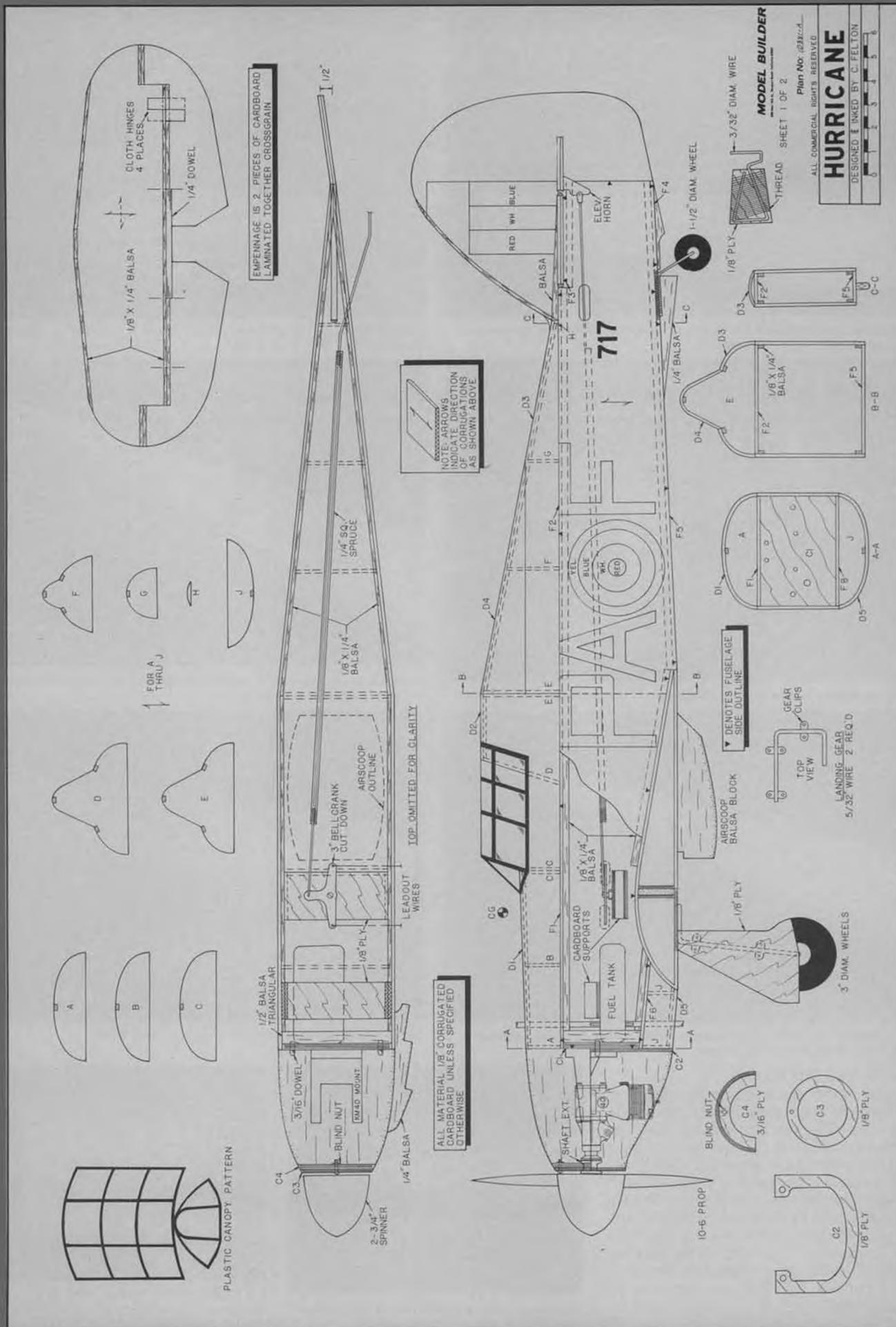
The Hurricanes were also widely used overseas, where their simplicity greatly facilitated maintenance at the somewhat

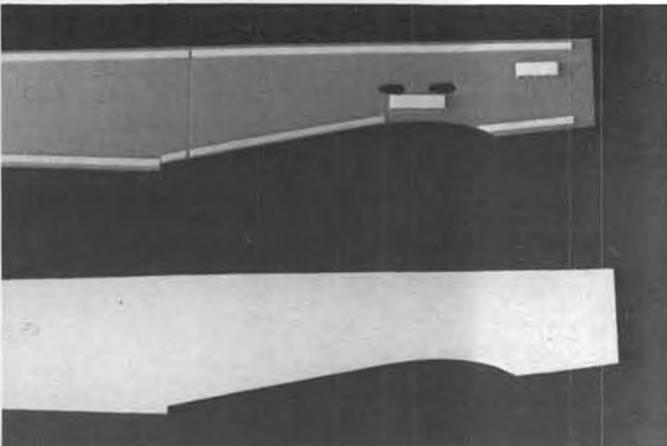
primitive airfields being used. In all, 14,231 Hurricanes were built, with hundreds be-

ing exported to foreign countries both before and after the war.

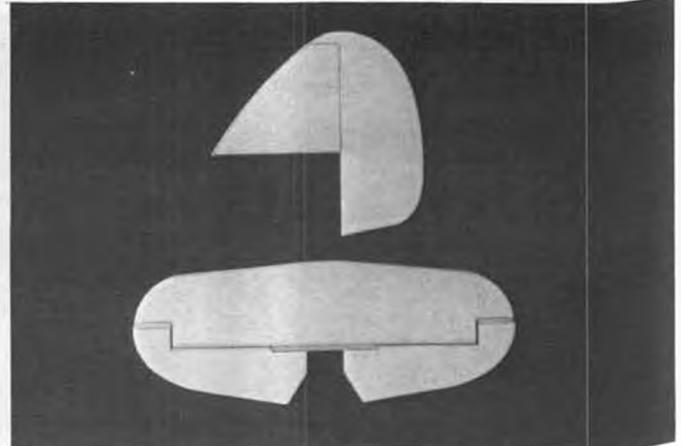


Thicker-than-usual leading and trailing edges of tail are only clues to this model's building material. Paint job's a beaut.

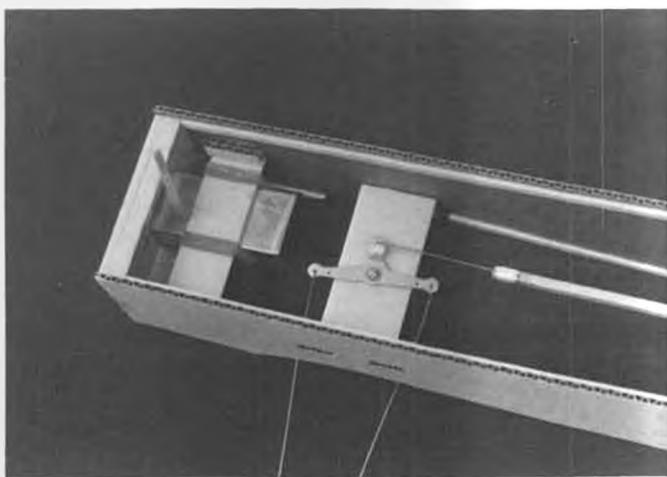




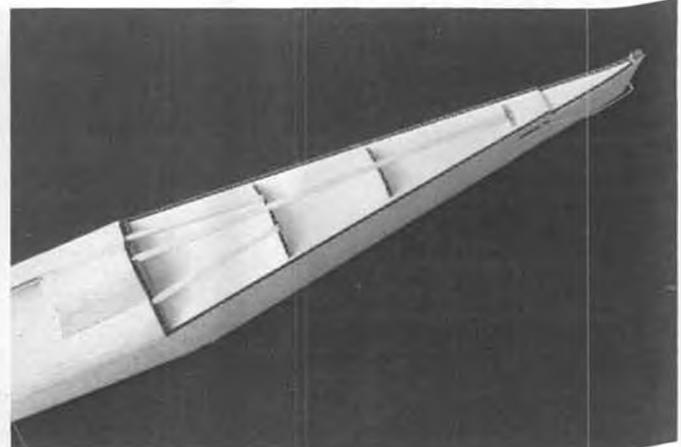
Fuselage sides are lined with balsa strips and cardboard supports for bellcrank and fuel tank supports.



Leading edges of the empennage are capped with 1/8-inch balsa to allow them to be rounded off.



Fuselage sides joined to firewall with fuel tank and bellcrank installed.



Fuselage top in place with cardboard formers and balsa stringers, typical of top deck construction.



Formers are covered with top deck pieces which have been scored and folded to give curved shape.

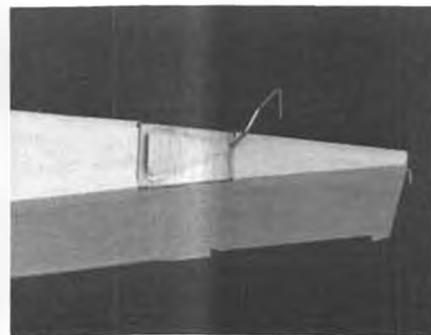


Cockpit area with carved balsa engine cowl block.

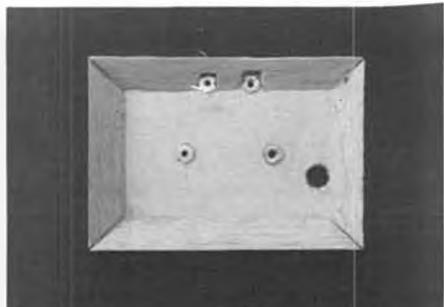
#### BUILDING THE MODEL

The model is constructed primarily of 1/8-inch corrugated cardboard. This greatly reduces both building time and cost. The design makes use of cardboard's unique feature in that it can be folded. The wing is built of two large pieces of cardboard with cardboard ribs and a single spar. The tail surfaces and fuselage are primarily cardboard with little internal bracing. The result is a low-cost, lightweight, fast-building model that has good scalelike appearance and can take plenty of punishment at the flying field.

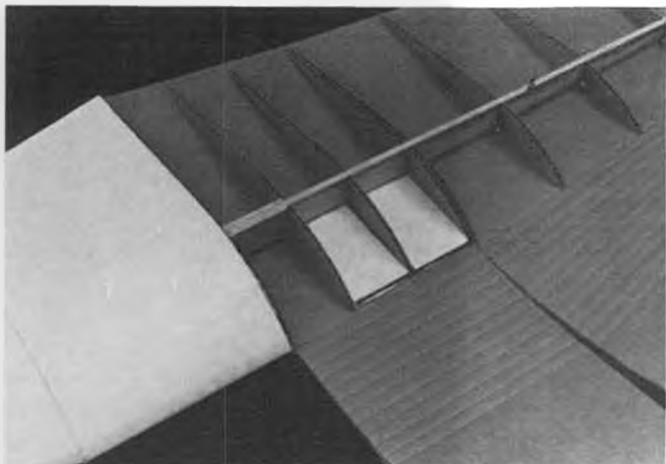
Cardboard varies in weight, but any 1/8-



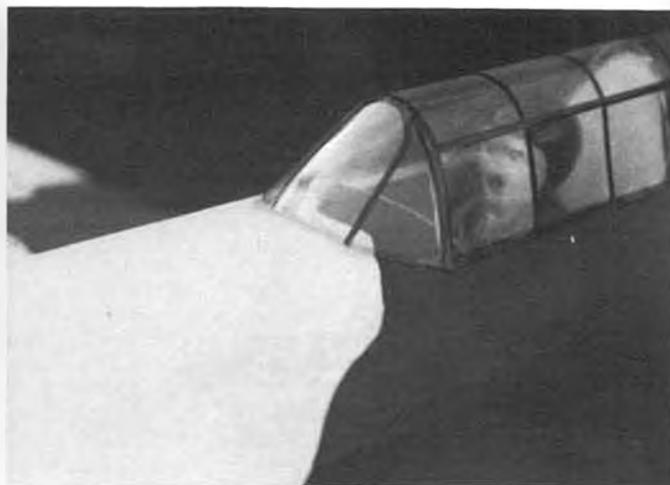
The tail wheel wire is attached to ply platform by wrapping with nylon thread.



Ply engine firewall is edged with triangular balsa bracing. Note blind nuts for KM 40 engine mount attachment and hole for fuel tubing.



**Wing has single spar, cardboard ribs and leading edge folds to obtain curved upper surface.**

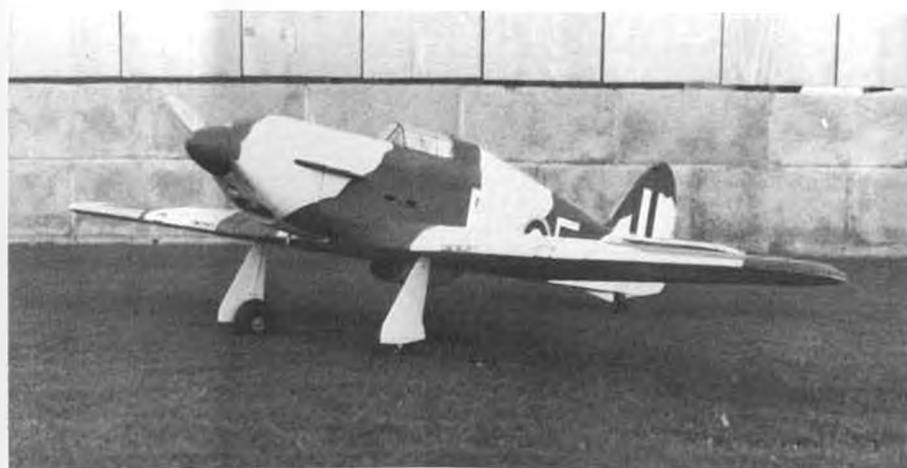


Hurricane's cockpit detail; you gotta have a pilot!

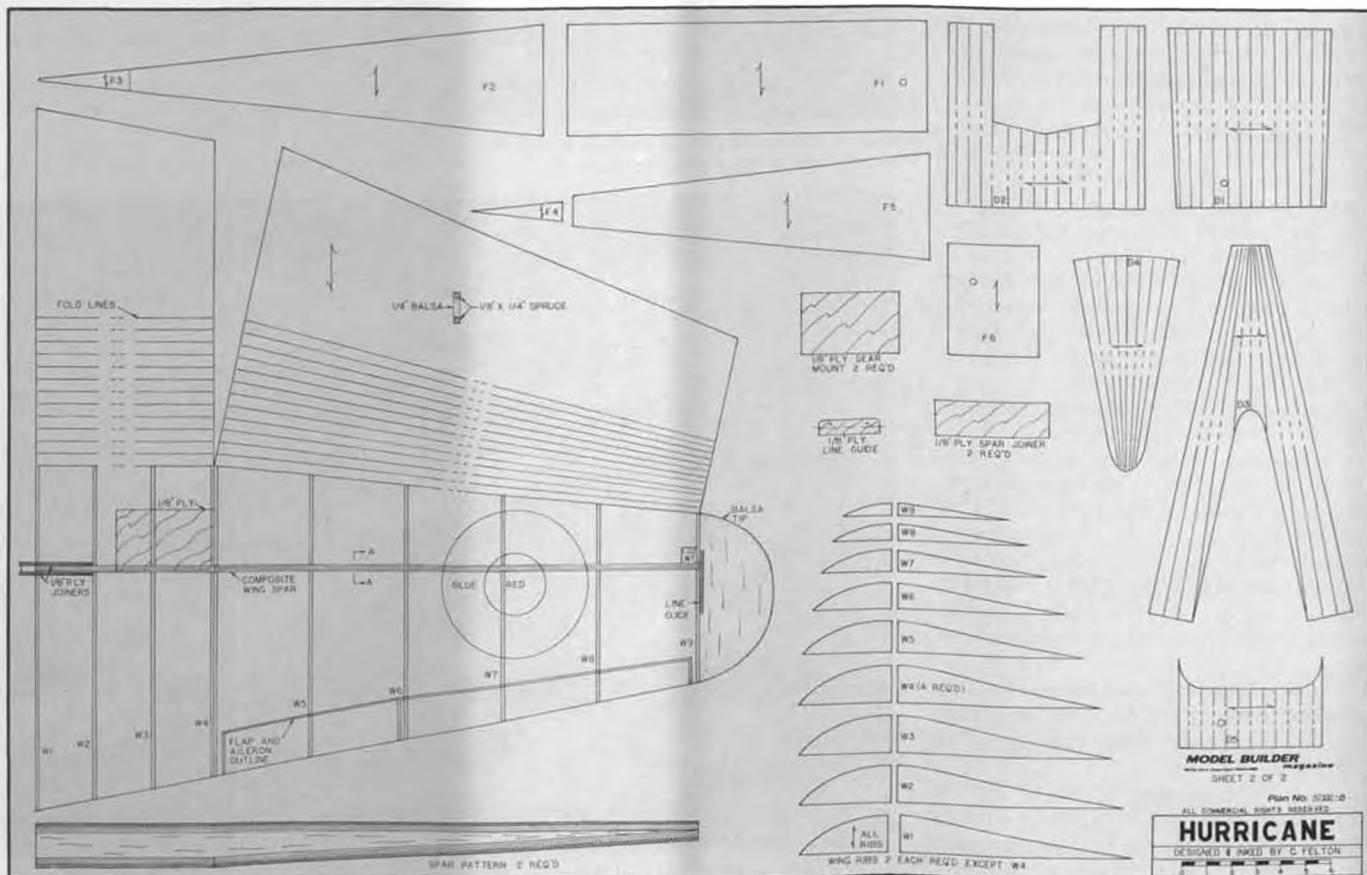
inch corrugated cardboard will do. Sources of this material include box manufacturers and local shopping centers, where you can find stacks of discarded boxes. Look for cardboard with brown paper on one side and a white finished paper on the other. The white paper on the outside of the model results in a smoother finish and neater appearance. The method of folding the cardboard and the use of gummed paper tape to seal the joints, and exposed corrugations is explained in the construction hints.

The model is built to a scale of 1-1/2 inches to the foot, resulting in a wingspan of 60 inches and a length of 47 inches. The bottom of the airfoil is flat with a curved upper surface, due to the scoring and folding

*Continued on page 92*



**Scale-like appearance of the Hurricane is enhanced by the paint job, but honestly, would you guess it was made out of plain old cardboard?**



# Control Line

BY JOHN THOMPSON

• Control line model aviation competition on the West Coast entered a new era on May 28 and 29, when the Eugene Prop Spinners and other Pacific Northwest clubs held the 17th annual Northwest Regional Control Line Championships on a new field.

The field was at Mahlon Sweet Airport in Eugene, Oregon, as always, but it was across the road from the old site.

The old site had one asphalt circle and five grass circles. The new field has three asphalt circles and four grass circles. Separate circles were available for advanced and expert precision aerobatics/profile scale; for racing/scale; for speed; for Navy carrier/balloon bust; and two circles for combat.

Weather was a little more changeable and, well, downright damp, than would have been desired, but with the contest occurring on the vast expanse of asphalt, it was not as uncomfortable as it might have been. Temperatures were comfortable and wind was light.

Turnout of competitors equaled the all-time high, and competition in the 33 events was excellent for the 99 trophies, the merchandise prizes and the first-, second-, and third-place grand championship trophies.

The new field was obtained through the efforts of Mel Marcum, who worked with city of Eugene officials, including airport officials Bob Shelby and Bob Staley. Marcum and Morrie Gilbert are negotiating a contract for a long-term use of the field.

Competitors were asked a number of demographic and economic questions in a survey handed out at registration time, which the Prop Spinners hope to use to show city officials the ongoing value of the 20-year tradition of CL model flying at the airport. About half the competitors returned the surveys, revealing that that portion accounted for some 200 people (including competitors, families, friends, etc.) who spent more than \$11,000 in the Eugene area during the contest weekend.

Preparations, much greater than for a normal Regionals because the "wheel had to be reinvented" were done by the Eugene Prop Spinners, a small club led by those two big men, Marcum and Gilbert. This involved making dozens of standards for crowd-control ropes, mowing grass, hauling the carrier deck, installing the speed pylon and safety net, assembling bleachers, arranging for concessions and restrooms, etc.

Contest Director Mike Hazel of Salem, Oregon, headed up the crew of officials and event directors, which numbers in the dozens.

When it came time to hand out the trophies, Mike was honored by Northwest modelers for his long service as editor and publisher of *Flying Lines* control line news-

letter and former *Model Builder* CL columnist.

Another special surprise award went to Alan Resinger of Burnaby, B.C., Canada: the Concours d'Elegance award for the most beautiful Precision Aerobatics aircraft.

Grand Champion for the contest was Paul Gibeault of Calgary, Alberta, with Dick McConnell, of Seattle, second and Bob Danielson, of Seattle, third.

Many more details could be told, but it would take the entire column to go into all



Shawn(left) and Wesley Mullins in Northwest Sport Race Junior Final. Wesley won.



The pit area before Northwest Sport Race.

the details of this fine contest, and the mailbag is bulging with other items that need to be reported.

If you would like to be a part of this fine event in 1989, plan to be in Eugene, Oregon, on Memorial Day weekend.

Here are the winners of the events:

**Racing:** Mouse I (Jr.), Wesley Mullens; Mouse I (Sr. Open), Paul Gibeault; Mouse II, Paul Gibeault; Rat, Marty Higgs; Slow Rat, Wayne Drake/Blake Jensen; Scale Race, Remy Dawson; Northwest Sport Race (Jr.), Wesley Mullens; Northwest Sport Race (Sr. Open), Henry Hajdik; Northwest Super Sport Race, Drake/Jensen.

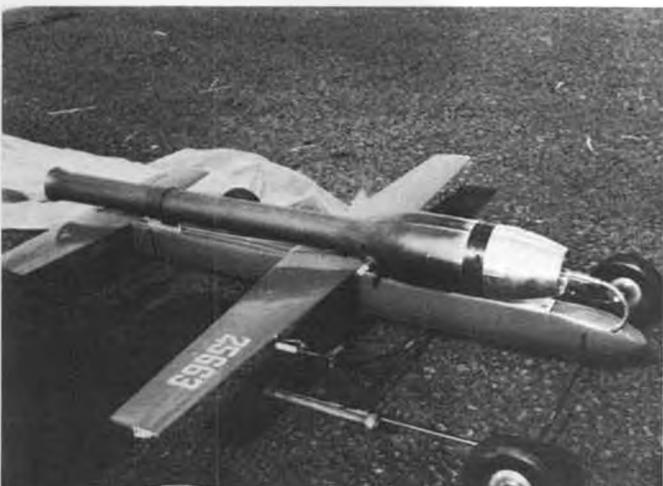
**Scale:** Precision Scale, Bob Danielson; Profile Scale, Dave Mullens.

**Combat:** 1/2-A, Mel Lyne; Slow, Frank Boden; FAI, Mel Lyne; AMA Fast, Phil Ganderson.

**Navy Carrier:** Profile, John Hall; Class I,



Some Precision Aerobatics ships line up for appearance judging at Northwest Regionals.



Jim Rhoades' jet speed plane, a conventional design.

Dave Shrum; Class II, Bob Danielson.

**Balloon Bust:** George Mickey.

**Old-time Stunt:** Ted Fancher.

**Precision Aerobatics:** Expert, Paul Walker; Advanced, Jack Pitcher; Intermediate, Terry Miller; Beginner, Pat Leonard.

**Speed:** 1/2-A, Dave Williams; A, Fred and Joyce Margarido; B, Frank Hunt; D, Bill Husz; FAI, Paul Gibeault; Formula 40, Paul Gibeault; Jet, Bill Nusz.

A final Regionals note: This long-traditional contest is such a part of Northwest modeling folklore that it actually has its own literature.

Yes, there is the mid-1970s vintage song about the Regionals' Slow Rat Race, set to the tune of "Hot Rod Lincoln," by a then-active racer and combat flier, which was revived for a recent Bladder Grabber competitor's breakfast. I'm sure the name of the author will come to me the instant I put this column in the mail!

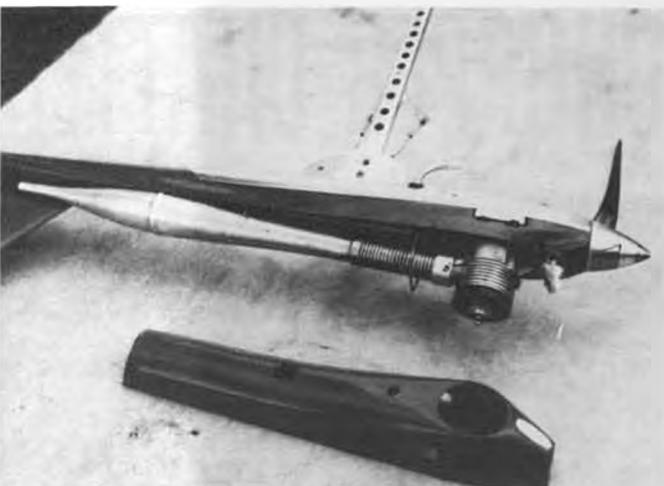
Now, from R.F. Stevenson, of Seattle, Washington, comes a new piece of literature.

Stevenson, by the way, is one of the legends of Northwest model aviation, and perhaps the last person alive who can fly not one, not two, but three CL airplanes at once (one from each and one from a handle mounted on a helmet), an old Jim Walker trick.

"Steve" also is one of the premier engine



Action in the speed pits.



Chris Sacket's FAI speed plane, disassembled.

can rest assured; they will sell at least one copy!

Anyway, here's part of what Steve writes this about his annual spring trip to the Regionals, where he sets up his beautiful engine display.

*"Fly Season: Sun is shining, wind is blowing, I am pining, for Eugene, going!"* Steve, by the way, just retired from the Boeing Co. after 45 years. He's a charter member of the Seattle Skyraiders.

#### MAILBAG

All of the "old timers" of CL model aviation, meaning people in their 30s or older, remember the great old kits of the 1950s and '60s. Some even admit to remembering kits of the 1940s. But you don't have to be an old timer to fly the old timers.

Several people now are producing plans and other support items for some of the oldies and goodies.

Our mail brings news of the latest entry into the field, and possibly the first new maker of kits for this activity.

We quote from the flyer:

"Several years ago some U-Control fliers decided to create an event which was really a rebirth of an older event out of the '40s and early '50s. The event was called 'Old Time Stunt.' The event appears to have caught on in a big way. In order to qualify

*Continued on page 95*



John Thompson, left, honors Mike Hazel for his service as Flying Lines publisher/editor.

# CHOPPER CHATTER

BY DICK GROSSMAN

• I'm not pointing a finger at anybody in particular; everybody is guilty. I know that a business has to show a profit, but when I look at some of the prices for helicopter parts, I get the feeling that the Army isn't the only one who buys \$750 toilet seats. I've heard from a number of retailers that the sales of helicopters hasn't been what they expected in 1988. I think the reason is obvious.

The guys who work in machine shops figured out long ago how to beat the system. They make their own bootleg parts and let their boss pick up the overhead. I'm a CPA. The only things I can make where I work are sharp pencils and Xerox copies.

There are a few tricks to managing your money in this hobby, however. Here's some of them.

## USED EQUIPMENT

If everyone who ever bought a helicopter was out there flying, we'd be knee deep in choppers. Though more people are flying choppers than ever before, there must be thousands of half-built machines sitting in garages and basements. Whether the owners gave up or just lost interest, the result is that you can often buy perfectly good equipment for as little as 25 percent of its original cost; and that could be an even bigger savings when compared to current replacement price. Obviously, you have to be very cautious of what you're buying and who you're dealing with. Most stolen helicopters are recovered because the thief or an unsuspecting buyer waltzes into the local hobby shop looking for help. Of course, everyone in town connected with helicopters in any way knew about the stolen chopper; and even if you convince the police that you're not the guy who took it, you're still going to be out the money.

Another thing to look out for is a machine that's old, obsolete, or worn out. If you can't get parts for it, you shouldn't buy it at any

price. Examples are the Schluter Helibaby and the American Revolution.

If you're lucky, you'll get one from a novice that was hardly hovered. Watch out for a machine that has been neglected, with bearings that grind; dirt, dust, and corrosion in the engine; and a radio with Ni-Cds that are totally shot. Look out, too, for signs of crashes; frames, shafts, pushrods, etc. that have been bent and re-straightened.

Now, maybe you've got a chopper and you see one for sale just like it at a good price; grab it! It can be your backup machine. Or you can just keep it on hand for spare parts. The cost of those parts will compute to a fraction of buying them individually; so even if you don't use 75 percent of them, you're still way ahead of the

game. To give you some guidelines as to what are good buys and what aren't, I've compiled a list.

## Gorham Model Products:

The Competitor and Cobra are the best buys. They are often available at a good price. They are good flyers, are still popular, the parts are available, and are compatible with the new GMP Legend.

The Cricket is still sold, with good parts support. It is inexpensive and simple, but technology has passed it by. You'd do better to look elsewhere.

The Shuttle is great. A pre-built ARF chopper, it's so easy to build/rebuild. There's plenty around, particularly the old model (DDF head, sky-blue canopy, and tail fins).



Canadian pattern champion Dave Patrick demonstrates his Kalt Baron 20.



Former national champ Robert Gorham still competes with GMP Cobra.



Another former champ, Mike Mas swears by Schluter Champion.

The Stork and Legend: these are the new models. There won't be too many used ones around yet.

Scale machines, such as SST mechanics are a definite yes, but the old-style Hirobo mechanics are a definite no.

#### Schluter:

Champion is the best. Helistar and Superior are also good. Mini-Boy is still being sold, but it is not as popular as it once was.

Heli-Boy is no longer being manufactured. This is the forerunner of the Helistar and has some parts compatibility with it, but generally you could do better.

Huey Cobra should be bought only as a museum piece.

SX 81 is a no.

Heli-Baby and Super Heli-Baby don't buy at any price.

Scout 60 and Junior 50 are the newest in the Schluter line. Terrific choppers, but, again, there won't be many used ones around yet.

#### Kalt:

Now distributed through Hobby Dynamics, the Kalt line will again be available from local hobby shops as well as direct from Circus Hobbies. The Baron 20 is one of the best of the 28- to 32-size choppers, and new it only costs around \$200. The Baron 50 is an excellent sport/competition chopper, and the Baron 60 is among the absolute top machines in the world. All these helicopters have been around long enough so that many have found their way to the used chopper market.

#### American:

Revolution, Commander, Mantis, Super Mantis, and Eagle. This company is out of business. Another company is supposed to be manufacturing the Eagle, but I don't know anymore about it. Don't buy any American brand chopper.

#### Kavan:

Ranger, Jet Ranger, Lockheed 286, Alouette 2—These are very old designs, but they are being sold on a limited basis in the U.S. It is probably not a good idea to get involved in these.

Shark is the new sport/trainer. Limited popularity in the U.S., so it has limited supply of used machines.

#### Heim:

Very popular in Europe as a competition model, but less so here. Very expensive, but both Robbe and Miniature Aircraft stock parts, so if the deal is right, go for it. However, not a beginner's machine. The scale R-22, Hughes 300, and Fox are fine models, but no longer being sold in this country. California Model Imports just couldn't make a go of it when the bottom fell out of the dollar in Japan.

#### Du-Bro:

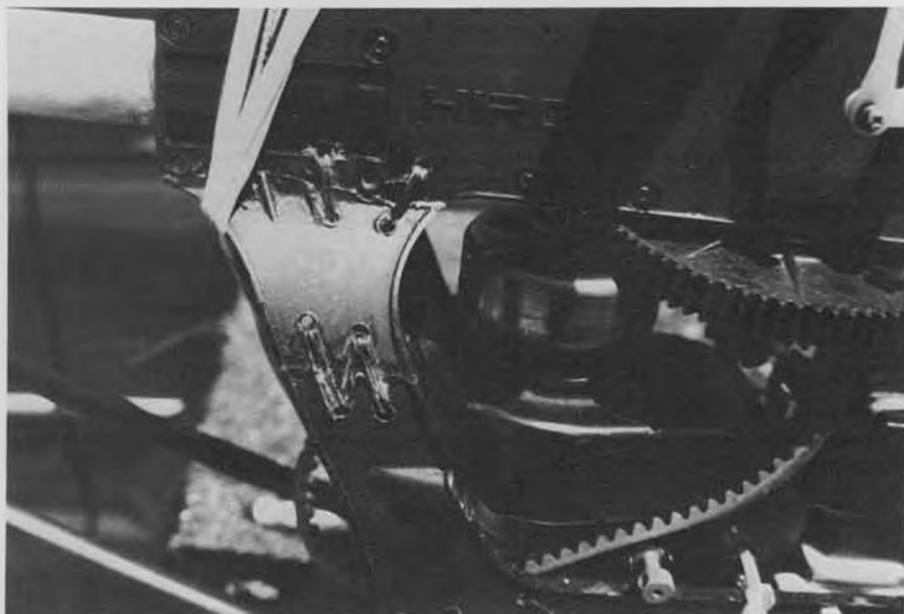
Shark, 505, Hughes 300, Whirly-Bird. Du-Bro, a company now famous for their line of accessories, was a pioneer in the helicopter field. One of their used choppers in good condition may have some value to a helicopter historian, but don't even think about ever flying one.

#### Miniature Aircraft:

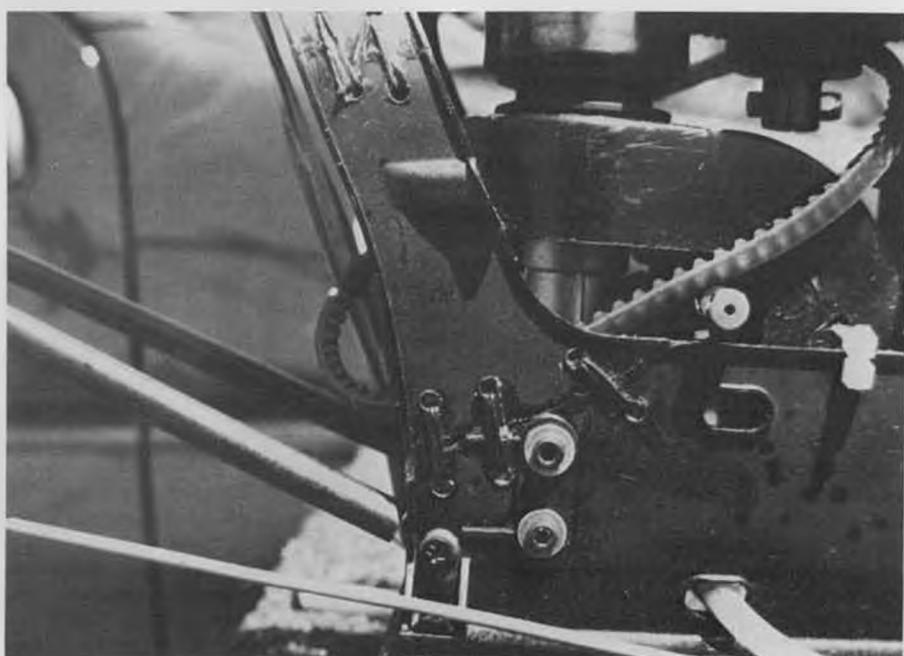
X-Cell 50 and 60 are two of the newest, state-of-the-art in helicopters. Too new for



All the equipment needed to fix broken Shuttle sideframes.



Rubber bands hold joint until CA sets.

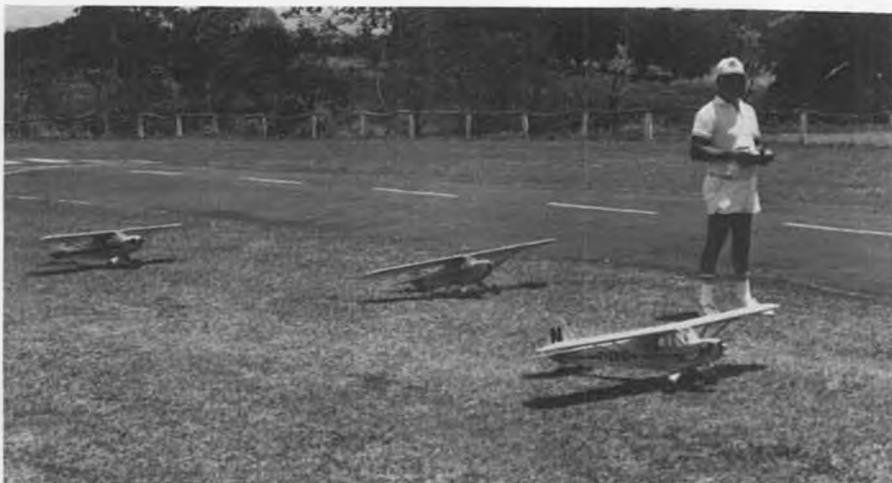


Finished repairs are stronger than before.

Continued on page 76

# Costa Rica

## ¡Número Seis!



By ELOY MAREZ. . .Here we go down south again with our intrepid reporter who even gets paid for these trips! Wotta life!

• If I have one major gripe, it is that there is just never enough time to do all the things I would like to do! It does help a little to plan ahead, to assign priorities and try to stick to them. Even that doesn't always work, though in the case of what events to attend every year, my number one choice is firm and easily adhered to: The Aeromodelismo Costa Rica Annual Fun-Fly. This is a must in my book, and since there seem to be so many repeaters from here in the United States every year, I am not the only one to feel this way.

Why? It is not an easy task to explain just why in words. There are definitely larger events. There are events in which one will



Top left: Enrique Nieto prepares for the first takeoff of three constant favorites, all Piper Cubs. Above, the Costa Rica Fun-Fly brings out a variety of models for the public to see fly.

get to fly more. There are events at which one will see more flying. There are definitely events in places that are easier and faster to get to. Why then, the success of the Costa Rica Tropical Fun-Fly?

Camaraderie—that is why. I know that I



Costa Rica's best chopper pilot, Juan Carlos Cotua puts his model through the paces for the large audience in attendance.



Julio Pastora's Ziroli Gooney Bird in the LACSA Airline colors used by the airline 34 years ago. Retract problems kept it grounded.



Lee Skaggs accepts the award for the Best Crash at the Tropical Fun-Fly from event organizer Julio Pastora.



The Cloud Dancers Show Team had a variety of functional aircraft present. The large twin in front drops up to four paratroopers which are radio controlled on the way down.



Cloud Dancers' Flying Machine makes what for it is a normal takeoff. Three of these fast and maneuverable craft perform at once.

can speak for many American R/Cers who make this annual trek to Tico-Landia, that we've made friendships down there that will endure the rest of our lives. But even first-timers soon get caught up in the friendliness of the Costa Ricans, the "Ticos" as they call themselves, and the enchantment of this beautiful tropical country. The natural and varied beauty that is Costa Rica does have a lot to do with the happy spirit that we all fall into upon our arrival. Costa Ricans like to refer to their lifestyle as "Pura Vida,"



The Cloud Dancers, all cleaned up and almost unrecognizable, line up to accept the Best of Show Award, as determined by the non-modeling public in attendance at the Fun-Fly.

the "Good Life," which is not only a slogan, but an actual way of life, as I learned during my first trip down here a few Fun-Flys back.

It was early morning, and I was on the way to the flying field with Julio Pastora, a name that is synonymous with modeling in

Costa Rica. After a stop at his house, we were a couple of blocks away when we passed a common sight everywhere, a lone sweat-suited man jogging along the side of

*Continued on page 88*



Show announcer Enrique Nieto and wife Aurora were celebrating his birthday the night of the banquet for the modelers.



This group of smiling modelers represent Guatemala, Brazil, Costa Rica, United States, Chile, Cuba, and Panama.

# BIG BIRDS

By AL ALMAN



• (Due to an unexpected and prolonged stint in the hospital, I was unable to get this month's column written. However, good buddy Ronnie Kemp, who has years of BIG Bird and ducted-fan experience, agreed to fill in for me. Thanks, Ron.—ama)

I have been very busy lately building, test flying, and writing instructions for yellow Aircraft's quarter-scale CAP 10B. The first prototype was powered by an Enya 120R and weighed 16 pounds on takeoff, which really isn't too bad considering the 980 square inches and a wing loading of 35 ounces per square foot.

This plane has amazed all who have seen it fly. While capable of landing at low speeds with no tendency to drop a wing or snap, this bird is still quite aerobatic and agile in the air (I can attest to this CAP's ability to resist treacherous and sudden snap rolls at low speeds, which is due, I'm sure, to her semi-symmetrical airfoil and built-in wingtip washout.—ama) She's capable of performing four-point rolls, inverted flight, hammerhead stalls, loops, flat spins, inverted spins, and even lomcevaks.

This was my first hands-on experience with Enya's 120R, and I was impressed with its power. This engine was capable of pulling the 16-pound CAO through extremely wide and graceful loops with ease. In a recent conversation with the Altech marketing people, I found out that new 120Rs will include a gear-driven pump.

When four-cycle engines came on the market several years ago, I bought a few Enya 90s, and to this day I'm still happy with

their power, sound, and longevity. However, the new generation of four-strokes have been re-engineered for more power, which seems to have had an adverse effect on longevity and has definitely made them noisy. It's too bad that manufacturers haven't put any effort into reducing the piercing sound of these engines instead of just concentrating on increasing their power. I have worked with ducted fans for years and know that new quiet pipes are coming down the pike for these high-speed engines. So why not the same treatment for four-strokes? Shouldn't engine manufacturers have to accept the responsibility to de-

sign better mufflers/pipes for all their engines?

I finish my planes in a multitude of ways. I prefer to keep them as light as possible, but my choice of finishing does depend quite a bit on the type and design of the bird and how much time I have. On the CAP 10B I used MonoKote on the wings, stab, and control surfaces. Since the fuselage was fiberglass, I went with DuPont 315 fill and sand lacquer primer. Any minor defects were corrected with PPG DLF-1 dark grey spot putty, and a base coat of white lacquer was applied (NW Orient Fleet White matches very close to MonoKote White).

After masking off the plane for accents, I used red lacquer (1970 Chevy Truck Red matches MonoKote Missile Red) for the striping and low-gloss black lacquer for the top of the cowl. I prefer lacquer because it's lighter and almost anyone can point without runs. The key here is to use the proper thinner. Some spot thinners dry too fast, and while this will definitely prevent runs, the paint will not adhere to your base and will flake off easily. If the weather is warm, use a warm-temperature thinner, and if the weather is cold, use a cold-temperature thinner.

In all cases you should get flow of your paint when it is applied, and there shouldn't be any overspray build-up in wing root and other curved areas. In cases of camouflage paint schemes, I use a very fast-



Terry Malcome's 23-pound Byron Corsair with Quadra 50 power.



This F-18A Hornet will be available in the fall from Yellow Aircraft. She's 97 inches long, spans 72 inches, weighs 23 pounds and is powered by two Byrojets.



Yellow Aircraft's prototype CAP 10B weighed in at 16 pounds. An Enya 120 R seemed to do the job okay. Span is 75 inches.



A Byron G-17S Beech Staggerwing powered by an OPS Maxi 30 with an 18-10 prop.

drying thinner to allow painting without masking off, so I eliminate the cut-line effect of tape. In this case, a fogged-in camouflage appearance can be obtained without bleeding into the base coat.

After deciding on the paint scheme, I use 600-grit and wet sand the entire plane lightly to remove flash, steps, or runs in the paint. Then I apply numbers, letters, and any other decals. The best way to blend in decals is to use clear lacquer and build up several coats around the edges of the decals, wet sanding between coats till all the edges are feathered smoothly. Then I clear-coat everything.

For a long time I clear-coated all my paints with DuPont Imron paint. While I must admit that this gave me a very glossy finish, the exposure to something this toxic was not worth the risk. Now I use PPG's Delclear Acrylic Urethane DAU75 for finishing. This provides me with an excellent gloss finish and is designed for application over custom lacquer finishes. If the finish is to be dulled to simulate a camouflaged warbird, I use a satinizing agent like PPG's DX685 Urethane Flattening Agent mixed in with the Delclear. Keep in mind that all catalyzed paints are toxic, including common epoxy paints manufactured for model airplanes. So always wear the proper protection.

I've been experimenting a lot with fuels lately, and I find it quite disturbing to see major manufacturers entering the fuel business with less oil in their blends. While engines with roller bearings on their connecting rods can survive minimum amounts of oil, hard-working engines in less than desirable locations, i.e., small cowls and internal ducts, need oil to survive. I've found that in all cases you'll achieve longer engine life with at least 18- to 20-percent oil, with 25 percent of that being castor oil. I would rather sacrifice 200 rpm and have to wipe a little more oil off my bird in order to keep the engine around for a longer period of time.

Let's face it: you don't get something for nothing. If I reduced the volume of oil in my alcohol, the viscosity of the end product would be thinner, so I'd end up tweaking the needle valve, and goodbye many \$\$\$ for parts or a new engine.

Also, all too often great claims are made before a product is even fully developed, and the public is conned into believing that this "expert" (who has little or no real experience) knows what he's talking about. Take



Schalesh Patel's superb P-47D Thunderbolt walked off with First Place at the Northwest Expo.



Also at the '88 Expo, this A6M3 Zero by Lynn Johnson took Second in Military Stand Off.

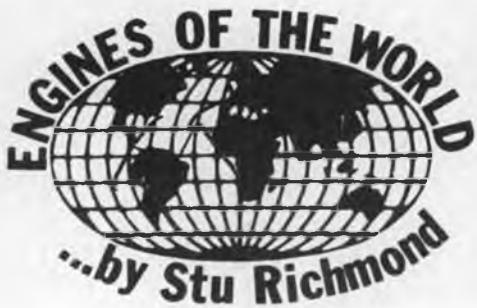


Mickey Stiffon took Third in Precision Scale at the '88 N'West Expo with this F6F Hellcat.

my Enya 120R for example. The manufacturer clearly states to use 15- to 20-percent castor oil or high-quality synthetic oil fuel. Here is a classic example of the engine designer telling the user exactly what to use

for lubrication, and since he designed and manufactured the engine, he surely must be aware of current metallurgy and chemi-

*Continued on page 66*



## MVVS Junior 2

**VITAL STATISTICS:** 2-3/8 inches long to prop driver, 1-5/8 inches across the mounting lugs, 2-1/2 inches to the top of the cooling fins. Has a bore of 13.5mm and 14mm stroke. Weighs 137 grams or 4.9 ounces. Displacement is .12 cubic inch (2ccs). Peak useable rpm are quoted at 16,400.

