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R/C MODEL BUILDER

volume 9, number 90 $2.00 JULY 1979

ISSN 0145-8175

- SUPERSONIC R/C MODEL
- COL. BOB THACKER'S TURNER SPECIAL
- "PERCY", the RUDDER-ONLY SLOPE SOARER
- SCALE VIEWS by WESTBURG - CURTISS BFC-2 "GOSHAWK"
- TOLEDO EXPO REPORT

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Equipped with "Squish-band" head . . . for cooler running and increased speed.

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A record breaking Free Flight and U/Control engine.

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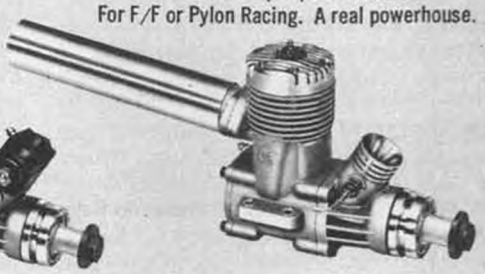
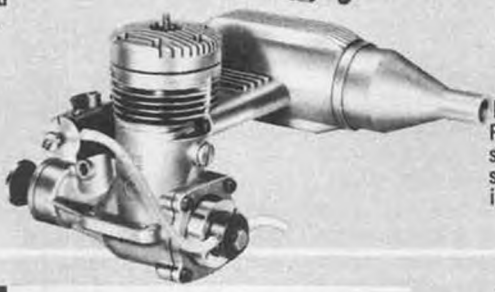


K&B 6.5cc (.40) R/C Front Rotor
Unbelievable horsepower. For R/C Scale and R/C Pattern.

K&B .61 R/C with Muffler
A top performing Pattern Engine. It competes with the best.

K&B .61 R/C with Perry Pump/Regulator
Features the most advanced step in model engine fuel systems . . . fuel is fed into system.



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R/C MODEL BUILDER

JULY

1979

volume 9, number 90

621 West Nineteenth St., Costa Mesa, California 92627 Phone: (714) 645-8830

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FEATURES

SCALE VIEWS

CONSTRUCTION

COVER: Being indecisive is not a very popular trait, but in the case of our cover photo (by Billy Root), Gaya Tronbelly, a dancer at the MGM Hotel/Casino, Las Vegas, Nevada, has succeeded in making it attractive to be "on the fence". The F7F Tigercat is the prototype for a new Bridikit. Span is 65 inches, and power is two K&B 61's with the heads anodized to match the Navy Blue paint job.

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Nancy, R/C soarer.
R/C Pattern World Championships.
Peanut Fokker D VI.
LSF Tournament story.
Bi-Prentice, R/C biplane trainer.

Vol. 1, No. 2 $3.00

December 1971

Curtiss-Wright Junior R/C 2" scale.
R/C Twin Trainer 75" span, for .40's.
Peanut Laird LC-DC.
Volksplane 3V-1 3-views.
How to build light "wire" wheels.

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January 1972

SHOCer F/F by Mel Schmidt.
White Trash, famous R/C soarer.
Peanut Ord-Hume.
Chet Lanzo's famous rubber Puss Moth.
Curtiss Robin 3-views.

Vol. 2, No. 4 $1.00

February 1972

Minnow U/C profile scale racer.
Fokker E-I R/C scale.
Al Vela's SOLD OUT Boy 1/2A
E-Z Bo .A, Al Vela.
Peanu d Fliver.
Fibe ing over balsa, by Le Gray.
Spoiler, FAI Combat.

Vol. 2, No. 5 $3.00

Mar/April 1972

Yankee Gull R/C glider 8' to 12' span.
Miss Cosmic Wind, QM R/C Pylon racer.
Peanut Scale Bucker Jungmann.
Siebel 1/4A F/F scale.
Mr. Mulligan 3-views.
FAI power "Folder."

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May 1972

Seahorse II, R/C seaplane. For .19-.35.
D.H. Humming Bird, F/F or R/C pulse.
Peanut Fokker V-23.
Whetstone 1/2A U/C combat.
Ryan ST 3-views.
Tethered Cars, R/C sail.

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June 1972

Bob White Wakefield.
Mongster QM biplane R/C pylon racer.
Calif. Coaster R/C glider. Sheet wing.
Three profile Peanuts.
Deperdussin 3-views.
Pesco Special 3-views.

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July 1972

Fairchild 51, 1" scale, R/C or F/F.
SAM-5 A/2 Nordic.
1912 Avro G rubber.
Comanche C stand-off R/C scale.
Travelair 2000 2" scale R/C, by Editor.
Chester Jeep 3-views.