**UNIQUE FEATURES:** Newly-produced in state-owned Model Research and Development Institute (MVVS) in Czechoslovakia with special goal of being suitable as a beginner's model diesel engine. A small batch of prototype engines was made and distributed for evaluation before the design was finalized and mass-production commenced. Instructions include excellent starting directions for diesel engines which are included below.

- Travel is one of the world's greatest freedoms. We Americans take it for granted. Travel between the East and the West countries is almost nil for the residents of Communist-controlled Eastern countries. Regular readers of this column may remember that my wife and I had a model airplane/engine trip in 1985 that took us into Czechoslovakia for three wonderful weeks, that we met with that country's engine makers, and that for much of that time we had a lovely native lady interpreter with us named Aniscka (pronounced Anee-shka), who made the visits most interesting as well

as providing great company for us. We were able to have Aniscka visit the USA and be our house guest this past spring, and she arrived from Czechoslovakia with a pre-production "Junior 2 DFS" model engine!



**Machining of prototype shown here is superb.** The production engines are equally great, but rod's cross section is now round, timing is altered, prop bolt is longer, needle valve is with larger ratcheted diameter, passageway through crankshaft is smaller, muffler tabs are stronger for larger diameter bolts.



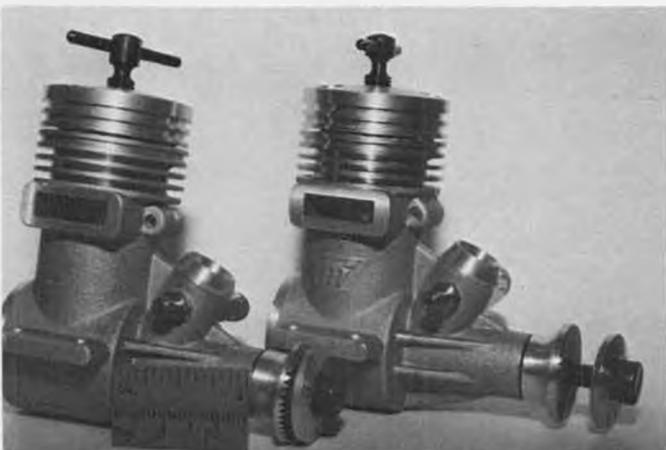
The Junior is a two-cubic centimeter-size diesel with front intake and side exhaust. Production version on right has name and size on the casting. Note absence of bulge of bypass port in casting like most engines have.

Until last November it was practically impossible for a Czech person to visit the USA, but the Soviet Union's "glasnost" or more openness policy has allowed more freedoms to the Eastern Bloc countries, and through glasnost I had a Communist country's new model engine hand-delivered for this month's column. In addition, Aniscka did the translation presented here of the instructions.

I'd been hearing for months that MVVS in Brno, Czechoslovakia, was developing a new beginner's engine, that it would be made in both diesel and glow, that an R/C carburetor and a muffler would be later options, and that MVVS had smartly made a small pre-production batch of engines that were carefully placed for evaluation with/by selected modelers before full production commenced. There was simply no way for me to own one of the pre-production rarities. But lots of friends' hands helped get this new engine into publication for you to see, and before Aniscka's USA visit ended, the first of the production engines was airmailed to me, and she translated the following which I feel you'll thoroughly enjoy reading. How to run a diesel engine written at a beginner's level. I have edited sparingly.

**MVVS Junior 2:** You will learn to use by coordinating the functions of the engine.

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Engine on left is extremely rare pre-production test model without identification. On right is initial factory production version.



Cylinder wall is extra thick and transfer or bypass path is cut into the inside of the cylinder wall, as is a fore and aft Schnuerle port.



# Electronics Corner

By ELOY MAREZ

- Every month I fumble my way through a number of foreign magazines. I say "fumble" because I cannot understand all of them. But I can look at the pictures and read the schematic diagrams. Some of these magazines are so-so, but I have developed my favorites. Among them is the Italian *ECO Model*, for its great covers and equally good electronic articles. Another one I like, maybe because I can understand most of it, is *Radio Control Models & Electronics*, from England. *RCM&E* almost always has some interesting electronics, often with enjoyable titles. One of my favorites was its first reference to the negative wire corrosion problem which we have discussed at length here, due to reader interest, and which *RCM&E* called "Black Wire Blues"! Just recently, it has intrigued me with an article entitled "Break The Pot Habit"!

Now, except for enjoying a tough of Bacardi Light now and again, I don't have any such habits that I need worry about breaking, but from past experience I knew that the *RCM&E* title did not tell it all. Sure enough, it turned out to be more of our type of writing. Said article is by a Mr. Peter Valentine, him who in this country I'm sure we would call "Happy." Anyway, Pete tells all about his experiments, and successes, in replacing those troublesome potentiometers in gimbal assemblies and servos, with Hall Effect magnetic sensors of the type we have discussed here in connection with spark ignition circuits. Pete's is not fully a do-it-yourself article, which he readily points out, though he does discuss the theory in enough detail to be understood and share with us the results of installing such devices in Dunham's R & R stick assemblies. Included also are schematics for the Op Amp circuitry required to interface the Hall Effect IC output to the normal encoder

circuit.

Interesting. And copies are available for the asking with a SASE, please!

You may question our need for such devices. Well, so do I, though I wholeheartedly applaud the efforts behind such experiments. Anyway, my input from various sources tells me that with one possible exception, pot failures fall way down the line in causes of complete system or catastrophic failures, somewhere after batteries and servo motors, which are still the main airplane killers. All of which has to do with what you paid for the radio in the first place! You see, unfortunately, batteries and servo motors are also the most expensive parts in an R/C system, quite possibly followed by

the pots. In any attempt to design an inexpensive R/C system, the first place to look for cost reductions is in the most expensive components, right? So you wind up with cheaper and less reliable parts of the kind that fail the most, even in the more expensive sets.

Now, pots fall about number three in cost, and somewhere further down the line in their being trouble makers. But in the case of cost reduction as stated, they do come under scrutiny and in most cases wind up being replaced by a cheapie! I think that it is important to remember that in the higher quality systems, with more expensive components throughout, pot problems are few and far between. More proof that dependability must be paid for can be seen in competition R/C cars, where the popular steering servo is currently the Futaba S131. This is an \$80 servo, and has often replaced the servo in an R/C system which cost less than that. It is popular because it is known that you can put one in and forget it, which includes pot problems, and let's face it, if the S131 can stand up in an R/C car steering application, that has to be one tough servo!

On the other hand, and this is the exception that I mentioned earlier, there are the pattern fliers who for years have been pulling servos apart to clean the pots and to adjust or replace the wipers. This was done to alleviate wandering or inconsistent centering, and I know fliers who used to do this religiously after a predetermined number of flights. I say "used to" because most servo pots are now sealed units, which cannot be easily taken apart, even if it was as easy to get to them as it used to be. Maybe someone that is active in pattern flying can enlighten us on current practices now.

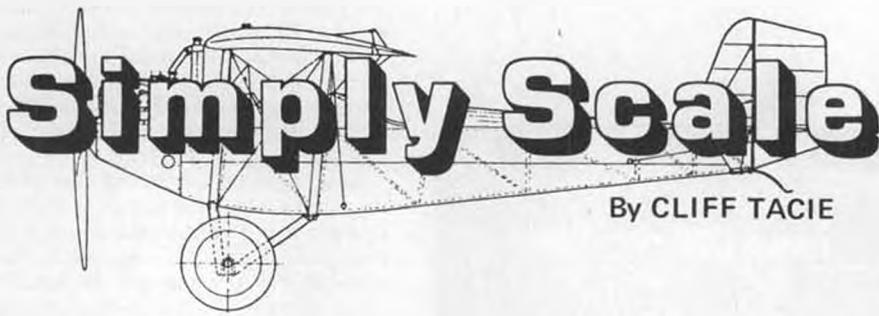
Anyway, if you have a pot problem that you are interested in breaking, a copy of Mr. Valentine's article is here waiting for you. Incidentally, I did check the issue month, and it was not April. You know, you just can't trust some people.

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Receiver development continues in an effort to provide us with narrow band units that will work properly under the new close-spaced channels. You may never own or see this one, a Futaba R-127DF, Double Conversion FM, but it is currently being flown in trouble spots throughout the country to gain some knowledge about actual requirements.

# Simply Scale



By CLIFF TACIE



Over 100 models of Aeronca aircraft gathered for the fourth Annual Aeronca Fly-In at Middletown, Ohio. A great experience for modelers and full-scale pilots alike.

• For the true scale enthusiast, there's nothing more exciting than having an opportunity to be around the full-scale aircraft that are the inspiration for our modeling efforts. Many times, we'll go out of our way on a family or business trip just to stop by an out-of-the-way little airport or perhaps an aviation museum. There's just nothing that fires us up as much as being able to get close to the real article.

Recently, a group of modelers from the Detroit area attended the 4th National Aeronca Convention held at the home of Aeronca, Hook Field in Middletown, Ohio. Middletown, for those of you who are a little rusty in Midwest geography, is located between Cincinnati and Dayton, Ohio, just west of Interstate 75. I myself have driven past Middletown a hundred or so times without realizing the significance of the town.

The Aeronca factory at Middletown, now involved in Aerospace technology, was the birthplace for thousands of Aeronca Champs, Chiefs, Sedans, Defenders, PT-19s, etc. On this weekend of June 10, 11, and 12, over 100 examples of Aeronca aircraft got together for a family reunion at the "old homestead." The best way for me to describe the feeling I got in attending this fly-in was that it was almost like being at the EAA Fly-In at Oshkosh. It was exhilarating and exciting to be able to walk between rows and rows of beautifully restored and maintained "antique"-type aircraft. The entire experience reminded me of the typical giant scale model fly-in you might attend. Pilots flew when they wanted to, and other-

wise just sat around talking about the things they loved, airplanes.

There are many things for the scale modeler to learn at a full-scale fly-in such as this. It's a great place to find a new subject for your next scale project. It's also an excellent opportunity to sketch and take pictures of all that minute detail that just doesn't usually show up in printed documentation. The only way you can really make your model look like the real thing is to actually know what the real thing is supposed to look like!

As an enhancement to your hobby of scale modeling, plan to take in a full-scale

fly-in yourself. You can usually find the schedules in full-scale flying magazines, or in the EAA magazine, *Sport Aviation*. I guarantee you'll enjoy the experience.

## PROTOTYPICAL SCALE

As I do every year, I made my annual spring trek to the green hills of Kentucky to attend the Mint Julep Scale Meet at Rough River Dam State Resort Park. Still ably hosted by the Southern Indiana R/C Modelers, it's a happening I just don't think I would like to do without.

The Southern Indiana R/C Modelers once again did an excellent job of hosting this prestigious Midwest event. The selection of events they offer vary from opportunities for the novice to the most keen competition for the seasoned veteran.

Surprising this year was the decline in registration. I have seen years where the number of models flown was in the 80s, however, this year only 48 models took wing. This follows on the heels of a rather disappointing turn-out in serious scale competition at the '88 Toledo Exposition. What is happening to the competition scale modeler? The only correlation I see is the continued increase in large scale-type models and less emphasis or interest in documenting the accuracy of these models.

An observation I've made in attending the giant scale fly-ins is that even though a large percentage of the modelers like to build and fly scale-type aircraft, the area most often modified or undocumented is the color scheme. Many giant scalers will either put a "prototypical" color scheme on an otherwise quite accurate model, or simply finish the model in a color scheme that looks attractive. Maybe these guys are giving us a message.

I know from experience that one of the most difficult parts of choosing a new subject is finding a color scheme that you like enough to keep your interest through the construction process. I personally find it hard to get excited about building a model if I really don't care much for the color scheme, and the only reason I'm building it is because I feel it will be competitive. That just isn't any fun.

In addition to finding a color scheme that you like, you are faced with the task of prov-



Stan Dzon gets lots of help starting his Sachs 3.1 engines on his scratchbuilt DH-4 Caribou at the Skymasters Chet Brady Memorial Rally. Stan's model spans 16 feet and uses 20 servos!



**Frank Magdich and Jack Fitch hold up Andy Pesonen's Nosen P-51 as Andy works on the gear linkage. Big Birds mean big work.**

ing that scheme to the judges. Was there really a full-scale aircraft with that exact scheme? Did you accurately reproduce the colors on your model? These are additional obstacles in building scale models to the current rules.

Say you want to build an airplane like the Spacewalker, a popular new home-built. When you look around for a color scheme, the only two available are the original red and black one by Jesse Anglin, and the red and yellow schemes by Maxey Hester and Hazel Sig. Although these are each attractive schemes, perhaps the color combinations aren't your favorites. Right now, the main reason preventing you from applying your own original scheme is the fact that you eliminate yourself from being eligible for competition in scale events. Some may say this is rather restricting and actually discourages creativity.

I've often thought I would like to have the freedom that home-builders of full-scale aircraft enjoy. One of the things I like most about attending the EAA Fly-In at Oshkosh is seeing all the different interpretations of aircraft types you can see. Perhaps it's this same freedom that has inspired so many modelers to move from competition scale modeling to the IMAA approach toward scale modeling.

After thinking about this seeming decline in scale competition in this area, and considering the effect that proof of color documentation has on participation, I began to develop a thought for a new ap-

proach toward scale.

How about a scale event (call it "Prototypical Stand-Off" where the object is to build a scale model that is accurate in outline and details, but the modeler is allowed to apply his own color scheme?

The model could be judged in the same categories that currently apply; "Accuracy of Outline" and "Craftsmanship." All that would be required would be to change the "Finish, Color, and Markings" category to "Finish Quality and Impression." Three-views would still be necessary to prove relative accuracy of the aircraft type and surface details, and "Craftsmanship" would still be based on present day criteria (that's another subject addressed separately in this column). "Finish Quality and Impression" would be judged on how accurate the finish quality is to the typical full-scale aircraft, and is the color scheme generally appealing? Finish quality would entail such considerations as: If the full-scale aircraft is fabric-covered, is this reproduced on the model? Is rib stitching reproduced? If military, is the color scheme prototypical?

I'm sure the details for such an event could be worked out if anyone wanted to take it seriously. Until such time, the only alternative for scale modelers of this persuasion is to attend events such as scale rallies, giant and otherwise, which, when you come to think of it, isn't all bad!

#### CRAFTSMANSHIP

In the January/February issue of *Replica*, the newsletter of the National Association

of Scale Aeromodelers, John Guenther presented for discussion and pondering, the subject of craftsmanship as it pertains to judging scale models.

Having been put in a position of having to defend his interpretation following an experience of being a static judge at the 1987 Scale Masters, John asks: "Craftsmanship—who out there can define the word as it pertains to F/F, CL, or R/C scale model aircraft?" I read his discussion, and in many areas, I must agree whole heartedly with him. Even though we designate Craftsmanship as one of the three areas in which we static judge scale models (Finish, Color and Markings and Accuracy of Outline are the other two), nowhere in the AMA rule book do we provide the contestant or more importantly, the static judge, a definition of just what is supposed to be interpreted as pertaining to craftsmanship.

As John says in his article, the closest we come in the AMA rule book is the paragraph in Sport Scale, p.79, section 4.6:

"The contestant will provide a signed declaration for the judges which will list the major components of the model the builder of the model did not make himself. (Examples: Molded, formed or shaped canopies, cowlings, wheel pants, fuselages, etc., or parts thereof.) In awarding craftsmanship points, the judges will take into account the amount of workmanship performed on a model by the builder as well as the quality

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**This AD-6 Skyraider was seen at the recent Indian City R/C Club Fly-In. James Smith built this 33-pound model from Ziroli plans.**



**One way to document the color of your model is to take a picture of it next to the prototype. Here's Steve Sauger's Aeronca with full-size.**



**The right way to start your next scale project is to document it before you begin. Here Ron Sears measures the gear on Clint Wilkins' PT-19.**

# The Littlest Futaba

By ELOY MAREZ. . . To successfully fly small R/C aircraft, you must concentrate on making your model as light and efficient as possible. Futaba has some equipment that can help you reach that goal.

• Anyone who has been into R/C for more than two days knows that some of the most sophisticated R/C equipment available for many years has been made by the Futaba Corporation. Should you have any doubts about this fact, the next trade show you attend, stop by the Futaba booth and take a gander—no, take an hour—to study the latest such system, the Futaba 1024 PCM, for top-class competition flying. And, yes, there is a version for helicopter fliers! In the class where not all of the competition flying operating features are necessary, the Conquest Series is seen in great numbers. Futaba even has a number of beginner's, entry-level if you will, R/C systems such as the two-channel "Attack" Series which even though relatively inexpensive, still comes with a lot of built-in quality and reliability.

What is probably not so well known is that Futaba also has some extremely small and lightweight airborne components, which can be used with any past or present Futaba AM transmitters, and with many other available transmitters. If you consider a receiver and two servos weighing in at less than two ounces as "small and lightweight," then read on, friend!

Before we start to get physical, err, I mean before we get to a physical description of these mini and micro items, let me first explain the Futaba plugs and equipment identification system. The two go together and are easy to understand once we get past the basics. First the plugs. The older Futaba plug, known to many as the "Futaba Standard," or "G-type," is officially the Futaba Mini-plug. The newer plug, first introduced with the J-Series systems, is known both popularly and officially as, would you believe, the J-plug!

To confuse the issue somewhat, the Mini plug is often referred to as the Futaba "AM plug"; the J-plug being called the Futaba "FM plug." These are strictly owner's or maybe dealer's nomenclatures, never having been referred to in that manner in any Futaba literature, but doubtlessly having occurred because at one time, all Futaba AM systems were equipped with Mini connectors, while all of its FM equipment had the J-plugs. There are differences in servo and transmitter timing also: Mini-plug equipped components use 1320 microseconds (1.32 milli-seconds) as a neutral point, while J-plugged equipment uses 1520 microseconds (1.52 milli-seconds). Furthermore, again referring to some of the erroneous nomenclature sometimes heard, there are no such things as "AM servos" or "FM servos," by Futaba (or any other com-



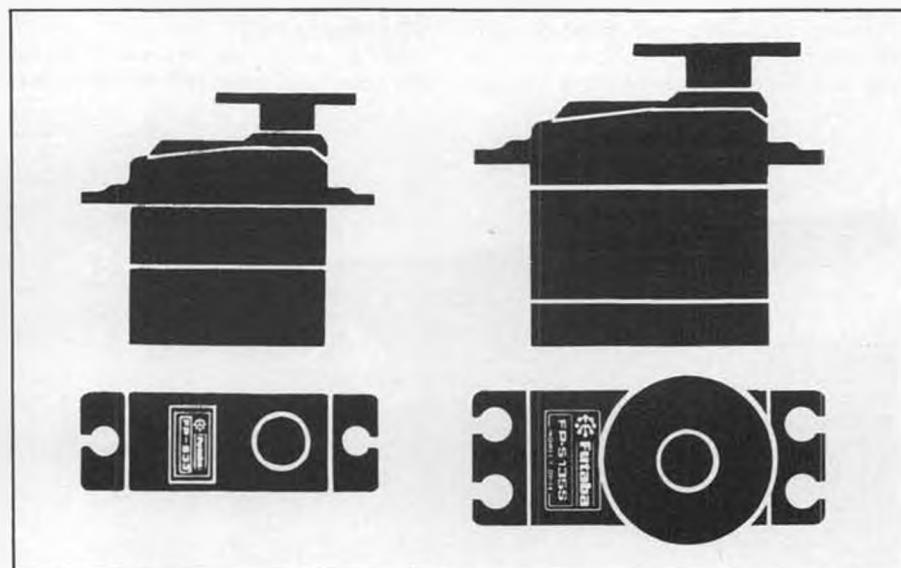
Little birds, like the Kyosho Robin 850, can co-exist with relatively king-size transmitters, but they must have the smallest, lightest possible airborne components for best performance.

pany), the only differences are in the plugs and in the timing.

While on the subject of servos, I will dive right into the Futaba servo designations. One of them that we will be discussing, the runt of the litter, is the Futaba S33/S133/S33L. The actual dimensions are 0.50 x 1.06 x 1.12 inches, and if your brain/eyeball calibration is out of adjustment, the sketch shown is full size. It is a wee one; isn't it? Anyway, those numbers indicate different versions of the same servo, in the order given: (1) Mini-plug equipped, (2) J-plug

equipped, and (3) Mini-plug with rotation reversed. All Futaba nomenclature follows that sequence. The basic numbers indicate Mini-plug, the same number preceded by a one, or sometimes a 10, indicate J-plugs. In the case of servos only, the suffix "L" indicates reversed rotation relative to transmitter stick movement. Now, that wasn't at all difficult; was it?

Getting back to the S33, we now know its size, and that it is available in three different versions. It weighs 0.6 ounce, and is rated at 27.8 oz./in. of torque. Its speed is advertised



The smallest currently available Futaba servos, the S33 (right) and S35 (left), are shown here full-size for your planning purposes. Complete specifications in text.

as 0.22 seconds for 60 degrees of rotation. The established retail price is \$59.95.

Next in size in small Futaba servos is the recently introduced S35S/S135S/S35SL, at 0.62 x 1.21 x 1.18 inches. We already know what the basic numbers mean, though we now have a new one thrown in, the suffix "S." In Futaba servoese, that indicates a coreless motor. However, that is not the only attractive feature of this small piece of electronic brawn; it also features metal gears and a ball bearing output. The S35, also shown full-size, weighs 1.1 ounce, with a rated power output of 36.1 oz./in. Its speed is claimed as 0.17 seconds for the normal 60-degree rotation. The price of this little beauty is \$79.95.

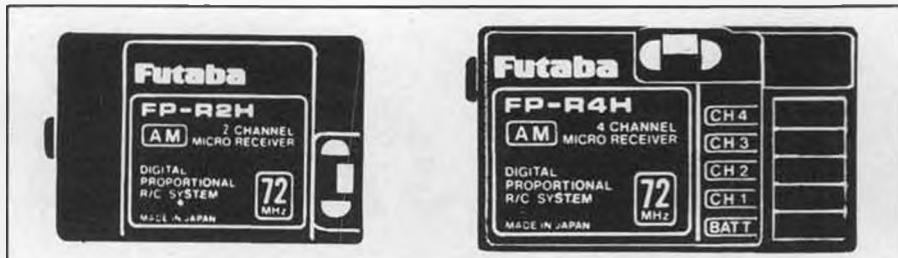
Now for the receivers; there are two that will be of interest to you small airplane aficionados. Again, referring to the full-size sketches for true sizes, on the left we have the R2H/R102H—and I know there is no need to go through that business on the numbers again; is there? The R2H is a two-channel receiver, measures 1.18 x 1/56 x 0.81 inches, weighs 0.77 ounce, and is available on 27, 72, and for you nonflying modelers only, on 75 MHz AM. Price for the R2H is set at \$69.95.

Next we have the slightly larger R4H/R104H, larger because this one is a four-channel receiver. However, it is not really all that big, being only 1.24 x 2.00 x 0.75, at a one-point nothing ounce weight. It is also available on 27, 72, and 75 MHz frequencies, AM only.

You have to have a Ni-Cd battery to go with all this wonderful flying stuff, and Futaba again comes through, with two 250 mAh packs to chose from. For most of us the best choice will be the NR-4G (NR-4K) four-cell pack. In this case, the assigned numbers code indicated the Mini-plug for the low-letter suffix; J-plug for the higher. This pack measures 2.18 x 1.18 x 0.56 inches and weighs 2.0 ounces. Price is \$19.95. For those applications, such as boats and cars in which a faster servo response is desirable, you can use the five-cell also 250-mAh capacity, NR-5G battery pack. It is longer by half an inch and heavier by half an ounce, available only with the Mini-plug. The price of this one is \$29.95.

All of these items are available individually, but are also packaged in some interesting combinations, intended for the most popular installations and uses. But before I go into them in detail, I would like to say a word or two about the prices mentioned, or to be mentioned for the following equipment. Remember that everything nowadays has more than one price, the Suggested Retail Price, which is what I have been quoting for you, and the real world price, which can be considerably lower. If you are a steady customer at one specific hobby shop, your best price will usually be right there. If not, shop around, you'll probably save enough for that next airplane kit!

If you are starting from scratch in equipping your small model, you may be interested in the Futaba 4NL/33 R/C system. The 4NL, advertised as a glider system, includes the popular and reliable four-channel two-stick Conquest AM transmitter, an R4H four-channel receiver, two S33 servos, and



Futaba's smallest receivers come in a two-channel version, the R4H (right, 0.75 inches high), and a four-channel version, the R2H (left, 0.75 inches high), also shown here full-size.

like all Futaba systems, also includes Ni-Cds, switch harness, charger, trays, mounting accessories, etc. The price of the 4NL/33 system is \$234.95. Of course, it is a simple matter to add two more S33s to make it a full four-channel system.

For existing transmitters, you have some choices in airborne packs:

Two channels: No. 22133H; R-102H receiver and two S133 servos. 27, 72, and 75 MHz, AM.

Four channels, with Mini-plugs: No. 42133H; R104H receiver and two S33 servos. 72 MHz only, AM.

Four channels, with J-plugs: No. 42133H; R104H receiver and two S33 servos. 72 MHz only, AM.

The two-channel also includes switch harness and accessories; the four-channel systems include those items plus NR-4 Ni-Cd packs.

As of this writing, the S135 (etc., etc., etc.) being new, has not been incorporated into any airborne system. Possibly by the time you are reading this, or soon after, Futaba not being known for sitting around, S135-equipped airbornes might be available. Have your dealer check for the latest!

Now, how about the operation of either of these two receivers with transmitters that you might already have. If it is one of the Futaba FG, FGK, 6NLK, or 4NL AM airplane transmitters; the two-channel Attack or Magnum AM transmitters; or the 3EGX AM marine transmitter, everything should be 100-percent compatible frequency-wise. Futaba uses so well matched crystals that you can buy one piece of equipment now, and another months later, and have them operate together perfectly. Now, you may have an older Futaba transmitter, built before the present specifications became effective, which might need some updating before it can be used. Unless you've already had it changed, such a transmitter will be on what is now an illegal frequency anyway, and requires changing to one of the new channels, in which case it should then operate normally with one of these new small receivers. To remove any doubts, talk to one of the experts at Futaba Customer

#### Service.

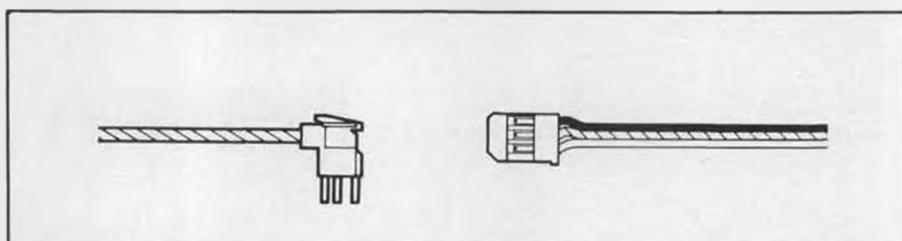
Earlier I stated that these receivers will also work with other non-Futaba AM transmitters. Well, that is so, but before you go blaming Futaba, this magazine, or myself for any possible incompatibility, there are a few things you should know. To start with, not all available transmitters are made with the same close frequency tolerance as the Futaba equipment mentioned. They may be close, and they may be legal, but still far enough away so that a reduction in range will occur. This will require a retuning of the receiver—it cannot be done at the transmitter—and is something that cannot be done by Futaba, who like all other companies, will only work on equipment of their own brand. Such tuning, if required, will have to be done at one of the independent service centers. For any work of this nature, I can recommend the following:

West: Authorized R/C Service, 941 N. Main St., Orange, California 92267; (714) 639-8886.

East: Kraft Midwest, 117 E. Main St., Northville, Michigan 48167; (313) 348-0085.

There is also that business of transmitter/servo timing I mentioned earlier, and other design factors that sometimes create incompatibilities between equipment of different eras and makers. It would be a good idea to contact one of the above and inquire if they have experience with the particular combination you have in mind and if they can undertake the frequency matching chore.

So there you have it; what's small and lightweight from one of the leaders in R/C equipment. There is some interesting mid-size equipment, both receivers and servos, which might fit your needs better, and, of course, a variety of the common sport- and competition-sized equipment. Ask your dealer to show you the latest equipment brochures from Futaba. You'll no doubt find some surprises, a lot of different items that you are probably not familiar with at all. Some of them might be the solution to the R/C equipment problem that you have not yet solved.



Futaba's original mini, or "G" plug, and the newer "J" plug, sometimes erroneously referred to as AM and FM plugs respectively. The "G" is now being phased out.



# PLUG SPARKS

By JOHN POND

- Well, if you missed the West Coast SAM Champs at Stead Air Base, Reno, Nevada, as conducted by John Pond, Contest Manager, you missed a "goodie." As advertised, "Everyone gets a prize," was no idle promise, as many contestants received as many as three or four prizes. Naturally, what else can be said when the announcement was made that Don Bekins was the high-point man of the contest, with 17 points for four declared events! Better than four points an event!

Billed as a large regional meet, contestants came from all western states. Most notable were the SAM 8 boys from Washington with other contestants from Texas, Arizona, Oregon, Utah, and, of course, the most being from California. The meet was rather large despite being regarded as a trial horse by the Contest Manager for next year's International SAM Champs.

Like any new locations, the idea of the meet was to find what problems, glitches, and bugs were to crop up. Sure enough, some problems did arise, particularly in the use of Stead Air Base. Some of the "homework" failed to filter down to the lower echelon resulting in the limited use of Stead. Eventually, this had to be abandoned because of a myriad of unannounced soaring gliders and light planes overflying the field.

The alternate R/C and F/F fields were more than adequate, but some felt the access roads were a bit rough. Another problem to be resolved! However, as far as weather went, the hundred-degree weather (because of the national heat wave) on Fri-

day became quite cool from overhead clouds dropping the temperatures to 70. This was comfortable flying weather, but thermals were a little tricky to find.

Photo No. 1 shows the organizer (or is it culprit?) of the West Coast SAM Champs,

John Pond, acting as Contest Manager. Pond is seen holding one of the 52 kits given away. This does not count the 66 plaques and 60 to 70 miscellaneous prizes. As stated before, everyone (including wives) received a prize! Knowing some contestants were coming a long way, no effort was spared to supply adequate prizes.

Seen in Photo No. 2 is Bill Preston of Bainbridge Island, Washington, sizing up the competition and the thermal activity. Bill is seen with the inevitable Lanzo Bomber, a design enjoying unprecedented popularity.

Before we get into photos too far, this Contest Manager extends his thanks for jobs well done to Ted Kafer and Bill Vandebek, R/C Contest Directors, and to Jim



Contest manager for the West Coast SAM Champs, John Pond in one of his less busy moments.



2. Bill Preston, of Washington, eyes the thermal activity. He's got a Lanzo Bomber, what else?



3. Don Bekins, undisputed Grand Champ of the meet. Phil Bernhardt times another max flight. Photos: Bowers.



5. A Modelcraft Commando by Dale Bowers, SAM 00, for 1/2A Texaco.

Persson and Don Wrench who ran the free flight events without a single hitch. Many others who come to mind are Dave Lewis, George Joki, Steve Roselle, and the inimitable Maryann Pond, Processing Control.

Processing was conducted for the first time on the West Coast with Friday being set aside for the measuring, weighing, and authentication of all old timer models entered. Judging was not that tough, as a ten-percent variance was allowed on dihedral, thrust line, etc. Wheel sizes were defined ahead of time, and only one entry was refused because of small wheel size. The main point of processing both transmitters and models was quite obvious; someone had to make sure the SAM entries conformed to SAM rules. Too much has been overlooked in the past!

If the foregoing sounds like it was a little rough, no such thing! As a matter of fact, most contestants were glad to be checked and find they conformed. At this time, special mention should be made of George Steiner, AMA R/C Frequency Coordinator, for his excellent work in checking all R/C sets for conformity to correct AMA frequencies. Only one set was found to be giving off spurious signals despite the frequency rating. Better to catch them before flying!

Getting back to the contest action, Photo No. 3 shows Don Bekins in his familiar pose milking a thermal. Phil Bernhardt, newsletter editor of SAM 49, checks his watch for time. Note the background; plenty of room here!

Not too many photos were taken of the free flight action, but we couldn't resist using Photo No. 4, showing the cowled front end of a Comet Sailplane. When it comes to nicely finished free flight models, Bob Oslan is without a peer. Sad to report: his models fly as good as they look! Note the fixed one-wheel landing gear. Certainly eliminates a lot of trouble engendered by the original folding gear.

Quite a few newcomers were noted. Among the most prominent were the new members from SAM 00. Seen in Photo No. 5 is Dale Bowers with an .049-powered Ontario Modelcraft "Commando." Dale, besides competing, also found time to take photos of the action as can be noted from the credits.

Got a nice shot (Photo No. 6) of a nine-foot Dallaire Sportster. Unfortunately, we



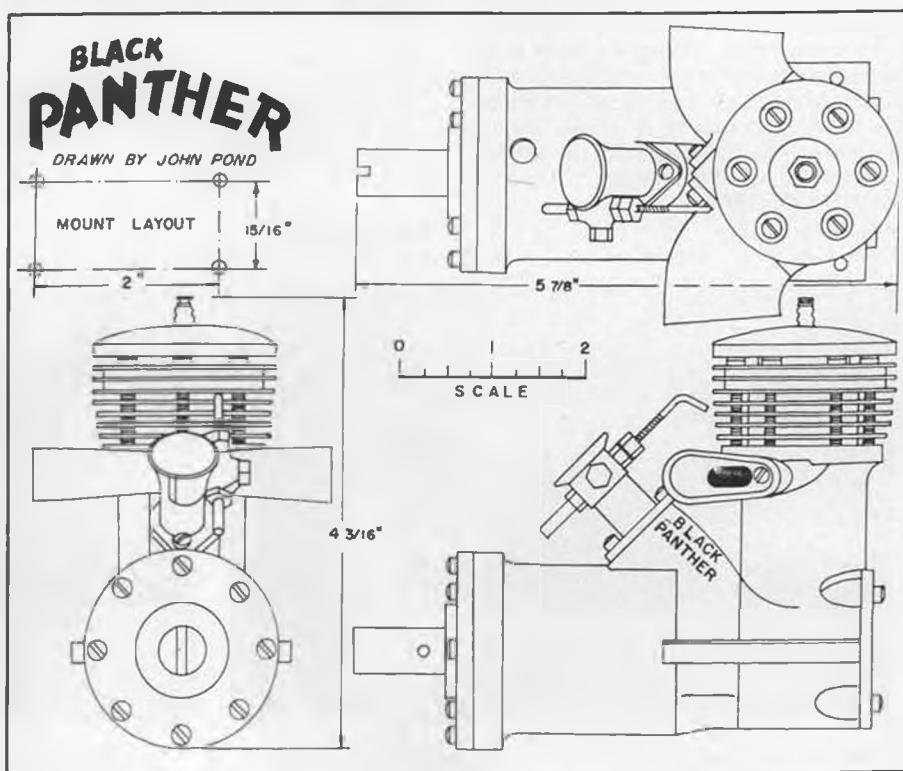
6. Good-looking Dallaire Sportster. Will the real builder stand up and be counted?



7. A newcomer from SAM 00, Doug Steinel, with a nicely built Comet Clipper MK I. Did well for his first time in competition.



4. Bob Oslan still turns out beauties! This Atwood-powered Comet Sailplane is another finely finished model from Bob.





**10. Gliders may come and go, but there will always be a Jasco Floater. Ray Factor at the SAM 7 Spring Annual.**

failed to get a name (M.R. Lipsey of Texas, perhaps?). Not readily recognizable, but there were a few ant hills in the parking area. Those red ants will wake up anyone. No problem, however, as they were more anxious to get away from the modelers than the modelers were from them.

As stated before, quite a few newcomers to the game made their debut at the West Coast SAM Champs. Such was SAM 00 member, Doug Steinel, seen in Photo No. 7. Doug showed up with a nice-looking Comet Clipper, MK I, and asked which events he could enter. Much to his surprise, he found he could get three events for one model; Class C LER, Antique (Pure), and Texaco. Needless to say, Doug was a busy boy for two days.

We haven't listed winners of a meet for quite some time, but, in the case of a major regional meet, this reporter feels the modelers should be recognized. After all, the shortest distance traveled was 200 miles.

In some cases, the results don't really show the activity, as the wind did come up rather strong after twelve noon. This limited the free flight boys pretty severely, although a considerable number had pre-entered. Let's take a look at the results:

#### RADIO CONTROL

##### Side Port Event (6)

1. Neil Kaminar Bomber 15:39



**8. An ancient Flying Quaker built in 1937 by Bob Fukuda of Hawaii. Ohlsson Miniature for .56 power.**

2. Don Bekins	Bomber	14:49	2. Ken Myers	Playboy	29:58
3. Bob Angel	Schmaedig	10:41	3. Gary Linford	Playboy	27:24
4. Robin Pharis	RC-1	8:24	4. Steve Roselle	Brigidier	25:04
5. Dough Steinel	Clipper MK I	6:17	5. Roland Boucher	Playboy	24:06

#### Ohlsson 60 Event (7)

1. Don Bekins	Bomber	19:07	1. Jim Kyncy	Anderson	29:49
2. Ed Sodenberger	Bomber	18:20	2. Stan Lane	Anderson	24:42
3. Dick Bringgold	Bomber	17:06	3. Jim Stimson	Dallaire	19:18
4. Bob Angel	Schmaedig	13:42	4. Neil Kaminar	Bomber	18:11
5. Bob Boies	RC-1	11:16	5. Bob Munn	Powerhouse	8:40

#### Antique (Pure) (11)

1. Don Bekins	Bomber	28:44	1. Ohlsson 23 (5)		
2. Neil Kaminar	Bomber	28:11	1. Howard Osequeda	Bomber	10:27
3. Don Bishop	Bomber	27:40	2. Ed Sodenberger	Bomber	10:19
4. M. R. Lipsey	Dallaire	15:49	3. Don Bekins	Bomber	7:38
5. Bill Burleson	Bomber	10:11			

#### Texaco (14)

1. Robert Munn	Powerhouse	30:00	1. Class A (8)		
2. Neil Kaminar	Bomber	30:00	1. Don Bekins	Zomby	10:26
3. Stan Lane	Anderson	27:56	2. Ken Myers	Playboy	9:22
4. Jim Kyncy	Anderson	26:09	3. Dale Tower	Strato Streak	9:08
5. Dough Steinel	Clipper	15:00	4. Howard Osequeda	Viking	9:04
			5. Ron Doig	Powerhouse	7:07

#### 1/2A Texaco (26)

1. Don Bekins	Bomber	29:16	1. Class B (12)		
2. Steve Roselle	Mike	28:27	1. Jim Kyncy	Kerswap	16:40
3. Jim Kyncy	Anderson	27:49	2. Eut Tileston	Scorpion	15:24
4. Nick Panigoutu	Mike	24:30	3. Don Bishop	Kerswap,	14:30
5. Tom Butler	Brigidier	24:20	4. Don Bekins	Alert	9:11
			5. Ken Kullman	Dodger	6:10

#### Electric Texaco (13)

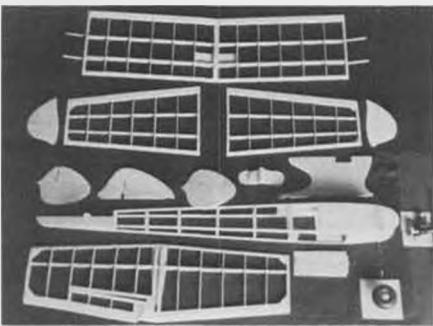
1. Jack Alten	Bomber	30:00	1. Class C (13)		
			1. Neil Kaminar	Bomber	20:51
			2. Don Bekins	Bomber	19:02
			3. Eut Tileston	Westerner	18:30



**9. Gorgeous silk-covered Sailplane with Aerogloss finish by Larry Davidson. Seen at the SAM 7 Spring Meet, Galesville, New York.**



**11. Classic winding stooge employed by Richard Fiore to crank up his Flying Cloud. Fine flying field is at Galesville, NY.**



**12. Breakdown of George Clapp's R/C Strato Streak, due for publication soon.**

4. Don Bishop	Bomber	17:04
5. Bob Munn	Playboy	13:49

**Electric LER (12)**

1. Tim Dunlach	Bomber	14:25
2. Ken Myers	Playboy	12:37
3. Steve Roselle	Brigidier	12:06
4. Bill Preston	Bomber	12:00
5. Gary Linford	Playboy	11:15

**R/C Glider (5)**

1. Bob Angel	
2. Dick Bringgold	
3. Ken Myers	
4. Don Bekins	

**FREE FLIGHT**

**Rubber, Large (8)**

1. Leonard Sherman	5:58
2. Ed Lamb	5:25
3. Fred Emmert	5:08
4. Jack Little	2:58
5. Art Watkins	2:02

**1/2A Texaco (9)**

1. Gene Evenson	11:44
2. Cliff Silva	10:57
3. Don Nordlund	7:35
4. Art Watkins	4:30
5. Jim Kelly	:46

**Cl. AB Cabins (8)**

1. Ray Chalker	7:10
2. Jim Robinson	5:48
3. Jerry Rocha	4:53
4. Abe Gallas	4:51

**30 Sec. Antique (7)**

1. Larry Clark	3:56
2. Dick Lyons	3:03
3. Art Watkins	3:00

**Class C Pylon (7)**

1. Jim Robinson	6:30
2. Larry Clark	6:26
3. Fred Emmert	:04

**H. L. Glider (5)**

1. Steve Roselle	6:00
2. Jim Persson	2:42
3. Gary Linford	2:02
4. Harvey Lance	:50

**Class AB Pylon (14)**

1. Charles Atkinson	11:33
2. Jerry Rocha	9:16
3. Bob Oslan	8:41
4. Bob Chambers	8:11
5. Jim Robinson	7:54

**Class C Cabin (8)**

1. Larry Clark	6:46
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**13. George Joki shows off his unbeatable free flight combination of Strato-Streak with an Arden .09 for power. Photo: Dowling.**



**15. A pretty shot of Howard Osegueda's Struck Record Hound. Dave Bruner, SAM 21 Prexy, is on left. Photo: Dowling.**



**14. Beautifully built Cloudbopper by Stu Bennet, at SAM 21 Show and Tell. It was also the contest winner! Natch!! Photo: Dowling.**

2. Ed Lamb	5:34
3. Gene Evenson	5:04
4. Jim Robinson	2:58
5. Cliff Silva	3:51

#### Rubber, Small (9)

1. Mel Chafin	5:25
2. Don Wrench	4:33
3. Art Watkins	3:24
4. Al Montiel	3:00
5. George Joki	2:06

#### .020 Replica (9)

1. Dick Lyons	8:16
2. Tom Butler	7:33
3. Jerry Rocha	6:02
4. Don Wrench	2:13
5. Charles Atkinson	2:00

#### Texaco (5)

1. Jim Kelly	18:25
2. Cliff Silva	3:31

#### ENGINE OF THE MONTH

As usual, we are indebted to another engine collector, this time, the well-known Bob Bowen of Lodi, California. We were lucky to get the use of this engine, as Bob had already sold the engine. With three days of grace, this was barely enough to get out the drawing.

The Black Panther was first noticed nationally when a full-page advertisement appeared in the September 1940 issue of Model Craftsman. The engine was touted as the "hottest piece of iron" to hit the track.

Advertising and production stopped very shortly thereafter. According to Bill Thompson of San Diego who researched an article for the Engine Collectors Journal and interviewed Ira Hassad, Ira disclaimed any connection to the firm, although it was quite apparent the Black Panther utilized Hassad parts.

The engine would have been produced in larger numbers if it hadn't been for the action of a theatre owner magnate, Charles Gore. Gore, an avid race car enthusiast, specialized in Hassad engines. In less time than it takes to tell about it, Charlie convinced Ira to go to Gore's lawyer and discuss action. The producer of the Black Panther (name unknown) was then threatened with a lawsuit if production didn't immediately cease. Ira is not sure if this was the cause of production stoppage or if the person just plain ran out of money. (Ed. note: Many, many engine firms went broke in less than six months as advertising and production costs would literally eat them alive.)

As can be seen in the drawing, the Black Panther was made strictly for the model car and boat modelers. The flywheel, which was enclosed along with the timer, made a very professional-type connection to the rear axle. Among the most innovative types employing the Black Panther was the JLS 6000 power unit, which took advantage of a ball bearing mounted on the outer end of the crankshaft to eliminate flywheel whip.

Technically, the engine was quite similar to the Hassad having a heat-treated magnesium crankcase. The piston was machined from Mehanite while the shaft was "hogged out" of solid bar stock.

Specifications of the engine included a



16. A mammoth Jimmy Allen Bluebird by Larry Ladd of Indiana. Power is a Tartan Twin 1.3.

bore of .937 in., stroke of .880 in., giving a displacement of .606 cu. in. An impressive size!

#### 50 YEARS AGO, I WAS...

Received a most interesting letter from Robert Fukuda, 1043-C Ulima Dr., Honolulu, Hawaii 96817, who has this to say:

"Here is a photo (No. 8) that will take you a long way back in nostalgia. Yes, the picture is of a Megow Flying Quaker I built back in 1937. The engine is one of those early classic Ohlsson engines, number 1276. I spent many a happy hour at Wheeler Field.

"The model had that fatal malady known as "spiral dive" which it did one day. (Ed

note: This was quite common with models featuring large rudders ala rubber designs.) After reading about thrust adjustments, CLA, CG, etc., I eliminated the windshield, built up the front of the fuselage, raised the engine thrust line, moved the center of gravity back by using a lifting tail; no more problems!

"One day I filled the tank and let her go. That she did, to that big hangar in the sky for all SAMs and their old time models. There is nothing that can replace the satisfaction of flying and chasing one of those old birds and then hearing that satisfying 'carumph' as the model lands deadstick on Voit or M &

*Continued on page 102*

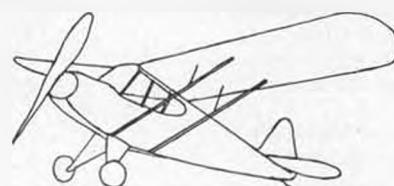
## PORTERFIELD-TURNER

#### Old Timer of the Month

Design by: Claude McCullough

Text by: Bill Northrop

Plan by: Al Novotnik



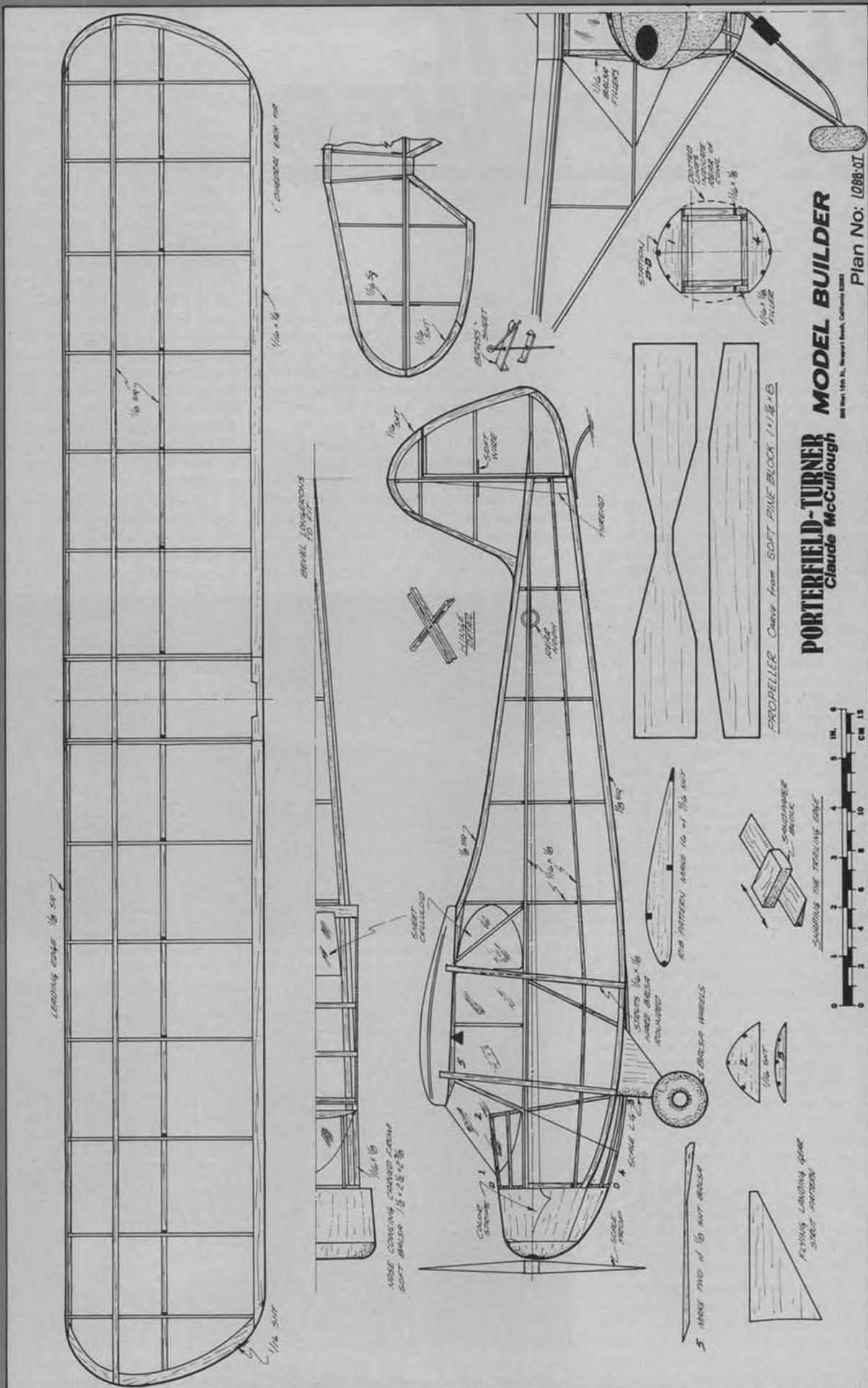
The aircraft was so named because Roscoe Turner, the flamboyant racing pilot, following retirement from active competition, had become vice-president of the Porterfield-Turner Aircraft Co., located in Kansas City. The PT 50 was a tandem two-place monoplane using the Continental 50 hp engine, which cruised at 92 mph while covering 27 miles per gallon of gas.

The model is very conventional in construction, with the wing being built in one piece. Because of the short nose moment, Claude recommended carv-

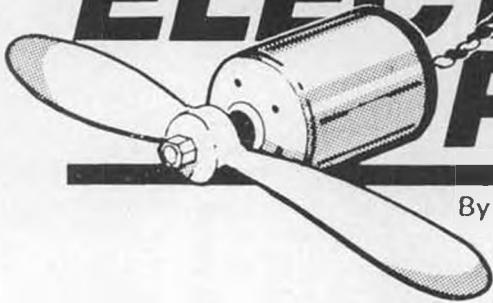
• On occasion, and this is one of them, we turn away from the all-out competition Old Timer to pick up a design that is remembered down the years for one or more other characteristics. In our opinion, the Porterfield-Turner fits into that category. It was published in the August 1940 issue of Flying Aces.

Among its features: It's a rubber scale model; it has great looks; it flies very well; and the plans, unusually well drawn for that period as well as now, were presented full-size in the magazine, and the designer, Claude McCullough, is still well-known for his many excellent creations.

*Continued on page 90*



# ELECTRIC POWER



By MITCH POLING

• Chargers continue to be the topic. First, I made a mistake on the charge delivery of the Lambda and TRC chargers. I missed a whole minute of running time, and came up with 57.5 Am for the Lambda charger and 59.5 Am for the TRC. This does an injustice to both of them; the TRC produced 75 Am of running time, and the Lambda produced 73 Am of running time. These are excellent chargers. Since I tested these, I received another charger, the NorCal Avionics Accu-Charger 1, which is very impressive too.

More on that later, but first a word about Am. I got a call from the editor, asking what Am were, this made me realize that many of you may not know about them. An Am (ampere x minute) is 60 times the Ah (ampere x hour) rating of the battery pack. A 1.2 Ah pack is a 72 Am pack; a .500 Ah pack is a 30 Am pack. Some packs are rated in milliamps; you can convert that to Ah then to Am, or use  $.6 \times \text{milliamp hours}$ . Unfortunately, battery packs got their ratings back when any charge time under ten hours was unheard of, and any discharge time under one hour would cause a manufacturer to disown the use of the battery! Charge times and discharge times in minutes was beyond any stretch of the imagination, science fiction stuff. So, all battery packs were rated in hours. Since such labels are frozen in stone once they are used, we will continue to see Ah ratings for centuries. I suppose we should be glad that batteries didn't get rated in days, or weeks!

A pack rating in hours is very awkward if you want to figure out charge times or running times because minutes is where it is at. The rating of a 72 Am (1.2 Ah) pack means current times time, so if you are charging at 4 amps, it will take 18 minutes to charge the pack,  $4 \times 18 = 72$ . If you are running the pack at a 24-amp draw, you can expect three minutes of running time,  $3 \times 24 = 72$ . If the rating is in Ah, you have to go through the 60 times conversion bit because the time will be in decimal parts of an hour. I like Am better!

The Accu-Charger 1 is intended for four-to seven-cell packs. It is a pulse charger, operates off 12 volts DC, and has a very reliable peak detector for automatic shutoff. There are jacks for an external meter, and the jacks are switchable from volts to amps. This is a unique feature. Put your DVM or voltmeter on the 20-volt range and read voltage, or if you switch to amps, read the voltage scale times ten to get amps. I like that! This solves the problem of having

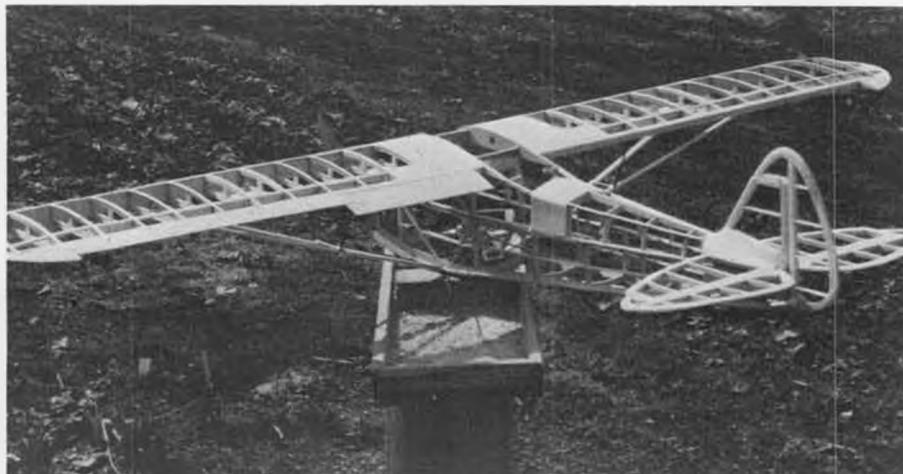
to use a separate ammeter. After the charge is finished, the charger switches to a 200-milliamp peaking charge. The charge rate is adjustable and can go as high as seven amps. The charger has a voltage boost circuit and a constant current regulator, which delivers rock-steady current for six-cell or less packs.

The seven-cell 1.2 Ah SR Batteries pack did show some current drop on charge. I started at 5 amps, and at the end of the charge it was down to 4 amps. This is much better than most chargers will do on 7 cells, and the pack was fully charged in 15 minutes, rather than the 25 to 30 minutes that many chargers take. Six-cell packs are easily

charged in 15 minutes, and you can charge them in ten minutes if you wish. The peak detector is exceptionally reliable, and even a very fast charge is all right. The peak detector shuts off the battery pack after a voltage drop of .05 volts or less.

I ran the Accu-Charger in a series of charges and motor runs, and it compares very well to the TRC and Lambda chargers I reviewed previously. I used a DSC Thrustmaster motor turning a Top Flight 8x4 nylon prop at an initial draw of 19 amps on a six-cell yellow label 1.2 Ah Sanyo pack. With this setup, the pack delivers 72 Am after charging with the Accu-Charger. I also use the charger to charge my radio battery packs. I am using Panasonic 500 mAh cells in my radios, and they are not designed for high-rate charging. I find that a 1.5-amp charge rate does a good job, and I have had very good results. At this rate of charge, figure 20 minutes will charge a completely discharged radio pack. Even if the pack is not completely discharged, 20 minutes will be safe, but do check the pack occasionally to see if it is getting warm. If so, take it off the charger.

I strongly recommend that you remove the radio battery packs from the transmitter or plane to charge them. At the minimum, unplug them from the radio gear, then plug them into the charger. Do not use built-in



Charlie Sylvia sent photos of his Pilot kit PA 18 Super Cub with a Cobalt 40 and an Astro belt drive. Charlie says it performs like the real one, including flap use.



The 3.5-inch wheels are from Hobby Lobby. All-up weight on the Super Cub is 8 pounds. Span is 75 inches, and wing loading is 22 oz/sq. ft. Graupner prop turns 6200 rpm.

charger jacks; you do not want the radio to have the chance to "see" the charger. That could be its last look! I have been field-charging my radios for 14 years, using these procedures, and I have never had a problem. I do not charge my radios overnight, and haven't for 14 years. Why bother, just do it when you want to fly. Who wants to plan ahead? I don't! The life of an electric flier is carefree!

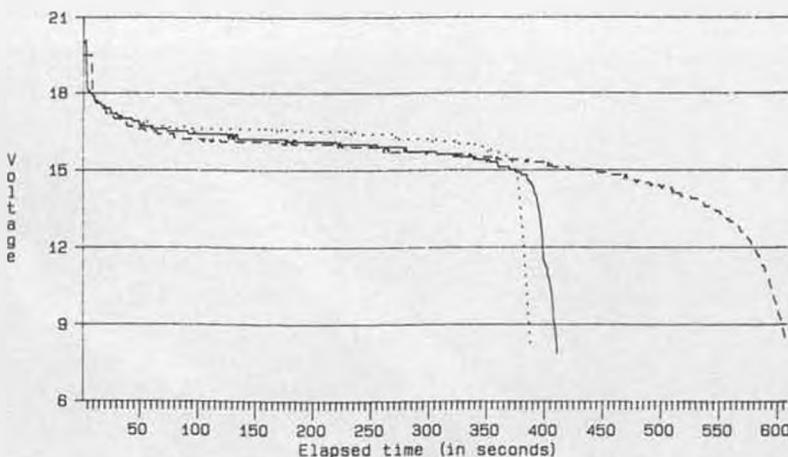
Anyhow, the Accu-Charger is compact, very sturdy and well-made, and does a super job of charging seven-cell or smaller packs. I recommend it. It retails for \$120. Contact NorCal Avionics, 5689 Glasgow, Troy, Michigan 48098; (313)828-8210.

I got two letters about the Sanyo SCE 1700 cell. One pointed out that the 200- to 300-rpm drop compared to the 1.2 Ah Sanyo SC cells and that the high temperature with high amperage runs meant higher internal resistance in the SCE cells. This, in turn, will mean a longer run, like running a throttle at partial power. That is true, but I did my testing at the same current for both the SC and SCE cells (actually, the SR Batteries equivalent, the Magnum pack), and I got my Ah ratings from a sum of minutes times current; i.e., Am. The Am do not change. If "throttle" is used, the pack runs longer but at lower current, and the sum of minutes times current will be the same. So, no, the 1700 packs are not getting longer run times because of internal resistance. They run longer because they have more plate material inside. This was achieved by making thinner plates, thinner separators, and by increasing the height of the plates. The latter meant eliminating the welded connections internally. The plates are connected to the cell ends by paste. I personally would have preferred that the welded connections had been kept because I think this is where the extra resistance and heat are being generated. Yes, the cells might have become 1.5 Ah instead, but that still represents a 25-percent increase in running time, which I think is worth it, and there would not have been heating or resistance problems.

The other letter was very detailed, from Keith Shaw and Dave Hares. They did some very careful testing of the Sanyo SC (yellow jacket), Sanyo SCR (red jacket), and Sanyo SCE (1.7 Ah). Their test results were identical to mine, and to Bob Boucher's. The graphs they sent are presented here. They used 14-cell packs and loaded them through auto headlights that could be switched to give loads from 5 to 50 amps in 5-amp steps. An IBM PC computer read the voltage and current values each second and kept a running total of capacity (Am). Tests were run at 10 amps, 20 amps, and 30 amps. Ten amps is the easygoing fun-flying such as is done by the Amtique or training gliders. Twenty amps represents sport flying with good aerobatics and fast climbing sport gliders and old timers. Thirty amps is for pylon racers, competition gliders, and competition pattern. The total capacity of all the packs held up well during these tests, as shown in the graphs. The SC and SCE showed more voltage droop during the test than the SCR. The SCE showed a long taper

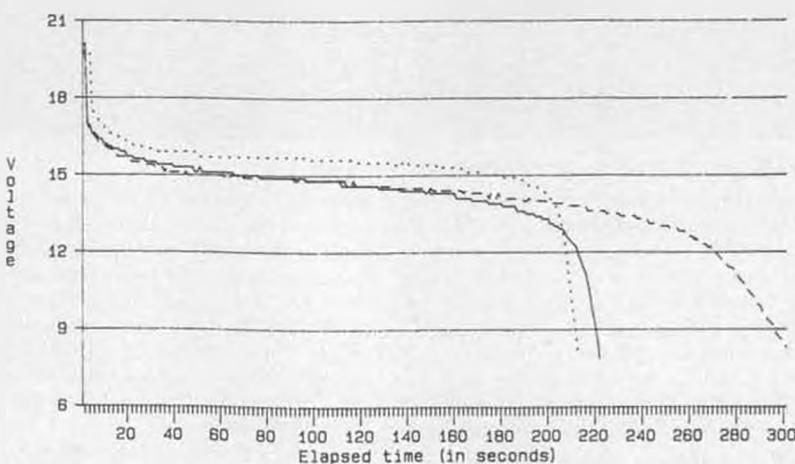
#### 14 Cell Discharge Test at 10 Amps

Cell Type	Capacity	Volt @ 1/3 C
Sanyo 1.2 AH SC	72 Amp-Min	18.24
Sanyo 1.7 AH SCE	103 Amp-Min	18.00
Sanyo 1.2 AH SCR	69 Amp-Min	18.60



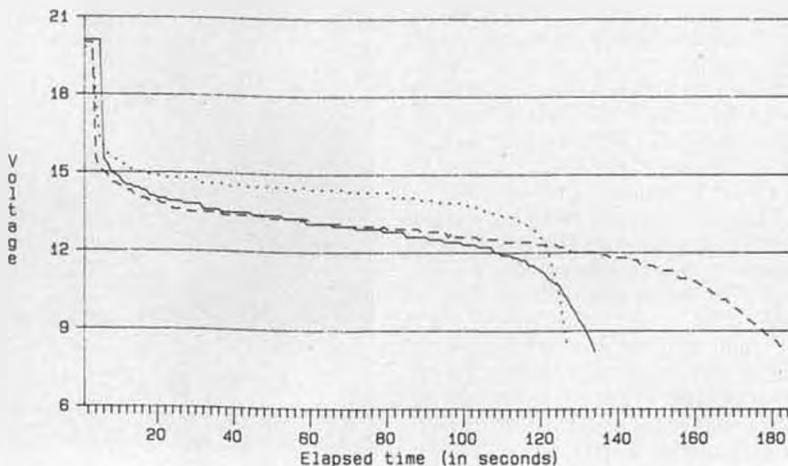
#### 14 Cell Discharge Test at 20 Amps

Cell Type	Capacity	Volt @ 1/3 C
Sanyo 1.2 AH SC	73 Amp-Min	15.00
Sanyo 1.7 AH SCE	98 Amp-Min	14.76
Sanyo 1.2 AH SCR	72 Amp-Min	15.75



#### 14 Cell Discharge Test at 30 Amps

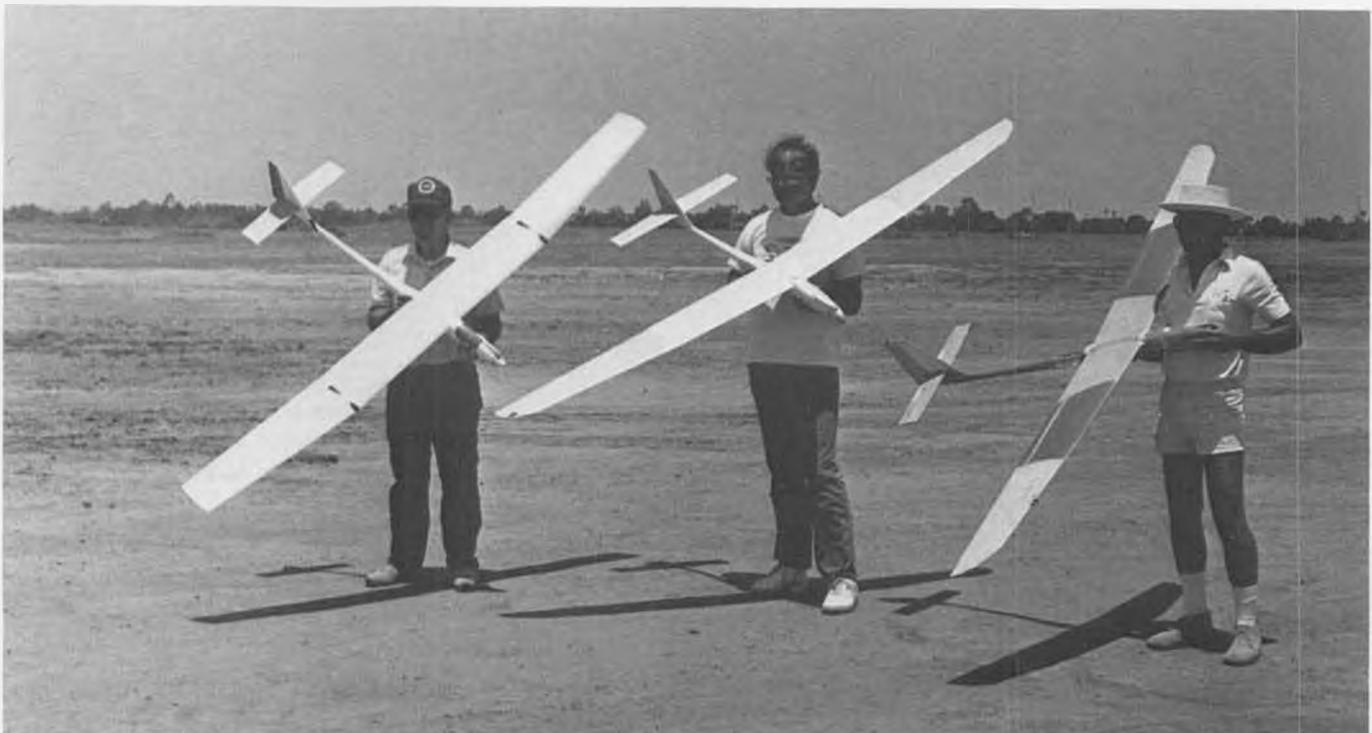
Cell Type	Capacity	Volt @ 1/3 C
Sanyo 1.2 AH SC	69 Amp-Min	13.40
Sanyo 1.7 AH SCE	95 Amp-Min	13.14
Sanyo 1.2 AH SCR	70 Amp-Min	14.51



*Continued on page 66*

# F3E TEAM SELECTION

By MITCH POLING. . .The Harbor Soaring Society held qualification trials for the team selection for the F3E World Championships. These high-tech electric-powered craft demand a high degree of pilot ability.



The U.S. team: Steve Neu, Jerry Bridgeman, Felix Vivas.

• The Harbor Soaring Society hosted the US F3E qualifying trials, held June 24 and 25, for the F3E World Championship. It was my pleasure to be one of the judges at the trials, which featured absolutely beautiful weather for the two days; blue skies, enough wind to keep everybody cool but warm enough to be comfortable, and superb flying. The life of a judge is for me! The Harbor Soaring Society did an excellent job, along with Bob Slif, and despite the competitive atmosphere, it all went very smoothly. I have been at F3E events before, but being a judge certainly sharpened my appreciation of what is required. Let's look at a typical flight.

The F3E ship is launched by the pilot's helper. The course the plane will fly is behind the launch. The plane flies nearly in line with the course behind it, and, after a few feet of acceleration, it pulls up steeply. The climbout is about 60 degrees, and the rate of climb is about 2000 feet per minute. Halfway through the climb, the pilot arcs the plane back towards the course while the steep climb continues. This is a "U" or boomerang climbout. By the time the plane is entering the course on the return leg of the climbout, it is between 1000- to 1500-feet high. The motor run has been 35 to 40 seconds.

The plane is about to enter the course, and the pilot turns off the motor for the distance (pylon) part of the event. Despite the eight-foot span of the plane, it is hard to see, about a quarter-inch span as measured at arm's length. The course is two imaginary

walls 150 meters (492 feet) apart. Now the pilot will use almost all the altitude in a series of high-speed legs (power off) between these two walls; the more legs, the higher the score. Typically this ranged between 16 to 20 legs in these trials, with the plane nearly "on the deck" on the last leg—very exciting! Three minutes total are allowed from the time of the launch to the end of running the legs.

The pilot then starts the motor for another quick climb, about 10 to 15 seconds. This puts the plane at about 500 feet. The pilot

then dives the plane to put it "on the deck" to go through the gate and then a steep power-off climb using the speed of the dive. The power-off climb will put the plane at about 400 feet, then there is a search for thermal or wave lift for the duration part of the event. If none is found, the pilot can turn on the motor, but any motor time is deducted from the five-minute max. Once the five minutes of duration are up, the pilot tries to land in the "bullseye" in the center of the pylon course. The 15-meter inner circle is a 30-point bonus; the 30-meter outer



The AMA judges try to decide where to go for lunch.

circle is a 15-point bonus.

Total scoring is 15 points per lap for the distance event, 300 maximum points (1 per second) for the duration event. A 20-lap run with a 5-minute max and a perfect landing would be 630 points. Most scores at these qualifiers were between 500 and 600.

As you can tell from the previous description, there is a lot of work for the pilot, and a lot of pressure. The event is labor-intensive for the hosting club too. There have to be two men per "pylon wall," plus two timers, someone to man the beeper or horn that tells the pilot to turn for the next leg, and scorekeepers. All runs are solo, and it takes about 40 minutes to recharge battery packs and prepare for the next run, so even with just five competitors everyone was busy from 9 a.m. to 2 p.m.

The F3E event requires a very good airplane. Pilot ability helps, but the fast climb and high speed through the course are essential to a good score. The four top competitors, Jerry Bridgeman, Steve Neu, Felix Vivas, and Keith Finkenbinder, had excellent planes. Jerry flew Mike Charles's original design, the Snipe, and its performance was outstanding. Jerry has only been flying R/C for three years, but you would never know it. The Snipe is the plane that I would fly if I decided to compete in F3E. It has an exceptional speed range and does not stall even in extremes. I saw some times when it proved it! It is an easy plane to fly, very unusual for F3E! It has a 100-inch span wing with 900 sq. in. area, Eppler 224 airfoil, and semi-elliptical leading edge. The foam wing is covered in veneer and uses carbon fiber spars. Flying weight is 7.6 pounds, for a wing loading of 19.5 oz./sq. ft. Power is the Astro cobalt 60; 27, 900 SCR Sanyos; STW throttle (made in Australia); and a K&W folding 13x7 prop trimmed to 12 inches. The fiberglass fuselage is a Rudy Freudenthaler design. Jerry built it from Mike's design.

Felix Vivas flew essentially the same design as Jerry, powered by the Astro cobalt 60 and 29 Sanyo SCR cells on a Geist 11x7 folding prop. He used a Geist (Germany) throttle. The Geist throttle is unusual; it is two-piece with the power board separate.

Steve Neu flew his original design powered by an Astro cobalt 60 and 27x 900



Jerry Bridgeman with his Snipe, designed by Mike Charles.

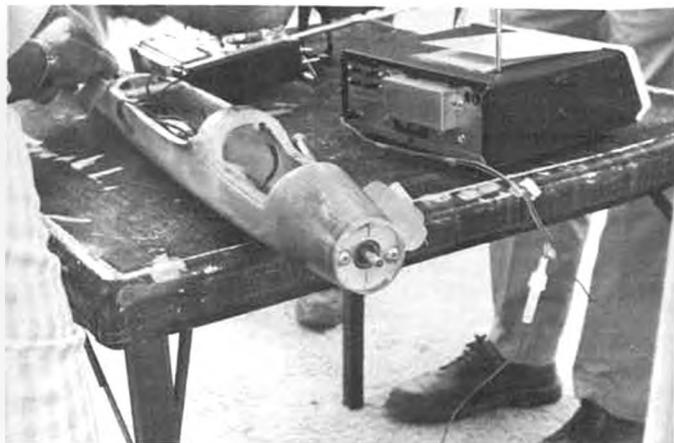


A close-up shot of the winning model, the Snipe.

*Continued on page 70*



Steve Neu, team member, and Keith Finkenbinder.



The Freudenthaler fuselage, used by all finalists. Note motor mount; it bolts to front bulkhead, very simple design.

# ASTRO FLIGHT CHAMPS

By BILL FORREY... The annual Champs stretched over three weekends in order to accommodate all the fliers and categories. As usual, the biggest names in electric-powered flight were in attendance.



First, second, and third in 7-cell Sailplane: Bob Sliff, John Lupperger, and Howard Doering.



Seven-cell Old Timer winners, first to third: Gary Westland, Lowell Howe, and Joe Ballasch.



Winners of Unlimited Sailplane: Bob Sliff, Jason Perrin, and Gary Westland.



Winners of Unlimited Old Timer: Ross Thomas, Bob Sliff, and Gary Westland.

• For those who may be unfamiliar with what this modeling event is all about, a brief synopsis is in order. Every year in Southern California there is an electric-powered aircraft competition sponsored by Astro Flight, Inc. This company is the only electric motor manufacturer in the United States currently producing high-power, samarium cobalt magnet, electric aircraft motors. Astro Flight was the first and is therefore the oldest electric power R/C hobby manufacturer in the world.

The host club this year (as in years past) for the Sailplane and Old Timer events was the Costa Mesa-based Harbor Soaring Society. The CD for these events was John Lupperger.

The Astro Champs are really several electric aircraft contests, with events in Free Flight Duration (several classes), R/C Scale, R/C Pattern, R/C Pylon Racing, R/C Seven-Cell Sailplane, R/C Unlimited Sailplane, R/C Seven-Cell Old Timer, and R/C Unlimited Old Timer. The Championships are held in late spring or early summer, and they are considered by most electric modelers the biggest and best-run electric competitions in the United States. For this reason, the biggest names in electric-

powered flight attend every year.

In the past, the Champs were usually split into two different weekends so that F/F and R/C enthusiasts could attend both contests.

This year, the 14th Annual Astro Champs were split into three different weekends. This year's three-way split was a solution reached by the organizers in response to



Jason Perrin and his 7-cell sailplane based on the Snipe fuselage. Used direct-drive Astro FAI 05 motor.



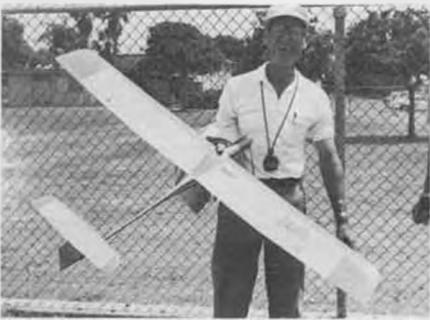
**Lowell Howe and helper Ross Thomas.** The model is Unlimited class design based on the Thermic Traveler fuse and tail. Used 10 cells and an Astro FAI 05 gear motor with smaller than normal prop to keep amps down.



**Dieter Lamprecht and his converted 7-cell Pilot Harlequin.** Model has flaps, rare on this type.



**Ross Thomas and his original design 7-cell motorglider.** Looks like it has potential.



**Chuck Hollinger and his Voltera 7-cell model.** Used thinned E-374 airfoil and direct-drive FAI 05 motor. Excellent performance.

many complaints by the Soaring and Old Timer competitors that the traditional one day was insufficient time for proving anything because only two rounds were possible in one day between the four events. Having a whole weekend exclusively for the R/C O/T and Sailplane events made it possible to run them on two consecutive days.

In years past, entering one event in the Astro Champs meant getting two flights for a grand total of perhaps 5 to 12 minutes of air time. One little flaw in either of your two flights was enough to cost you a trophy with no chance of making up for lost ground. "Better luck next year," is not what you like to hear after a year's planning, building, practicing, traveling, and one minor screw-up!

For this reason, if your one event happened to be a seven-cell, you generally double-entered in the Unlimited event just to double your air time and make the trip worthwhile. This year's four rounds per event in Sailplanes and Old Timers was a big improvement.

As you have already surmised, this report will concentrate on the four above-mentioned events which were held on Father's Day weekend, June 18 & 19.

#### THE EVENT TASKS

Some really intelligent thought went into this year's tasks. CD John Lupperger and company decided to make things more interesting by having three different thermal duration tasks for Rounds One, Two, and Three, with different motor run times for each class within each round, and with each flight group's duration times and landing bonuses scored man-on-man, normalized to 1,000 points. Round Four was the same task for all classes, yet it was also the most varied task as everyone flew this round a little differently (you'll see why a little later). Landing bonuses were awarded in



**Scott MacKenzie put some real horsepower in his Electra when he installed an Astro FAI 05 gear motor.** Competitive model!

two ways: All Sailplane classes in all rounds were given a 50-foot diameter circle to land in, with a 25-foot radius landing bonus tape graduated to 100-points at the center; all Old Timer classes in all rounds were given an in-or-out 50-foot diameter circle for a 25-point landing bonus.

For Seven-Cell Old Timers (first ones flown Saturday morning), the Round One task was a 40-second motor run to make a 3-minute glide. Considering the overcast skies that morning, making three minutes was not a given. Seven-cell Sailplanes were next with a 25-second (try that one five years ago!) motor run time to make a 3-minute glide. Unlimited Old Timers were next. Their Round One task was a 25-second motor run to make a 3-minute glide.



**Gary Westland and his modified V-tail Astro Challenger.** Wires under fuselage help keep motor out of the dirt.

Unlimited Sailplane fliers had the toughest motor run time: 15-seconds! With this brief climbout, a three-minute hang time was the goal.

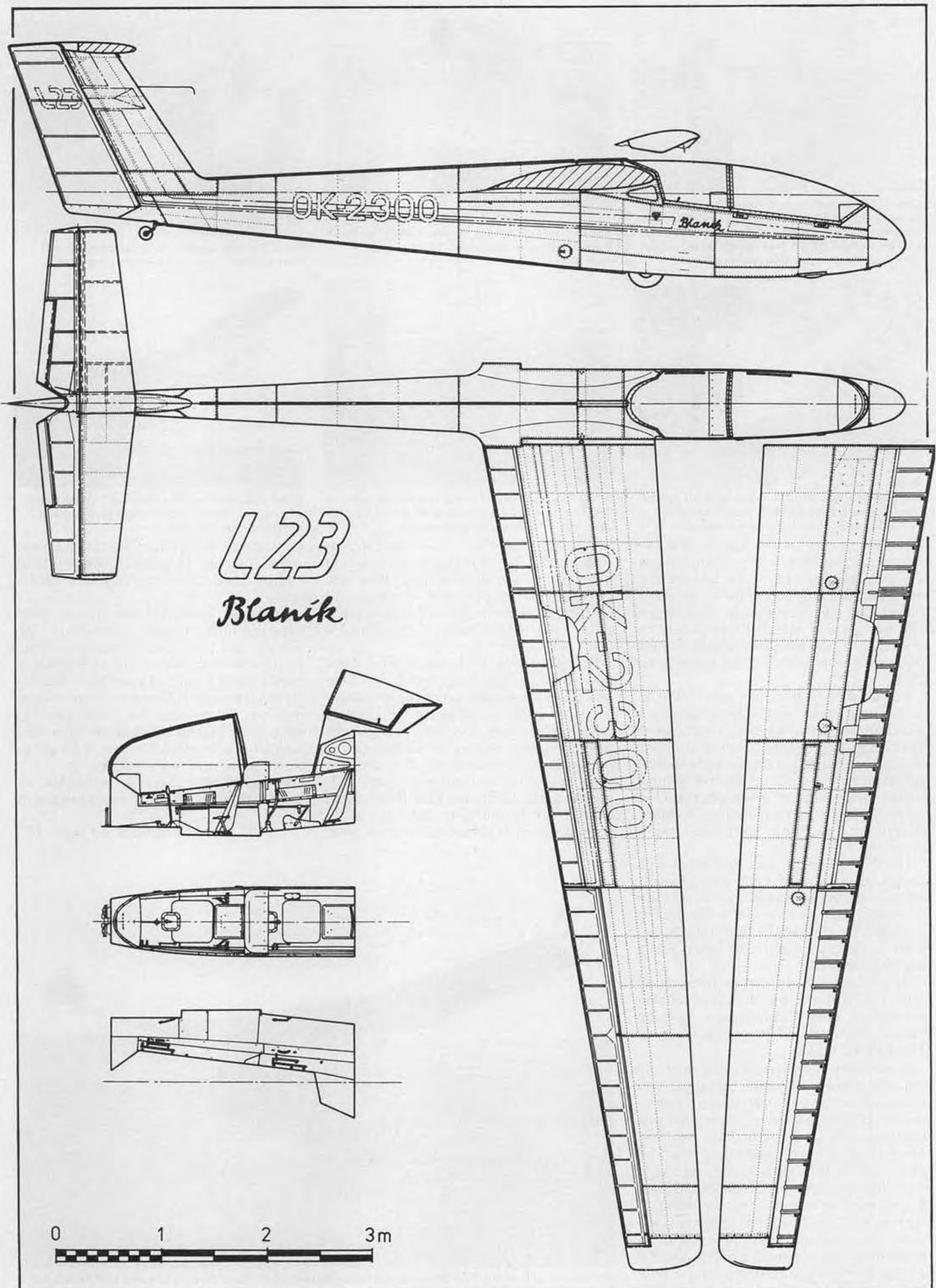
In Round Two, all classes had to make seven-minute maxes. Seven-Cell O/T models had a 60-second motor run time while seven-cell gliders had 45 seconds. It used to be a couple of years back that the standard motor run time for a seven-minute max was 90 seconds! The Unlimited O/Ts were given 35 seconds while the Unlimited Sailplanes were given 25 seconds. Landings were the same as in Round One.

Round Three, originally scheduled for Sunday morning, actually was squeezed in

*Continued on page 105*



**Author's 7-cell Astro FAI 05-powered Strato Sreek.** Excellent flyer, but came to Champs for first flights, and didn't perform well in the competition.



# MODEL DESIGN & TECHNICAL STUFF

By FRANCIS REYNOLDS

• Last month we looked at "Cube Loading" or CuL, a better way of comparing the weight of airplanes, regardless of size, and "Reynolds Performance Factor," or RPF, with which we can estimate the wing size, the weight, or the power required for any airplane of any size.

Now I come down off the high of that bold venture, with different information, investigation, dissertation, speculation, elucidation, exhortation and presentation of data on weight (this month), and materials and structures (in months to come). But don't think you have heard the last of cube loading and RPF. I will be using both of them routinely in this one-room schoolhouse, and I hope other columnists, the construction article writers, and the kit manufacturers will begin using them too. If you are out in left field wondering, "wha' hoppen?", read MD&TS for last month. If you didn't get MB for last month, send me a SASE and I will mail you a copy of the column. Plot up your own models on the curves provided. If you will send me CuLs, RPFs, and size data for some of the popular models and airplanes, I will try to compile the data and publish it in a few months.

## WEIGHT

Why must our models weigh anything? Because they are concrete objects (not that kind of concrete, Clyde), and such objects have mass. This is ridiculously obvious, but sometimes starting with the obvious leads us to a better understanding of the non-obvious.

What would we like our models to weigh? Zero. I don't completely believe that, but it is a good starting position for a discussion. For one thing, if a model airplane weighs nothing, it is lighter than the air it flies in, so it is really a dirigible, a very fast one. Also, if it has no weight, it has no mass and no inertia, so its acceleration would be infinite. Since it would be lighter than air it would also fly faster straight up than it would straight down. Interesting to think about, but we are not going to have weightless airplanes, so let's return to reality. For most types of planes, we would like them to be as light as we can make them, as long as they are strong enough. This does not apply to sailplanes, where certain weight and inertia are essential.

Why is weight bad? Some of the negative effects of weight in model airplanes that I

can think of off hand, are: 1. In order to fly a heavier model, the wing must generate more lift, therefore there is more induced drag, therefore the top speed of the plane is reduced. 2. The stall speed and landing speed of a heavier model is greater because to support the greater weight at maximum lift coefficient, the wing velocity must increase. 3. Greater weight means more inertia, so a heavier plane requires a longer take off run. 4. and a longer landing run. 5. and a longer dive to recover from a stall. 6. A heavier plane also has greater moments of inertia so the response to all controls is slower. 7. The minimum looping radius of a heavier plane is greater. 8. The rate of climb of a heavier plane is less. 9. A heavier plane has more kinetic energy in flight, so it will crash harder, doing more damage to itself and to anything it hits. 10. A heavier plane may cost more because it requires more weight of materials. 12. A heavier model is harder to carry. 13. A heavier plane may require a larger engine (more money, and still

more weight), or will cruise at higher throttle settings (higher fuel consumption and more money). If anyone can think of thirteen reasons why more weight in model airplanes is good, let me know.

How light could we build our models? A lot lighter than we do now, if we get smart enough in designing the structures and in choosing the materials, and if we are clever enough with our hands. These are the things we are going to be studying.

From a practical standpoint, model airplane builders are stuck with certain fixed weights. In R/C models, for instance, most of us don't build our own engines or our own radios. Even there, however, weight is one of the factors we consider, or should consider, when we buy engines and radios. But the structural and non-structural air-

*Continued on page 93*

TABLE 1

Material	Density lb/in <sup>3</sup>	Strength lb/ft <sup>3</sup>	Strength kpsi	Strength to Weight Ratio
White bead foam	.0006	1.0	.0115	19.2
Blue styrofoam	.0014	2.5	.0375	26.8
1/8 ABS foamboard	.0038	6.6		
.145 paper-face foamb'd	.0069	11.9		
Very soft balsa	.003	5.0	.28	93.
Medium balsa	.007	12.5	.70	100.
Very hard balsa	.011	20.0	1.12	102.
Sig Lite Ply	.013	22.9		
Spruce	.014	25.0	1.75	125.
Birch plywood	.024	41.6		
H <sub>2</sub> O (water)	.036	62.4		
Nylon	.042		10.0	250.
ABS & PVC	.045		4.0	100.
Polyester & polystyrene	.047		8.0	175.
Glass-reinforced nylon	.049		22.0	450.
Epoxy	.051		10.0	200.
Kevlar fibers	.052		400.	7800.
Epoxy-Kevlar laminate	.052		192.	3700.
Epoxy-graphite laminate	.057		200.	3500.
Epoxy-fiberglass lamin.	.075		240.	3200.
Graphite (carbon) fibers	.066		410.	6200.
Magnesium (wrought alloy)	.066		45.	680.
Aluminum (wrought alloy)	.100		75.	750.
Glass fibers	.091		500.	5500.
Tempered steel (lead)	.283 .410		113. 400.	



By BILL WARNER

Illustrations by JIM KAMAN

## PART 12

- Time to cover! Hope you still have your June 1988 *Model Builder* and have covered at least one simple model by now. We'll use the kit tissue, though you could buy some Japanese tissue if you want to really go first-class. The original model, according to Old Timer Models' Ken Sykora, was green and yellow. The darker colors usually went on the fuselage. We'll stick the tissue on with white glue, except in places where it is going to overlap tissue we have already put down.

Just a reminder: go over the entire model with fine (220-grit) garnet paper to make sure that everything blends in and nothing is left sticking up to make wrinkles in the tissue (you can't cover up mistakes!) and that everything including the L.E., T.E., and the

tops of the ribs where the tissue touches are rounded and smooth. If you try to tissue over a ragged edge, sometimes the tissue will snag and leave wrinkles at that point.

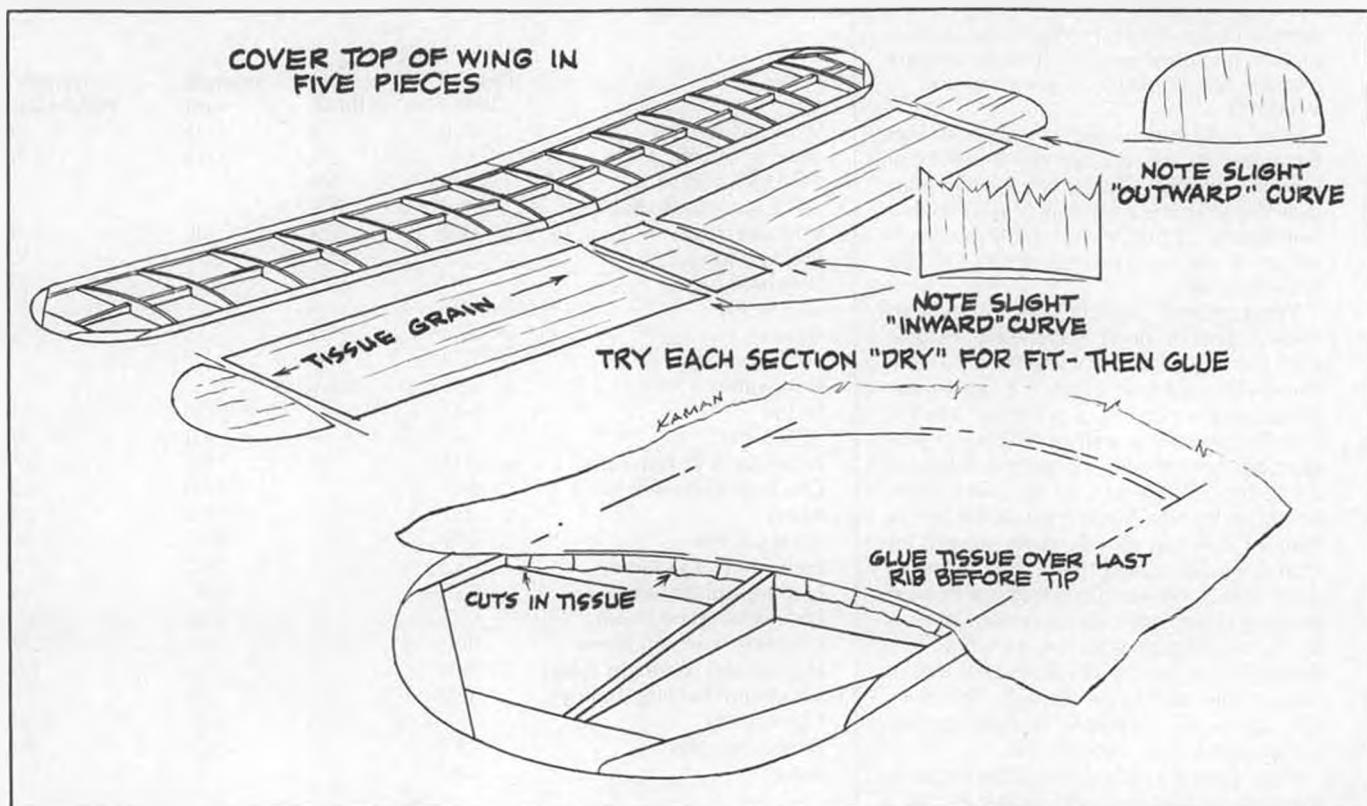
### COVERING THE WING

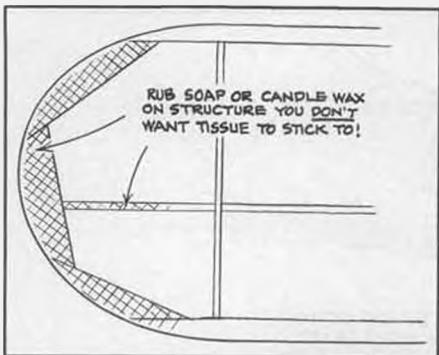
I have had kids try to cover the whole wing with one piece of tissue, wrapping it around like they would a Christmas present. Don't try it. Every time the wing changes direction, you'll get a wrinkle because tissue doesn't stretch like sheet rubber. A good rule to follow is to cover just as much at one time with a small sheet as you can without the tissue having to be wrinkled when you try it on for size. When the model shape changes in only one direction, you have no problem, and the entire bottom of the wing could be done with one sheet, if you wish, as it changes direction only in one "plane," namely at the center

section dihedral breaks. No wrinkling problem there. But when you look at the top, the top of the ribs are cambered (a direction change), and there is dihedral at the same time in the center area, and also the tips change direction downward on top with the tissue being stuck to a circular tip pattern. You will need to make five tissue panels to cover the top easily. I would suggest making newspaper patterns if you do not have a lot of extra tissue in case you make a goof. Newspaper is cheap, and better yet, you can get it easily, whereas if you use, or waste, too much of your tissue, you may have to wait a couple of weeks to get it mailed to you from a supplier. Actually, Peck-Polymers has a nice assortment of colors in its domestic tissue, and if you are going to be doing a lot of building, you might order an assortment. The tissue in the kits from any manufacturer always seems to be not quite the color you would have chosen! Again, if you want to splurge for Japanese tissue (about three to four times the price of domestic), it will give you a little better and lighter job. I advise against using colored tissue from art supply stores, as my experience has been that the colors run when they get wet, requiring attachment with dope only and shrinking with a fine mist only. Very fussy, though extremely colorful.