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August 1972

Bonzo standa R/C sport pv scale.
Counterf ailless A/1 sic.
Shoes' R/C QM.
Pear SOLD OUT aylorcraft on ts, also big one.
Fairey Delta 3-views.

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Feb/March 1973

Profile F4U Corsair C/L stunt, .40 power.
Beecroft's Satan, Class A free flight.
Indoor Ornithopter.
Peanut Travelair 2000
PT-3 Scale Views.
Thermal hunting with R/C gliders.

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April 1973

Fabulous PEA POD, R/C sailboat.
Briegleb BG-12, scale R/C soarer.
R/C Spirit of St. Louis, semi-scale, .049-.09.
Peanut Volksplane
Finish painting of rubber scale models.

Vol. 3, No. 17 $3.00

May 1973

Bantee mini-pattern R/C 3channel, .19 power.
Woodwind A/2, all sheet covered wing.
Slope soaring technique.
Teakettle, twin-boom CO_2 pusher.
Peanut Monocoupe 110.
Aerbo, .020 Replica, OT

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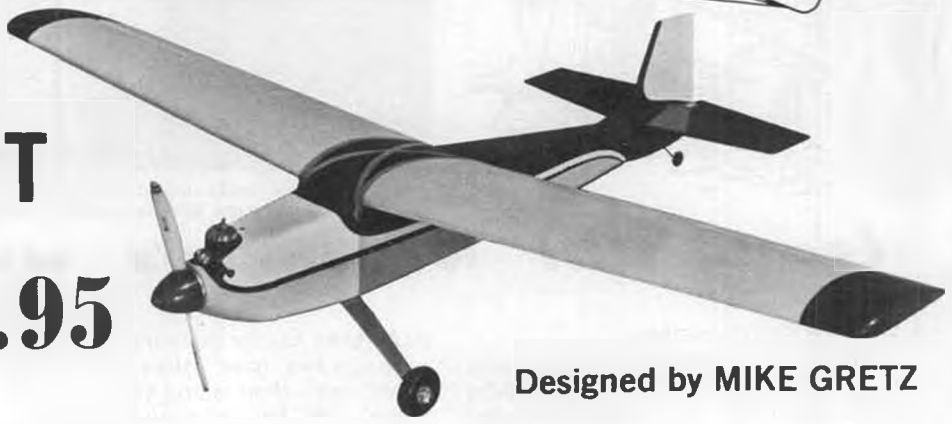

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Two of the Chief Cooks and Bottle Washers of R/C MODEL BUILDER at the 25th Anniversary Toledo R/C Exposition. Without hands we couldn't talk. Photo by Anita N., the 3rd CC & BW.

from Bill Northrop's workbench . . .

HALF-DUES FOR 65'ERS

Roy Mayes, a recently retired Senior Citizen living in Leisure World, Laguna Hills, California, has sent the following appeal to AMA's Executive Council. We at **RCMB** wholly support the proposal, and urge AMA and all active modeling clubs to adopt the policy.

Dear Fellow Modelers:

Along with many AMA members, I feel quite disturbed with the apparently necessary large increase in membership dues. While it is understandable that inflation is the main reason, it will also be necessary to understand that things will need to be put in their proper priority. Unfortunately, the things we enjoy most are not always vital necessities: they would have to be sacrificed to maintain a reasonable lifestyle.

As I am now in the age bracket of a newly retired "Senior Citizen", inflation has become a more deadly factor than it is with people still working, and therefore more able to keep up with inflation than older people on their fixed incomes. This means that I, and possibly hundreds of older model builders like myself, will have to conclude that AMA membership is too much of a burden to carry.

I also feel that most of these Senior Citizens may have given long years of service . . . not only to AMA . . . but to all the various phases of model aviation. It would be a great loss to have them drop out and become inactive.

A review of many organizations has shown that they have realized and appreciated the work done by their Senior members and they have responded by granting them a substantial discount in the cost of their memberships.

On behalf of all Senior Citizens, I am therefore requesting that AMA grant a 50% reduction in dues to members at age 65. This would be greatly appreciated and would surely show the gratitude AMA has for these members who, in most cases, have "Already Paid Their Dues" with their many years of assistance in the field of model aviation.

I believe it is also fitting that AMA suggest to all its membership clubs that they also give reduced rates to their Senior Citizen members . . . especially those R/C clubs where flying fields are at a premium, and so controlled as to make it impossible for low-income elderly people to pay exorbitant membership fees.