### THE CENTER SECTION

The center section is easy to cover and can be covered with a panel cut just about 1/8 inch over width and length. Paint your glue mixture (about 60-percent white glue to 40-percent water) around the edges, like following the edge of a picture frame. If you use Japanese tissue, put it on "shiny side up." The grain of the tissue should be "span-wise," meaning tip-to-tip direction. Let dry and trim off excess, wrapping about 1/8 inch around the L.E. and about the same

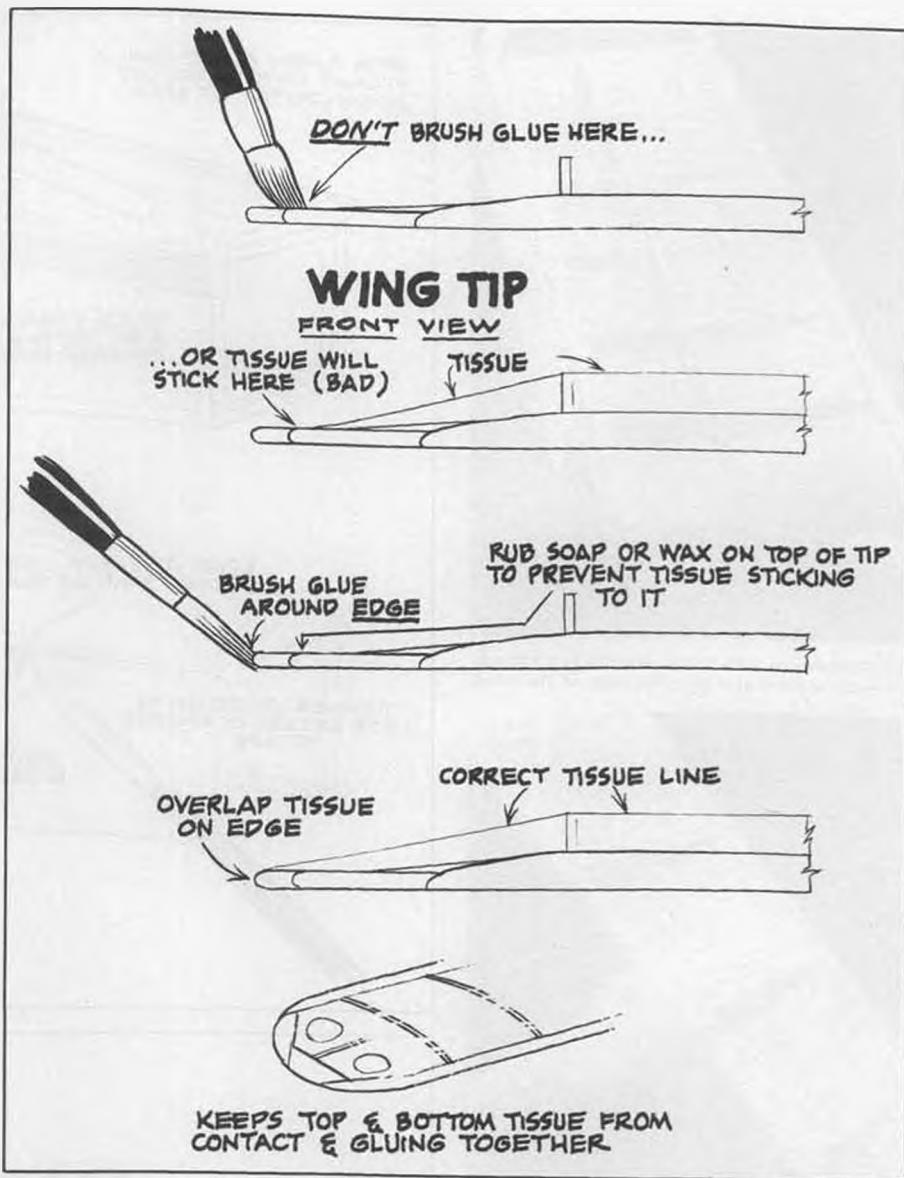




around the T.E., rubbing a little glue along the edges to make sure it is stuck down. Be careful not to let the glue dry on your fingers or thumbs while you are working, or you may pull chunks of tissue off by accident. I constantly (well, every few seconds) wipe my fingers and thumbs while doing the sticking-down.

#### THE TOP WING PANELS

I'd advise not trying to cover the top of the wing and the tip section with one sheet, due to the "compound" curve the tip covering has to make. Make your tissue panel about 1/4 inch too long (with the grain in a spanwise direction), and leave about 1/4 inch all along the L.E. and T.E. for handling and "wraparound." The place where the tissue attaches to the center section is doing two things at once: coming down at the dihedral angle, and curving to fit the camber, both at the same time. It will help if you cut the edge that touches to have a very slight inward curve (see drawing). This will make for a better fit. Some guys even make a few little "fringe" cuts along that edge, although the dihedral on the FAC Moth is not really steep enough to need that much attention. Apply the glue with a small brush around the "picture frame" you are covering. Don't try to stick it to each rib; that's a waste of time and may even get in the way of even shrinking. When you come to the last rib before the tip, stick it to the top of that one. Many modelers then like to make a few "fringe" cuts in a spanwise direction in the excess tissue on the tip end and glue it down over onto the side of the rib for more strength and to make a neater job of it. This is optional. Allow the lot to dry. Now trim off the L.E. and T.E. excess, leaving just enough to wrap around and color the struc-

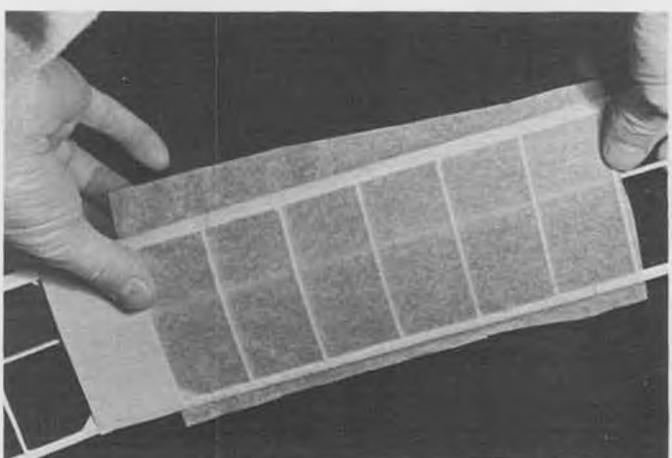


ture with the tissue. You could cut it off even and then use a felt pen or colored dope, but taking a little extra time to do it with tissue will look very professional.

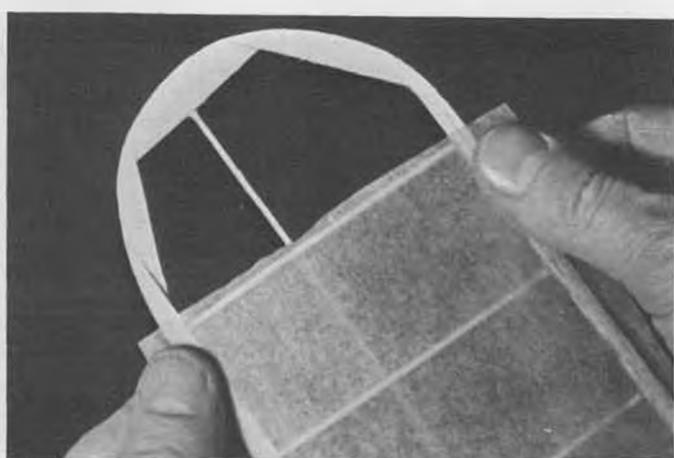
#### THE TIPS

Cut the edge of your tip tissue panel just the opposite of the edge you joined to the center section. The slope is in the opposite direction, so you will make a little outward

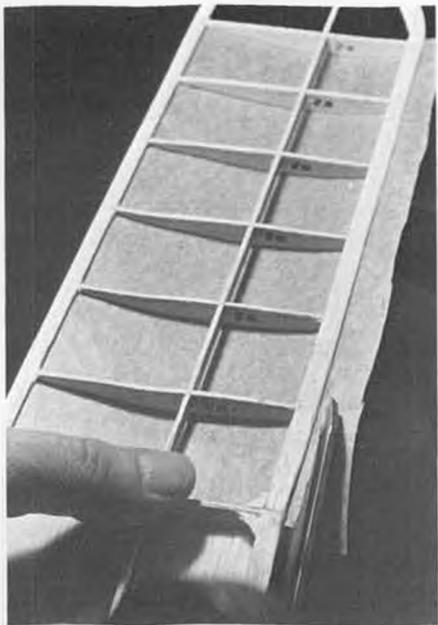
curve this time so that it will follow the camber of the rib it attaches to. Rub some soap or candle wax on to the top surfaces of the wingtip structure and the end of the main spar so that the tissue will not adhere to the wrong places. To have a nice smooth tip covering job, you want to glue your tissue *around the outside edge* of the tip, never to the flat top. To get the tissue to go around



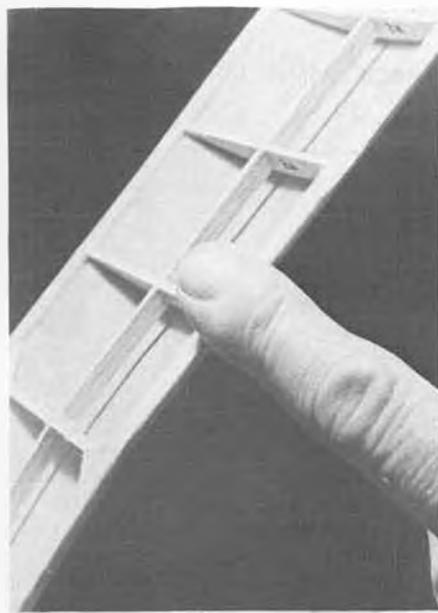
Cover the wing top in five parts. Do the center first, then from there to the last rib before the tip. Note excess tissue.



Pull wrinkles out of the tissue side-to-side and also end-to-end before the glue dries. Keep wiping those thumbs dry!



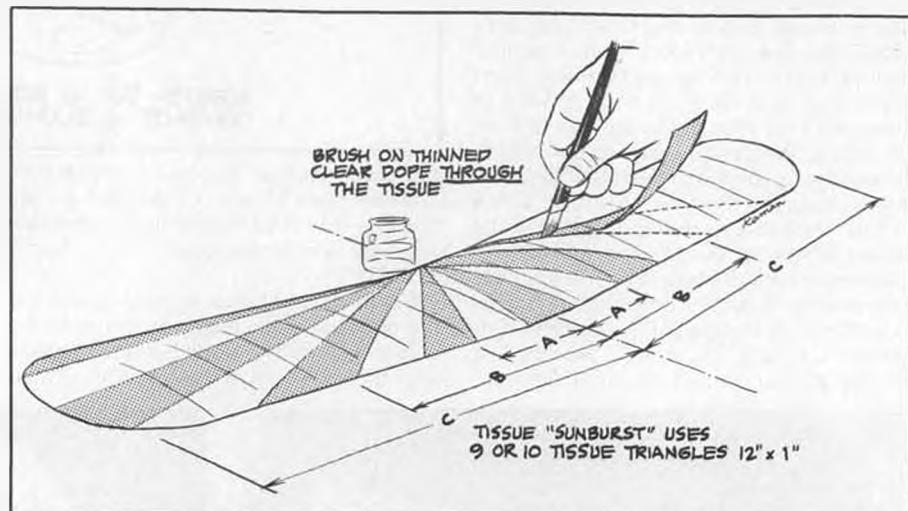
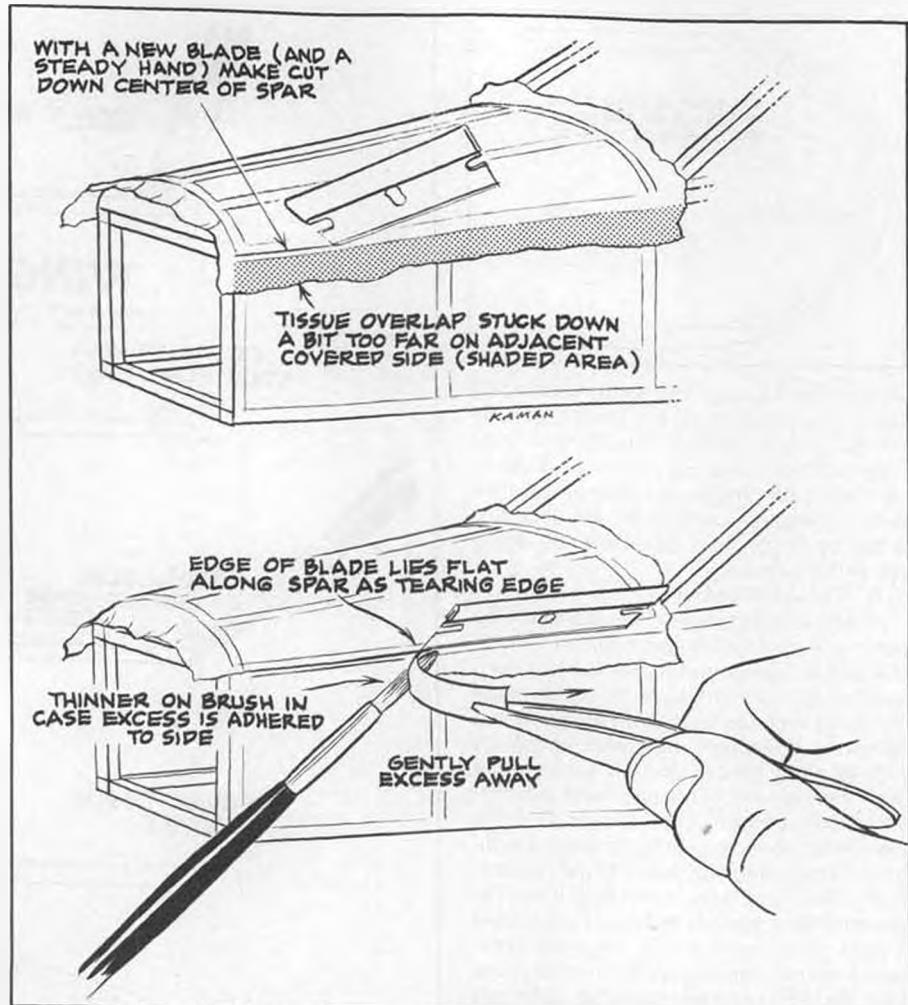
Use scissors to trim tissue, leaving just enough to wrap around and hide the edge of the wing.



Run a moistened finger along a glued or doped edge to make sure it lies flat when it dries.

The shape of the tip, you should first "picture-frame" the area with glue and then dampen the tissue you are putting on with a fine mist from water in a hairspray bottle. Putting your tissue between two damp towels for a while works, too. Attach it to the rib carefully and then pull out all wrinkles with your thumbs. Remember that damp tissue tears easily. Making little fringe cuts on the excess around the curved tip with sharp scissors will allow them to overlap each other a bit and fit around the tip. Clean the scissors blades with a damp paper towel before the glue dries or your mother will kill you! You can wait until the tissue dries and then do it if you wish.

Before you attempt the above operation, I would like to call your attention to what may happen if you either try and cover the tip before the top panel is dry or if you use too much wet glue on the place you stuck the top panel down. If that glue is not really



dry, or if your new coat of glue softens it up, you may wind up with the top covering moving off the top of the rib. This is a disaster. It can be avoided by overlapping the end of the top panel down the side of the rib as we mentioned earlier, by making sure the glue is *really* dry and not getting the area wet enough to loosen the old glue, or by using a different kind of glue to stick on the tip tissue.

One of the tricks every modeler should know is that of using glues that do not dissolve each other. These "dissimilar" glues, in this case, are model dope (just a thin glue or liquid plastic) and white (water-based)

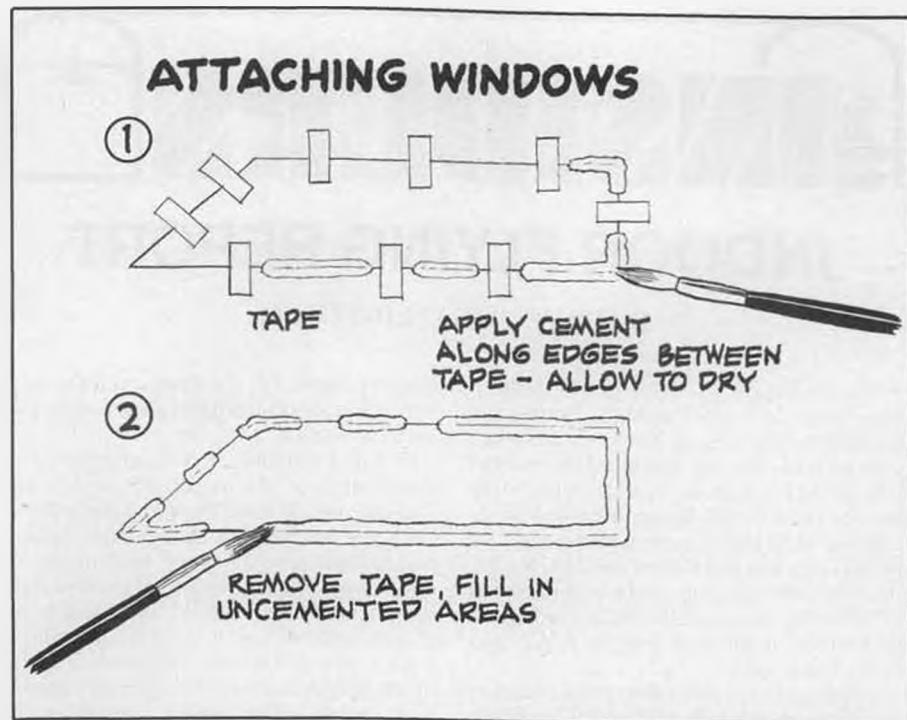
glue. If you glued the top tissue panel on with white glue, then using dope to do the tip panel will not have any effect at all on the previously applied tissue. Clever, no? Keep in mind that you will need about two or three coats of dope on the "frame" before you put the tissue on to get enough "sticky" to hold. Dampen the tissue, lay it on, and brush some thinner or thinned dope right through the tissue. When you are laying one tissue panel over another, it is always good to fit it exactly, as it's hard to trim off excess tissue over tissue. Over an edge, there's no problem, so start your fit at the rib end, and let the extra hang off the wing tip

end.

#### THE WING BOTTOM

This is a piece of cake. No fancy curves. We could even do it in one piece if we were feeling adventurous. I do mine in three pieces, no special reason. I do suggest, though, that you don't try and shrink the top tissue before you cover the bottom. Helps avoid nasty warps. Assuming that you wrapped some of the top covering around the L.E. and T.E., you can now overlap that just a little and then trim the excess off when it dries (see drawing). One of the problems with this is getting the excess off, as some of it is sure to have stuck to the wing where you want to strip it away. I usually have pretty good luck just dampening the stuck-on part and pulling it off. Using dope for the bottom tissue adhesive makes this simple, as a little dope thinner on a brush works wonders in loosening the tissue on the side you want to peel off, and if the top tissue was done with white glue, it wouldn't be loosened a bit! To finish up the job, rub a finger with a tiny bit of thin glue around all the edges to make sure the tissue is stuck down with no fuzzy edges. The difference between a really good-looking model and a slap-dash one is often just the two minutes taken to stick down those ragged trimmed edges! If you use dope to stick the edges down, moistening your finger with water will help the tissue lie down flat so the dope can do its job sticking it to the surface.

#### COVERING THE FUSELAGE or



#### NOW THE FUN BEGINS!

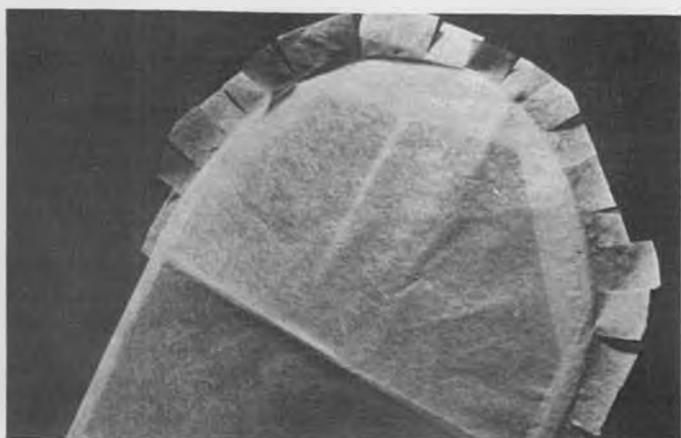
Covering the fuselage will be done best in five pieces: one for each side, one for the bottom, one for the front from the windshield forward, and one from the cross-strut where the side windows end to the tail. Again, maybe making patterns from

newspaper would be better than running out of tissue when almost done. Generally, it works best to run the grain of the tissue in a nose-to-tail direction, especially when going around rounded surfaces. It tends to

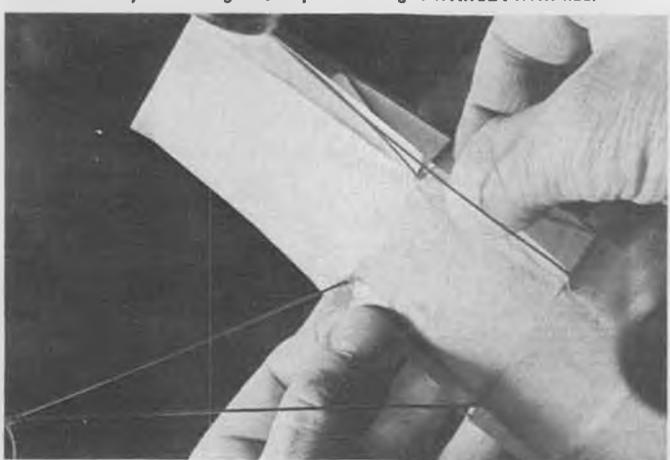
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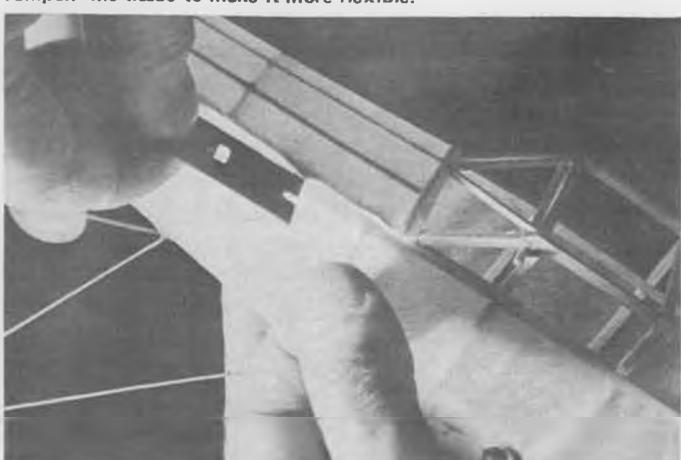
Cover wingtip panel separately. Glue around edge only. Lightly spray with water if you can't get it to pull out tight without wrinkles.



Cutting a fringe on tissue that has to wrap under helps if you do not dampen the tissue to make it more flexible.



Cutting little slits to go around the landing gear makes applying tissue to the underside of the model easier.



Trimming off excess tissue where two panels meet is a tricky job. Cut right down the middle of the stick underneath.

# The INSIDERS

## INDOOR FLYING REPORT

By DAVE "VTO" LINSTRUM

• Contributions to "Hint of the Month" have been zero from readers, but we are starting to get lots of feedback from aficionados of Obscure Aircraft. This month's little-known full-scale design is the 1940 Napier-Heston JA-5 Racer, modeled by Al Lidberg in 32-inch Coconut Scale size. The prototype was a test bed for the 2310 hp, 24-cylinder Sabre engine, and it was intended to break the 500 mph barrier. It crashed on its maiden flight and due to WWII was never flown again.

Lidberg has modeled this unusual ship in a rubber version with a unique three-blade prop made from a pair of P-30 props. The wings knock off for damage control and packing. The sleek lines with lots of detail should make it a favorite of scale judges in AMA or Coconut.

For a set of plans with full instructions, send six bucks to Al. If you want just his catalog, send a buck to Al Lidberg Plan Service, 614 East Fordham Dr., Tempe, Arizona 85283. His FAC NoCal Scale ships are super; try the Blohm & Voss BV-141 Bomber for a real Obscure NoCal. Tell Al that "The Insiders" sent you.

### FLYING WINGS: AL'S ODDITIES

In response to our call for Obscure Aircraft, Al Backstrom of Texas sent us a half-dozen flying wing photos! These birds would make great entries in the MB-sponsored Northrop Flying Wing Contest at Tait in October if they were built to outdoor standards. However, all are insiders. Several are FAC NoCal—a profile class that is popular all over. Take a close look at AO-1 through AO-6 for some interesting oddities. For more info, send a SASE to: Al Backstrom, 1220 Yacht Club Rd., Little Elm, Texas 75068. Tell Al where you saw his oddities and ask how to get plans of Arnoux Simplex Racer, a French Monoplane flying wing from 1922.

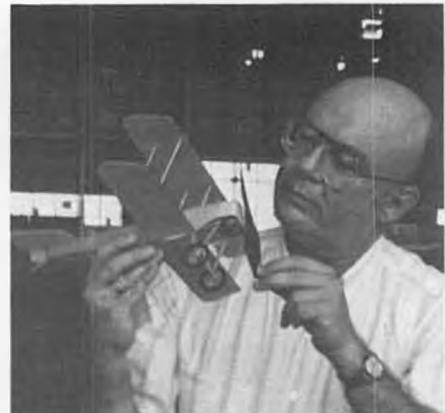
### WHAT IF THE RULES WERE DIFFERENT?

This concludes Hewitt Phillips three-part article (See August and September "Insiders"). The most effective way to increase the endurance of a model is to reduce its wing loading. This problem is still the design challenge that keeps up the interest of the experts in the AMA Microfilm Stick and FID categories. These models, as pointed out previously, require such skill in construction and handling that only a few enthusiasts continue to participate in these events, and the endurance attained by these experts would make a contest impractical if there were more participants. In order to reduce the endurance to a more practical value, it is necessary to control the wing

loading. Preferably the rules should also result in a model that is more durable and easier to construct.

In Part I (August), it was suggested that elimination of bracing on the wings and fuselage would have these desired effects. With the problem of continually seeking the lightest possible wing loading eliminated, some other method of presenting a design challenge should be sought. As shown, another way to increase the endurance is to provide optimal values of many other design features, for example, aspect ratio, motor stick length, propeller diameter, airfoil shape, etc., while still meeting the requirements of the rules. Finding the best values of these quantities can be a lengthy trial and error process that may take several years of competition. Thus, a design challenge can be presented to the contestants provided that these design features are not unduly constrained by the rules.

Examples of the long process of establishing an optimum design can be found whenever the rules have remained consistent over a period of years. In the FID event, for example, models were initially scaled-down versions of the AMA Stick models of the time. The first design trend found beneficial was a shift to larger propeller diameters. Later, the benefit of lower aspect ratio reduced to the point that the model must be extremely fragile to reach the specified one gram minimum weight. In effect, if the model cannot be made as light as one



Guess who admiring his WWI Peanut Bristol Scout B built from Nowlen Aero kit.

gram, this limitation is no longer operative. It can be seen that the time required to reach an optimal condition may be extended by eliminating restrictive rules as far as possible. This idea has not been followed in setting up some of the existing events. In Easy B, for example, there is no freedom to vary aspect ratio, tail area, or span because these parameters are all specified by the rules. The Easy B has by now almost reached the status of a one-design class, with little further development possible.

In order to provide the greatest design challenge in a new model category, as few parameters as possible should be specified, leaving the designer with the problem of determining the optimal combination of the other parameters.

Possibly no regulations are needed other than the elimination of bracing. The size of indoor models, such as AMS Stick, tends to be self-limiting because of the operation of the cube-square law. This law states that as size of a model increases, the weight goes up as the cube of the linear dimension, whereas the wing area goes up as the square. The wing loading therefore increases with size.

Very small models are inefficient aerodynamically because of their low Reynolds numbers, but, at some point, the cube-



San Diego Orbiteer Insider John Oldenkamp in his sunny workshop with a trio of Coot indoor hand launch gliders. Details in text. Photo: Carin Howard.



AI Lidberg's obscure aircraft is a 1940 Napier-Heston JA-5 racer, modeled as a Coconut scale. He sells plans; see text.

square law takes over and prevents further gains with increasing size. The best model size may still be larger than desirable, however. If it is desired to limit the size of models below this value, certain other restrictions may be imposed.

In the past, the AMA rules limited size of models by specifying wing area, whereas in the F1D class the wingspan is limited. Limiting the wing area, though effective, is undesirable because it is a difficult quantity to check at a contest. Limiting wing span has the disadvantage that it encourages rather ungainly models with wings of low-aspect ratio and long tail booms.

An interesting possibility is the specification of maximum wing chord rather than span. If this type of rule were imposed, the designer would have to select the optimal span or aspect ratio. The resulting aspect ratio could not be too small, or the model would be too small; whereas it could not be too large, or the resulting wing would be

too heavy. In general, the effect would be to encourage higher aspect ratio wings, resulting in stronger and more graceful models.

A mathematician may recognize the design of a model to meet rules of this type as a problem in calculus of variations. In this branch of mathematics, a combination of parameters is solved for the cases: some function of these parameters (in this case the endurance) to be a maximum, while at the same time satisfying certain constraints (for example, the wing chord).

Actual design of a model by this procedure is impractical because the theoretical effects of all the parameters are not known mathematically. Often, computers are used to solve such problems in an iterative, trial-and-error manner to locate the optimal design, very much like the real life procedure in which many modelers, competing over a period of time, come closer and closer to the solution.

This mathematical procedure is men-

tioned not to suggest its use in designing models, but to point out that the calculus of variations can also solve cases in which the constraints are not single values, but are functions of the parameters. This type of problem suggests another method of formulating rules. As a simple example, consider a rule which specified that the sum of the motor stick length and maximum wing chord should be a constant (18 inches, say). Now the designer has a more puzzling problem. If he reduces the motor stick length, he can use a larger wing chord, but he is restricted to a shorter motor stick that can hold less rubber. The test design under these conditions is not at all obvious, and could lead to a variety of design approaches until the best configuration evolved.

The use of constraints or restrictions involving functions of the parameters leads to so many possibilities that careful thought

*Continued on page 71*



From Al's Oddities by Al Backstrom of Texas is this CO2 Flying Wing Westland Hill Pterodactyl.



Another Oddity from Al is this Arnoux biplane. Poor performance proves two ain't always better than one!



A non-scale Bostonian with meat tray foam wings and fin. Fuselage box is horizontal.



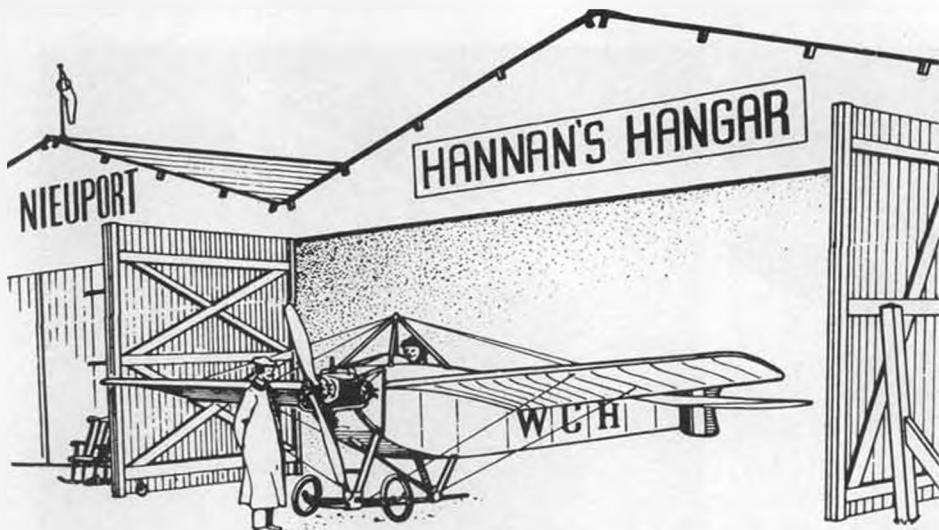
FAC No-Cal profile by Backstrom is the Hoffman All Wing. Truly obscure!



An all-balsa FAC Waterman Aerobile flying car, with a long nose.



A Lippisch Delta I Flying Wing, another Backstrom FAC No-Cal profile with long motor stick!



"...the only reason for the production of a new type of airplane is to do a particular piece of air work more efficiently than it has been done before."

- Our lead-in line this month, by Major General James E. Fehet, appeared in his 1933 book *Flying*. Certainly the thought is just as appropriate for model builders as for designers of full-size aircraft!

Another intriguing quotation, this by Jeana Yeager speaking about the world's largest gathering of aircraft at Oshkosh, Wisconsin: "It is as magical to aviation enthusiasts as the Emerald City of Oz is to children."

#### ICARUS GAMES, ANYONE?

According to the April 1988 *Pilot* magazine, sent to the Hangar by Leo Opdycke, plans are in progress for an "Olympics of the Air" to include ballooning, hang gliding, parachuting, soaring, air racing, and precision flying. The proposed date is scheduled for 1990, and France is the proposed host. Why not added events for model aircraft?

#### HUMOR AND REFLECTION CORNER

Blame this joke on J. David Williams, who featured it in his 1939 *R.P.M. Airport Weekly*:

Rich aircraft owner: "What's this gadget?" Pilot: "That's an artificial horizon." Rich owner: "Artificial? Tear it out, I can afford to buy a real one." Dave explains that he found this gem (?) in his archives, an accumulation dating back about a half century, and says:

"I tend to have recurring attacks of nostalgia (hopefully not fatal). I've always been a pack rat, seldom throwing away anything."

Formerly a Professor at Northern Illinois University, Dave is now retired. "...so now I can reminisce and build models and putter as much as I damn please."



Delightful little trophy from the Second Parcel Post Proxy Peanut contest of Japan, sponsored by the Nagoya Shonai club. Trophy has a wooden base with a genuine Peanut pilot enclosed in a molded plastic canopy.

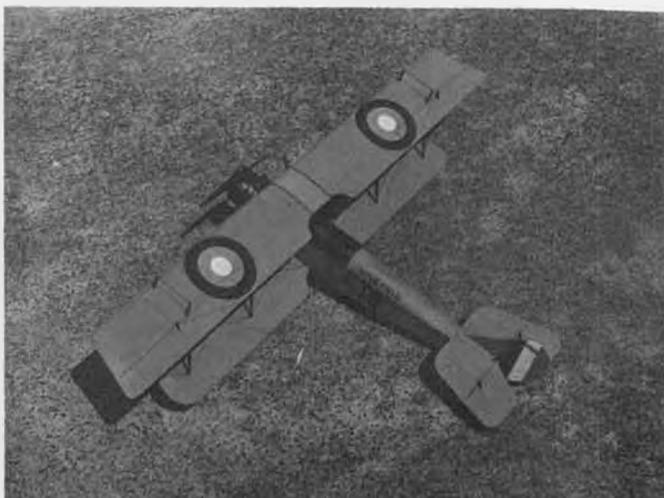
#### BY SLIGHT CONTRAST

Herb Weiss, also a collector and also retired says: "Every day throw something away." On second thought, he suggests donating excess items to a fellow enthusiast, or possibly to an aviation museum.

On the philosophy of life, Herb recalls an Agatha Christie book character who said: "Life is a one-way street." To which Weiss adds: "You can look back but you can't go back. And don't spend too much time looking back; there may still be a few potholes in the road ahead." Sobering thoughts. However, model building seems to be an exception to the rule. Many of our readers



Don Srull's mind-boggling free flight Dornier X has 12 electrically driven motors.  
Photo: Schmitt.



Display scale model of Love Field Curtiss Jenny was constructed by four members of the Texas Flying Aces Club. See text.



Gyroquette, autogyro by Georges Chaulet, of France, is constructed primarily of foam, and is one of a long series of rotorcraft.



Don De Loach, of the Texas Flying Aces with his Jumbo scale Corben Super Ace, with scale construction throughout.

build models remembered from their early beginnings in the hobby and say that they enjoy them as much or even more than they did when they were youngsters. Have we found a time machine?

#### WHAT'S NEW?

Shifting deftly from the past to the present, we have received a bumper crop of new product samples this month. We are seeing an especially industrious outpouring of items for model builders, ranging from documentation through plans and accessories. The following offers only a brief "taste" of some, and we suggest that you write for more information on anything that catches your interest. Please tell 'em *Model Builder* sent you!

#### Publications:

"Aeromodelers have an unsatiable appetite for scale information." So say the publishers of *Aircraft Archive*, who are compiling a fine series of books devoted to detailed scale drawings of exceptionally high standards. *Aeromodeller* and *Scale Models* magazines of Great Britain have long been leaders in the production of drawings aimed at builders of miniature aircraft. What originally started as the presentation of relatively simple "general arrangement," or three-view, drawings has evolved over the years into comprehensive technical art which are truly masterworks.

The subjects featured, to quote the publishers, "belong to an era that will never return—before aircraft engineering became an assembly of compromise and outlines took on the image of committee decisions." One suspects the fine pen of Ron Moulton behind those choice words, and in the selection of the fascinating drawings.

The initial volumes were reviewed in an earlier Hangar column, and the latest releases are: Volume 2, *Fighters of World War Two* (includes mostly propeller-driven aircraft), and Volume 2 of *Post-War Jets* will be of more interest to the builders of ducted-fan models. Among the favorites in the *WWII Archive* are: Hawker Hurricane, Messerschmitt Bf 109s, North American Mustangs, Supermarine Spitfires, Northrop Black Widows, and Vought Corsairs, as well as lesser-known but suitable modeling subjects such as the Fokker D23, YAK 9, and Fairey Fulmar. The non-prop types include the Heinkel Salamander, Me 262s, and Me



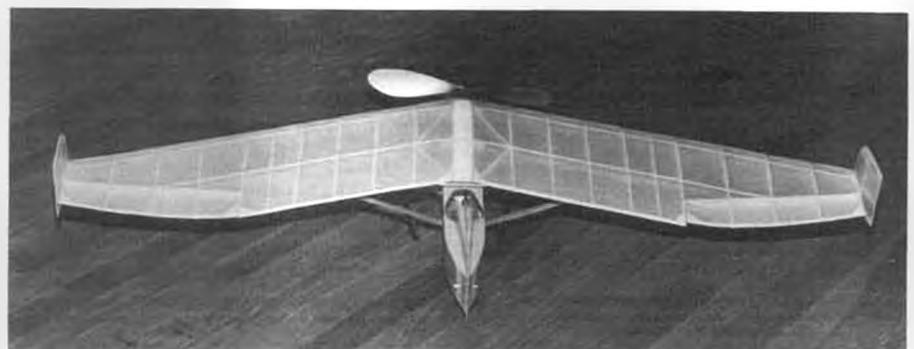
Dr. Wil Nakashima with one of his most recent models, a Champion Model Products' Coupe.

#### 163 Komets.

For the jet set, the other volume offers machines such as The Chance Vought Cutlass and Crusader, Hawker Hunter, Convair

Delta Dagger, Grumman Cougar, McDonnell Phantom, British Aerospace Sea Har-

*Continued on page 78*



Al Backstrom's Texas-sized Coconut Scale model of the Lippisch Storch flying wing spans 36 inches, yet weighs under two ounces.



Inspiring Bucker Jungmann photo was taken by model builder Frank Rueuss from his brother-in-law's Tiger Moth.

# Build your own AIR CANNON

By RANDALL BARNABEE . . .

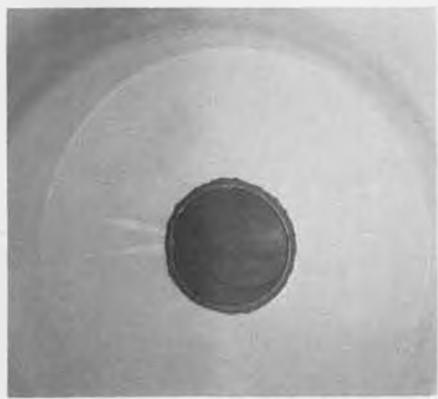
Even if you don't need an air cannon to dislodge trapped indoor models, you can still have a heck of a lot of fun with one. C'mon, give it a try, it's easy!

- If you fly indoor models and would like a safer way to dislodge them when they get stuck in high places, read on. An air cannon is the tool for you!

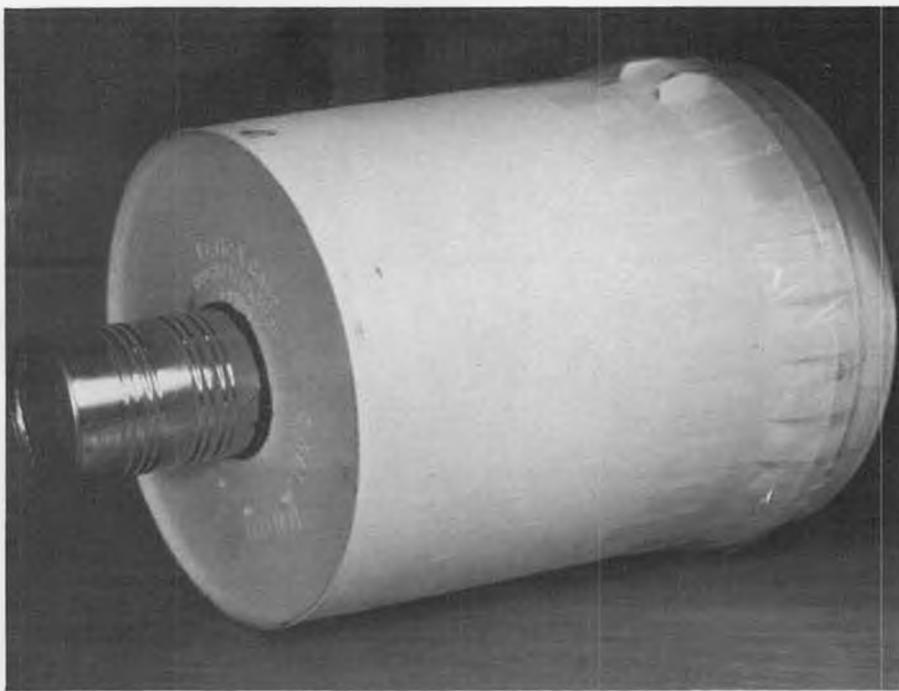
In Ken Johnson's "Indoor" column of the March, 1985 issue of *Model Builder*, he wrote a lengthy section called "Adventures in Retrieval." Now, I am not an indoor flier, but Ken's anecdotes were interesting and amusing, and I could empathize with someone who had put hours of work into a model only to have it fly up and stick to some quite out-of-reach obstruction. As I read his column, the slow, ponderous wheels and cogs of my brain began to turn, and soon I had an idea for something that might be extremely useful to Ken and every other indoor modeler: an Air Cannon!



Everything you'll need to make your own air cannon.



Apply a bead of adhesive to the inside rim as well.



The finished air cannon, ready to dislodge hung-up indoor models, or to blow mammoth smoke rings, or just for fooling around.

No, an air cannon is not something of the 12-gauge, pump variety, but is instead a device which has actually been around for some time. An air cannon is a rather simple instrument that propels a ringed vortex at varying velocities for some distance through the air. The vortex is the same sort that smokers create when they blow smoke rings. Propelled by an air cannon, a vortex has speed, power, and travels in a straight line. In short, it is readily aimable.



Cut inside line with hotknife. Don't get too close to the line--you can always trim it down more if you need to.



Cut your diaphragm material on a radius three inches greater than that of your air chamber rim.

When I was sixteen (some years ago) I read an article about air cannons in a general aviation magazine, and I wish I could remember either the magazine or the author so as to give due credit. Reportedly, the idea of the air cannon as a tool has been around at least since World War II. Toward the war's end, the Nazis were supposed to have been working on one for use in an an-

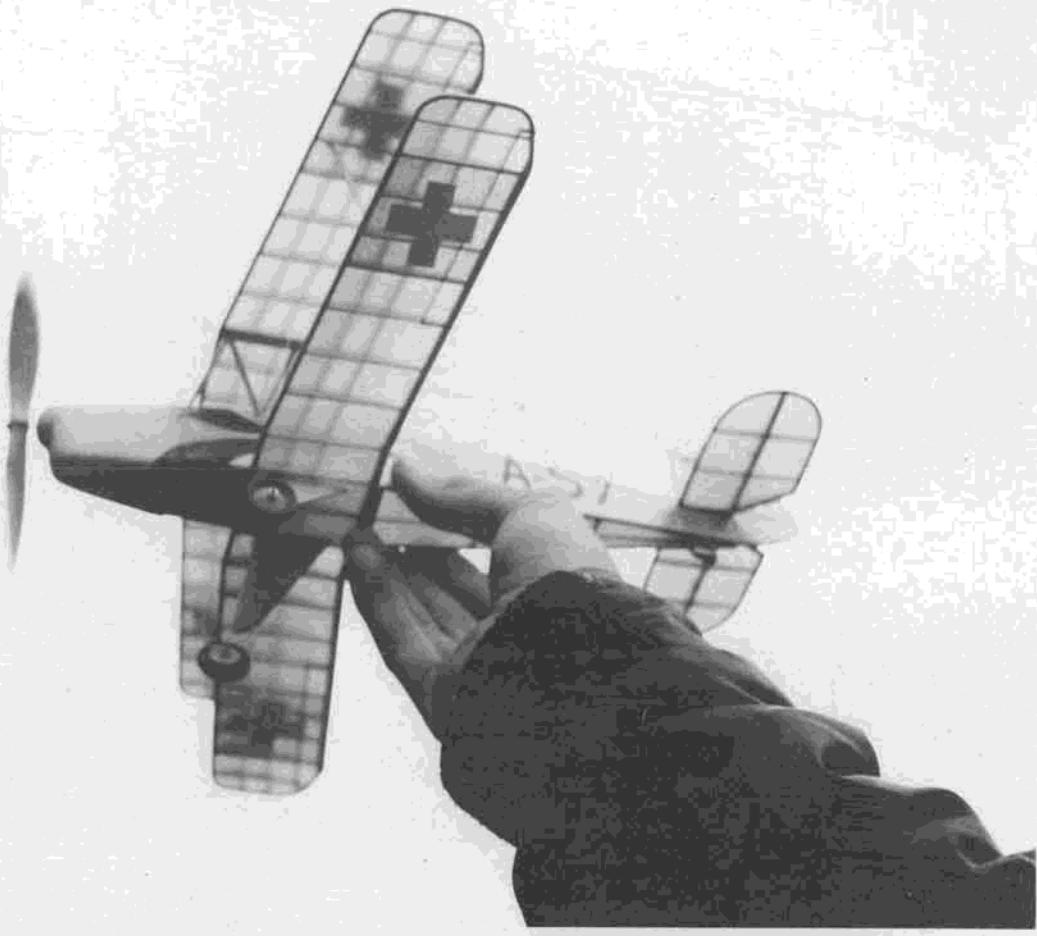
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Applying silicone adhesive. For a thicker bead, do it in layers. Otherwise it will take a long time to cure completely.



Diaphragm is all stretched and taped in place. Note upper strapping band and lower which hold tape strips to chamber sides and to the diaphragm.



## BUCKER JUNGMAN

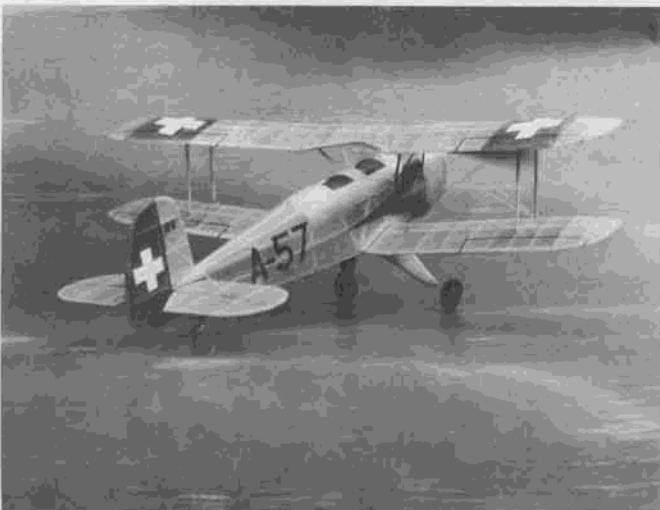
By WALT MOONEY... We reached way back 16 years to the March/April, 1972 issue of Model Builder for this good-flying scale model of a well-known biplane. As usual, building is easy from Walt's plan.

- This is a peanut scale model of the Bucker Bu 131 B Jungmann, the famous German primary trainer for most of the German pilots who later flew the fighters and bombers in WWII. Profile Publication Number 222 has provided the data and the

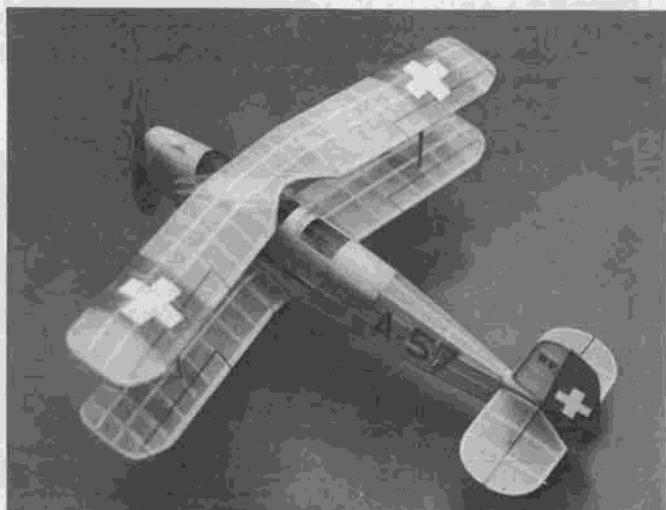
three-views necessary to design this model, which is a model of a Bucker Bu 131 B numbered A-57 that was license-built by Dornier-Werke A.G. in Switzerland. It has the standard color scheme applied to all Swiss military Bu 131s after WWII. In fact,

this color scheme was the single item that inspired the model. The base color is yellow, with white crosses on red bands on the top and bottom of the wings and on either

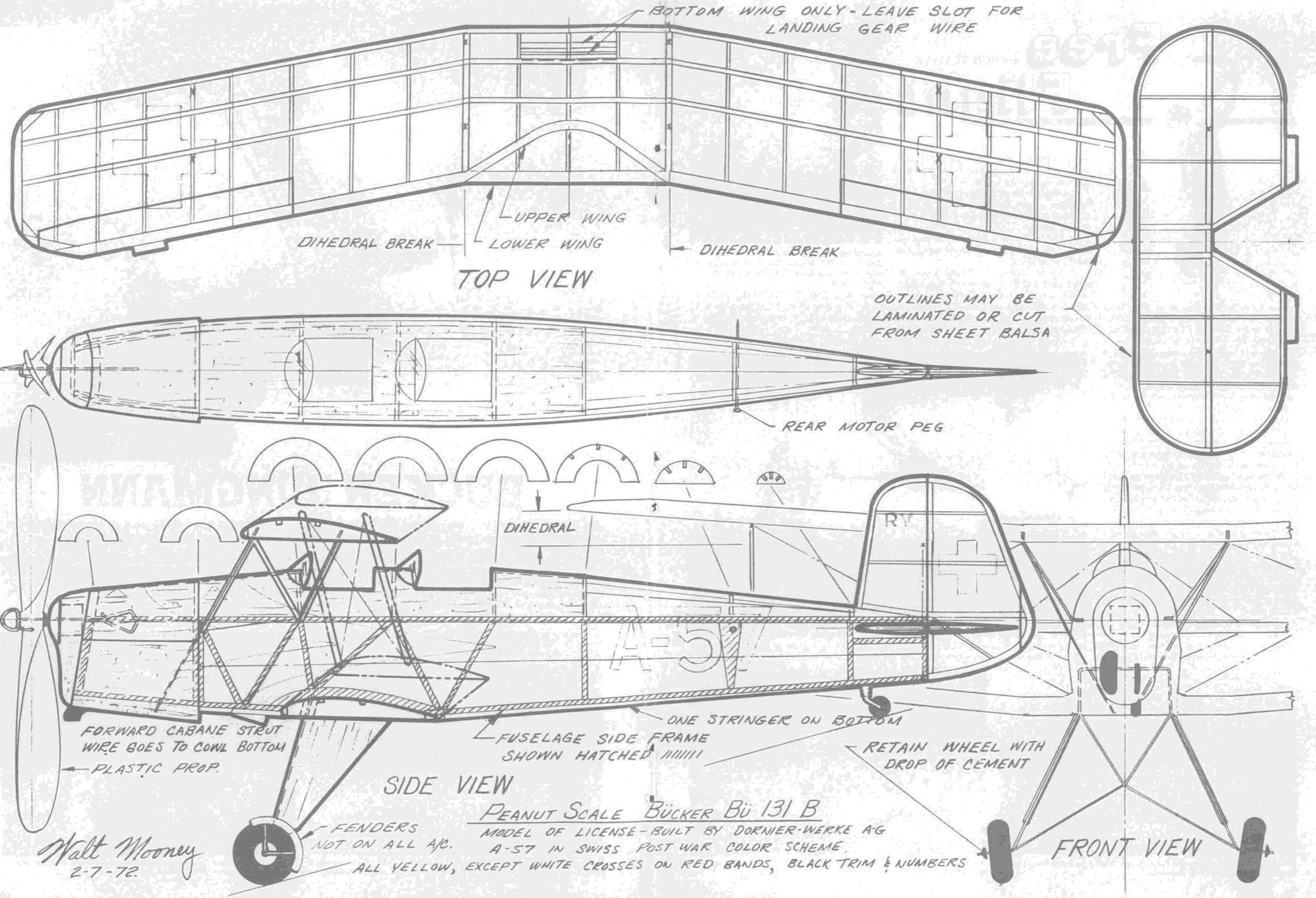
*Continued on page 74*



The Bucker has beautiful proportions for a scale model that is supposed to fly rather than sit on a shelf. Base color is yellow, with red rudder.



Wingtips and tail outlines are laminated strips of balsa. Stringers are cut from 1/32 sheet for lightness.





# Free Flight

By BOB STALICK

lot of expenses also. Since we like to kid each other a lot, he proceeded to send me the following price sheet!

1. Model Pickup: a. Standard, throw assembled model in bed of truck; \$7.00. b. Custom, put model in tool carrier on bed of truck; \$10.00. c. Deluxe Custom, take model apart before putting in tool box on truck, usually preventing severe wing and stab stress; \$14.00.

2. Model Storage: a. Throw model in back yard; \$3.00 per week. b. Hang model in tree out of dog's reach; \$5.00 per week. c. Place model in garage; \$10.50 per week. d. Place model in garage off floor where Doreen parks the car; \$17.00 per week.

3. Model Protection: a. None; \$3.00 per



Ken Oliver with his new FAI Power (F1C) V dihedral model. Note ship's winglets to assist with power and glide. This configuration is hard to beat.

week. b. Guard dog; \$6.00 per week. c. Guard dog with teeth; \$9.00 per week (add puppy chow at \$1.50 per pound per day = \$18.00).

4. Standard fee for bothering me with



Harlan Halsey is a member of SAM 51, but he has ventured into the land of nostalgia with his version of Dan Sobala's Geef 250. Looks like a Thermal Hopper engine. Photo: Armstrong.



Wil Nakashima and his current 1/2A design; British roundels and raked-tip wings look like a WWI derivative.



Ray Smith and his Torp 19-powered A-B Spacer. A hot combination. Photo: Armstrong.

your damned airplane in the first place; \$25.00.

'5. Long distance fee (you're there, I'm here!); \$6.00.

'6. Add .25 for the stamp, \$6.00 for my time to detail prices for you, \$27.00 for gas, \$37.98 for edge of town meals while away from home" Well, gang, how's that for starters this month?

#### **PEARL DUSTER B-C by Dave Linstrum**

Many years ago, when Mindi Linstrum was a young teenager and Dave Linstrum still wrote a column for another magazine called "V.T.O." instead of being the resident "Insider," this design appeared in his column. Dave was following a design trend that had its popularity in England, called Bitsa models. You know what I mean, bitsa this, and bitsa that; soon you have a complete ship. Well, to cut a long story short, Dave put together the wing and stabilizer from a Starduster 600 (with squared off tips), and rubber banded them to a fuselage from a Bill Chennault Pearl. The result was called the Pearl Duster—pretty innovative, huh?

Well, Mindi did fly this ship at the 1973 Nats powered with a McCoy .29 and .35. She did right well, too, winning first place in C Gas Junior.

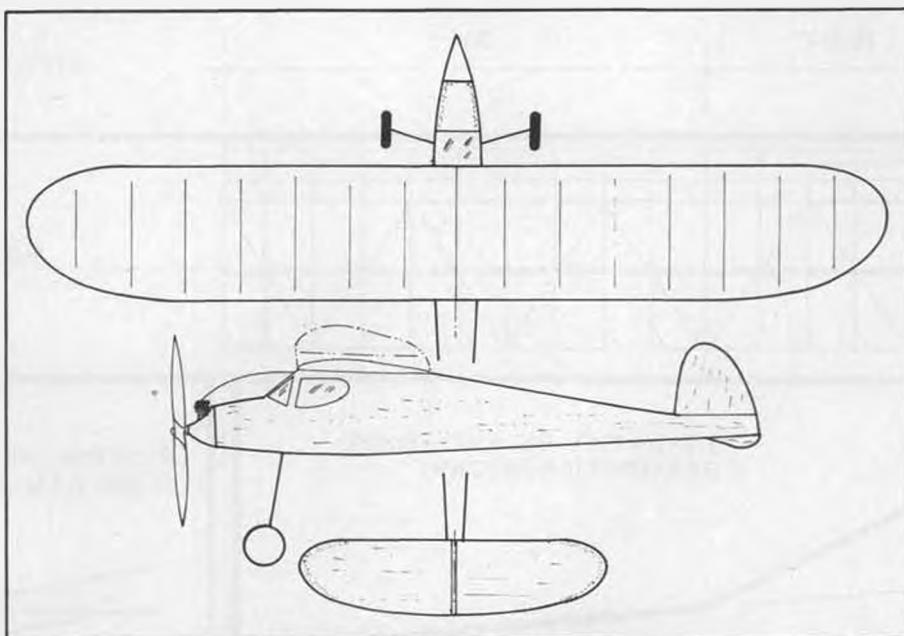
As anyone who gives Dave his address knows well, he has a habit of sending all kinds of stuff to you in the mail. In one of the mailings that I got from him was this three-view of the Pearl Duster. Recently, while cleaning up my workbench, I ran across it and decided to share it with you.

I have made a couple of additions to the Linstrum three-view; notably, I have included a half-size wing and stab rib pattern, just in case you would like to build the ship. These ribs are patterned after the original Pearl-type wing section and should do the trick for this ship. I would like to suggest a couple of other changes for anyone who does contemplate building this model. These are:

1. Do not cover the ship with MonoKote. Use either double Japanese tissue or silk. Build 3/16- to 1/4-inch washin in the right wing when you build the model.

2. Also wash out each wing tip about 1/8 inch. If you cover with tissue or silk, you will not need to add the anti-twist bracing in the wing.

3. Set the initial wing incidence at just over two degrees; begin with .3 (5/16) inch, and, after hand gliding, be prepared to add



#### **OCTOBER MYSTERY MODEL**

or delete some incidence to obtain a flat, floating glide.

Most of the other directions are included on the three-view. If you have the Pearl kit, the job is even easier. If not, the sketch is provided in 1/8-inch scale so that you can draw up your own full-sized plans. And to complete the picture, I hope you can find an old McCoy .35 or Fox .35 stunt to bolt onto the nose. If you do all of this, send a picture of your Pearl Duster to Mr. Ex-VTO right here at *Model Builder* magazine.

#### **OCTOBER MYSTERY MODEL**

No weirdos this month, but a stumper just the same. Here is one from a kit that is still being produced. This ship has a wing-span of only 23.5 inches and is touted as being convertible from rubber to CO<sub>2</sub> power right on the field. In fact, to emphasize this changeability, the model comes equipped with a "freezewall," instead of a firewall. One other hint, the ship is all sheet except for the built-up wing.

If you know what it is, then you stand a good chance of winning a free subscription to *Model Builder* magazine. Just write your winning answer on a postcard or in a letter and fire (oops, freeze) it off to Bill Northrop at *Model Builder*. First one with the correct answer, wins.

#### **OCTOBER DARNED GOOD AIRFOIL—**

#### **S.I. "Flying Wing"**

The English have garnered a reputation for designing and flying "odd ball" ships during the past several decades, and this section is one that has been in common use for such ships. The section is actually an airfoil specifically developed for tailless models. The sharply reflexed trailing edge, extending over about one third of the chord width, results in exceptional stability so that it is possible to produce a stable airfoil without recourse to sweepback. A number of highly successful Swiss "flying plank" tailless models incorporate this section or airfoils of similar type. The average center of pressure position is roughly 1/5 of the chord.

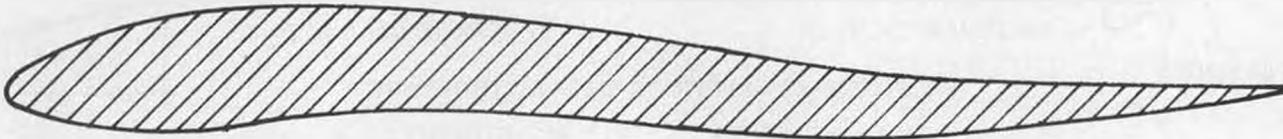
So, if you want to design a flying wing, give this airfoil a try.

#### **AMERICA'S CUP COMPETITION**

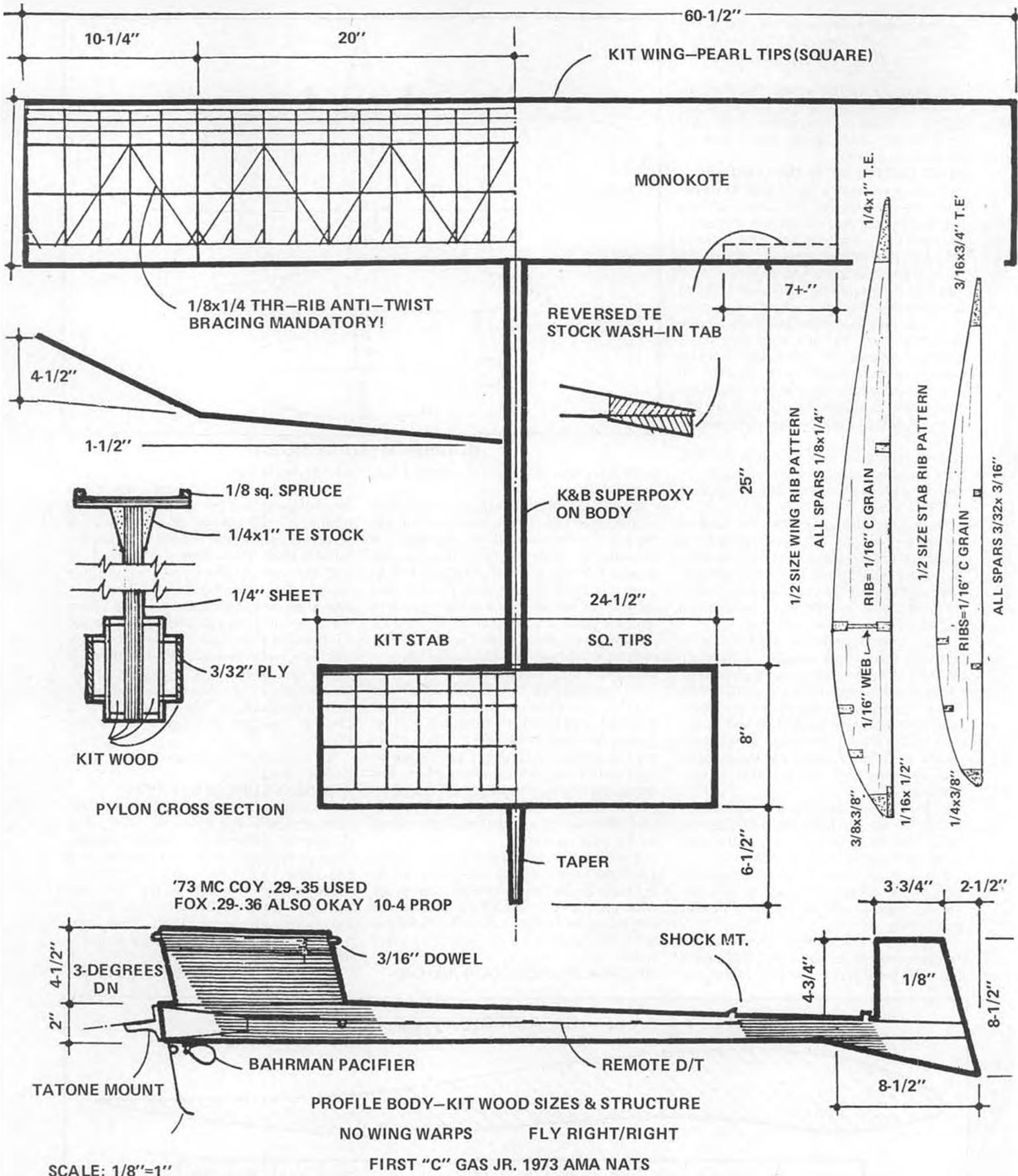
In an effort to promote FAI Free Flight competition in the USA, the SCAT club (Southern California Aero Team) is proposing a yearly competition to select the best FAI Free Flight flyer in the Nordic, Wakefield, and Power in the U.S. and Canada. Following the format of the recently inaugurated World Cup, the America's Cup will be presented annually to the best flier in each event.

The winner in each class would be the

#### **S.I. AIRFOIL 'Flying Wing'**



STA	0	2.5	5	10	20	30	40	50	60	70	80	90	100
UPR	3.5	6.0	7.0	8.4	10.0	10.0	9.0	8.0	6.5	5.2	4.7	4.7	4.7
LWR	3.5	1.4	.8	.1	1.0	2.0	1.8	1.0	0	.4	1.0	2.5	4.4



# PEARL-DUSTER BC

MODIFIED STARDUSTER 600 KIT MINDI LINSTRUM CHICAGO



George Perryman with his variable pitch, variable diameter rubber model prop. This is the large-diameter prop. See sketch at right.

competitor who, each year, has the highest score in a series of designated FAI contests in the USA and Canada. The America's Cup will be run on a trial basis in 1988 with the scoring contests selected at random. The first year of official competition will be in 1989 using contests proposed by their organizers and accepted by the SCAT Club Committee. The SCAT Club will organize, record, and take responsibility for this ongoing event.

This competition is not related to the Team Selection Programs of either country. SCAT invites contest organizers to submit their FAI FF contests for inclusion in the 1989 first year of competition.

In brief, the rules for the competition include:

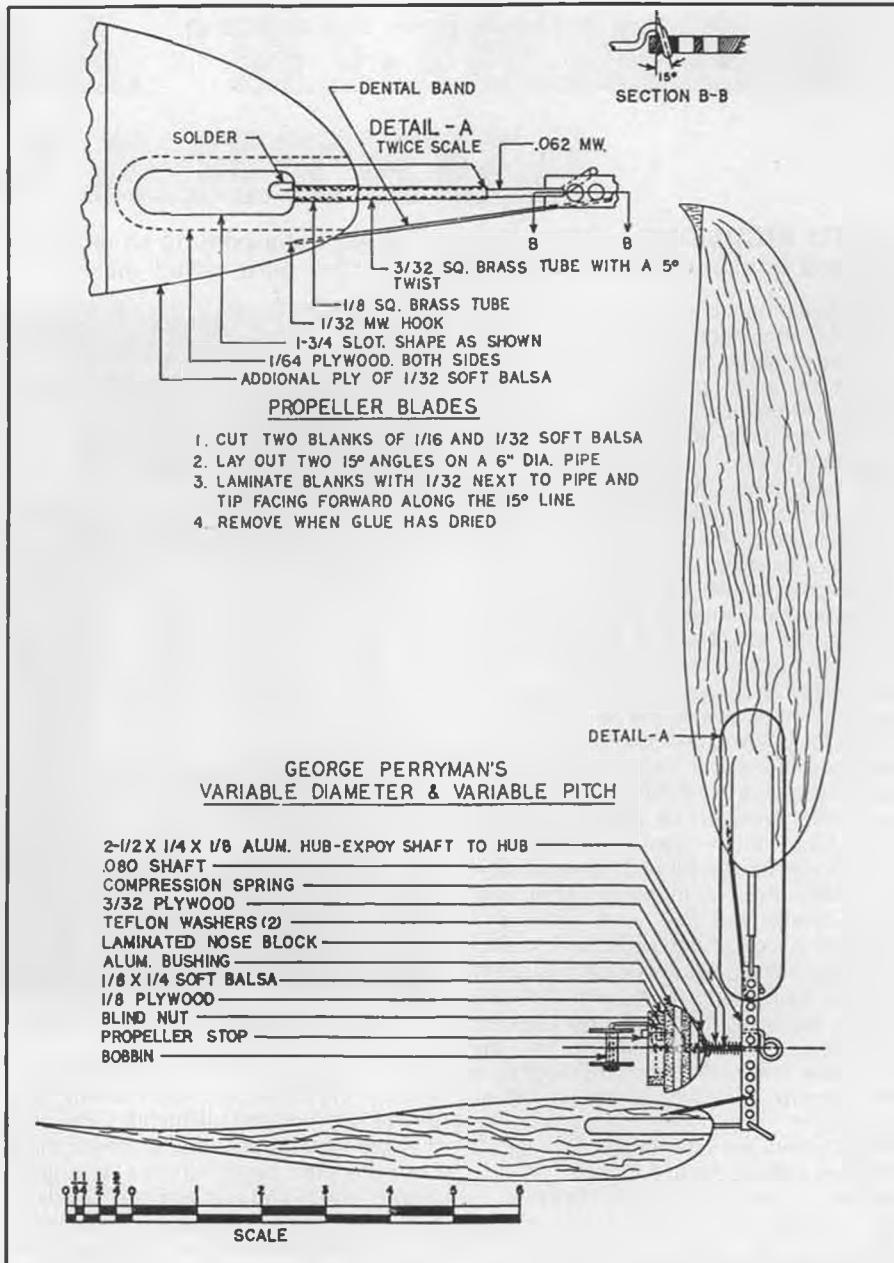
1. Contest must follow the FAI Sporting Code.
2. Seven rounds minimum with three-minute flight times required.
3. Eligibility is restricted to citizens and permanent residents of the US and Canada.
4. Any number of designated contests can be entered and at any contest site.
5. The highest score of only four contests can be counted.
6. The scores from only two contests from one site can be counted.
7. Points are accrued on a calendar year basis.

Other rules and a list of the 1988 designated contests plus further information about how you can either sponsor or participate in this attempt to further the cause of FAI FF can be obtained from Al Hotard, 1012 Damato Dr., Covina, California 91724; (818)966-4788.

Time is almost over for 1988. By the time you read this, the following contests are all that remain on the schedule for 1988:

Skyscrapers Annual FAI Challenge: Galeville, New York, September 3 through 5.

Ft. Worth Planesmen FAI: Benbrook,



Texas, September 3 and 4. Contact Ed Turner, 3544 Granada Dr., Ft. Worth, Texas 76118; (817)589-1519.

Sierra Cup: Sacramento, California, October 15 and 16. Contact Roger Simpson, 2625 Queenwood Dr., Rancho Cordova, California 95670; (916)634-0373.

Livotto FAI Invitational: Taft, California, October 22 and 23. Contact Juan Livotto, 13212 Lake St., Los Angeles, California 90066; (213)391-5986.

Patter Memorial FAI: Taft, California, November 19 and 20. Contact Bill Hartill, 7513 Sausalito Ave., Canoga Park, California 91307; (818)340-1704.

My suggestion is to at least attend one of the above meets if you can. Find out more about the America's Cup. Even with the lamented changes in the FAI FF rules for the future, it is still great competition and friendship.

#### GEORGE PERRYMAN'S VARIABLE PITCH/VARIABLE DIAMETER PROPELLER

In the August issue of *Model Builder Free Flight*, I featured some of George Perry-

man's ideas on rubber model flying. One of the items I didn't feature was George's variable pitch and variable diameter rubber model propeller. That was because I didn't understand how it all went together. So, I dropped George a note with a question, "How does it all go together, George?" Within a few weeks, the sketch that appears elsewhere in this column arrived in the mail. Along with it came George's description, as follows:

"Being a country boy, I have to do things simple, and this prop is easy to do. I don't have a large test field available, so have not flown it on enough power to fully prove if it is a benefit or how much. The model it was designed for is my "Small Giant Speckled Bird" of 606 sq. in. and gross weight of 7 ounces. It goes pretty good and I'm going to try it at the Nats in the Unlimited Mulvihill event."

"The variable diameter and pitch is only a piece of 3/32-inch square brass tubing with

*Continued on page 64*

# RAMBLIN' AROUND AUSTRALIA

By STU RICHMOND. . .With his stay in Australia coming to an end, Stu visits some hobby shops in Sydney, and hooks up with a venerable ex-Spitfire pilot called the Red Baron.

• When a model builder gets to a strange town he'll often hunt up a hobby shop if he has time to pass. So here I am half way around the world and about eight to ten days before my flight leaves from Australia back to the USA. Where are the hobby shops in Sydney?

My host, John Chadd, set up a hobby shop tour that I could easily follow that was just great. Let's take a two-day tour, together.

In early morning I'm dropped off at the Red Baron's Hangar, an obscure down-the-alley-off-of-the-main-drag hobby shop full of color and fun. The Red Baron is Stuart Leon-Harris, a Spitfire pilot from RAF WWII days. Stu is about ten years older, but we had much in common, and he allowed me to start the day by answering his incoming telephone queries. I used to work in a hobby shop north of Atlanta, so I kinda knew what to expect on the phone while Stu took care of the customers at the counter. Quickly it was evident this was no ordinary hobby shop. Aviation video films were being made, engines were sold, and modelers came and bought and visited while the coffee pot got reworked, passport pictures were being taken, and the cash register was busy. It was apparent between calls that this Red Baron or Stu, my namesake, was really enjoying the day. A late morning lull gave us time to talk as follows:

**MB:** To whom am I speaking?

**RB:** They call me the Red Baron!

**MB:** What airplanes have you flown?

**RB:** Anything with a bloody fan on the front.

**MB:** Big ones or R/C ones?

**RB:** Both! Full and model sizes.

**MB:** How many air hours in the real ones?

**RB:** 24,210 hours, including the Battle of Britain and on to the Berlin Airlift. I started in singles and ended in multis.



This is one of the Model Flight stores in Australia; well stocked and staffed, but most products were unknown to Stu.

**MB:** And today you enjoy life doing what?

**RB:** I'm still flying 'em, still crashing 'em, still bendin' 'em, and still mendin' 'em, only they are now *models*, and I operate them from this little haven where I have good friends stop in and visit and say "howdy."

**MB:** Why do they call you the Red Baron?

**RB:** I was known to have damaged more bloody English aircraft than I did Germans! That's why I lost some English fighters, and some English bombers too, when "they" (the Germans) got hostile. Seems I've had eleven difficult landings with ragged holes, parts missing, fans not turning, fire coming

out the wrong places, and such.

**MB:** Boy, we're lucky to have you with us today supporting the model airplane industry.

**RB:** Oh, I thank you for those kind words. Yes, we've both batted the bloody breeze today, mate.

While Stuart sold stuff, I was busy dispensing "how to" info over the phone; it was a nice morning. I spotted the broken front end of a big model and asked:

**MB:** Are we gonna honor that "fish head"? Are you going to fix it for next weekend to fly again?

**RB:** Naw, we'll engine-up one of the other



Sydney's Stuart Leon Harris, RAF, Rt., Distinguished Flying Cross recipient and hobby shop entrepreneur shows Stu how he got a series of shots at a German Stuka from his Spitfire in WWII.



"I build 'em, I fly 'em, I bend 'em, and I mend 'em says Stuart, better known as the Red Baron. This nose section was from Sunday's R/C outing. Text explains how the Red Baron got his name.



Stu bought a supply of these PMC Imp engines from John Channon. Background is Sydney Harbor, downtown, the peaks of the Opera House, and the Harbor bridge. Area has about 2,000 model builders.

buggers for next Sunday. I never miss a bloody Sunday of flying.

**MB:** Are you happy in life?

**RB:** Well, I certainly try to be.

**MB:** I'm honored as hell to have met you, Stu.

**RB:** Geeez, you make me feel good. This has been a fun session, and it proves aviation is 90-percent happiness. Let's close this place and go eat lunch!

We had a long lunch and were joined by Charles Peake, a retired airline captain for Qantas (stands for Queensland And Northern Territory Aerial Services) who's an active scale modeler. It was a most memorable session. After lunch I bought two bottles of Glo Glide model engine oil that's made in Oz, was given a Spitfire VCR tape, received a beautifully inscribed book from Stuart Leon-Harris about Spitfire pilots in WWII, and reluctantly left. My next visit had been set up for 4:00 p.m. on the other side of Sydney.

Australia has about three major importers of model airplane supplies (very little is actually manufactured there compared to the USA), and at 4:00 p.m. I was at John Chan-



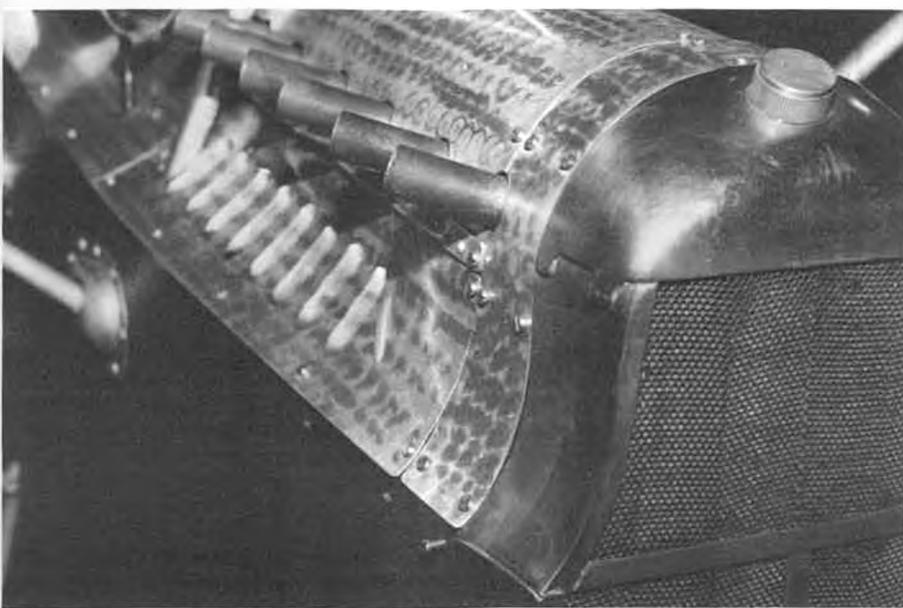
This eight- or nine-foot span model of the Kingsford Smith Southern Cross hangs in Sydney's International Airport. Stu spotted it as he left Sydney to ramble around New Zealand.



Including Chris, Wings 'N' Things has a staff of five behind the counter. Chris says that every beginner who comes in wants to build a Lancaster or a Spitfire.



Stu spent an evening with Ross Woodcock, one of the world's premier scale builders. Ross was on OZ's 1980 F4C scale team in Canada.



This is typical of Ross' ability in scale modeling. This Ansaldi flies on a Multiplex radio. Ross works for QANTAS and is in charge of building two Avro 540 aircraft to be used for public display by the airline, which began its company with the purchase of two in 1921.

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non's desk to learn why model supplies are so expensive "down under." John's Jordal Hobbies Pty. Ltd. imports the Super Tigre engines and many other products for resale. I found the pricing truly incredible in hobby shop after hobby shop, so John took the time to explain what happens on model imports into Australia. If a simple Futaba radio system with only three servos and no Ni-Cds or charger were to be landed or imported into Australia for, say, \$100, here's what happens:

Immediately 28-percent government tax is added to the landed cost to now make the cost \$128 before the radio moves off the dock. Then, let's say the radio, at the wholesale or importer's level, which is John Channon's, is marked up to \$150 wholesale to

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the hobby shop operator. At that point another 20-percent wholesale tax is added. Now the \$100 Futaba has \$30 more tax added to make the cost to the hobby shop \$150 plus 20 percent, or \$180 plus about \$5 freight to get the radio to the retail hobby shop. Now the hobby shop has paid \$185 for the radio, and he has to mark it up to retail value (40 percent is common in the retail hobby business). So, \$185 plus 40 percent becomes \$259 suggested retail. If you walk in the hobby shop, belong to a model club, etc., you usually get as much as 10-percent discount from the selling price, sometimes more, and you end up paying about \$230 plus local taxes for a four-channel radio with only three servos that doesn't even have Ni-Cds or a charger! The wholesaler maybe made twenty bucks for

his time, risk, etc. The retailer didn't do well either. The Australian government made a bundle on the sale! That's the incredible story of what happens in a country that does little to encourage manufacturing. The USA should be so warned. Small manufacturers made the USA great. It pays to pay a bit more and buy American if you can.

From a current Australian model magazine, please let me quote you prices for common modeling items. Remember that the Australian dollar costs about 75 U.S. cents today.

One-third scale (97-inch span) Airtourer, \$1580; PICA Rapier 40/60 kit, retail, \$179; discounted Great Planes Trainer 20 kit, retail is \$144, discounted to \$85.

Following are discount prices, like Tower Hobbies:

Great Planes Cap 21 72-inch for .60, \$299; Airtronics Olympic 650 glider, \$99; O.S. 20 four-stroke R/C engine, \$125; Cox .049 with R/C throttle, \$57; Robart Right Angle drive for Dremel, \$49; Kraft servos (Yes, Kraft!) from \$39 to \$95 each; Goldberg Falcon 56 kit, \$129; K & B R/C glow plug card of 12 plugs, \$50; Futaba Conquest with three servos, no Ni-Cds or charger, FM, \$249; Futaba S148 servos, \$43.50 each or three for \$125.

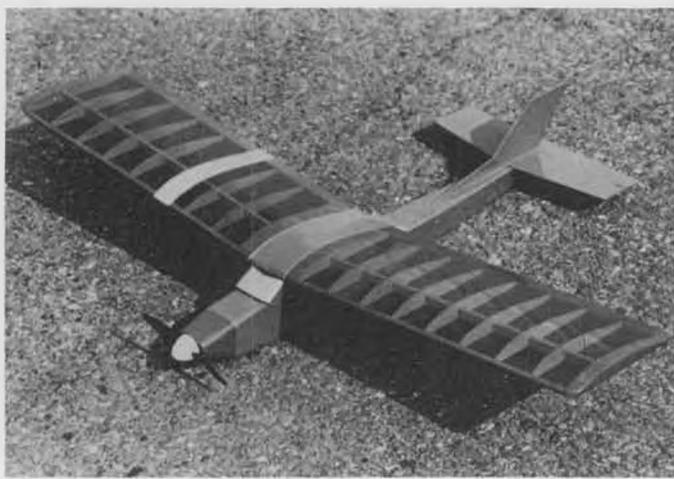
I guess you see how lucky we are to be Americans.

After a pleasant visit with John, I was picked up for the evening by Ross Woodcock who works for Qantas and is one of the world's premier scale modelers. After dinner we adjourned to Ross's workshop, and the models built and under construction just had to be seen to be appreciated. Ross had been on Oz's FAI World Championship team to Canada, and he writes a monthly scale column in *Australian Radio Control Modeler* magazine, which is published monthly.

The next day I got to two more hobby shops. Few American products were there, lots of Pilot and Thunder Tiger products, Multiplex radios from W. Germany, Royal scale kits straight from Japan, hardware from England, and balsa wood from New Guinea (very inexpensive); busy stores with as many as five retail clerks helping modelers. Small quantities of American Zingers and Master Air Screws and K & S metal wire/tubing and some Williams Bros. products were spotted. Magnum .40 and .45 R/C engines from Taiwan seemed to sell out as fast as they arrived. My head was spinning, I'd seen so much and met so many great model builders, been up late so many nights, and drank so much Foster's glow fuel (that's the same brand Crocodile Dundee drinks) that total exhaustion set in.

I had an invitation to visit *Model Builder* reader Bill Cooksey in New Zealand. We'd modeled together at Georgia Tech in the fifties and stayed in touch through the years. The guys from Sydney put me on a Qantas flight to Auckland, New Zealand, and I slept in a moving vehicle for the first time in my life. It was a long flight, about 2,000 miles. From Auckland, a twin-prop Fokker F-27 carried live fish, auto body parts, heavy freight, and a few passengers like me to Gisborne, New Zealand, where I hoped to

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## PARTENAVIA P-68 VICTOR TWIN

Our popular PARTENAVIA P-68 kit has been completely redesigned for the Astro Cobalt 05 Motor. The airfoil section has been changed to the Eppler-195 for improved aerobatic performance. The P-68 has always been a popular model at our electric contests, and in fact an Astro Cobalt 05 powered P-68 won first place in aerobatics at the 87 EAA Electric Championships. The deluxe kit features all machine cut and sanded balsa parts. Wing Span 50 inches, Wing Area 400 Sq.In., Flying weight 4.5 lbs.

Kit # 1013.....\$89.95



## THE ASTRO CHALLENGER NATS WINNER

Bob Boucher's Astro Challenger won the 84 Reno Nats its first time out and has been winning electric sailplane contests all over the country ever since. Powered by an Astro Cobalt 05 Geared Motor turning a 12 inch folding propeller, the Challenger climbs almost out of sight in 45 seconds, and can repeat this climb three or four times on a single battery charge. The distinctive wing planform with elliptical tips maximizes aerodynamic efficiency and minimizes tip stalls. It's gentle and forgiving nature make it perfect for beginners too. Kit features all machine cut and sanded balsa parts. Wing Span 72 inches, Wing Area 612 sq.inches, Airfoil Eppler 193 Flying weight 39 ounces. Kit#1020..... \$ 49.95



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The Porterfield Collegiate makes a great sport scale electric model. It's gentle and forgiving nature make it perfect for beginners, but at the same time it can be quite responsive in skilled hands. The large wing and light wing loading lets the Porterfield climb steeply to and land short. Just what you need for flying in your neighborhood park or schoolyard. Beginners to R/C should install the Astro Cobalt 15 Geared Motor. More experienced flyers can install the Astro Cobalt 25 geared motor for very realistic scale like maneuvers. Wing Span 69.5 inches, Wing Area 690 sq inches, Airfoil Eppler 193, Flying Weight 4 to 5 lbs.

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sleep and recover before more ramblin' with model builders. We'll cover New Zealand, a world garden spot, next month.

We end on a sad level this month. I've learned the colorful Red Baron, a new-found friend, died at the R/C flying field doing what he enjoyed most, R/Cing with his mates on a Sunday with his models. I'm sure he's sitting up there on a fluffy cumulus cloud watching and waiting for us to join him. I'm happy to have met him while ramblin' around Australia. Hang on, Red Baron, we're coming!

pitch. The dental rubber band does a dual function and folds the blades with 12 or 15 rubber turns left for positive fold.

"I will not make any great claims as to this prop's benefit, but theoretically a higher pitch is beneficial at the latter portion of rubber torque and will carry the model further forward for each revolution while keeping airspeed up. On a regular fixed high-pitched prop at the lower end rubber torque, the prop has too much rotational resistance to turn fast enough to keep climbing. By reducing diameter this reduces torque required, and it climbs right to the prop fold. This type of prop might have good application for Wakefield, but I haven't tried it on one lately. I did about 20 years ago with inconclusive results.

"I've been asked lots of times why the swept tips with hooks on all my stuff. I use them on wing, tail, subrudder, and props. I have been doing this for nearly a quarter of a century after observing birds and fish. Have you ever seen a bird or fish with a square wing, fin, or tail? God knew what he

was doing, and I only copied. At long last, NASA has made wind tunnel tests which confirm a 10.5-percent reduction in induced drag on a wing, using these.

"I have been in touch with Burt Rutan, and his latest twin-engine race plane has swept tips with hooks. Also he has butterfly tails with subrudders. I've designed nothing but this on my models for 46 years." George continues with some other Georgisms, but the main points above should prove interesting for others who are interested in experimenting not only with variable pitch and diameter propellers but with swept surfaces as well. I'm not sure about the polka-dot speckles, though. The rest of us have to draw the line somewhere.

Thanks, George, for sharing your experiments and ideas with the rest of us. I hope you enjoy your newly acquired retirement.

## NFFS SYMPOSIUM—1988 VERSION AVAILABLE NOW

It's time to order your 21st edition of the National Free Flight Society's Annual Symposium. This year, the book has been put together by Herman Andresen, Stan Wenerstrom, and Sal Fruciano—The Phoenix Connection. The contents are stunning with 27 different articles, the top ten models for 1988, and the inductees to the NFFS Hall of Fame. This year's edition is truly international as well, with authors from the U.S., Holland, Germany, Denmark, Scotland, China, Italy, and other countries.

If you are like me, you don't want to miss a single issue of the Symposium, so you had best place your order now. The cost is \$15 for NFFS members in the USA, plus another buck for postage. If you are not a member, add a dollar. If you are out of the country, the postage will be higher. Send your orders to: NFFS Publications, c/o Fred Terzian, 4858 Moorpark Ave., San Jose, California 95129. Do it now!