WANTED

Someone who may live in the San Diego, California area now has a Logictrol International Super-Pro two-stick transmitter, serial No. 110840, and a Graupner Cumulus Sailplane with white fuselage and yellow Monokoted wings and stab. Unfortunately, unless they have been returned to the owner, Frank Navarro, 1206 Chestnut St., Burbank, CA 91506, these items are stolen property. If someone in Southern California suddenly appears at a flying site with this combination and/or offers it for sale, check it out carefully.

GREETINGS 'GATE, LET'S VENTILATE!

Recently we quoted a newsletter article emphasizing the dangers of spray-painting in a confined, unventilated area. It brought the following reaction from Bob Pettit, president of Pettit Paint Company, which produces Hobbypoxy materials for hobby use, as well as a line of marine epoxy paint products for full size boats.

Dear Bill,

As one of three sources of epoxy paints in the model building field, you cannot imagine how disappointed I was to read the "Epoxy Roulette" article contained in your "Workbench" column. As a matter of interest, copy essentially the same as the article you have printed, was also published in two other model magazines.

Our desire to preserve the long established good name of Hobbypoxy Products, which includes a line of epoxy paints and four formulations of epoxy adhesives, induced me to encourage these other two publishers, as well as you now, to set the matter straight and prove that, in no way, epoxies, per se, are anywhere as dangerous as your column indicates.

The entire matter concerning the health aspects involved with the application of epoxy products to model craft appears to have originated in the house organ of North Central Airlines, entitled, "The Ungarbled Word." There never was, incidentally, reference to the actual person authoring the experience referred to.

It was unfortunate that your column was somewhat out of context in that it did not quote in its entirety, the original article in "The Ungarbled Word."

At both the WRAM and Toledo R/C shows, we have encountered modelers who were concerned if they should be particularly cautious about their health while applying our Hobbypoxy products, or other epoxy products, for that matter, to their models. Their questions were instigated after having read one of several reprints from "The Ungarbled Word", such as, where the subject of epoxy paints was presented rather ominously in **Model Builder** *magazine.*

At this point, it would be best to quote that part of "The Ungarbled Word" which was omitted from your column:

"One of our number was lucky enough to live through the experience which he here details, so if you ever see the following words, by all means, pay attention:

'WARNING: VAPOR HARMFUL OR FATAL. AVOID PROLONGED OR REPEATED BREATHING OF VAPOR OR SPRAY MIST: USE WITH ADEQUATE VENTILATION.'

Continued on page 116

OVER THE COUNTER

• There's a new addition to the low-cost 2-channel R/C system market; it's MRC's Guidance System 2000. This unit has features not normally associated with inexpensive radios, such as open-gimbal sticks, sealed pots, and extremely accurate control response. Something this unit has that we haven't seen on any other system of this type is the ability to add up to two more channels as the need arises. Thus, if you're learning to fly with this radio, you needn't go out and buy a more expensive system when you're ready for a more sophisticated rig.

The airborne part of the Guidance System 2000 is small enough to fit in most 1/2A models. The unit normally comes with the MR 12 servos, but for really tight installations, the smaller MR 60 servos may be substituted for an extra $10. The total airborne unit weighs just 9 ounces with a 450 mah battery pack, and all connector pins are of the same gold-plated type used in MRC's top-of-the-line 775 system. Nothing cheap about this radio!

All in all, the Guidance System 2000 looks like a good way to go for the beginner in R/C, or for the glider or 1/2A pilot who wants a good, high-performance, low-cost radio. Retail price of the Guidance System 2000 is just $99.95, which sounds like a real bargain.

MRC's new "Guidance System 2000" 2-channel R/C outfit.

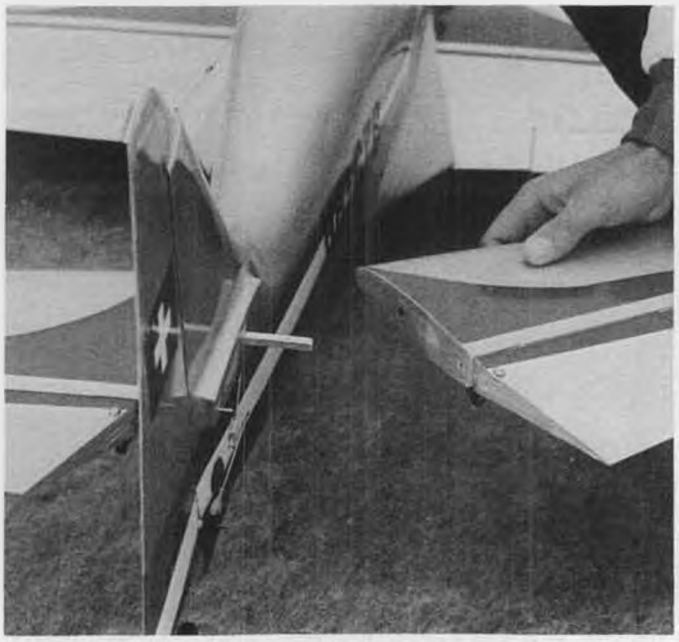
More good news from MRC is that a new improved version of the Webra .91 is now available. The .91 is now in great demand and has proved itself as one of the top choices for 1/4-scale models, and 18 of the 28 pilots at the last Tournament of Champions used the Webra .91 in their models.