## WORDS TO LIVE BY

"Cynicism just isn't what it used to be."  
**BOB LARSH IS LOOKING FOR YOU**

Yikes! That's right! If you have some old postwar issues of *Aeromodeller* or *Model Aircraft*, Bob Larsh is looking for copies. Bob is attempting to catalog a complete set of available designs that meet the Nostalgia Ignition event. In order to do so, he needs some of the postwar to early 1950s editions. If you can help, drop Bob a note with the

## Free Flight... Continued from page 59

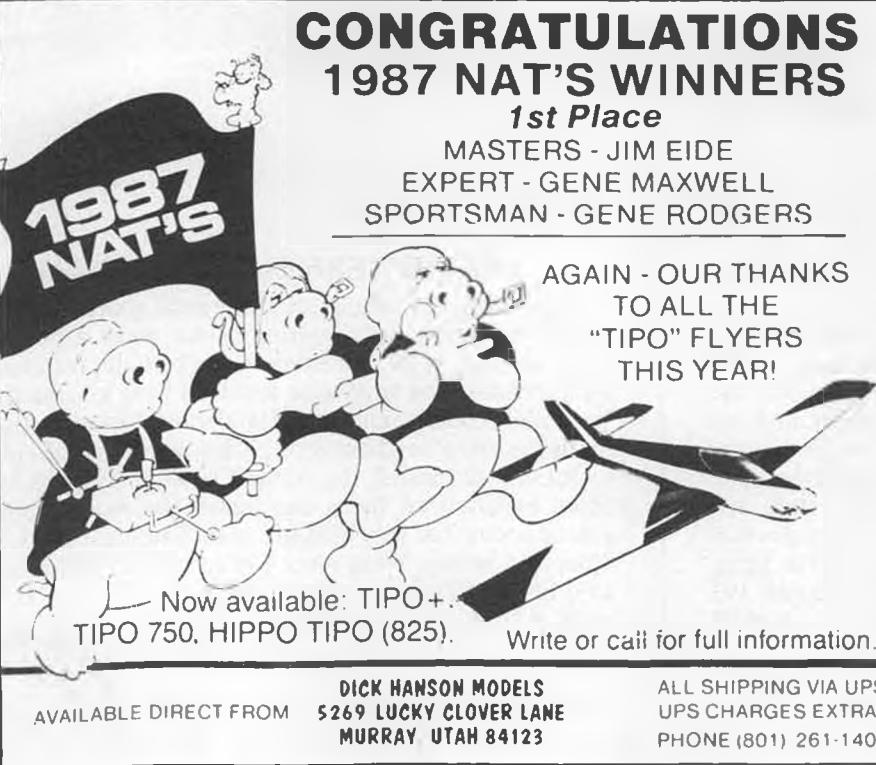
a five-degree twist, which I do by grabbing each end with pliers and twisting. A piece of 1/8-inch square brass tubing is epoxied in the blade hub. Centrifugal force snaps blades open to 25-3/4 inches and 29 pitch. As power diminishes, the dental rubber band begins reducing diameter and increasing pitch until at full retraction. It becomes 23-3/4 inches in diameter and 33

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Construction article Feb 88 Model Builder. The original Bobcat was featured in Jan 85 Model Builder.

*Aviation Artist, Writer and Model Designer / Builder comments on*

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from vibration. The point is to isolate your system with as much thick foam (like Sig's RF-240 foam rubber) as possible. (I've been using CH Electronics units for many years and have never had any trouble with them.) By the way, this foam rubber should also be your first choice when mounting receivers and those high-capacity battery packs.

Hope you all have a great, safe flying season. Remember to treat your engines to a good after-run oil after each flying session. Condensation and dampness can ruin bearings.

## Electric Power *Continued from page 37*

drop at the end. The flight test on an Amptique showed an increase in flight time, from 12 to 14 minutes for the SC and SCR to 20 minutes for the SCE. Again, this is in agreement with my own flight tests, a definite 30 to 40-percent increase in flight time. The SCE pack got very hot. In fact, in the 30-amp run, it was too hot to hold. Again, like my own experience.

Charging a six-cell SCE pack is similar to charging six-cell SC and SCR packs, but a seven-cell SCE pack is a different matter. If you are using a voltage booster charger like the Astro DC/DC charger or the TRC Impulse 4 charger, the seven-cell pack can be charged in 30 minutes or so. It may take as long as 40 minutes if a non-booster charger is used. My advice in the June issue was to take the packs out of the plane for charging. Do so, and you will be able to control the battery pack heat, and your packs should hold up well. Keith's conclusion was that the SCE pack is best suited for sport flying in the 10-amp sport flying range, with a throttle, and I agree. Keith does not recommend the SCE cells for high-performance planes due to the heat and voltage droop. I did fly my tests on the SCE at a higher current draw than Keith did, nearly 20 amps, and I found that the droop at the end was like a half-throttle cruise. It is fine for getting back to the field and getting set up for a landing, and the plane will maintain altitude. If you used SCE cells in a sport pattern plane (20-amp draw), you would use it as you have with SC cells. Figure that half of the extra time (compared to SC cells) from the SCE cells would be used for cruise. The offroad suppliers are now carrying SCE cells. SR Batteries, Box 287B, Bellport, New York 11717, sells the Magnum pack. The six-cell pack is \$42.95, the seven-cell pack is \$49.95, and individual cells are \$6.50.

I had a very interesting conversation with Larry Sribnick at SR Batteries about testing cells and matching them. Many manufacturers sell "computer-matched cells." It has never been clear to me what that means! Larry has the best testing and matching procedure I have heard of. Each cell is charged at five amps, then discharged at three different rates: 300 to 500 millamps, 10 amps, and 20 amps. These runs give the internal impedance of each cell and discharge curves. A pack is then made of cells that have matching internal impedance, total capacity, and discharge curves. This is a very thorough procedure, and very impressive. I had not thought of using matching discharge curves, that will make a pack very

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info on which magazines you might be able to loan him to support this cause. Bob can be reached at 45 S. Whitcomb Ave., Indianapolis, Indiana 46241.

### THERE YOU HAVE IT DEPT.

Well, there you have it for another month. I hope that your fuel was hot, your fuse wad dry, and you found every thermal that you deserved. What, you say, you didn't find any thermals? Well, then maybe you didn't deserve any.

Anyhow, here's wishing you a thermal until next month. It's the least I can do.

### Big Birds. . . . . Continued from page 23

cal breakthroughs in synthetic oils. So don't be fooled by the wild claims made for some lubricants. The cost of replacing your engine will buy one helluva lot of the right kind of fuel; stick with proven products.

I run a 50:1 mix in my gas engines. I've used most commercially available synthetic oils and have been satisfied with all of them. For the last year I've been using Morgan Fuels' two-cycle mixed 50:1 with gasoline and have run this mix from coast to

coast with absolutely no problems, and the price is reasonable.

Traveling around in a van with cans of mixed fuel can be dangerous as well as nauseating. Fortunately, my van runs on regular, so whenever I'm through flying, I dump any excess fuel right into the van's gas tank. This also eliminates the possibility of using stale/contaminated fuel.

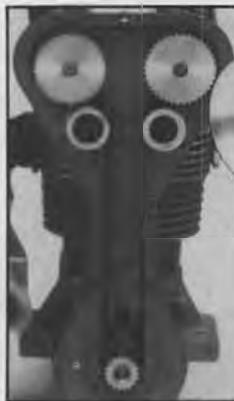
A word of caution about octane boosters: Some of these products can cause some oil blends (like Belray) to precipitate out of solution with gasoline, and there goes your engine.

I recently purchased a used 4.2cid Sachs/Dolmar engine along with its CH Electronics Ignition System, and much to my disappointment it wouldn't run when put on the test stand. The "black box" proved to be inoperative. I sent it off to CH Electronics' Bill Carpenter who informed me that a number of components had failed because they'd been subjected to unusually high vibration. These particular components, he pointed out, usually never cause problems; he figured that the ignition system had been given little or no protection

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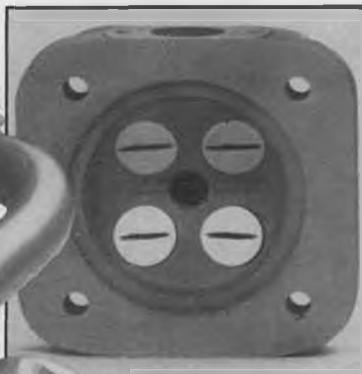


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"smooth" in discharge. I usually just match capacity. Well, now I know! A pack matched like this will give its best power and will "stay in step" through its life, which will be a long one with any care in charging. I know that is true, I have some SR packs that are nearly five years old, and they still perform well.

And now for a completely new topic! Since Astro Flight stopped selling its ferrite 020 and 035 motors, there has been a sad lack of motors for small planes, in the 16- to 20-ounce range. The AP-29 from Tower Hobbies has helped, but it does not come in a flight package. Peck-Polymers sent me a sample of their new Silver Streak motor and flight system, and it looks to me like the small 020 planes will be back! The motor is exactly intermediate in length between the old Astro 020 and 035 and has the same diameter, so it is a drop-in replacement. It weighs 2.6 ounces with the wire and a three-pin Deans connector. The six-cell Sanyo 550 mAh battery pack comes with a three-pin Deans connector and weighs five ounces. The wiring harness has a toggle switch and a charge jack, and weighs .5 ounce. Total weight of the system is 8 ounces, which makes 16- to 20-ounce models quite practical. The motor will turn a 6x3 Rev-Up prop, which is included in the system, at 12,000 rpm, while drawing only 6.5 amps. This should give very good flight times, about six to eight minutes. The mounting screws are even included! Bernard Cawley flew the Silver Streak at our

Boeing Hawks electric Fun-Fly in his Schoolboy, and the performance was excellent. He could do consecutive loops from level flight at any point in the flight. I have a Schoolboy that has been waiting for a motor, so I can give a hands-on report later. I have one suggestion: replace the wiring with high-flex wire, and put four-pin Deans connectors in the system. I'll bet you will pick up at least 300 rpm. It looks good to me. The motor is \$19.95; the system is \$62.95. Contact Peck-Polymers at P.O. Box 2498, La Mesa, California 92044; (619)448-1818, or order through your hobby dealer. Enjoy!

Charlie Sylvia sent photos of his Pilot kit PA 18 Super Cub using a Cobalt 40 with the Astro belt drive. Charlie says that he has very good success with RTF planes (he was referring to my report on the Royal Products 40S RTF, which flies well with the Astro 40). He has flown the Model Tech CAP 21 with an Astro 60 cobalt, MK Magic 20 with a 25 Astro cobalt, and Great Planes Cherokee 40 with an Astro 40 cobalt.

Indy sells the MK line; you can check with them at 10620 N. College Ave., Indianapolis, Indiana 46280. Charlie may also sell suitable RTF planes for the 40 to 60 size. Contact him at CS Flight Systems, 31 Perry St., Middleboro, Massachusetts 02346; (617)947-2805.

Anyhow, Charlie says the Pilot PA 18 is a dream plane; it flies so nice it is hard to believe. The handling and flight characteristics are almost like the real plane, including

flap use. He is using two 22-cell packs, a 900 SCR, and a 1200 SCR, with flight times of six and eight minutes, respectively. Charlie built the Super Cub as advertised except for removing material from the forward plywood bulkheads to allow battery air flow. It was covered with Coverite Mica Film and Black Baron film trim. The 3.5-inch wheels are from Hobby Lobby. All-up weight is 8 pounds; span, 75 inches; wing loading, 22 oz/sq ft. An Adams ETC-2 speed control is used; the belt drive is 60/22. The motor is mounted on the beams supplied in the kit, with Bob Kopski's inner Nyrod plus 4x56 bolt tie-down method. A Graupner 13.5x8 turns at 6200 rpm, and this will cruise at 1/3 throttle. Charlie originally used a Rev-Up 13x8 on 20 cells at 5600 rpm, but this was a little too slow. The shot of the Piper sitting ready to go looks real, and very pretty! Good work, Charlie!

For now, fly them big, fly them small, fly them all, fly electric!

## F3E Team. . . . Continued from page 39

Sanyo SCR cells turning a 13x7 K&W folding prop. The throttle was a Sommerauer (Germany). The fiberglass fuselage was a Rudy Freudenthaler design. The carbon spar and foam wing was covered with white birch veneer. Flying weight was 8.46 pounds; wing area, 913 sq. in.; wing loading, 21.3 oz./sq. ft.; span, 8 ft. The airfoil is a Quaback 209. This is a very competitive F3E ship, and it got the highest single flight in the qualifiers, 601 points.

Keith Finkenbiner flew the same design as Steve Neu, and came in a very close fourth to Felix Vivas. The total of the best seven out of eight rounds were Jerry Bridge- man, 4005; Steve Neu, 3950; Felix Vivas, 3723; and Keith Finkenbiner, 3672.

Some technical notes: all the contestants used Astro cobalt motors, all the finalists used Astro cobalt 60 motors, and all the contestants used the Sanyo 900 SCR cells. Needless to say, the Astro cobalt 60 is the best motor available for power-to-weight ratio and overall power handling. The 900 SCR cells have the best power-to-weight ratio around. Current draws for F3E are frequently in the 40- to 60-ampere range, and the Astro cobalt 60 is putting out two (2) horsepower at that current. It does so with ease! The 900 SCR cells and the cobalt 60 are available from Astro Flight or retailers. The throttles in F3E have to be very good indeed. In fact, regular switches will not do; they blow out at the initial current surge, which is well over 60 amps. The only thing that can do the job is a speed control, and the STW throttle was very impressive. The STW throttles are available from Hobby Specialties, 3 Castle-Florissant, Missouri 63034; (314)831-5031. The finalists used a variety of chargers: Jerry used the Astro DC/DC Super Charger, available from Astro Flight or retailers; the ASL 4 and the Geist chargers were used by Steve Neu and Keith Finkenbiner. I think these are available at Wilshire Model Center, 2836 Santa Monica Blvd., Santa Monica, California 90404; (213)828-9362. The K&W folding props were excellent; they are available from CS Flight Systems, 31 Perry St., Middleboro,

Massachusetts; (617)947-2805. The Geist props are available at Wilshire Model Center.

Other items of interest: all contestants made their own battery packs, and they do not use the solder tabs. These cannot handle the high currents. The solder tabs are removed, and braided connectors are soldered directly to the cell ends. I have done this frequently. My favorite soldering iron for this is a 40-watt pencil iron. Keith Finkenbinder kindly gave me a sample of the birch veneer he and Steve used to cover the wings. It is beautiful in appearance, lighter than 1/64 ply, and very strong. It is used in cabinet making for veneer. I recommend it for covering foam wings. Both he and Steve used three-piece wings; these use a plug-together spar. The wings are taped together at the seams. Jerry used a one-piece wing. The wings all have both flaps and ailerons; the servos are inside the wings, with access covers. Jerry painted the tips of his wings black underneath, day-glo orange on top, and it really helped in the pylon turns. It made it easy to see which way the plane was turning.

As mentioned before, the flying weather was fantastic, and it did give the pilots an excellent chance to see what they could do. The final points really depended heavily on landing points and whether you could squeeze in another lap. Duration was a pleasure to watch, there were enough thermals and some wave lift for the pilots to show off how well they could search for lift and go up from an altitude of 100 feet or so. This was done often! The F3E ships are very efficient soaring machines; they fly fast and can cover a lot of ground in search for lift. Once in lift, they go up quickly, as well as any of the "floaters." The pilots have some help though, often hawks would come through and show just where the thermals were! Thanks to the CDs, Bob Sliff and Frank Chastelier, and to the members of the Harbor Soaring Society and North County Clouds clubs; they put in many hours of hard work. We have a good team, now on to the International in St. Louis!

#### Insiders. . . . . Continued from page 49

needs to be given to determine those that have particular advantages. The more desirable rules should be easy to administer and should lead to models that are graceful, beautiful, easy to build, reasonably sized, and have satisfying, but not too great, endurance.

Looking back in history, I would say that the Goldberg and Greenberg indoor tractors, taken from Frank Zaic's 1934 yearbook, are examples of the type of models that seem to meet these requirements. The intention is not to propose an old-timer class, however. These models could be improved by use of modern features such as microfilm propellers, larger tails, offset wings, etc. without losing their desirable characteristics.

#### INSIDERS WORKSHOPS

We have a beauty this month, from San Diego's John Oldenkamp. Here is his description of a sunny design/build shop:

"Shop photo you requested herein. Carin

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Howard did the shot. Planes on far left are Ehling Stick fuse, F1B fuse in for repair. Drawing surface is 30 x 10 feet, doubles as building surface. 'Desk' is 3 x 5-1/2 feet. Bike for quick getaway should all else fail. Jimmy Allen Canadian and P-30 somewhere in background. Large prop on sill was carved from 100-year-old 2 x 4 found on a ranch one day in Oregon. Shaped it with shingle's axe! Anyhow, nice bright place for me, since I must do all my designing and building in full daylight. Last, model box on floor is 1/4-inch foam core. Great stuff and cheap. But Coots somehow got smashed at Reno anyway!"

Simply Scale. . . . . Continued from page 27

of that workmanship. Only that part of the workmanship actually done by the contestant in completing or finishing parts he did not make will be considered for workmanship points. If no signed declaration accompanies the documentation for the model, no craftsmanship points can be awarded." So it appears by this reference that craftsmanship might be considered as how much of the model did he actually complete himself, and to what degree did he involved himself? Obviously, it would seem to make sense to award more points to a modeler who designed and scratchbuilt his model from the ground (or picture) up than to one who simply (no, I know, it's never simple) assembles it from prefabricated parts provided from a manufacturer. If the degree of completion by the modeler were to be a consideration, one might rate craftsmanship from highest to lowest:

1. Draw own three-views and plans from photos and published pictures. Fabricate all parts (no purchased parts other than engine, radio components, nuts, bolts and screws) himself.
2. Draw own plans from published three-views, photos, and published drawings. Fabrication as in 1. above.
3. Build from published plans and three-views. Fabrication as in 1. above.
4. Build from published plans and three-views with some manufacturer-supplied parts such as cowls, canopies, and wheel pants, as well as hardware items such as commercially available retractable landing gear assemblies.
5. Build from a "normal" kit, with built-

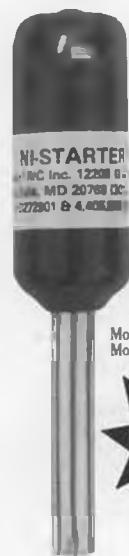
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Obviously, it's not practical to break craftsmanship into so many types and categories, and I know I'm being a little picky in my grading system. It is, however, something to ponder. Is it really fair for someone who builds or assembles a "prefab"-type kit to be able to garner the same craftsmanship points as someone like a Bob Wischer, Steve Sauger, or Dave Platt, who build their models from the "ground up"? I may be alone in my opinion, but I think not.

What is craftsmanship? The FAI rule book comes the closest to addressing the question of craftsmanship by defining it in the FAI "Judges Guide for Static Judging":

"Model should be checked for quality of workmanship, with particular reference to filling of grain; clean, sharp edges, especially trailing edges of wings and tail surfaces; correct gaps at hinge line of control surfaces; close fit where wings are attached to fuselage, and general finesse. Check for any components which have not been made by the contestant and adjust the mark awarded accordingly. A complex subject should be awarded slightly higher marks than a simple subject." The lack of a definitive description of just what craftsmanship should be was never really a serious problem until just the past few years when the

Scale Masters program elected to institute a different arrangement of static judging. The traditional method of static judging scale models (there is no "right" or "wrong" method in AMA events) utilizes three judges, and each judge critiques the model in all three areas of Accuracy of Outline; Finish, Color, and Markings; and Craftsmanship. The scores of the three judges are then averaged to determine the contestant's static score. Using this method, each judge is required to mentally separate the judging of these three categories and "balance" their individual points in his mind.

The method of judging at the Scale Masters again uses three judges, but each judge is assigned the responsibility of judging only one category of the final static score; one judge for Accuracy of Outline, one for Finish, Color and Markings, and one for Craftsmanship. The static score for the contestant is the sum of the three scores.

I suppose the reasoning behind the Scale Masters approach is that it is impossible for one single person to successfully differentiate or separate his feelings about what score should be assigned to each category. The idea of having a separate judge for each category means that the Accuracy of Outline judge should only be looking for areas of the model which are not true to scale in outline; for instance, wing outline and airfoil, stab outline and airfoil, etc. The Finish, Color, and Markings judge should only be concerned with whether the color hue is correct, the quality of the finish (matte, dull)

is prototypical, and the markings are all in the right places and of the right shape. Finally the Craftsmanship judge should only be concerned with...what?

We could say the Craftsmanship judge should only be concerned with workmanship as it pertains strictly to construction techniques. Has the modeler used a piece of sandpaper? Is the wing and stab on straight? Are there wrinkles and irregularities on the surface of the model? Does the wing mate the fuselage tightly? These are all areas that would seem likely to be the responsibility of this judge.

What happens, however, when the Craftsmanship judge sees a stab that is aligned properly, nicely hinged, with a proper degree of finish applied, but it is a flat stab rather than the airfoiled stab that is indicated on the three-views or photos? Should the Craftsmanship judge downgrade the modeler because he did not take the time or effort to properly reproduce this flying surface? If so, this modeler is now being downgraded by both the Craftsmanship judge and the Accuracy of Outline judge. Is this right?

I hesitate to take sides in this debate, but my concern with the one-judge-for-each-category system is that one person as a judge has too much influence over the final static score of a contestant. With only a single score from each judge, there is too much room for error or bias. It is really asking too much of a person to expect him to ignore all other aspects of a model except for the area of his responsibility. Even with complete and accurate definitions of how he is to perform his job, it is impossible to effectively put on "blinders." I'll leave it up to you to decide what method of judging yields the fairest results. What should we define as Craftsmanship? What do you think? Take a few minutes to jot down a note to your local Scale Board member, Dave Platt (Scale Board Chairman), John Guenther, or even myself, if you like. I will make sure your input gets forwarded.

Keep It Scale and Simple!

Cliff Tacie, 49404 Michelle Ann Dr., Mt Clemens, MI 48045

**Counter. . . . . Continued from page 8**

your model the look it deserves. See your Sig dealer, or write: Sig Manufacturing, Montezuma, Iowa 50171.

R/C Extras, Box 28B, Sergeant Bluff, Iowa 51054, has a new six-foot span Weeks Special Biplane kit that includes all hand-cut plywood and balsa parts, plans and instructions, cowl, canopy, landing gear and wheel pants. Engine size of 2.0 to 3.1 cid is recommended. For more information, drop them a line.

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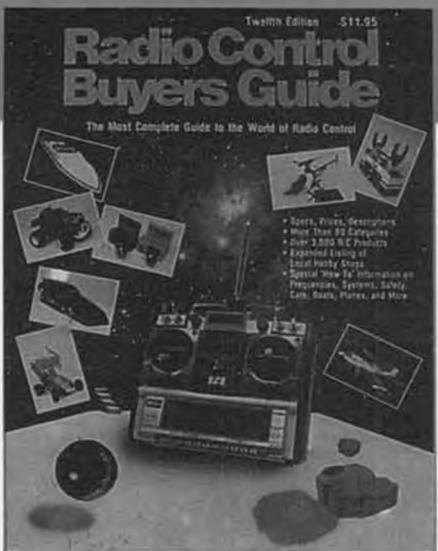


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**Bucker. . . . . Continued from page 53**

side of the red rudder. It has a black fuselage stripe and black numbers on the fuselage.

The aerodynamic setup of the Jungmann is very good for a rubber-powered model with its long nose and ample tail length. In addition, the two wings result in quite a bit of wing area within the 13-inch span limits of the peanut rules. The prototype model uses a Williams Brothers propeller and small nose plug. It uses hardwood wheels and a simple straight pin for the rear motor peg. It uses 1/32-diameter piano wire for the landing gear, the propeller hook, and the fore and aft cabane struts. The strut fairings and the interplane struts are made of 1/64 plywood (doubled for 1/32 thickness in the case of the interplane struts). All the rest of the structure is balsa wood.

The fuselage is constructed in the traditional fashion, with two sides built over the plan, assembled into a box with cross braces and formers, and then 1/32-sheet balsa cockpit combing, stringers, and cowl panels of thicker sheet with a block balsa nose. The bottom of the engine cowl is made of 3/16-thick balsa, the sides of 1/8, and the top of 1/32. Note the curious angular shape of the nose block and use a block with the grain parallel to the thrust line. This simplifies making the square hole in the nose block of the nose plug. Carve and sand the engine cowl and nose plug to the correct contour. For lightness, the stringers are cut from 1/32 sheet by 1/16 wide and these are installed on edge. Sand the entire fuselage structure for lightness and to re-

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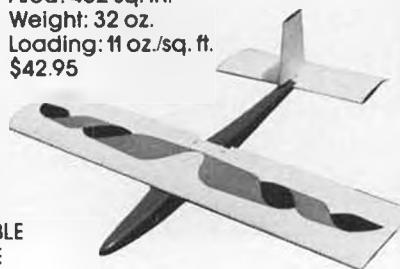
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move any rough edges prior to covering.

The tail outlines and the wing tips are laminated using 1/16 by 1/32 pieces. Make 1/8-inch thick balsa forms to the shape of the inside of the surface outline. Wax the edges of these forms so glue won't stick to them. A common color crayon is satisfactory for this waxing and has the advantage that the color indicates complete waxing. Thin some white glue with about two parts water to one part of glue. Use this to glue three laminations together and wet the layer that is to be outside. Then using masking tape to hold the laminations to the form, wrap laminations around the outline. The secret to avoiding kinks as the laminations are bent around the outlines is to maintain a slight amount of tension at all times during the wrapping operation. Let these dry, preferably over night.

If the laminating method looks like too much trouble, the outlines can be cut out of 1/16 thick sheet balsa, and they will be strong enough if they are kept about 1/8 of an inch wide.

The tail structure is made over the plan using sticks 1/16 thick by the width shown. When dry these are removed from the plan and 1/32 square pieces are added on the top and bottom of the ribs after which the tail structure is sanded to an airfoil section before covering.

The wings are conventional multi-spar structures with ribs cut from 1/32 sheet balsa. Leading and trailing edges are 1/16 by 1/8, and the spars are 1/16 square. The ribs nearest the tips are thinned down a bit to match the thickness shown in the front view, and the upper wing center section ribs are shortened and recontoured for the wing cutout. This model is a little more complicated than the average peanut, and it has more ribs than necessary from a structural stand point. Every other rib can be omitted for simplification, if desired. On the other hand, it may be questioned as to why it doesn't have scale rib spacing. The reason for the specific spacing shown on the model is that the edges of the red wing panels are located on a rib which simplifies the covering, and the wing struts are also lined up with a rib, as indicated by the small Xs on the wing plan. The landing gear wire extends through the lower wing, so two pieces of balsa are placed between the next-to-center ribs after the center rib is slotted to accept them.

Cut the spars to allow the correct amount of dihedral to be blocked up under the wing tips and cement the dihedral joints. Then sand the wing to remove all rough spots and shape the leading edge to a half-round section and the trailing edges to a triangular section.

Start the covering of the model using red tissue for the areas that are to be red and then going on to the yellow for the rest of the covering. Use Japanese tissue. After covering, water-shrink the tissue using only a fogged-on spray of water. When dry, give all the parts a single coat of thin dope. Then cut the trim from black tissue and, using thin dope, install the big numbers on the fuselage striping. The control outlines and the small lettering is done with a thin felt pen. The white crosses are made from

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white decal sheet or, in lieu of this, from thin bond paper.

Install the fore and aft wire cabane struts. This is a ticklish job and will take a little trial and error effort to make certain that the wing is aligned in the proper position. It should end up parallel to the bottom wing in the top, front, and side views. Cement the wings in place and then make the strut fairings so the cabane struts become an "N." Make and install the interplane struts at the Xs shown in the wing plan. Cut away the last upright of the fuselage to allow the installation of the horizontal tail and put it in place cementing only the very back part to the fuselage. This will allow tail incidence adjustments by shimming the leading edge

of the tail if necessary. Cement the vertical tail in place making sure that it is straight. Check the surfaces for warps and remove them at this time, using heat if necessary.

Install the main landing gear wire by slitting the wing tissue and sliding the wire up in the slit between the balsa braces. Cut out the main landing gear fairings from 3/32 sheet balsa and sand to a streamlined section. Cover with yellow tissue and cement in place. Make a tail wheel from hard balsa and cement it in place. Make windshields from thin plastic and cement them in place. At this point the fuselage can be given another coat of dope, but resist the temptation to dope the surfaces again unless you are sure they won't warp.

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The model now is complete except for details. There are a large number of minor details that can be added, and these can be found in Profile 222. The model in the photos has the wing, flying, and landing wires and the tail brace wires made of eight-pound test monofilament fishing leader. This has the advantage that it can be installed with a little slack, and the application of a little heat will shrink them enough to tighten them. Don't overdo the tightening and warp the model, however.

The model should balance level if supported at the tips of the upper wing at the leading edge. Ballast it if necessary. Test glides should be straight and without a ten-

dency to stall. Shim the leading edge of the horizontal tail up or down to achieve this. With the drag of a biplane, don't expect too flat a glide, so long as it's smooth and not too fast it will be okay. Adjustments for flight under power should be made by shimming the nose plug to point in the direction the model needs to go.

### Choppers.... Continued from page 19

many used ones to be available, but keep your eyes open.

The opinions expressed here are my own. You may not agree with them, but I hope you will defend to the death my right to say

them.

Another good source of building a parts inventory is from other people's crashes! Be a vulture. Plastic helicopters in particular that have just crashed always look worse than they are. Make an offer, or just salvage what you can from the garbage pail. I must have built four or five Hirobo Shuttles just that way. The nice thing about plastic parts is that either they're broken or they're not; no hidden fatigue or stress fractures. Broken or not broken, very simple.

### REPAIRING

The easiest way to repair a helicopter is to throw money at it. But that doesn't mean it's the only way. Flying buddy Datu Ramel has developed some techniques for repairing the Hirobo Shuttle. This nearly-all-plastic chopper has become tremendously popular in the past couple years, and is probably responsible for more new people in this hobby than anything else. It's relatively cheap to fix, but, unfortunately, relatively cheap still comes out to be quite expensive. Datu pushes his Shuttle to the limit, having done loops, rolls, and rolling stall turns. When he slips beyond the flight envelope of this chopper, he generally has an evening at the work bench ahead of him. Now, it's true that new sideframes for the Shuttle don't cost as much as those for other machines, but, as I said, they're still not cheap. Being plastic, they don't get bent, they just break.

Datu has found that these sideframes can be repaired without any special equipment. The medium viscosity cyanoacrylates (Super-Jet, Flex-Zap, etc.) hold well. To reinforce the joint, Datu drills small holes in the plastic on both sides of the break, through which he threads *fishing line*. (See photo.) He then saturates the fishing line with more CyA, and gives it a shot of accelerant. Though the photos show the broken sideframes completely apart, you could probably make this repair without completely disassembling the helicopter. It was amazing to me how strong the sideframes are after being repaired in this manner. As might have been expected, Datu crashed again doing same damn fool thing, and the sideframes broke again, but not in the same places.

### ROTOR RAMBLING

Just some notes and observations.

O.S. 61 Long Stroke Engine: I have been running the ringed version of this engine in my X-Cell. You might recall that I definitely recommend the ringed version over the ABC because it runs more smoothly and is much easier to start. I had a problem with the engine leaning out for no apparent reason, and I determined that it must have been sucking some air somewhere when it heated up. It did this with both the 6H carb and the new Supertigre Mag carb that I put on it. (The Super Tigre helicopter carb, Part 1907, is no longer being made or sold.) I put some blue RTV silicone gasket seal around the throat of the carb, and the problem was gone! The engine ran great, had unlimited power even at high rpm, and was miserly on fuel. The Magna-pipe seems to be responsible for some of that power, but I still have a problem getting the engine to come down smoothly after flying around for a while at full throttle. I don't know if it's the engine,

the pipe, or the carb.

Incidentally, I have been using the Fox miracle plug, and I am very pleased with it. It allows a nice low idle, easy starting, and I haven't had any burnouts. Miniature Aircraft recommended it to use with the Magna-Pipe, and I'm also using one with a Whisper-Tech pipe on my Competitor.

Speaking of the Competitor, I made the change to the blade holder arms recommended in an article in *The International Helicopter Magazine*, to create a Delta-3 angle. This is supposed to increase the "gust response," which means to make it more stable in the wind. I was unable to discern any difference at all. I wonder if this article was an April Fool's joke. If it was, I fell for it. And speaking of helicopter magazines, there are now three of them, all published in England. The other two are *Radio Helicopter International* and *Helicopter World*.

I have been using the Airtronics Spectra radio and ran into a couple minor quirks. The low battery warning buzzer goes off at too high a voltage. Airtronics can adjust this if you have the same problem. Also, the tail rotor compensation setting can get distorted when you remove the transmitter battery module or even if the transmitter is just turned off for several days. This isn't an ideal situation, but it's not serious, so just check it before you fly. Otherwise, the radio has operated flawlessly.

Also, some observations about the GMP Special Edition Stork. A hot 60 is too much engine for this chopper. It flies great on a 50 and a smooth-running 60 is fine, but the truth is that the O.S. 61 Long Stroke ABC was too much engine. I stand by my opinion that this is the best beginners' helicopter available because it is so easy to build; and between the DDF head and the belt-driven tail, nothing hovers better. That's not to say that it doesn't handle aerobatics very well also. That DDF head helps in forward flight, particularly in the gusty wind conditions that prevail in Chicago. Replacement parts are substantially cheaper than either Schluter or X-Cell. It seemed that GMP stopped promoting this helicopter when they announced their new Legend. I think that was a mistake because the Stork is becoming very popular in the Chicago area.

**SETTING UP YOUR HELICOPTER**

I will be devoting some future columns to setting up a helicopter for beginners. One basic rule I want to stress is that a helicopter must be set up *mechanically* as close to perfect as possible, regardless of the radio being used. Another mistake beginners makes is to over-restrict the throw on collective, cyclic pitch, and tail rotor. This is not the way to learn to fly. Insufficient throw on the controls may make it seem that your chopper is more stable, but it also severely restricts your ability to make needed corrections. Put in sufficient throw to allow you to maintain control over your helicopter, then *discipline* yourself not to over-control.

Another area of self-delusion is in restricting the range of collective pitch. The normal range of pitch is between +9 at full throttle and -3 at low stick. This gives a fairly responsive helicopter, and might seem to be too touchy for a beginner. Should you

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change the pitch to a range of between, let's say, +5 and +1? Well, the theory is that this will prevent your accidentally getting your helicopter too high; or panicking, slamming the collective down, and smashing it into the ground. But let's see what really happens:

At half stick your pitch will be about +3 degrees and your helicopter will be hovering at a fairly high head speed. Let's say your chopper gets caught in its downwash and suddenly drops. You give it full throttle, but the two degrees change in pitch is too little to give much braking power, so it's mostly the increased rpm that will generate the needed lift. But, like a fixed-pitch helicopter, the engine response is slower, so your chopper doesn't respond immediately. Finally it does respond, and your machine starts rising. Now you lower the collective/throttle so it won't get too high, but pitch is still positive, so the helicopter continues to climb from the momentum. Finally it stops climbing, but now it's 15 feet in the air. You cut throttle, but the slowness of engine response combined with the +1

degree pitch keeps it from descending. All this time the tail is swinging this way and that as the torque is constantly changing. If a little wind has come up, it could keep the chopper up in the air even longer. Also, since the engine has gone down to idle, you've really got too much pitch (+1 degree) for that engine speed; the rotor speed is decaying, and your cyclic and tail rotor response is close to nil. What you've got here is a \$500 kite! When and if it does start to come down from 15 feet, the momentum will increase, and it will head toward the ground even faster than before. This time you probably don't have enough braking power with just +5 pitch; the torque from slamming that throttle forward will spin the tail around a few times, and... splat!

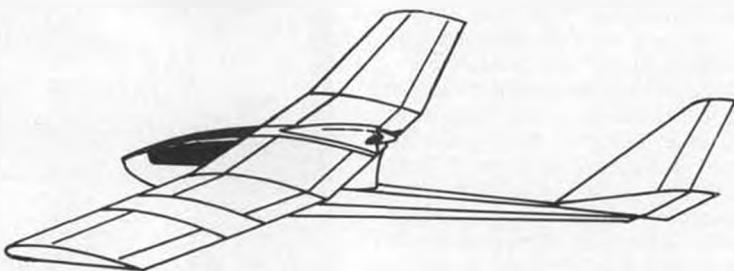
What's the lesson here? If you're going to fly a helicopter, you've got to be able to *fly* it. Instead of reducing your ability to control the helicopter, increase your determination to control it correctly.

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Hannan. . . . . Continued from page 51

rier, and rare birds such as the charming Miles Sparrowjet and the still-futuristic-looking Leduc 021.

The masterful drawings are augmented with useful photos and specifications making the publications well-suited to scale model contest documentation. For more information, contact Argus Books Limited, Wolsey House, Wolsey Road, Hemel Hempstead, Herts HP2 4SS England, or try Model Builder book dealers.

**Aeroplans:** "AC" Anson has recently published the first in a series of model plans

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and three-views intended for "scratch-builders." The drawings compiled from various parts of the world represent several aviation eras, as evidenced by this random selection: 1895 Polish hang glider, 1913 Curtiss Model G Scout, 1917 Lawson Military Tractor, Russian Anatra, Heath mid-wing, Junkers/Mitsubishi heavy bomber (with a biplane tail!), and even some old-fashioned wooden "solid" model plans. A stamped, pre-addressed return envelope will bring you details of this and other Anson publications: Aeroplans, 8931 Kittyhawk Ave., Los Angeles, California 90045.

**More Plans:** Al Lidberg, well-known for his magazine model designs, also markets

plans by mail. Latest of his efforts are construction drawings for the 1940 Napier-Heston racer. Al's model spans 32 inches and is intended for rubber power. The full-size version featured a 24-cylinder engine and was of exceptionally advanced appearance. Although "stringer-intensive," its appeal to dedicated stick-n-tissue builders should be great, and the accompanying instructions are unusually comprehensive. For an illustrated catalog showing this and many other designs, send \$1 to: A. A. Lidberg, 614 E. Fordham, Tempe, Arizona 85283.

**And Still More Plans:** Al Arnold, Bill Gallopay, George Payne, and Curt Upshaw have teamed to produce model construction drawings under the name Flying Scale Incorporated. The samples we received, the Stinson SM-7B, Druine Turbi, and Curtiss Falcon, were neatly drawn, cleanly captioned, and featured many useful ideas, such as hints on propeller and scale-like hub fabrication. Browsing through the offerings list we find such tempting morsels as the Boeing PW9-C and F4B-2, Chester Jeep, Corben Super Ace, Curtiss Navy Hawk, Seahawk, Helldiver and Falcon; the Fairchild F-24C-8, Fleet biplane, Fokker D-8, Ryan STA and SC, Tachikawa Ida, and Sopwith 1-1/2-inch Strutter plus others, 29 in all.

More are being added, and the fellows also solicit suggestions for future projects. (They'll be sorry!)

If you would like the complete price list, please send a stamped, pre-addressed return envelope to: Flying Scale Incorporated, 1905 Colony Road, Metairie, Louisiana 70003.

**Flying T Model Company:** Roger Teagarden also markets plans, mostly in the 1909-1917 vintage. Additionally, he offers modeling materials and accessories such as blank decal sheets (for making your own), soft aluminum plate (.005 thin), aluminum and copper paper (card stock), and an ingenious line of (presumably) etched metal fittings for 1/24-scale models. These consist of strut fittings (to assist in rigging vintage models), instrument bezels, footstep plates for fuselage sides, and proper hub plates. We have inspected a set of the "prop bosses," which consist of two each of three different types of perforated hubs. If you've ever tried to make such things by hand, you will instantly appreciate their value. Send

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**Velvioli-Tom Thumb:** Carlo and Frank Godel also market plans, three-views, and accessories by mail. Originally specializing in offbeat (particularly Italian!) designs, they have widened the scope of their interests and taken on the Tom Thumb line as well. Where else can you find an entire series of Fikes? (Yes, Virginia, there were more than two.) The \$1 catalog price is refundable with your first order from: Velvioli-Tom Thumb, 5726 Case Ave., North Hollywood, California 91601.

**Silver Streak:** New from Peck-Polymers is an electric motor recommended for models in the 30- to 48-inch wingspan range. Labeled the Silver Streak 035, the motor weighs 2.6 ounces and is claimed capable of turning a 6-3 propeller 12,000 rpm. These units are available separately or as part of a complete system. Full details about these and other quiet forms of propulsion, including rubber and CO<sub>2</sub>, may be obtained by sending \$2 for a complete catalog to: Peck-Polymers, P. O. Box 2498, La Mesa, California 92041.

#### HOW'S THAT AGAIN?

Jake Larson, of Kenneth City, Florida, assures us that he discovered the real meaning of *stealth* while testing his model glider version, which landed atop a 50-foot pine: "Stupid Tree Eating Arm Launched Tree Hanger."

#### SO NOW YOU KNOW

From John Meaney, of England, explanation of a quaint Royal Air Force expression dating back to WWI. It seems that when the hangar chief wanted the Sopwiths and S.E.5s back indoors, he would hollar "Two-six!" It meant he wanted two fellows to lift the tail and six others to push on the lower mainplane. Over the years it came to be used if anything needed to be done "right now!"

#### FAC, TEXAS DIVISION

Tom Hughston, of Plano, Texas, reports that the Texas branch of the Flying Aces Club is active in both model building and aviation history preservation. The Aviation History Collection is a large research

museum located in the University of Dallas, which has been most useful as an information source for scale modelers. In return, some of the builders serve as volunteers in cataloging the collection and assisting with special projects. Most recently, four of the members completed a model Curtiss Jenny, which is now displayed in the terminal lobby at Love Field, an early training facility.

As for model flying, members such as Dick Johnson and Al Backstrom help to sparkplug the 15 or so members who have the use of a 150-acre grassland field south of the University.

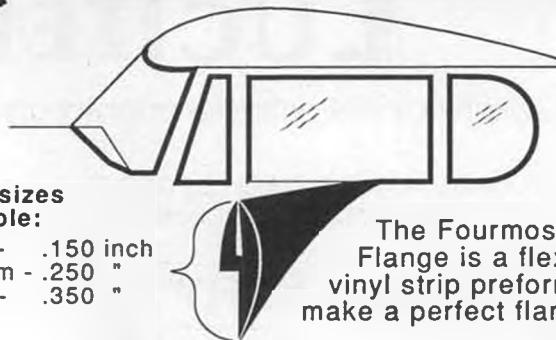
The Flying Aces Club is especially proud of their junior members, such as Don De Loach, who has captured trophies in every

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thing from Pistachio to Jumbo Scale. Keep 'em flyin', fellas!

### SPEAKING OF HISTORY

From an article by Wilbur and Orville Wright published in the September 1908 *Century Magazine*, brought to our attention by Jim Alaback, we found:

"We had taken up aeronautics merely as a sport. We reluctantly entered upon the scientific side of it. But we soon found the work so fascinating that we were drawn into it deeper and deeper." Sounds rather like model building; doesn't it?

### AERO PHILATELISTS

Some modelers also collect postage stamps, especially those with aviation themes. Alan Callaghan, of England, alerted us to a new British Royal Mail stamp depicting a vintage transport. In a clever (we assume) play-on-words, the inscription reads: "BY PLANE." Most appropriate for the H.P. 42 Handley Page biplane portrayed.

### AERO NUMISMATISTS

Certain model builders also collect coins (well, we all try!) and Alain Parmentier sent

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us a fine specimen commemorating the famed French aviator Roland Garros (1888-1918) and his Morane-Saulnier Type N. On the obverse of the golden 10-franc piece is a symbolic bird, while around the coin's periphery is the motto, "Liberte, Egalite, Fraternite."

### SIGN-OFF

Frank Zaic, after a lifetime devoted to free flight, says he is finally ready for R/C. (Retirement Community, that is!)

**Electronics... Continued from page 25**

### TALKING ABOUT TRUSTING PEOPLE

I might say that about our proofreader! But then again, since he is a he, I can understand how his attention sort of wandered, and he let one slip by. In the caption that goes along with Carolyn in our August issue, it was supposed to read: "I just wanted you to know that I have *not* forgotten the idea...." Well, maybe it reads better the other way. No, for those of you that asked, a SASE and a contribution to the AMA building fund in any amount will not get you an

address or phone number. There are no schematic diagrams either!

### VOLTAGE CONVERTERS

In the past few months, voltage converters have been discussed here in *MB* and in various other publications. Nothing concrete, just some attractive sounding ideas, complete with schematics in some cases, which are supposed to power your R/C equipment or electric model from relatively small and lightweight lower voltage batteries. Forget it! Can't be done, at least not in the way it is being presented.

In case you missed the whole thing, the subject deals with what in the electronic industry is called a "Dc/dc Converter." This is a device which will accept a low DC voltage and transform it into a higher one, also DC. This is not an uncommon process, and, without even trying, I can name you a dozen companies that manufacture such devices and also a number of Integrated Circuits around which such circuits can be built. For us, it won't work, and I'll tell you why.

The idea as presented is to save weight; instead of all those heavy cells you carry a couple of small ones and one of these electronic magic do-funnies, as if voltage were the only consideration. Well, there is an old saying about not getting something for nothing that is probably truer in electronics than it is in most other things. Not only do things not stay even, but every time a conversion of any sort takes place in an electronics circuit, there is a certain loss, generally easily measured.

The unit by which we measure power, either available or that being consumed, is called a "watt." It is simply volts times amperes. Available power starts with our battery supply and can be calculated from the maker's specifications. There are actually two terms used to measure batteries for comparison purposes: (1) The "gravimetric energy density," a measure of the available energy in watt-hours compared to its weight, and (2) the same measure compared to its physical size. Watt-hours is the product of the battery voltage times its rated capacity in Ampere-Hours. For example, a .5 Ah (500 mAh) cell, with its nominal voltage of 1.2 VDC, has a watt-hour rating of .6. We can consume current at the rate of .5 Amp for one hour, less for a longer time and more for a shorter one, but we can never exceed the available power of .6 watts.

In the using device, the same arithmetic applies. If you connect this 1.2V/500 mAh cell to a low voltage motor, which happens to have the right resistance to permit .5 amps to flow, you would then say that it is using .6 watts. For the sake of discussion, and assuming no loss in wires, switches, etc., this motor would run for one hour. Again, the less current/more time, more current/less time rule applies.

There are a number of electronic tricks, including a DC/dc Converter, which can be used to modify, increase if desired, the input voltage. But there are no tricks that will change the wattage rating of the source battery. If you take it out as a higher voltage, the available current capacity goes down. Plus there is that loss that I mentioned, which under the best conditions will be at least 20

percent; more under others.

To state that another way: Yes, you can make or buy a device which will let you run your R/C equipment from two 500 mAh capacity Ni-Cd cells. It will weigh at least as much as an additional Ni-Cd cell, and its side effect will be that of reducing your 500 mil battery down to at least 400 mils of usable power. Hardly worth it, now is it?

#### STILL ON THE SUBJECT OF BATTERIES

As if we could go a whole month without some discussion on the subject of batteries. I've just run into a service I want to tell you about. It's called Accu-Weld, and its job is to make big ones out of little ones.

First, however, I need to tell you that all Ni-Cd manufacturers warn us about soldering directly to their cells. The reason is that one of the basic requirements for a good solder joint is heat, and heat is one of the Ni-Cd cell's worst enemies. No matter how you attempt the operation (high heat for a short period, low heat for a longer period, or any combination in between), you have to heat the battery to solder to it, and when you do, you will cause damage to the chemical compound. And when you do that, you have lowered the capacity of the cell and shortened its life. Only cells which have tabs welded to their terminals should be soldered to.

Well, putting on those little tabs is what Accu-Weld does best. They can tab individual cells for you, or they can strap cells into any physical configuration you may want. These can be your cells, or they can furnish many of the popular brands of cells, custom assembled into whatever battery configuration you may require. Obviously, the possibilities! And the prices, too many to name here, but I have found them to be competitive and fair. Further information from Accu-Weld, 789-C West 19th St., Costa Mesa, California 92627; (714)645-1050.

#### NORTHEAST ENGINEERING POWER PANEL

This panel is a popular item, well made, and works well! However, since we all have individual requirements, every now and then someone comes up with a worthwhile modification to just about everything. One such example is this modification developed by William Klein, of Allentown, Pennsylvania. Bill took—well, let's let him tell it:

'Quite a while back you had an article about this panel in response to a reader who wrote to say that the panel continued to draw current from the 12-volt battery if the switch were left on even though the glow plug were not connected. You responded with a schematic to install a flashing LED to remind the user that he had left the switch on. I thought this was great and made the installation. I found, however, that red LEDs, being what they are, did not attract my attention on sunny days, and I would have left the switch on all day. I caught it many times, however, when I brought the flight box into the house. Since that time Radio Shack brought out their 'Super Bright' LED, which is rated at 300 mcd (I guess this is milli candles). (Close. Actually, "candela," the unit by which we measure luminous intensity—em) This compares with no more than three mcd for most red LEDs. It is really brilliant and there is never

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any question about whether it is on or off. One reason, I believe, is because it is in a clear case rather than a red one. It draws 20 mA at 2 volts, and I removed the flashing circuit and simply dropped the extra 10 volts with a 510 ohm resistor. Digi-Key has a similar LED, of the same physical size but rated at an astounding 2000 mcd; Part No. P408, but it costs \$4.38. (The Radio Shack unit, No. 276-066, is \$1.19.—em)

'What I am really getting around to is another change which I made, nothing really sophisticated, but I thought rather nice. When I was first trying to decide where to put the LED, I recalled that when I first purchased the panel I was wondering why Northeast had used banana jacks for the glow plug connections rather than a co-ax power jack and plug inasmuch as there was no need to ever change polarities as there is with the start jacks. I decided to take care of that at the same time. To do it you simply remove the banana jacks and drill out the two holes in which they are installed to 5/16 inch. In the left hole, mount a Radio Shack chrome LED holder (276-080) and install the super-bright LED to which has been soldered the resistor. The connection to power is as you described in your column. In the right-hand hole, install a Switchcraft jack, No. 712A, connecting two wires from this to the points where the banana jacks were originally connected on the printed circuit board. For anyone who may wish to do this, he must be aware that this jack has a built-in

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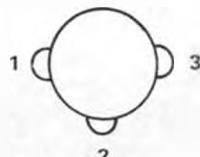
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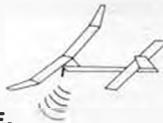
switch and therefore three soldering lugs. Looking at the bottom of this jack, it looks like this:



"Connections must be made to lugs No. 2 and 3. Polarity is not important although it is customary to have the positive to the center point of the jack (and the plug), and this is lug No. 3 on the jack." Great idea! I picked up one of the LEDs mentioned

### AT LAST...

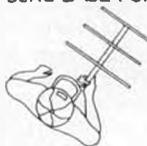
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decent-sized electronics parts supplier; not Radio Shack in this case. Thanks for sharing with us, Bill.

Meters is to be the subject for next month! How they work, what they can tell us, and how to use them. See you? •

#### Engines. . . . . Continued from page 24

The quality of good performance depends on the good mechanical ability of you, and the life of the engine depends on good quality break-in. Before we try to put the engine to work, it is good to get to know the basic rules of manipulation in coordinating the parts of the engine. These rules are for beginners. But experienced workers at MVVS say these instructions can also help experienced modelers.

The engine has two coordinating controls. One is for firing (ignition timing), and the other is for quantity of fuel that enters the carburetor. The basic aim of the fuel control is between three and four turns open. If we close the fuel mixture needle valve, fuel mixture is lessened, and the turning of the engine is faster. When we open the needle, the mixture is enriched, and the turning is slow. Both opening and closing have certain levels or limits. The engine can stop turning because of too much or too little fuel. Both is not good.

The firing/ignition control is coordinated by turning the lever on top of the engine. When we close down this lever, the contra piston moves down a little toward the top of the piston. By this lever the volume is changed and compression that generates

when they first appeared; they are indeed brighter than the normal ones we are used to seeing. It's been filed away waiting for a good application, though Bill beat me to it.

The LED should be connected with its anode to the 12 positive battery input; cathode to the side of the switch to which one side of the plug is connected.

The Switchcraft jack mentioned is a true power jack, as opposed to an audio jack. Power jacks of this type are to be found on a number of transmitters, Airtronics and Futaba for example. Audio jacks are those found on radios and tape recorders for connecting headphones. They should not be used in applications such as this one. Switchcraft products are available from any

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heat for combustion is greater as turned down. When we open up or raise the lever, this enables the contra piston to click and jump up as the propeller turns. The experienced modeler determines the approximate basic position for starting of the compression lever by feel. But the beginner must follow these instructions.

When we turn the propeller, we find the level when the piston is in the upper most position (top dead center). Then we carefully screw down the compression lever until you just feel resistance; the compression lever is not able to turn down easily any more. This means the contra piston is in touch with the piston. With small back and forth turning of the propeller, we test to see that piston and contra piston touch. Then we turn back (or up) about 1/2 to 3/4 turn of the lever. By turning the prop, we enable the contra piston to jump (often with an audible "click") up to this new starting position. When the engine is new, turning the lever down will take much force, and the contra piston may not jump up the 1/2 to 3/4 distance unless a couple of drops of fuel are put above the piston and the prop is smartly turned. The contra piston will be very tightly fitted above the piston.

We remind you these initial settings are only approximate, and you must develop a sensitive feel for the controls. You must react very quickly to changing levels of compression as fuel in the combustion chamber varies, as this is related to starting/running the engine. You must be very aware of compression changes. For exam-

ple, if we are not successful in starting after several tries, it may be that too little fuel is in the crankcase. After first detonation, if too much fuel is in the crankcase, the excess of fuel transfers quickly above the piston, and it blocks free/easy turning of the prop. In worst case after first detonation, excess fuel can be damaging if prop is forced to turn.

That is why, after first detonation, we must lessen immediately by turning the compression lever to not damage due to over compression. In case of the engine crankcase getting too much concentration of fuel, we advise you to remove the back cover of the crankcase and pour out the excess fuel. You will become quite skillful

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# duke's mixture



*Yesterday, I was 69 years old! Forgive me if I reminisce a bit. Sixty-five years ago I saw my first airplane fly — and from that day I knew I wanted to design and build flying machines. Sixty-two years ago I built my first successful flying model — a Baby R.Q.G., (rubber powered, of course) from a kit my father found somewhere. It flew about 75 feet, as I remember, in a perfectly straight flight path. August, 1928 — I discovered "Model Airplane News". How wonderful! I could send away and buy glue, dope, thinner, balsa wood, and other wonderful goodies. This started a ten year building spree, during which I probably built close to 100 models a year mostly rubber powered and nearly all original. College, then work, then the Army slowed building, but didn't stop it.*

*In 1943, 45 years ago, I built my first motor.*

*In 1948, I left the Douglas Research Department to devote my full time to building model airplane motors. The model airplane motor business has been good to me and supported me well, even though I was guided more by what interested me than what was good business.*

*In these past 40 years I have built a facility capable of efficiently producing ten times our present 1.5 million volume. The market is the best it has been in 20 years. I have four new products in various stages of preparation. We should be going like Gangbusters, but I just don't have the steam to push like I used to. What this business needs now is a young, highly motivated, model oriented man with a college degree in Business Administration. Since there is no motivation like owning part, or all, of the business, it would be nice if he had rich parents or relatives who would stake him to some degree of ownership. If you know such a person, send him my way.*

*It is inevitable that someday this business will have a new owner. But, rest assured that I am going to continue to contribute my talents to it as long as I can — and my ancestors were long lived — the most notable was my Great Aunt Libby, who worked to the ripe old age of 113 (No, that's not a misprint).*

*Happy flying.*

*Duke Fox*

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and experienced in recognizing when the engine has too much and/or too little fuel. It is good when you learn to coordinate both the needle/fuel control and the compression lever together. That is why, when you are a beginner, you must be patient. It is good when you ask an experienced modeler to aid in first starting or testing.

(The instructions continue in detail about mounting on a test board, centering the fuel height at/below the needle valve level, running in a suitable environment for noise and fresh air, selecting the right prop, etc. The starting directions follow.)

To engine we inject by squirting above piston which is in the "down" position about 0.2 cubic centimeters of fuel. By finger we choke off the carburetor's throat and turn prop two to three times counter-clockwise. We uncover the throat, and, by extreme fast vigorous flipping of the prop, we start the engine. If the engine doesn't start after several tries, it means we put too little fuel or too much fuel in it. In the first case, we put more fuel; in the second case, we must un-flood the engine and remove

the excess. When engine does start, we leave it running for warm-up. After ten minutes of running, we try for higher revolutions by turning in the fuel needle in coordination with the compression lever. Enriching yields cooler running. This we repeat until the engine can run at peak speed without slowdown.

Immediately after engine stops, we draw tight the head screws of the cylinder and the cover of the crankcase. Tighten alternately the bolts to not cause out-of-roundness. Engine is now ready to put in your model.

(The instructions advise using the same fuel for flying as for break-in. Their 7-11-type stores sell diesel fuel in at least two grades. The fuel containing amyl nitrate is used only after 100-percent break-in and freedom is maximum. Instructions say max power may come only after several hours running time. The R/C carb and muffler can be added after break-in is complete. Tank's close-to-engine location is detailed as well as use of a wedge tank for control line stunt flying as well as use of an inline filter. The instructions continue as follows:

After each day's flying of the engine, we clean it with fuel without amyl nitrate to protect from rust. We cover the exhaust of the muffler, and we wash the intake with a small brush wet with benzene. We disassemble the engine *only* if it is necessary; i.e., when dirt gets inside. Then we loosen only the rear cover and flush through this opening, the exhaust, and the intake venturi openings. When the engine is more dirty, as when sand gets inside, we must disassemble all over to pieces. We must be very careful to not turn the prop because one grain of sand can damage the piston and cylinder. After good flushing with benzene, we coat all parts with paraffin oil (kerosene) and very carefully reassemble.

In case of big needs, send the engine to our factory for repair. Describe problems briefly. No-cost guarantee repairs will be made for six months after purchase. But, if you damage the engine yourself, this guarantee is void. For factory service, you must return the guarantee papers.

Additionally, blanks were filled out on the instruction sheets as follows:

Type motor, Junior 2; entering control, 20; date sold, April 1, 1988; serial number, A-390; (signature of factory worker); (stamp of selling store and signature).

This engine was bought in the House of Technical Hardware in Prague, CSSR by a friend who airmailed it to me.

I thought you'd like to know more about Aniscka. She is pretty, lovely, and speaks five or six different languages. In English, her name is "Ann." She was at Toledo's R/C show this year. My wife and I love her like a daughter. Her home is and always will be in Czechoslovakia. Her native money is worthless here. It cost \$20 a day for her to be in the USA, payable in advance to the Czech state bank. The money was given to her for expenses as she exited her country. Her trip to the USA was "sponsored." In Czechoslovakia she holds a very responsible job; it has taken her several years to attain this position. She was recently offered membership in the Communist party. Wisely, she accepted, which ensures her

job's continuity. She earns about 2500 crowns a month; her Communist party dues are about 100 crowns monthly plus she must attend meetings. Lynn and I took Aniscka to Disney World to see the great America parade as a highlight of a fun-filled Disney day; the Haunted House, Hall of Presidents, and rides preceded the parade. Small American flags were passed out as that wonderful parade approached us. Aniscka got two; one for each hand. What a sight to see her enjoy a visit to the USA, to see her enjoy the parade that features America, to see her waving those two tiny American flags, and to see her laugh and smile and enjoy.

All good things in life happen through model airplanes! A few of these new "Junior 2" engines will become available in the USA. If interested, write me care of Model Builder. I can help you make proper contact. Please include a SASE.

#### Air Cannon... Continued from page 52

tiaircraft role. The concept was to create a very large vortex, traveling at a very high rate of speed, which would simply break up invading Allied aircraft. Look, ma, no wings!

So what does this have to do with indoor free flight? You have just landed your best microfilm job on a girder thirty feet up. Mort "Ten-Thumbs" Snelzbacher has (despite your protestations) volunteered to dislodge it with his forty-foot telescoping model grabber, which he has gone to retrieve. You have to get your plane down quickly, before he returns with his pole to (Oops! Sorry...) smash/dislodge it. So you race to your car and return with your new air cannon. As you take aim and prepare to fire a couple of volleys, you can feel the stares of your buddies as they wonder just what in the world you are doing. You sight in on your model, give your air cannon a couple of thumps, and your model suddenly pops off the girder to finish its flight—without any apparent physical effort on your part. If you can imagine this, then you should be building an air cannon for yourself.

You may be wondering why, if this is such a hot idea, did I wait so long to write about it. Actually, I constructed an air cannon and started this article in the spring of 1985, but job changes, relocations, and my return to college to finish my degree put the project on hold.

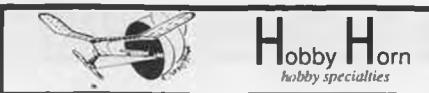
#### CONSTRUCTION

Before you start your own air cannon, you will need the following materials:

1. A five-gallon plastic paint or commercial food bucket
2. A 16-ounce (approx.) vegetable can
3. Silicone caulk
4. A heavy (4-6 mil) plastic sheet, 24" x 24"
5. Good quality strapping tape

An air cannon consists chiefly of three parts: an air chamber, a vortex cylinder, and a diaphragm.

Your five-gallon bucket will for the air chamber. Start by removing the bucket handle (it only gets in the way). Turn the bucket bottom-up on your work surface and mark



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the exact center of the bottom. Most such buckets have a smaller support ring already molded in, so location of the center should be easier still. Now, take your 16-ounce vegetable can and cut the bottom as well as the top out with a good can opener. This is your vortex cylinder. There should be no ragged edges protruding inward, because the vortex cylinder acts as the barrel of this air gun (pardon the pun). It forms, shapes and aims the vortex, and anything less than a smooth interior surface will adversely affect performance.

Take the vortex cylinder and center it on the upturned bottom of the air chamber. Trace around the cylinder with a pencil and set both aside. With a hot knife cut around the *inside* of the line. You want the vortex cylinder to fit pretty snugly inside this hole in the air chamber, so go easy on the cutting at first. You can always trim further for a better final fit.

Now, fit the vortex cylinder into place. The cylinder should fit through the hole with its rim butted against the inside wall of the air chamber. It might be a little work fitting the two together because the can's rim has a greater diameter than its body and because the whole is slightly undercut. If you end up with a cylinder that is somewhat wobbly as a result of overcutting, do not worry. Prop the cylinder in place (so it is fully extended outside the air chamber) and caulk around the outside of the seam with silicone adhesive. If you need to build up this seam, do it in layers or the silicone will be forever in drying.

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Once your outside seal has cured, lay a bead of adhesive around the inside rim as well. The adhesive at these joints is not just for structural purposes either. It prevents air leakage and improves the performance of your cannon.

When all of your adhesive is cured, it is time to fit the plastic diaphragm to the other end of the air chamber. Lay your heavy-gauge plastic sheeting out and put the open end of your air chamber over it. Mark a cutting line on the plastic with a radius three inches greater than that of the air chamber, and cut out the diaphragm. Cut in advance a couple of dozen 6-to-8 inch lengths of strapping tape and have them readily available.

With your air chamber centered on the diaphragm, fold up one side of the plastic against the side of the chamber, and secure it with a piece of tape. For reference, this first piece of tape is your 12 o'clock position. Now go to your 6 o'clock position, pull the plastic tightly against the side of the air chamber (so as to tighten the diaphragm) and tape in place. Do this at your 3 o'clock position next, followed by the 9 o'clock position opposite. Continue stretching and taping the diaphragm in this manner until it is stretched drum-tight and is secured around the entire air chamber.

To keep the tape strips from pulling up from the chamber and allowing the diaphragm to go slack, wrap a band of strapping tape tightly across the tape strip ends for at least two times around the air cham-

ber. Do the same for the ends of the tape strips adhered to the diaphragm.

Now your air cannon is complete, but how do you know if it works? The easiest way to see just how large a vortex your air cannon makes, and how fast it travels, is to use smoke. Suspend a smoke bomb on a length of wire through the vortex cylinder and into the air chamber. Be careful that the smoke bomb is not too close to the diaphragm, or you may end up installing the diaphragm a second time (I wasn't, and I did). When the smoke bomb is spent, withdraw it from the cannon. Stand at one end of an easily ventilated area, such as a garage, cradle the cannon in one arm, take aim, and hit the diaphragm firmly with the palm of your free hand. A perfect smoke ring will shoot across the space for twenty feet or so before it begins to lose some velocity, but will continue for up to fifty feet or so before petering out.

I tried to photograph a smoke vortex in flight, but it was far beyond my photographic capabilities. The vortex moved too fast for my wife and I to get an up-close coordinated effort.

"Ready, one, two, three!" Thump! Click!  
"I think I missed, let's try again."

We now have a whole set of static pictures of our empty garage.

Try blowing out a birthday candle from ever-increasing distances. By the time the smoke in your cannon is gone, you will have mastered the rather basic aiming and firing techniques to the point that smoke as

a shooting aid is no longer necessary.

### VARIATIONS

The original air cannon article I read suggested using sheet rubber for the diaphragm. Not having access to such, I have always used heavy plastic. I strongly suspect that rubber might allow for a more forceful vortex ring, and if anyone tries this method, I would be very interested to know the results.

As I said before, the vortex cylinder is very much like the barrel of a gun, and the longer, the better, to a point. At any rate, the diameter of the cylinder should always be less than its length. Likewise, the diameter itself should not be too small, either. The proportions of the cannon in the photos are about right, give or take a little.

Although the air cannon shown will extinguish a candle at twenty-plus feet, I suspect that it will be able to dislodge the lighter indoor models from twice that distance. In fact, I would go easy with the cannon at first when trying to shake loose a model from its lofty perch (remember the Nazis' intended purpose). Overexuberance might easily result in damage to a delicate model of the microfilm duration kind.

Having an air cannon will not completely eliminate the occasional need to make like Spiderman, but it will give you one more solid option before you have to rely on Mort "Ten-Thumbs" Snelzbacher or engage in feats of aerial derring-do. As well, it might be difficult to resist taking random, surreptitious potshots at your buddies' planes in

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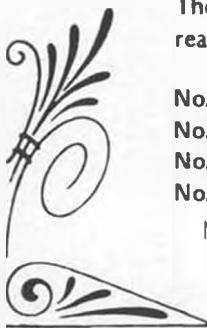
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flight. A few direct hits will surely make a believer of the worst or skeptics.

So, indoor modelers, there you have it: a cheap, portable, innovative alternative to knocking your models down with poles or climbing to retrieve them. What are you waiting for? Go build yourself an air cannon!

**Costa Rica. . . . Continued from page 21**

the road. Julio beep-beeped and waved, at which the man gave us a wave back. To my question of "Who dat?" Julio answered "That is the President!" We had just passed

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Mr. Oscar Arias, the President of Costa Rica, running along the side of the street! Without a single battleship, tank, or helicopter gunship, not even a lone armed guard to protect him. The leader of Costa Rica does not need bodyguards; can you imagine such a thing in this or any other country? That is what I call "Pura Vida." Yes, you've heard the name, not as a famous jogger, but as a Statesman, as Mr. Arias has since earned for himself the Nobel Peace Prize; and it was to his little country, to his backyard literally, that many of us traveled once again to enjoy one of the prizes that

comes with peace, being able to bring together peoples from many countries, drawn there through a mutual interest, with no thought being given to politics or international boundaries.

At this one, Numero Seis, Number Six Tropical Fun-Fly, we had the pleasure of having with us and meeting representatives from more countries, some not previously in attendance here in previous years. From Brazil, we were visited by Felipe Santoro, whose beautiful Made-in-Brazil ready-to-fly "Tucano" and other interesting models are being distributed here in the United States by Air Champ Models in Miami, Florida. Also from South America, Chile in this case, came Pedro Munoz. Closer-by, Guatemala was represented by Juan Francisco Villaverde and Carlos Enrique Pullin. And to prove that the love of flying things can overcome some impossible appearing obstacles, we had the pleasure of once again seeing the popular Raphael "Pepo" Cano, from Panama. Now this is during the heat of the problems in that country with Noriega and Company, the banks being closed, and everything else that you read about and saw on the telly. Pepo in some way gathered together enough "Balboas," as the Panamanian dollar is known, and drove to San Jose. Bear in mind that we are not talking about a leisurely drive down a six-lane interstate. We are talking mostly two lanes, and furthermore, two lanes shared with everything imaginable that drives, creeps, or crawls. I prefer sitting back in one of LACSA's airliners with a pretty Tica serving me Ron Centenario; but, Pepo, we are happy that you made the effort, and we were all glad to see you.

It is a polyglot crowd indeed at the Tico Fun-Fly. In the crowd we see AMA Prez Don Lowe and the patient, pleasant Claire. We see Bruce McAviney, number one man at Global Distributors (Hobby Shack), all recovered from some ailments that kept him grounded and away last year. That busy crowd over there with the pretty airplanes, pretty shirts, and prettier ladies is the fantastic "Cloud Dancers" show team from Florida. They make R/C airplanes do things that R/C airplanes simply can't do! Enough with the celebrities though; take it from me, those of use in the common ranks had just as good a time as they did.

Get there we did, obviously from all points of the compass, with all manner of flying machines, large and small. For those of you with us for the first time, the Aeromodelismo Costa Rica Tropical Fun-Fly is somewhat different from what you are used to attending here in the US of A. Our Fun-Flys are for us, the fliers. The Tico event includes one day, Sunday, for the general public. A lot of advance publicity via television, radio, newspapers, and with posters throughout the city spread the word. On the appointed day, the flying field, which is located at Los Reyes Country Club in the suburbs of San Jose, takes on the air of a full-scale airshow. The air action is varied and continuous, and if the applause is any indication, appreciated and enjoyed.

However, the action is not limited to that aimed directly at the general public—some of it we do for us. Most Fun-Fly attendees

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come early and stay late, to enjoy the spectacular natural beauty that is Costa Rica, from beaches to volcanoes to rain forests. There is a barbecue on one of the evenings, for which Aeromodelismo member Enrique Nieto graciously lends his country home, the grounds of which are only slightly smaller than Oklahoma! Another highlight of the long weekend is spaghetti night at the home of transplanted Californian John Marino. What started at an early Fun-Fly as a chance to dine and talk modeling has developed into an enjoyable tradition which now includes everybody and completely overflows the Marino home. John, remember that in some cultures a loud burp is accepted as a sign of appreciation of fine dining, not as proof that some of us don't know when to stop eating!

Anyway, we all enjoy each other's company and the flying. It is important to remember though, that a lot of hard work takes place before and during such an event, and all of us there recognize that we'd never get off the ground without the efforts and energy of Julio Pastora, Aeromodelismo President and main mover of all modeling events in Costa Rica. Addition-

ally, we appreciate the sponsorship of Cerveza Costa Rica, El Hobby Shop, both of Costa Rica, and Texson Precision Products, of Miami, Florida. And a most generous "gracias" has to be extended for the sponsorship and services provided us by LACSA Airlines and the Hotel Irazu. Any of you who have traveled with model boxes will certainly appreciate the above-and-beyond hassle-free service that gets your airplanes there safe and sound and on the same flight that you are on. Also appreciated is a hotel that provides storage for said boxes, a display hall for your models, plus whatever other facilities an individual or the group may require.

We are also grateful to the following organizations who provided donations this year: Ace R/C, Air Champ Models, Airtronics, Duracraft Inc., Futaba Corporation, Hayes Products, Hobby Shack, Model Builder magazine, and Polk's Hobbies. Thanks to each and everyone of you; can we make you a reservation for next year?

Alas, the Sixth Tropical Fun-Fly, like all good things, has to come to an end, but not without a struggle. We get to clean up and make ourselves pretty for the presentation

and farewell banquet, also at the Hotel Irazu. Everyone gets a plaque for being a participant, with special flying awards being given the following fliers:

**Best Scale Aircraft:** Charlie Rodriguez, YAK 50.

**Best Sport Aircraft:** Oreste Perdomo, Force One.

**Best Aerobatic Flight:** Donald Downer, Tycoon.

**Best ARF Aircraft:** Bruce McAvine, Dago Red P-51? **Best Novelty Aircraft:** Lee Skaggs, Snoopy Doghouse.

**Best Helicopter Flight:** Orlando Ruiz, X-Cell.

Determined by the reaction of the general public that was present, the **Best of Show Award** was presented to the Cloud Dancers Team, as a group. Their routine includes parachute drops, with the individual parachutists R/Ced down to spot landings, formation flying, and a lot of on-the-deck maneuvers which are impressive to all of us and really wow the non-modelers. The last award was one that no one wants or works for, but is usually earned anyway. Worst Crash went to Lee Skaggs, another Californian turned Tico, who lost an old friend called "Big Red," which he always described as "sorta a Laser." May it rest in peace!

Static awards were presented as follows:

**First Place:** Julio Pastora, a DC-3 done in the colors of LACSA Airlines, as it was 34 years ago.

**Second Place:** Oreste Perdomo, Force One.

**Third Place:** Jose Maria Volio, Aeromaster.

**Special Mention:** Tucano, Air Champs.

**Special Mention:** 1/3rd Scale Laser 200, Lee Skaggs.

It is all over, except that we have to make plans for 1989! No, it is not too early, at least not for the basic planning. The date will be the weekend of May 5 through 7 and will include a one-plane event, based on the Thunder Tiger 40S "Sweet Stik," which comes built but uncovered. Other "Stiks" of the same general configuration, with the same minimum dimensions will be permitted. The engine is limited to .45, front rotor, unpiped. Detailed rules will be available in plenty of time, to be had for the asking. And while you are at it, LACSA Airlines takes you down from Miami, New Orleans, or Los Angeles—be sure and get your reservations early. Remember, for '89, first on the list is the Seventh Annual Tropical Fun-Fly in San Jose, Costa Rica. Spanish? Not really necessary, but if you should find yourself without one of our English-speaking hosts, just remember that all you have to do is smile! And say "SI"!

**Old Timer... Continued from page 34**

ing the prop from pine in order to help in obtaining the proper balance point, which as in many old magazine plans, was not located. One-third of the chord back from the leading edge should be a good starting point. A modern plastic prop may provide the extra weight required. Eight strands of 1/8 flat rubber are recommended for power.

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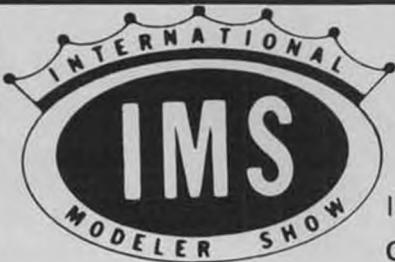
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### Hurricane . . . Continued from page 15

technique employed. Engine of .30 to .40 size can be used. Its size and stability make it a good sport flying model.

#### CONSTRUCTION HINTS

Before we begin, take a look at these special tips for working with cardboard:

**Glue:** Water base glue, such as white glue or Titebond, is recommended. Contact cement is not recommended since parts cannot be shifted when gluing surfaces together.

**Folding:** The scoring of the fold lines is done with a screening tool available at any hardware store. It consists of a handle with a 1-1/2-inch radius wheel at one end, which is run along a straightedge on the fold line.

**Waterproofing:** Waterproofing of cardboard is quite simple and can be done to the raw material before you cut out the parts of the model. Simply mix 25-percent clear polyurethane with 75-percent paint thinner. The latter can be the cheapest hardware store variety, which is thoroughly mixed with the clear polyurethane. Brush the mixture liberally onto the cardboard sheet and allow to dry for 48 hours. This adds no appreciable weight to the material and renders the cardboard completely waterproof. In addition, when you start to cut the treated cardboard, you will find that it is as crisp as wood and cuts sharply and cleanly.

**Finishing:** Cardboard gives a solid surface with no open areas to cover and is non-

porous. The easiest finishing method is to give two coats of clear dope, sanding lightly between coats with #400 sandpaper, followed by three coats of colored dope. However, a wide variety of finishing materials may be used on the cardboard. Coverings, such as Solarfilm, MonoKote, and vinyl paper can be used. With any of these, it is recommended that the surface not be doped, which will result on a better bond.

**Paper Tape:** All seams, joints, and exposed edges of the model are covered with strips of gummed paper tape. Obtain a one-inch wide roll from a stationery store. Simply cut a thin strip to length, dip it in water, and smooth it over the seam.

#### CONSTRUCTION

Cut out all cardboard and wood parts using the template outlines. Be sure to note the direction of the corrugations. Score and fold cardboard parts as indicated in the plans.

**Empennage:** The fin, rudder, stabilizer, and elevator are each made from two pieces of 1/8-inch cardboard laminated together crossgrain to give 1/4-inch thick surfaces. Add a 1/8- x 1/4-inch balsa strip to the fin leading edge and round off. Add 1/8- x 1/4-inch balsa strips to the stabilizer leading and trailing edges and round off. Glue the elevators to the 1/4-inch dowel. Add 1/8- x 1/4-inch balsa strips to the remainder of the elevator leading edge and round off. Seal all raw edges with gummed paper tape. Hinge the elevators to the stabilizer with cloth hinges at four places.

**Wing:** Make the wing spar by capping each 1/4-inch balsa spar half with a 1/4- x 1/4-inch spruce strip top and bottom. Join the spar halves together with 1/8-inch ply joiners front and rear at the centerline. Glue the 1/8-inch ply gear mount into each wing panel. Glue the right side of the wing spar onto the right-hand wing panel from the centerline to rib W4. When dry, glue the outboard portion of the spar to the bottom wing from W4 through W9. Glue all cardboard ribs into the right wing. Add cardboard doublers over the ply gear mount between ribs W2-W3 and W3-W4. Glue a one-ounce weight to the right wing tip.

Glue the left wing panel to the left spar in a similar fashion. Add the ribs and gear doubler to the left wing. Apply glue to the top of the inboard wing spar from the centerline to the dihedral break, the top of the ribs and the trailing edge of the inboard wing. Fold the top wing surface down and pin securely in place until dry. Repeat the process with the outboard wing panels.

Add the balsa tips to the wing. Make a line guide from 1/8-inch ply. Cut a slot in the left wing balsa tip and glue the line guide in place. Cover the trailing edge and all seams with gummed paper tape.

**Fuselage:** The fuselage sides are outlined with a triangular symbol on the drawing. Line the upper and lower edges of each fuselage side with 1/8- x 1/4-inch balsa strips, as shown in the fuselage edges. Bevel the strips at the aft end of the fuselage so that the cardboard sides will come together.

Add cardboard supports to each fuselage side above the fuel tank and below the bellcrank.

Make the firewall, C1, from 1/4-inch ply. Locate the mounting holes for a KM-40 motor mount on the face of C1. Drill the mounting holes and install blind mounting nuts on the back side of C1. Drill a hole in C1 for a fuel tubing exit and two holes for the 3/16-inch dowels. Glue the dowels into C1. Line all four back edges of C1 with 1/2-inch triangular balsa for bracing.

Glue C1 to the right side of the fuselage. When dry, glue the left side of the fuselage to C1. Attach the fuel tank to the 1/8-inch ply support. The fuel tank may be attached to the support with rubber bands. Make a pushrod from 3/32-inch wire and 1/4-square spruce and attach it to the bellcrank along with the leadout wires. Install the tank and bellcrank assemblies by gluing the ply supports to the cardboard supports on the sides of the fuselage. Glue the fuselage sides together at the tail.

Glue F1, F2, and F3 in place to cover the top fuselage. Be sure to bring fuel tubing fill and overflow lines out during all covering operations. Cover the bottom fuselage with F4, F5, and F6.

Add bulkheads A through H to the top fuselage, adding 1/8- x 1/4-inch stringers. Cover bulkheads A through C with D1, which has been scored and folded. Cover bulkheads C through E with D2. Cover bulkheads E through H with D3. Cover upper portion of bulkheads E through G with D4. Add the three J bulkheads, with stringer, to the forward bottom fuselage and cover with D5. Add balsa exhaust stacks to both sides of fuselage.

The cowl is made from a hollowed-out balsa block. The top half consists of a hollow block with 3/16-inch ply C4 glued to the front. Drill a hole in C4 and install a blind nut on the back side before gluing to the balsa block. Then glue the block to the firewall. The removable bottom half of the cowl consists of C2, the hollow block, and C3. The holes in C2 must align with the 3/32-inch dowels in the firewall C1. When aligned, glue C2 to the back face of the hollow block. The holes in C3 must align with the hole in C4 in the top block. When aligned, glue C3 to the front face of the lower block. Sand, carve, and hollow the balsa block to shape. Test-fit the engine in the cowl and drill mounting holes in the KM-40 mount. Use a shaft extension to give adequate spinner clearance. Cut holes in the cowl block for the cylinder head, exhaust, and needle valve.

Glue the stabilizer to the fuselage. Add 1/2-inch triangular balsa to bottom of horizontal at fuselage intersection for bracing. Glue the fin to the fuselage. Add scrap balsa bracing between fin and stabilizer intersection. Add the rudder to the fin with the trailing edge offset 1/2 inch to the outside of the flying circle.

Make the tailwheel gear from 3/32-inch diameter wire. Bend as shown, place on the 1/8-inch ply support, wrap with nylon thread, and smear with glue. When dry, glue in place in the bottom fuselage cutout. Add scrap balsa wheel fairings.

Make the main gear from 5/32-inch di-



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ameter wire as shown. Make gear fairings from 1/8-inch ply and attach to the gear with nylon gear clips. Attach the gear assemblies to the 1/8-inch ply supports in the bottom wing with nylon gear clips. Make the aircoop from a hollowed out balsa block and glue to the bottom of the wing.

### FINISHING

Now is the time to paint and trim the model before final assembly. The color scheme is dark green and gray on top and gray underneath. The lettering and roundals are made from MonoKote. Make the canopy from thin plastic and epoxy to the fuselage. Outline the canopy with strips of black MonoKote. The aileron and flap outlines are also made of black MonoKote.

### FINAL ASSEMBLY

Glue the wing to the fuselage. Pass the leadout wires through the wingtip line guide and tie off. Attach the nylon control horn to the elevator and hookup the pushrod. Attach three-inch diameter wheels to the main gear and a 1-1/2-inch diameter wheel to the tail gear. Attach a 10-6 prop and a 2-3/4-inch spinner to the engine. Your ship is now complete. Be sure to balance the model at the point shown on the plans.

### Technical Stuff *Continued from page 43*

frame weight we can do a lot about. We are not going to reduce the weight of our models very much for free, however. By 'free,' I don't mean dollar cost. What we will have to spend to get lighter airplanes is design time and effort, at least to start with. If

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developing airplanes is not your bag, you can buy ARFs and fly them, and in the long run you will be flying better, lighter models, because the ARF manufacturers are constantly improving their materials and designs. But why let them have all the fun? I mean it when I say that for me, the designing is more fun than the flying. Try it, you might like it.

### DENSITY

Density is the weight of something divided by its volume. In other words, density is a measure of how heavy or light a material is. For instance the density of water is 62.4 pounds per cubic foot. White beaded polystyrene foam has a density of only one pound per cubic foot. You will sometimes also see the term "specific gravity." That is simply the weight of a material compared to an equal volume of water. Aluminum is 2.7 times as heavy as water, so its specific gravity is 2.7. When we finally go all metric, things will be even simpler. Since the weight of water was established at 1.00 grams per cubic centimeter, in the metric system the density of any material is the same as its specific gravity.

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out to be a very important factor in the choice of materials from which to make our model airplanes.

We use materials from as light as foam to as heavy as steel (or lead, if you want to count the balance weights), but the broad range isn't the important point. What counts is the fact that we can build lighter and/or stronger models if we use material of the right density in the right place. To explain: We use spring steel wire, a dense material, for our landing gear struts because it is strong and resilient enough for the job with a small cross section, so the drag is low. As another example, we use lead, a very dense material, for balance weights because it takes less space for a given weight. At the other end of the scale, the major part of the main structure of our models is usually of low-density materials, to keep the weight low. Next to foam, balsa wood is about the lowest-density structural material we have, so it seems we have been using the right stuff over the years. True, until the plastic foams and composites came along. Now we have some options. (Incidentally, a structural steel worker wouldn't call balsa "structural," but his view is narrower than ours).

Actually, the main structural material for a light model doesn't have to be low-density, provided the density of the entire airplane is low. What I'm driving at is that except for the cheap solid-foam ARFs, we

don't make our flying models out of a solid chunk of material the size and shape of the model. We make built-up models, and the volume of the model is mostly air. That is fine, since air is very light. If we go to denser but stronger materials, the volume of the actual materials used is less and the volume of air increases.

Depending on the material and on the structural design, the strength of a model made of denser material may be very good, and its weight the same, or less, than a balsa or foam material. We see plenty of fiberglass models that are as good or better than balsa models. Very strong yet very light all-steel or all-aluminum R/C models could theoretically be built (and a very few have been). I say "theoretically" because the problem is in the difficulty of designing and building such planes. Imagine a metal-structure model airplane with a few hundred welds or rivets. No thanks.

The above applies to a fabric or film-covered model, but when we build rigid-skinned models, another factor enters the picture. Namely, aluminum gauge problems. If the model is covered with sheet balsa, usually 1/16th to 1/8th inch, and the surface is hardened and strengthened with film, fabric, fiberglass, or just paint or dope, the skin becomes rugged enough to withstand handling and it is thick enough to have a little bending strength and a little compression strength. On the other hand, if

we skin the model with thin sheet steel instead, and make it the same weight as it would have been if skinned with 1/16th balsa, the steel skin would be less than .002" thick. This would be subject to handling damage and would add little or no monocoque strength. There are therefore strength/weight advantages in using low-density materials for model skins.

#### MONOCOQUE STRUCTURES

I used a term there that all you upper classmen know well, but you beginners may not have heard. "Monocoque" refers to the fact that a smooth, hollow structure, like an eggshell, can have a very high strength-to-weight ratio. An egg is "full monocoque," since all of its strength is in the skin or shell. Full monocoque hollow spheres or near spheres are very structurally efficient, but in most airplane shapes, such as the fuselage, "semi-monocoque" is better. There, the skin takes most of the load, but a light structure, including bulkheads or ribs, supports the skin enough to keep it in the intended shape. A fiberglass fuselage with no bulkheads and no internal foam is full monocoque. If we add some internal structure, we end up semi-monocoque.

As previously mentioned, we usually do something to harden and strengthen the surface of a balsa-skinned wing or fuselage, such as cover it, glass it, and/or paint it. Some of you may have thought you went to all this work just to make it look pretty. Esthetics is a factor, but it is low on the list of considerations with this designer. The most important reason is to seal the balsa (bare balsa would sop up fuel, exhaust goo, and water like mad). The next most important reason for the covering and/or paint is to strengthen the plane and greatly increase its ding resistance. Remember, we have a semi-monocoque structure with most of its strength in the skin. Toughening up that skin adds a lot of strength for little weight. Yes, even paint adds some strength, but not nearly as much as a film or fabric, or better yet, fiberglass.

#### COMPOSITES

An epoxy fiberglass or polyester resin and fiberglass laminate is a composite material. It is a medium-density material and makes good high strength-to-weight ratio semi-monocoque models. It doesn't do as well in full monocoque structures, because it has to be made too thick (and therefore too heavy) in order to hold its shape without support. Many kits provide molded fiberglass fuselages, and the modeler may add bulkheads and other internal structure to make it semi-monocoque. Few modelers make their own molded fiberglass fuselages, because making molds is a lot of work. Much more on composites here in months to come.

#### SANDWICHES

"Foam board" is a "sandwich" composite material with a low-density plastic foam core and medium-density facing material on each side. It is available with either thick paper or thin plastic facings. Good stuff for a few model applications, but it is too weak for many R/C applications. I know. I have had the structural failures to prove it. But just because commercially available foam board is wanting in our applications doesn't

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mean we have to give up on sandwich structures. The structural sandwich concept is very efficient. It allows us to use strong, thin, medium-density materials such as fiberglass, Kevlar, or carbon fiber, and support them with thicker, very light foam. The composite structure has a much better strength-to-weight ratio than either material alone.

If you have built balsa-covered models and fiberglassed them, you have built open-faced sandwich structures. My friend Paul Weston fiberglasses both sides of his 1/16th balsa wing skins before skinning the wing, for full sandwich strength. Balsa is too dense a material for the core of optimum model airplane sandwich structures, however. Foam is much lighter and still strong enough. It is also easier to build, as we shall see in the future. When we cover a foam wing core with balsa, the whole wing can be looked at as a sandwich structure or as a semi-monocoque structure. But now we are using the balsa as the structural skin of the sandwich, not as the skin-supporting core. But balsa (soft balsa, anyway) is too low in density to be an optimum monocoque skin for our larger models. Poor balsa!—sometimes it is too dense, and sometimes not dense enough. More about balsa and its strengths and weaknesses in months to come.

#### STRENGTH-TO-WEIGHT RATIO

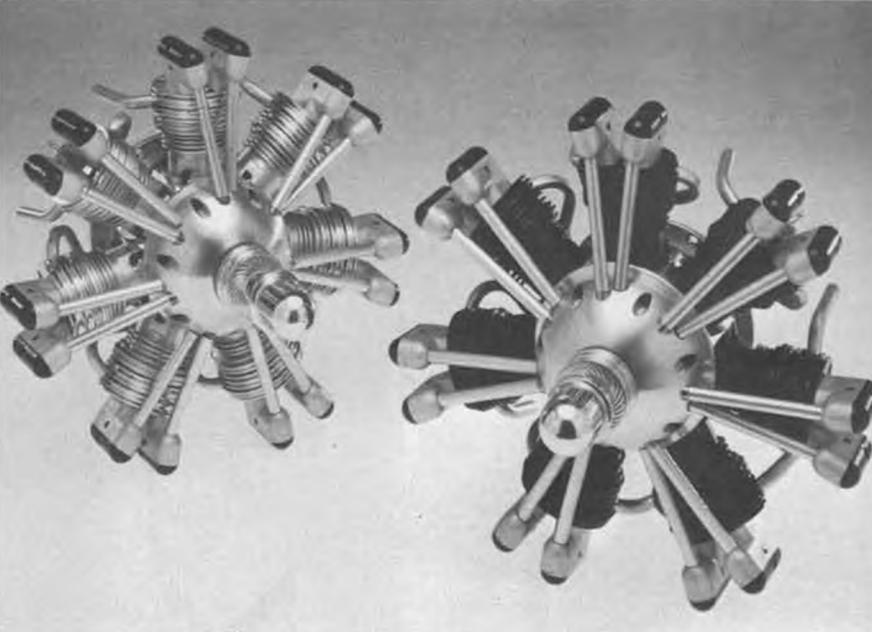
We are talking about weight, but we can't talk weight without talking strength, because the need for some strength is the basic reason why our airframes must weight something. What we really need to know first is just how much strength we need in each part of our models, then decide what is the lightest structure we can build in each case to achieve the required strength. We will look at the complex problem of required strengths next time. A convenient way of relating strength and weight is to speak of strength-to-weight ratios. Obviously some materials have better strength-to-weight ratios than others. Table 1 is a compilation of data from a number of sources, including the results of a few tests of my own. Some of the data is controversial or requires explanation, so don't take it as total gospel at this point, but let me leave it with you for now. It just might get your design juices flowing. Until next month, don't weight, design well.

#### Control Line.. Continued from page 17

for old time stunt, the plane had to be dated prior to January 1953. Another event, 'Nostalgia Stunt,' also called 'Classic Stunt,' was added to fill the 12-year gap between January 1953 and December 1964. There are several sources for old time and classic plans, but until now, there was no source for kits.

"Control Line Classics was formed for the purpose of producing and marketing quality U-Control classic stunt kits. Our first kit, introduced in April 1988, is Bob Palmer's great stunt design from April 1954, the Pow-Wow. The Pow-Wow is a 52-inch wingspan, approximately 598-square inch full-fuselage stunter designed around any cross-ported .29 to .35 glow engine. The kit fea-

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"A second classic kit, 'The Oriental,' a 55-inch wingspan, 550-square inch full-fuselage stunter designed by Dee Rice about 1959, is now in production and should be available about the end of July 1988. The Oriental is designed to handle any .35 to .40 crossport engine.

"A third kit, the T-Bird I, a copy of Bob Palmer's great first version Thunderbird with the upright engine, is in the design stages and should be available about September 1988." This is good news for CL fliers, who by nature often are found scour-

ing the hobby shops for kits of their favorite airplanes, or any airplanes at all.

Entrepreneur Tony Drago says these planes will be available by mail from Control Line Classics, 1788 Niobe Ave., Anaheim, California 92804. Introductory price is \$59.95.

I'd be interested in including a note in the column from anyone who has received and built one of these planes.

#### NEWSLETTER HEAVEN

Regular readers already have discovered that I am a newsletter junkie. It is the joy of the magazine columnist to receive newsletters from many clubs; and if I'm not yet getting yours, I'd welcome it.

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The rules permit adjustable leadouts, adjustable tip weights, and internal beefing of structure. Obvious dimensional/external structural changes that do not conform with original design or intent are prohibited.

Fuel will be available for out-of-state fliers requesting it.

Pre-entry (\$10 fee) is encouraged. A receipt will be sent to entrants.

Contact JoAnn Keville, contest director, 6618 Dashwood St., Lakewood, California 90713; (213)804-4056.

One more newsletter note: Having mentioned the *Flying Lines* newsletter in the past, we've received requests for information about how to subscribe.