So how has this powerhouse been improved? Well, the engine now comes

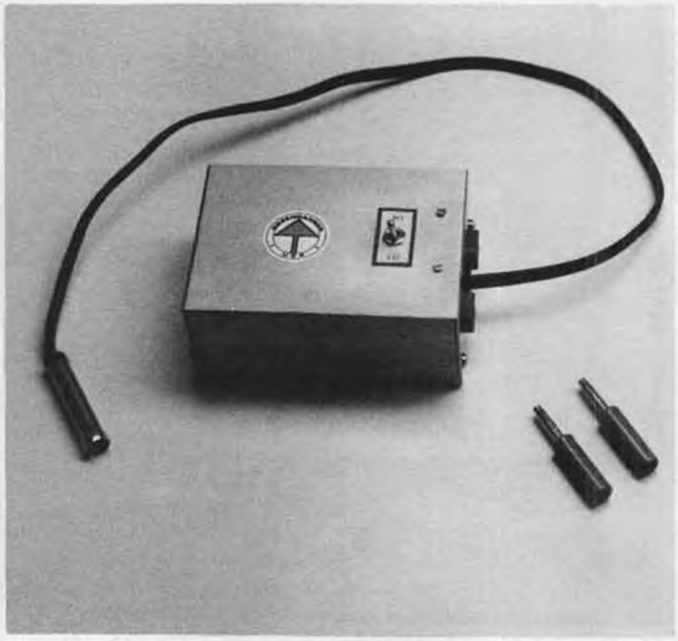
The big Webra .91 is now available with the slide-valve Dynamix carb.

equipped with the well-known slide-valve Dynamix carburetor, which provides even higher rpm's, a more linear response, and a smooth transition throughout mid-range power settings.

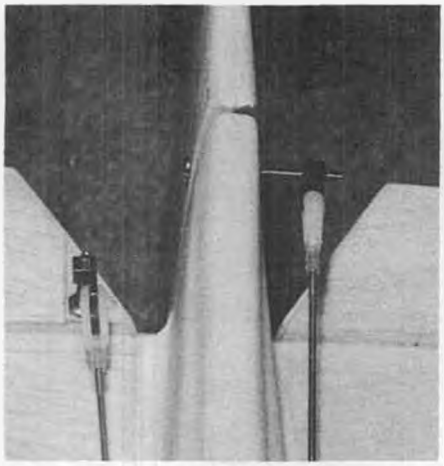
Since the Dynamix carb doesn't need a venturi, the incoming airflow is not restricted, resulting in more efficiency at all speeds. A pressurized fuel system is necessary to make this carb work; simple muffler pressure is good enough.



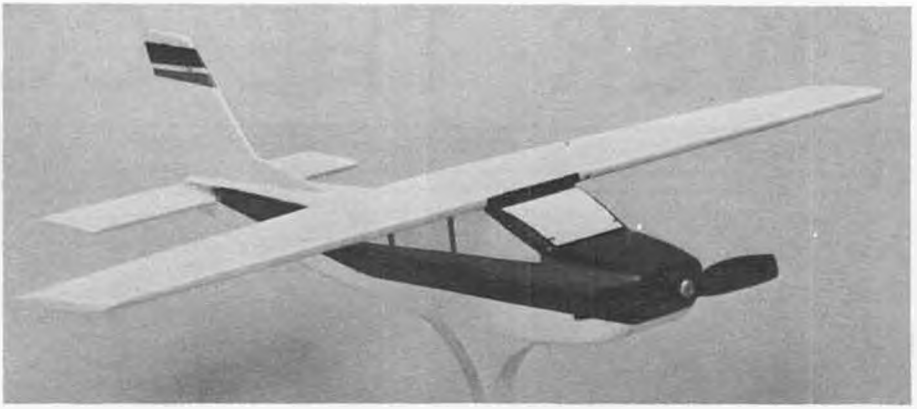
The Removable Stab Device from Giezendanner USA.