*Flying Lines* is the newsletter of Pacific Northwest control line model aviation, but also has technical tips of interest to modelers in general. Published since 1979, *FL* is now in the hands of its third editor, Pat Leonard.

To subscribe, send \$12 for ten issues (approximately one year) to *Flying Lines*, P.O. Box 177, Kila Montana 59920.

## FIRST IMPRESSIONS

Will the competitors at your contest come back for another try next year?

Many things go into answering that question; fliers will come back if they enjoyed themselves and felt that the contest was run in a professional and fair manner and that

they were treated with respect. Contest organizers, above all, must make sure that the competitors feel as if their interests always are placed first, no matter what travails the officials may be going through.

Part of the secret to making sure the competitors go away with a good impression of the contest is the *first* impression they receive.

How does your contest greet competitors?

Many of the major contests I attend make a special effort to provide competitors with a packet of materials, handed out at registration, that gets the contest started on the right note.

Here are some of the things that go into the contestant packet for a good contest:

1. Registration forms. (Putting these in the envelope makes sure that the competitors actually open and read the packet.)

2. Contest schedule. (What time the events occur and on which circles.)

3. Spectator program. (Some of the major contests make a program explaining the various events and including the schedule and information about how to get involved with control line model aviation. Certainly, each competitor should receive one of these as well.)

4. Map of site. (Including location of circles and what is to be flown on them, along with other pertinent facilities (restrooms, water fountains, etc.). Map can be combined with schedule.

5. Map of the community where the contest takes place, including a listing of area motels. (Mike Hazel's Northwest Regionals' map this year included photocopies of the yellow pages advertisements for motels, grouped by geographical area.)

6. Schedule of nonflying events. (Is there a traditional pizza feed or party on Saturday night? Make sure everyone knows!)!

7. List of prize donors and trophy sponsors. (This could include a postcard that competitors could mail to the sponsors to thank them for their support.)

8. Coupons for products. (Most major contests receive coupons for discounts from various manufacturers, such as glue makers. Putting these in the packets makes sure they will be received.)

Be creative; add your own touches to the programs!

## FAVORITE HOBBY SHOPS

Everybody has one: a favorite, or just a special, hobby shop. I have one of each; a special one and a current favorite. The special one doesn't exist any more, except in my memory. It was Em's Hobby and Cycle Shop, on Front Street in Port Angeles, Washington, in the early 1960s. Em was the bicycle repairman and was usually in the back tinkering. His wife, whose name I probably never knew, was the hobby sales person.

I remember riding my bicycle downtown every few days to buy some little essential item and to ogle the unattainable treasures.

I could afford a nylon prop at 50 cents (we disdained wood in my little flying group; those cheap 25-cent props didn't last like a newfangled nylon!) or a glow plug. A quart of fuel was dear at—what was it, \$1.50? I never had a gallon of fuel until I was an

is the *Direct Connection*, the newsletter of the "Knights of the Round Circle," in Lakewood, California, edited by Mike Keville (who also is a fine photographer).

The newsletter has the usual club news: contest rules, meeting reports, calendar of activities, technical tips, photos, cartoons, etc.

President of the Knights is Don Repp, Vice President is Randy Heydon, and Secretary-Treasurer is Fred Bridgeman.

Club members get it free, but this is one of those newsletters that might be worth subscribing to, particularly if you are in California or the West. Send \$3 to Mike Keville, 6618 Dashwood St., Lakewood, California 90713.

From the pages of this newsletter comes some information about a contest that's coming up soon:

It's the Inaugural Vintage Stunt Championships scheduled for the Whittier Narrows recreation area, South El Monte, California, February 18 and 19, 1989.

Events are:

Old time stunt, per Garden State Circleburners' rules, for designs up to December 31, 1952. Bonus points for no-flaps and/or ignition engines. No appearance points. The AMA 1951-52 pattern is flown.

Classic/nostalgia stunt, for 1953 to '63 designs. 40 points maximum appearance points for finish and detail only, no realism

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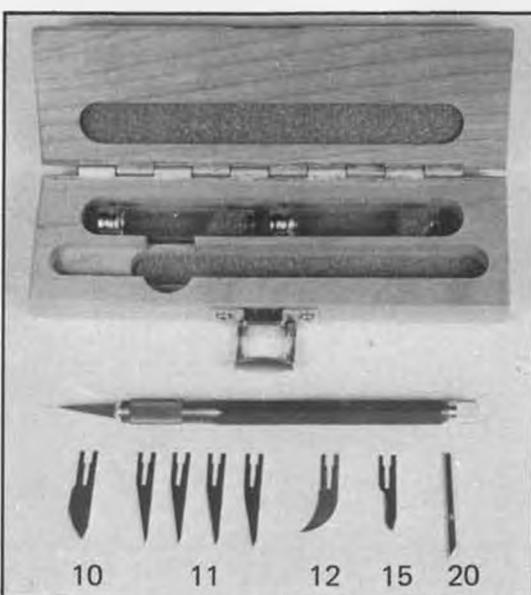
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## MODEL BUILDER PRODUCTS

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adult.

While flying 1/2-A planes powered by engines cannibalized from old plastic ready-to-fly planes, I saved my nickels for that big purchase, a McCoy redhead .35 at \$5.95. The price had gone up to \$9.95 by the time I got it, and I still have it!

Em's wife was the most knowledgeable sales person I could imagine, even if she did once sell me a pusher prop for my McCoy. Not knowing there was such a thing, a friend and I spent an hour trying to get that McCoy to right forward. Hey, big engines aren't supposed to run backwards!

All of this nostalgia brings me around to mentioning my current favorite, and also the only viable shop within reachable distance for me.

Eugene's Toy & Hobby, Eugene, Oregon, now in its 55th year of ownership by the Agerter family, still has a little of the special atmosphere of old Em's. Even though it has just doubled in size in a complete remodeling, ET&H retains that friendly feeling.

Paul, Mark, and Alan Agerter, with several helpers, still run the hobby shop with as much expertise in each type of modeling as can be expected of somebody trying to serve a wide variety of people. And they keep their hand in hobbies as they can, most recently as terrors on the R/C car race track.

None fly CL anymore, but they still listen and try to stock or order what the Oregon fliers ask for, often going to great lengths to find unusual items. They contribute gift certificates and discounts for prizes. And they still stock up that huge U-Haul truck and

bring it to the Regionals once a year for the benefit of all Northwest modelers, whose visit to the truck is a tradition.

ET&H just started publishing a periodic newsletter, which goes out to all their regular customers. It includes, along with specials and general news about the store, a calendar of Eugene area modeling events, contests, club meetings, etc.

The first issue of the newsletter showed a picture of original owner Byron Agerter, along with son Paul, and the family's first employee, posing the shop in 1938. Paul can still be found there today, most likely trading stories with a longtime customer while Mark and Alan hustle around digging out those important items for the customers.

If you're ever passing through Oregon, stop into Eugene's Toy & Hobby and say hello to Paul, Mark, Allen, and the gang.

I'd be happy to feature your favorite shop in a future column. Send me some information and maybe a picture.

### TIPS AND RIBS

And now for some random samplings from the world of CL model aviation newsletters.

Ever wonder what the letters mean in O.S. engine designations \*such as OS 40FSR)? B, Buggy; RSR, rear carb, schneurle-ported; H, helicopter; FF, flat four-cylinder; FS, single-cylinder, four-cycle; RF, rear exhaust, front carb; SE, side exhaust; FP, front carb, schneurle-ported, plain bearing; ABC, aluminum piston, chromed brass cylinder sleeve; VF, rear exhaust, front carb, schneurle-ported; FSR, front carb,

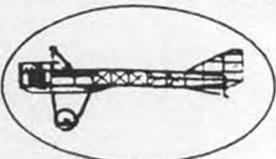
schneurle-ported, side exhaust; DF, ducted fan; M, marine; FR, radio cylinder style; FT, twin-cylinder, four-cycle; SF, side exhaust, front carb.; LS, long stroke. (High-Low Landings)

Going flying in the Vancouver, B.C., area? Check out the Richmond, B.C., flying site, home of the CL wing of the Vancouver Gas Model Club. The VGMC, in existence since 1935, is headed in 1988 by these officers: President, Bruce Duncan; Vice President, Henry Hajdik; and Secretary-Treasurer, Chris Sackett. The club also has free flight, control line, and R/C representatives. President Duncan reports that his first model airplane, obtained at age 13, was a "Wen-Mac Aeromite .049 plastic super-streamlined ready-to-fly model which no beginner could possibly fly." (The Hot Head)

What does your club do for beginners? The Skyraiders of Seattle, Washington, have an annual "Beginners' Day." Club members assemble at their usual field, with a variety of trainer planes, and they help all comers learn to fly, and some new fliers learn some new tricks. In the 1988 fly, on February 27, nine-year-old Wesley Mullens flew one of the trainers from a handle mounted on a helmet, the way R.F. Stevenson (mentioned above) does. Ten just-plain beginners gave flying a try, some of them were mere passersby. Congratulations to Wes, instructor Dick McConnell, and the Skyraiders for a great tradition. (The Skywriter, via Flying Lines)

"Pro Combat" continued with the Money Nats in Los Angeles, California, in April, with 50 fliers competing for a \$1,000 first

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prize, a Carver stereo for second, and a TWA engine for third. Michael Willcox, of Texas, a former Bladder Grabber winner, captured first place with a 10-2 record. Second was Larry Driskill, of Texas, at 9-3, and Steve Kott, of Wayne, Michigan, was third at 9-3. The contest also raised money for the combat FAI pitman's fund. (Miniature Aircraft Combat Association News)

The top Miniature Aircraft Combat Association flier overall for 1987 was Richard Stubblefield, of Houston, Texas. Top FAI combat flier was Tom Fluker Jr., a former world champion. Jerry Sabin was tops in slow combat, Michael Willcox was top in

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AMA combat, and Terry Bynum was top in 1/2-A. (MACA News)

One of the most active promoters of precision aerobatics and control line in general is Tom Dixon of Atlanta, Georgia. Tom has had various CL-oriented businesses in the past, and now operates a unique service. Tom attempts to offer for sale items that are not available elsewhere. In short, he's trying to help CL people find what they need. He handles such items as Merco engines, Bolly props, mufflers, old time and modern stunt plans, etc. For a catalog, write Tom at Suite 401, 1938 Peachtree Road, Atlanta, Georgia 30309.

Tom Dixon, by the way, is president of the Precision Aerobatics Model Pilots Association. Other officers are Vice President, Robert McDonald; Treasurer and Newsletter Editor, Windy Urtnowski; and Secretary, Mike Pratt. (Pro-Stunt News)

Remember, I'm interested in receiving newsletters, letters, photos, reports of club activities, technical tips, etc.! John Thompson, 1505 Ash Ave., Cottage Grove, Oregon 97424.

**Hey Kid. . . . . Continued from page 47**

pull a bit tighter from side-to-side across the grain than longways with the grain. You will need to allow about a half an inch extra on each side for handling.

The difficult places to cover will be the rounded area in front of where the windshield will go, around the landing gear, and where the wing mounting dowels poke through.

#### COVERING THE FLAT SIDES

The easiest part is the top of the fuselage behind the wing. Notice that there is no cross-strut on the fuselage where the T.E. of the wing crosses. That does not mean that you should stop your covering at that point! Go to the next strut which will be covered up by the wing and end your covering there. There is no point in covering the whole top of the fuselage right up to the windshield, but you can do it if you want to. I leave it open in case I have to get inside to make repairs in that area; it saves cutting out tissue. Repairs are usually neater from the inside. Trim off the excess tissue when it dries.

The right and left sides of the fuselage aren't bad except where the dowels are sticking up. Now, if you were what the British call a "total Clever Dick," you would probably not have installed those dowels yet, waiting until you had finished the job of slapping the tissue down on an uncomplicated flat surface. I never seem to do things like that and have to make up for my lack of planning ahead by making a little "X" in the tissue with a razor blade where the dowel is sticking up, and letting it poke through. Fit the paper dry. If you cover the sides of the structure around where the side windows go, it will look neat when you put on the clear plastic. When you trim off the excess, you may want to leave just a bit, no more than the thickness of a credit card, sticking out all around. Paint a little of your thinned glue along the edge and use your finger to smooth that tiny "overhang" down and around the edge. When it dries, push the rear motor dowel peg through the tissue on both sides. Don't glue it in!

When you come to places where there is landing gear wire coming into the fuselage box, the easiest thing to do is have the tissue just exactly the right width so there won't be any interference. If you do things like I do, you'll probably have more tissue width than you need, and will have to make a few slits with your razor blade to get a good fit (see photo). If you are making the slits after you have glued, be sure to wipe any glue off your razor blade with a paper towel or cloth. The bottom of the fuselage will have no special problems other than with the landing gear wires, and a slit or four in the

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tissue will solve those. NOTE: If you mess up, don't be ashamed to take the tissue off and start again. No one was born with the ability to cover models; it has to be learned. Often, you will need to cut away a whole "bay" or section of tissue and replace it to get rid of wrinkles. It happens to everyone now and then. It works best to cut it out between balsa parts, even if it's only a small place. Patches done on tissue alone show up from a mile away. If you do patch, make sure the grain is in the same direction as the original and that the same side of the tissue is up so it will look the same.

### COVERING THE PART IN FRONT OF THE WINDSHIELD AREA

You can make an "exact-fit" newspaper pattern for this curved area so that you won't have too much overlap where it meets the side covering on each side. This is one place where it would not hurt to use dope to stick the tissue down so as not to disturb the white glue-attached tissue you are overlapping. Make sure the tissue grain is going "longwise" (nose to tail) or you will get shrinking problems later on.

There are two ways to attach the tissue. You can use a straight-cut side of your tissue and start it exactly where the finished overlap will be on one side and then attach it carefully from there on over the curved part and trim the extra off the far side. The other way is to paint the dope on carefully just where you want the tissue, and, after attaching an extra large sheet of tissue, make a light cut with a sharp blade through the tis-

sue you have just attached before it is completely dry and then peel off the extra which got accidentally stuck down past where you want it to stop. Loosening the excess with thinner on a brush will help you carefully peel it off. The cut should be made right down the middle of a stick, which is not an easy task. Some people prefer just to touch the whole edge of a razor blade along the line you want to cut on, and then to pull the excess up gently, using the blade as a shear. You will find modelers who prefer to cover curved areas "wet," that is, with pre-dampened tissue. This works well on the wing-tip problem as well, but I should warn you that it takes a bit of skill,

and a willingness to start over several times when it tears.

### COVERING THE TAIL PARTS

Because the tail parts, especially the rudder, is lighter construction than the wing or fuselage, you may wish to pre-shrink the tissue used in covering them (see March 1988 Model Builder). Cover both sides.

### DOPING THE MODEL

Shrink the tissue on the model using a light mist from a hairspray bottle filled with water or rubbing alcohol. Wiping the alcohol on with a soft bit of cloth will work, but be careful not to poke a hole or loosen the place where the tissue is stuck down. Do not use heat to speed up the drying. If you

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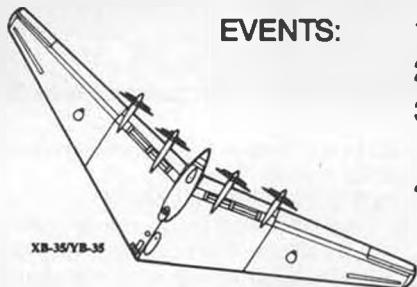
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● **NOTE:** Proxy entries encouraged. Send models to flier of your choice, NOT to *Model Builder* or CD's.

must hurry it along, use a hair dryer held at arm's length on low and cool, never hot. The tail parts can be given a light alcohol spray, but don't soak them. Even if you have used pre-shrunk tissue, they will still tighten up a little more.

Dope the model in the normal manner, going over the seams with your water-moistened finger after each coat so they will blend nicely. If you use dope mixed 50-50 with thinner, about three coats on the fuselage, two on the wing, and one on the tail surfaces should do. If you intend to fly in the rain, use more.

#### ATTACHING THE "GLASS"

Start with taking lots of time making paper or card-stock patterns until you get

just exactly the right fit. Don't cut the plastic until you have the patterns set. You'll need one pattern for the front windscreens and one for the side windows (one will do, as both sides are the same). Attach the pattern to your sheet of clear plastic (near the edge, not right in the middle) with a couple of pieces of Scotch tape. Go around the edges with the point of your modeling knife. You don't need to go all the way through, as it will crack along the line when you bend it back and forth.

The plastic windshield and side windows can make or break your model. They are where most people look first at a model. You can put a nice instrument panel on the "F-4" to add a point of interest. Even a

drawn-on one looks better than bare balsa. Now the trick is to get the plastic attached so you can still see through it. Don't try to stick it on by smearing model cement around the frame and then trying to fit the windshield; it will smear all over, you will get glue fingerprints all over it, and, in the worst case, the cement will dissolve and warp it.

The trick is to fix it so it can't move, and so you don't need to touch it while it's drying. I use little pieces of tape every half inch or so to stick it on, usually masking tape. You can get it off easily by using a little lighter fluid (naphtha) on it to dissolve the "sticky" when you are finished. After attaching the "glass" with the tape, I brush just a little Wilhold RC-56 glue along the line where the plastic meets the framing, staying between the bits of tape and not touching them. Let that dry for at least a half hour. RC-56 looks like white glue, but it isn't the same. If you do accidentally smear a little on the plastic, get it off with a dampened Kleenex immediately, or it will leave a mark. Then, remove the tape and fill in the places where the tape was with the same technique with which you brushed it between the tapes. By doing half at a time, you have total control over the result, something you don't get if you try to hold it on with your fingers.

Another way you can do it is to use Testor's Cement for Wood Models, thinning it out just enough for brushing and painting the frame to which the plastic will stick. Tape it with bits as in the sequence above, only this time use Kodak Film Splicing Cement. It comes in a little bottle with a brush in the top. It is like water, and, when brushed lightly where the plastic meets the model, it will creep in underneath by what is known as capillary action. Don't use too much, though, as it can creep under tape, too! I have used thinned model dope in a pinch, and find that it usually does the same thing. Again, just use enough to tack the plastic in place. You can put a longer run on when you have taken off the tapes. Resist the temptation to squirt some glue under places that stick up. Tape 'em down, use a wee bit of cement, and be patient.

If you happened to get a little dope or cellulose cement on the plastic where it showed, a quick swipe with a thinner-wetted rag one time over only might save the job. Using toothpaste on a soft cloth to buff out minor damage sometimes works. You can always buy thin plastic sheet or find something packaged with it if you goof. I have known modelers who would rather cover the whole cabin area with black tissue than attach plastic! You can cover the edges and give your glass a "frame" with strips of black tissue or black "chart tape" available at your stationery store. Some guys put the plastic on first and then tissue, but that really takes some practice not to make a mess.

Note: If you washed the plastic and your hand before doing all this, you won't have to be wondering now how to get your greasy fingerprints off the inside surfaces!

#### DECORATING THE MODEL

Cutting letters, stars, lightning bolts, or long thin triangles to make a wing and stab "sunburst" from black tissue and then



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painting thinner or thinned clear dope over them makes decorating one's model easy. Use several layers of tissue taped down with your pattern on top and use a new sharp razor blade and a metal straight edge to get good results. When cutting on a curve, like making an "O," I find it easier to cut a tiny straight line a fraction of an inch long, and, leaving the blade in the cut, turning the cardboard to which everything is taped just a little, then do another tiny straight cut, and so on, without moving my "knife hand" and arm from the table. Gives better control.

Letters and decoration like this can be soaked off with thinner and used again

when making repairs.

I do not recommend colored dope on this type of model. It is a lot of trouble and adds weight! Ditto for decals. Note: If you must use decals, trim off all the extra clear decal around the letters or whatever before you soak it off the sheet. It always shows up and looks less than professional.

Next month, we'll key up our wing, carve a prop (if you are game), braid up a motor, make a winding tube, and head for a calm place to test'er out! The FAC Moth kit and the Lacey M-10 scale rubber model kits along with other supplies for this series are available from Peck-Polymer/Beginners, P. O. Box 2498, La Mesa, California 92041

(large SASE for list). Old Timer Model Supply, P. O. Box 7334, Van Nuys, California 91409, carries the prop blank we'll use next time (8 or 9 inches), plus lots of other neat stuff, too (\$2.00 for illustrated catalog).

Until next time, lots of luck with your finishing! Be sure and take a good picture, as we are planning a contest for the best FAC Moth picture and 50-word flight description! Details next time.

### Plug Sparks... *Continued from page 34*

M Air wheels." Editor's note: most early gas models had huge tails as no one knew how to design a gas model. Most of us had to draw upon our rubber-powered flying experience with the net result of ending up with large rudders; a sure bet for spinning in!

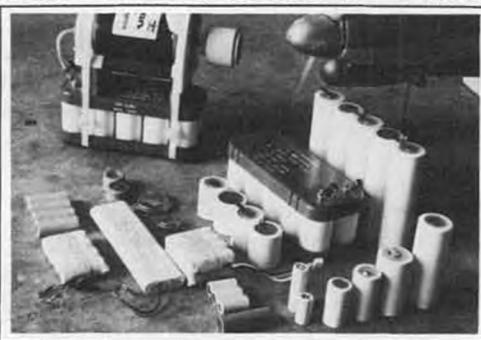
It wasn't until Charlie Grant designed the KG model and Joe Kovel (the "K" of "KG") introduced the model in 1934 with a stunning World Record of 64 minutes. The Grant design, which featured a six-percent rudder, was a quantum leap in gas model flying. Thereafter, many "new" designs evolved. Careful examination will show that Grant's proportions, moment arms, and tail areas were used albeit in different shapes.

Maybe Charlie Grant was old curmudgeon in many respects, but he knew enough about models based on his engineering experience in full-size aircraft. Charlie was a dedicated promoter of modeling!

### SAM 7

Leave it to Morton Ross to send in photos

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of SAM 7 activity at Galesville, New York, on May 29. Mort reports a beautiful day: hot, almost windless, and thermals galore! Ross says he had a great time; he didn't win, but who cares!

Ross competed with his 20-year-old K & B 29-powered American Ace and also a 15-year-old Bantam-powered Winged Yankee. As he says, silk isn't the only thing that goes with the passing years. Engines like his Torpedo wore out the crankcase bearing; sad part is that the engine was a screamer. The Winged Yankee suffered a solder joint failure in the wiring. Naturally, you find this after the contest.

Mort also sends in several photos, the first being Photo No. 9 of Larry Davidson's K & B 5.8 glow-powered Comet Sailplane. Larry has produced a work of art with silk covering and Aero Glass finish. This radio-controlled old timer flies as good as it looks.

The next photo (No. 10) is of Ray Factor, of East Hartford, Connecticut, shown with a very neatly finished Jasco Floater. This particular design, in spite of its boxy fuselage, is an excellent towline glider project. Unfortunately, no reports of how well the model did.

Ross also submitted Photo No. 11 showing Richard Fiore of Farmingdale, New York, with a Flying Cloud. This columnist has always admired the self-sufficient modeler using a winding jig. You can't blame anyone but yourself when something goes wrong. Of notice is the cocking of the fuselage because of the diamond configuration. At first look, it appears to be offset by torque effect during the winding of the motor.

#### STRATO STREAK R/C

While talking about eastern activities, George Clapp, 11 Collins Terrace, Central Square, New York 13036, sends in Photo No. 12 showing the bones of his Strato Streak soon to be published.

George has gone to considerable lengths in being able to disassemble the model for transportation. The radio package snaps out after disconnecting the servos; no screws! The antenna runs through a soda straw (good idea!) and exits the fuselage at the rear.

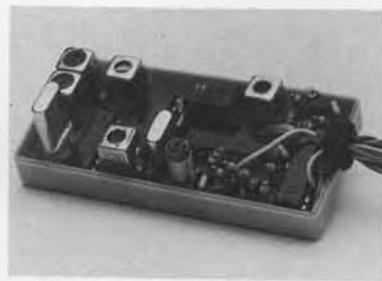
Worth noting is the use of outboard fin rudders. George is now using all three fins as rudders for tighter turns near the ground. Seems like there are a million trees and obstacles to overcome when flying back East. **SAM 21**

There is so darn much "Show and Tell" at the SAM 21 monthly meetings that this columnist has been overwhelmed by Lesher Dowling who takes photos on a regular unfailing basis.

The most surprising thing about SAM 21 membership is the amount of modelers interested in O/T free flight. As can be seen in Photo No. 13, George Joki, an inveterate R/C glider flier, is seen with his free flight Arden .09-powered Garami Strato Streak.

With the advent of such serious competition in O/T R/C events, many of SAM 21 modelers are looking for a different venue of O/T flying. Case in point is the Annual One-Design Rubber Contest. Last year it was the Miss World's Fair, followed by this year's feature, the Cahill "Clodhopper." This

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is seen in Photo No. 14 as built by old timer Stu Bennett, longtime Oakland Cloud Duster and now active SAM 21 member. **SAM 00**

Here is the latest and newest SAM Chapter that has the nickname of "Second Time Around Gang." This chapter has been organized by Howard Osegueda, former president of the East Bay Radio Controllers (EBRC), a long and distinguished club.

Howard has really been smitten by the old time bug and can be seen, as a member of SAM 21, at the recent Show and Tell in Photo No. 15, displaying his very colorful Henry Struck Record Hound.

This model in its attractive red, white, and blue color scheme has been adopted as the SAM 00 club logo. Plans are under way to make up suitable tee shirts, jackets, decals, and club hats. Utilizing this logo, all of this has occurred in four short months. Some live wire action!

As President of SAM 00, Howard will be leaving SAM 21 as a member to devote full time to SAM 00. Plans are presently underway to participate in the SAM 1/2A Postal Texaco Contest. An invitation has been extended to SAM 21 to fly at their field in Dub-

lin. Looks like it is going to be a very busy flying year with six SAM chapters (21, 27, 30, 32, 31, and 00) in Northern California alone.

#### READERS WRITE

Ever so often, a modeler will like a particular design so much he will build it in various sizes. Such is the case of Larry Ladd, Rt. 1, Box 105, Floyds Knobs, Indiana, who sends in Photo No. 16 showing him with an oversize Jimmy Allen Bluebird.

The model has a wingspan of 114 inches (whew!) powered with a Tartan 1.3. This huge radio-controlled model has turned in many impressive flights and is a most leisurely flying model to handle. Great for learning how to fly R/C!

Larry is so enthused he is proposing an "ultralight" (full-size aircraft) Jimmy Allen Bluebird powered by a Cuyana 430-D gear-powered engine. This 33-foot aircraft would have the pilot seated in it very similar to the arrangement Charles Lindbergh used in his successful New York to Paris Ryan monoplane. Won't that be something?

#### FUN-FLY CONTESTS

With SAM contests being so hotly contested these days, there is a natural ten-



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dency to get away from "all-out competition" and get back to the leisurely fun-filled meets. Harry Lowe, of 3134 Calusa Ave., Simi Valley, California 93063, suggests the following modified 1/2A Texaco-type of event.

Harry feels that less restrictive rules would encourage new blood and would make SAM bigger than ever. Below are the rules proposed by Harry Lowe in condensed form:

## MODIFIED 1/2A TEXACO TEAM EVENT

I. Models must be any non-pylon model which qualifies as an old timer or Antique under SAM rules.

(a) Any scale can be used.

(b) Construction restrictions:

1. Sam airfoil, dihedral, etc.

2. Two-wheel gear (single wheel may be increased to two, but not reverse).

3. No wing loading.

4. Modifications for dethermalizers acceptable.

5. Power: Baby Bee or Golden Bee Cox engines with standard tank, .049 displ. (.020 version with stock tank also

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acceptable).

### II. Flying.

(a) Contestants should be divided into two groups (A and B).

(b) Flying shall be by rounds, with Group A flying first and Group B flying second in the first round. The second round is reverse order with Group B flying first and Group A second.

### III. Flights.

(a) First flights shall be unlimited with a full tank of fuel.

(b) Fuel for the second round is limited by filling the top vent with the cylinder head parallel to the ground. When lower vent overflows, tank will be approximately 1/3 full.

(c) Flights may be from five to ten minutes in length as per Contest Director's discretion.

### IV. Miscellaneous.

(a) Where not covered by the above rules, the present SAM rules shall be in force.

(b) R.O.G. is required.

Harry feels that modelers would use their favorite building technique from sliced ribs

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to pine without censure. Wheel sizes should be at least 1-3/4 inches (as per West Coast SAM Rules). Under this system, Harry says there isn't much incentive to cheat, as rules allow plenty of freedom. Of course, weather conditions would determine when the Unlimited flight would be scheduled. Harry says, the earlier, the better. There is less chance of losing the model. In any respect, here is an idea that leaves 1/2A Texaco wide open and encourages team flying.

### LOTTO FUN-FLY

Here is another idea promulgated by Hal Cover for an event to be called the SCAMPS "Lotto." This is an unusual way to entice many of the fun-fly people and "also-rans" to enter.

The system for awarding prizes depends on luck of the draw rather than whose model was the best performer or who got the best thermal. Under this system, any model is on an equal basis, be it gas, rubber, glider, CO<sub>2</sub>, electric, or Jetex. Best part of it all is that you can enter as many models as you want.

Nothing is for free, each modeler must

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take three flights. These three flights then become his lucky "Lotto" number. As an example, a total time of 5 minutes, 31 seconds would have a lucky Lotto number of 5, 3, 1, or the closest to this.

At the end of the contest, numbers would be randomly drawn at the "Big Spin." The closest to the numbers would be the winner. Now, how about that? Any model is competitive and not dependent on superlative flight times. Hal Cover is to be commended on his clever idea.

### THE WRAPUP

Just about the time this column is nearing completion and this writer is looking for a suitable ending, a letter from one of my old friends shows up.

This time, a delightful letter from Carl Schmaedig arrived. Carl is truly an old timer having had his first Loutrel-powered gas job called the CG-7, published in three parts in the 1936 issues, March, April, and May, of *Model Craftsman*. This would form the basis for the Scientific Miss America as co-designed by Carl Schmaedig and Frank Zaic. Let's hear what Carl has to say:

"Hello, John. My travels via trailer have come to an end. We have settled here in Florida for the last few years. We have taken a small apartment (one room for a shop) which is easy to maintain. I work several days a week in a hobby shop to maintain my activities and vices. Lots of old time modelers are settled in Florida as you well know.

"I am still building and flying sport R/C gliders and some free flight. The 'jungles' are not kind to free flight models here.

"So, I am just finishing up an interesting project; a Miss America. I have built it just like the #2. You remember the number one flew away from Frank and I during test flights (one!).

"It is sort of odd building something one built over 50 years ago. How I built two of

the darn things I'll never know. I won't miss the cutting and fitting of those 3/8-inch square cross braces and longerons. The Miss Model Craftsman (CJ-7) must be worse, as I have a 1/2A version.

"I got a Hobby Horn kit. They did a good job on the wood for the Miss America (not the stuff that Frank used to cut). Only problem was the directions on the plans were very difficult to read. Fortunately, the old memory bank worked and the model went together fine.

"The only deviation from the original was the control surfaces for R/C operation. I won't fly free flight in the 'jungle.' Actually, the old girl makes a fine R/C trainer; way ahead of its time.

"I covered the Miss America with Micafilm, but it came out with too much of modern-type finish. So, off it came, and then on went paper like the original. The model is just like the number two prototype which was sprayed orange and grey nitrate dope when I delivered it to the Scientific

people (Johnny Frisoli) in Newark.

"I did add the strip, but somehow I hate to put in the Miss America and the flag bit. (This writer has since sent two decals of the original Miss America and flag as produced by Dick Welch in Washington.) She is all set to fly with a Saito 45 (too much but it will do). I am waiting for a good calm morning as it has been so windy this spring.

"I have been in touch with Frank Zaic on the project. He said to give the story to John, which I would have done anyway. I have taken black and white and even some color shots. I will include some flying shots.

"In the meanwhile, I ran into John Worth at the Atlanta IMS, and he said they would like the model for the AMA Museum. I will take it up North during the Nationals in Virginia." Well, what else can you say? Isn't this what old timer modeling is all about? •

**Astro Champs. . .Continued from page 41**

Saturday afternoon. All classes were given a five-minute max glide time. Seven-cell O/Ts

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were given 50 seconds, and Seven-cell Sailplanes were given 35 seconds, Unlimited O/Ts were given 30 seconds, and Unlimited Sailplanes were given 20 seconds.

The name given to the fourth round event was "Five-minute penalty-duration," and it was similar to the FAI F3E thermal duration task. Each class was given a five-minute max, one point per second awarded for glide, one point per second penalized for each second of motor run time. The flight begins scoring at the moment of release and stops at the moment of touchdown. You could start or stop the motor anytime during the five-minute period, but each second cost you points. If you were getting too close to landing short of the five-minute goal and if you still had juice in the batteries, you could switch the motor back on (hopefully!) for another climbout. Of course, the optimum flight would be the least motor run possible while finding enough lift to make five minutes.

Thirty-seven entries were recorded in the four classes. By far the most popular event is and always has been seven-cell Sailplane. This year there were 17 fliers in this class. The second most popular class was seven-cell Old Timer with nine entries, followed by Unlimited Old Timer with six, and Unlimited Sailplane with five. Attendance this year may have been down a bit (in spite of the fact there are more modelers flying electric this year than ever before) because of a lack of valuable advance publicity, late date setting for the event, conflict of soaring-type events locally, and the fact that the following weekend was the U.S. FAI F3E Team Selection Finals at the same field (no risk takers here!).

As far as I know, all fliers used Astro Flight cobalt motors in their planes. The new breed of Astro cobalts with their hotter winds, bigger commutators, and bigger brushes are truly the best in the world. Also, advances in battery technology by Sanyo in the last couple of years have produced low-impedance 900 milli-ampere-hour (mAh) "half-sub-C" nickle-cadmium cells. These

cells can pass more current than the lighter Sanyo 800 mAh ("fat AA") cells, which became popular a few years ago, and almost pass as much as the much larger and heavier 1200 mAh sub-C cells. The 900s, being shorter than 1200s or 800s, seem to lend themselves better to model fuselage designs, and as a result find their way into more and more models these days. They seemed to be in the majority of planes at this year's Champs.

## SEVEN-CELL SAILPLANE

First place went to Bob Sliff. Bob flew a new kit prototype called the Electrifier. This model has a D-tube construction, polyhedral wing with an E-195 airfoil and a span of 72 inches. The motor used in the Electrifier was the new Astro FAI six-turn wind, 05-gearred, cobalt-powered by seven 900 mAh cells.

Second place went to the CD, John Lupperger. John flew a design which is about as old as the Midway Model Co. Gnome 2M (four years?). It was originally called the Electra and was designed by Bob Sliff as a Gnome 2M spinoff. The Gnome 2M was an enlarged two-meter version of the John Lupperger designed Gnome hand-launch glider. Different wing tips, fuselage, and stab shapes were used, so the Electra's Gnome heritage is not obvious. Then along came Goldberg Models and their modified Gentle Lady which they also named Electra. Well, there can't be two Electras, so Bob and John came up with a new name, Amplitude, which is its official name these days.

The Amplitude uses the Gnome airfoil, a thickened Eppler 205 with higher camber somewhat resembling a compromise between the E-207 and E-195. John also used the new astro FAI 05 cobalt gear motor on seven 900s. Both John and Bob used electronic speed controls and K&W 13-7 fiberglass folding props which seem to work best with this motor/battery combination.

Third place went to Howard Doering and his LJMP Electricus. Howard was one of very few who flew with the older seven-turn wind Astro 05 cobalts. Also, he was one of only two that I can recall who used direct-drive motors. Howard's climbouts were not nearly as spectacular as those FAI gear motor-powered ships, but he is a master thermal flier and made up for the lack of climb rate under power with climb rate on the glide. Howard's non-folding Rev-Up wood prop even survived unbroken the entire contest!

## UNLIMITED SAILPLANE

Bob Sliff took first place in this class with his giant three-meter span Midway Electra-Gnome. It was powered by 28, 900 mAh cells and one brute of a motor, the biggest used in this contest, an Astro Cobalt 60 direct drive. It had the best climb in the contest and by far the flattest glide.

Jason Perrin flew the most unusual sailplane in the contest. Based on the Jerry Bridgeman Snipe fuselage mold, Jason built himself a Kevlar-reinforced beauty to house a direct drive Astro FAI 05. The wing was multi-polyhedral and multi-taper design with a straight (no sweep) trailing edge. It spans 66 inches and has 351 square inches of area, making it almost R/C hand-launch glider sized. The all-up weight

worked out to 33 ounces with seven 900 cells. Jason used a K&W 8.5-6 fiberglass folder which with the aluminum hub actually came out to 9-6. The wing section used was the Eppler 224. Had he to do it over, he thinks he would have picked the E-222 instead. The E-224 had a very bad laminar separation at high coefficients of lift, regardless of speed. It was weird to see him coming down at high speed using his elevator to push the tail down and stall the wing. His wing was the speed brake! In defense of the design, it did fly well when kept on the step at high speed, and its climb was as good as the best Unlimited ships. Even though it was only a seven-cell design, Jason took second in Unlimited Class Sailplane!

Third place went to Gary Westland flying a Midway Model Co. Ultra Mark IV. I don't know what he used for power, but it was likely a cobalt 15 or 25. The Ultra IV is still a competitive airframe for electric competitions. Given a big cobalt and a wider belly to swallow the extra cells, it is a winner! One fellow Ultra IV flier commented, "And why not, the air hasn't changed!"

## SEVEN-CELL OLD TIMER

The first place winner here was again, Gary Westland. This time the winning model was the Leisure Lanzo Bomber powered by a geared 05 cobalt. This kit is a good choice for an off-the-shelf competitive O/T.

Second place went to Lowell Howe who came all the way from Texas to fly. I believe this makes it his third trip out! Lowell flew the same Cabin Playboy (modified from the Leisure kit) that he flew last year. He also took advantage of the Cabin Playboy's long snout and used a folding prop.

Joe Ballasch placed third with another Astro-powered Leisure Bomber. Joe used a rigid wooden prop and what looks like a Higley Heavy Hub spinner to help achieve balance.

Yours truly had the most unusual O/T at the Champs. I can make this statement because it was the only other type of O/T present besides Playboys and Bombers. It is a 65-inch span enlargement of the 42-inch original 1941 Louis Garami Strato Streak, the plans for which are available from Bob Sliff at Hobby Horn (see Index to Advertisers).

The overall performance of the Strato Streak I feel is excellent. Unfortunately, I wasn't able to prove this until after the contest was over, when it seemed I was able to stay up as long as I liked. The reason for the poor showing was basically due to using a brand-new, never cycled, 900 mAh Ni-Cd pack. In spite of overnight charging, the pack pooped out about 15 seconds shy of the 40-second motor run.

The second round proved more disastrous for me than the first, because I hooked up the practically dead batteries and peak detector charger to the 12-volt battery backwards! If it weren't for the voltmeter loaned to me by Chuck Hollinger and the watchful eye of Howard Doering who witnessed the voltmeter numbers descending rapidly about a minute later, the error might have gone undetected and the pack ruined! A back-up 800 mAh Ni-Cd pack was hur-

riedly crammed into the fuselage, a pack which hadn't been used in about two years and had only been slow-charged overnight to equalize the cells. The disappointing second takeoff ended about 20 seconds shy of the longer, 60-second motor run. My first two launches were half what they should have been.

Round three started to show more promise as the pack had been cycled once before (deeply!), and it was showing both higher voltage and increased capacity, as it should. In this flight, I actually made it to cutoff time, 50 seconds. Alas, one 931-point flight wasn't enough to save the day, and I ended the first day dead last.

The Strato Streek weighs 46 ounces. This isn't much of a lifting challenge for the hot, six-turn Astro Challenger FAI 05 cobalt gear motor and the Rev-Up 12-8 THP four-cycle non-folding prop. The 900 mAh cells which came in the Astro flight system were rewired internally with tin-plated, braided copper solder wick on Sliff's recommendation. This helps to eliminate some impedance and the resultant heat build-up of the stock, solder-tab wired pack. German-made, ultra-fine strand, 12-gauge copper wire was used to rewire my KO Propo CX-II speed control to handle the high current demand of the new system. Anderson Power Pole (Sermos) silver spade-type connectors were used to further reduce resistance to current flow. I have no amp-meter to measure the current flow, nor have I used the stock system wiring to compare rpm changes, but I have it on good authority that all these changes do make a significant performance increase (did they say 500 rpm?).

The specs for the Streeker are: wingspan, 65 inches; wing area, 600 square inches; stab area, 212 square inches; wing airfoil, 9-percent flat bottom; stab airfoil, 10-percent flat bottom; length overall, 41.25 inches (LE of cowl to TE of stab); balance point on wing, 67 percent of chord (yes, the tail lifts); total lifting surface, 812 square inches; weight, 46 ounces; surface loading, 8.2 ounces per square foot; landing gear, single wheel (original Streeker part tool!); moveable center rudder (only), hinged at the high point of vertical surface; and radio, Futaba 4NL-Conquest Micro.

The roll response is good at cruising speed and above, but only fair at low speed (you get used to it). The Streeker has ample dihedral and tip dihedral, so if you were to make all three fins into rudders or add spoilerons in the wings, the roll response would be perfect at all speeds.

With the Strato Streek's fuselage hanging below the bottom surface of the wing, the center of gravity (or mass) is a good seven inches below the main source of lift. As with any tall pylon model, you can get into some weird pendulum oscillations if you move the sticks with a heavy hand, especially under power! Trying to damp the oscillations by using corrective rudder only seems to perpetuate the pendulum swing. Left to itself, the Strato Streek will "free flight" very willingly, and oscillations will take care of themselves.

The theoretical advantage of a pylon design is higher efficiency. The idea being that there is less disrupted airflow past the under

surface of the wing, and that a greater portion of the wing is working, not being hidden by fuselage. Also, back when pylon models were first being built and flown, it was discovered that they could be powered with bigger engines and get steeper climbs than their equivalent size cabin models. Better climb and glide was the result, and accounts for the many pylon designs to choose from!

#### UNLIMITED OLD TIMER

The winner of this class was Ross Thomas. Ross flew his full-size Lanzo Bomber with an Astro 40 cobalt on 24 cells. The climb of this large model is something to see! A good 45-degree climb is not an exaggeration.

Second place went to Bob Sliff and his Astro 40-powered full-size Cabin Playboy. Like Ross, Bob used an Astro 40 motor on 24 cells.

Third place went to Gary Westland who flew a pylon Playboy (66 inches) from a Leisure kit. I'll have to guess that because Gary flew a Lanzo Bomber in the Seven-Cell class, this Playboy was powered by something larger. The Astro 15 fits right in the same mount (or firewall hole) as the 05, so this was probably the motor which was in Gary's Unlimited Class entry.

#### PRIZES, PRIZES!

Bob Boucher of Astro Flight really deserves a round of applause for his generosity. At the conclusion of the contest Sunday morning, he brought many hundreds of dollars worth of motors, chargers, motor controllers, high flex wire, connectors, and other valuables to be awarded by free raffle (your contest registration card was your ticket). Many other companies joined in the giving, too many for me to remember them all, but Midway Model Co., Hobby Lobby, and SR Batteries come to mind.

Electric power is coming on strong these days. With many flying fields being jeopardized over noise violations, it's nice to be able to fly in a neighborhood vacant lot within just a few score yards of a residential area and have no one realize you are there. No complaints. No fuels. No mess. Very little risk of fire (you would have to short out a charged pack!). It's also very nice to fly electric motors as powerful and efficient as the little Astro FAI gear motor. Many more really impressive model projects are possible with the new generation motors and batteries that only five years ago were just not possible or practical.

Look for the announcements for next year's Astro Champs and plan to be a part of the fun!

#### Jake. . . . . Continued from page 7

the gear, aircraft center of gravity location, thrust line location, and torque. I don't know what that function is, but you can trust me, it is a function of some sort.

Jake

#### Workbench . . . Continued from page 7

1914, and during the Golden Era between WWI and WWII. If we're not mistaken, the

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first such model event took place in Italy, for the "Coppa Schneider," about three years ago.

Now, through the efforts of Bob Martin, Bob Martin R/C Models, and Norm Goyer, editor of Scale R/C Modeler, the US will have its first "Schneider Cup" reenactment, November 10, 11, and 12, 1989, in Lake Havasu City, Arizona. It will be held in conjunction with the 4th Annual London Bridge Seaplane Classic, hosted by The Desert Hawks R/C Club (You did know the real London Bridge is now located in Lake Havasu City, didn't you?).

For a complete rundown on aircraft specs, competition rules, and other information, contact Bob Martin at 1520-C, Acoma Lane, Lake Havasu City, Arizona 86403, phone (602) 855-6900 days, (602) 855-2016 evenings.

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Wingspan	48.82" (1240mm)
Area	446.5 sq. in
Weight (w/rec system)	39 oz.
Motor	RS540SH w/3:1 reduction gearbox
Recommended system	Futaba 4NBL/MCR

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1024

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# Cheat the wind

As off-road continues to grow, Tamiya continues to stay at the forefront of design, technology and new introductions. Now Tamiya's already burgeoning selection adds two more futuristic off-road designs. Again it is Tamiya who is willing to spend the enormous dollars needed for the research and tooling of new molds. It's Tamiya whose engineering and development staff is the largest in the industry, and the most visionary as well.

It was Tamiya, the innovator of off-road buggies, who was the first to mass produce high quality, high performance off-road buggy designs engineered to look and function like the prototypes. And use the technology needed to design a variety of working suspension systems that mimic the operation of full size racers. And of course, it is Tamiya who introduces the steady flow of new models year-in and year-out. Tamiya, who continues to innovate and popularize off-road R/C. Tamiya who makes it the fastest growing sport in the country.

**And now, the 4WD Thunder Dragon and 2WD Sonic Fighter Roar Off The Test Tracks And Into Your Hobby Shop.**

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- Shaft driven 4-wheel drive • Two adjustable oil spring dampers on the rear, one mono oil spring damper in the front • Fully independent 4-wheel suspension uses double wishbones • Front end anti-roll stabilizer 3-step forward and reverse speed control
- Unitized differential gears keep closer tolerances, with less friction

## Sonic Fighter

- Top shell lifts to reveal a box frame chassis that permits quick access to all radio components • Independent swing axle suspension in the front
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