Giezendanner USA's Tone Glow Plug Starter Unit.



The Precision Control Fittings from Giezendanner USA.



The "Two-Gether Cardinal," solid model for children, from Hobby Hideaway.

Use of a tuned pipe will get you even more power from the engine.

For those who already own a Webra .91, the slide-valve Dynamix carbs are also available separately. If you want more info, see your dealer or contact Model Rectifier Corp., 2500 Woodbridge Ave., Edison, NJ 08817.

* * *

One of our new advertisers, Giezendanner USA, sent us a bunch of fact sheets for all sorts of R/C accessories, so many that we're going to present some now and save the rest for next month. Giezendanner USA is run by Dick Penrod, who is marketing products designed by Bruno Giezendanner, top Swiss R/C flier and two-time World R/C Aerobatic Champion. With qualifications like those, you can be that whatever he sells under his own name will be about the best you can get anywhere.

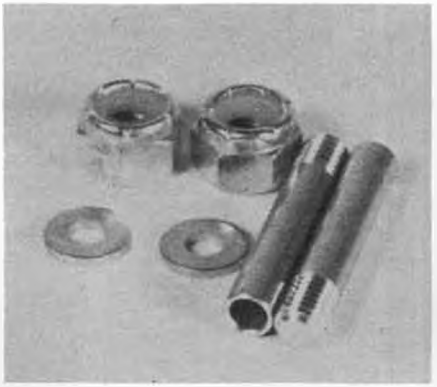
One of the high-quality products is a Tone Glow Plug Starter Unit. This compact device is actually a glow plug driver. A switch is mounted in the case which you can use to select low or high current (low is used for normal weather and a ready-to-go engine, high is for cold weather or a flooded engine). One feature we haven't seen on any other unit of this type is that device emits a continuous tone, which indicates that your glow plug is in working order.

The Giezendanner device contains nicds and can be charged from your R/C system charger or at 250 ma for 12 hours; no charger is supplied. However, all charging jacks and plugs are included, so you shouldn't have any problems charging the batteries. The Tone Glow Plug Starter Unit is equipped with the Du-Bro plug connector, and sells for $34.95.

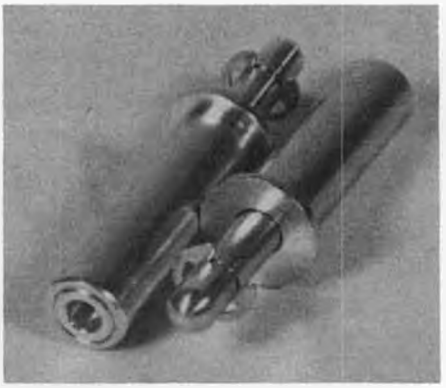
Also from Giezendanner USA is a gizmo for precision control surface adjustment. It takes the place of the usual nylon control horn and consists of a 4-40 x 1-1/2 inch bolt that is fastened to a plywood insert in the control surface (see photo). A special nylon fitting threads onto the bolt to any position you want, giving very precise control throw adjustment. One package contains two bolts, two nuts, and two nylon fittings, for $1.25.

Next, there is a device for equipping your model with a removable stab for easy shipping or transporting. Specially molded nylon sockets are glued permanently into each stab half; the sockets have square holes molded in them and plug onto a square cross-section aluminum crossbar mounted in the

The Easy Bailer from Eastcraft Specialty Products.



Gemini Models' new Scale Wheel Axles.



Snap-On Wing Mounts from Gemini Models.

The sleek "American Enterprise" work crew transport boat from Dumas.

model (again, see the photo). For added rigidity, there is also a small wire further aft in the fuselage that plugs into brass tubes in the stab halves. Each half is held to the fuselage by a small screw that taps into the aluminum crossbar. It's really simple, and the whole unit weighs under 1/2 ounce. The package includes all the necessary parts and instructions and sells for only $8.95.

Lastly, there is a take-off on the removable stab idea that lets you put a full-flying stab on your model. This system makes use of the same type of aluminum crossbar and nylon sockets mentioned above, but the crossbar rides in ball bearings mounted in the fuselage, and a long control horn with a square hole for the crossbar is also provided. The instructions are very thorough, and everything you need is included. Total added weight is less than 1 ounce. The Flying Stab Mechanism sells for $14.95.

For more info on these and the other excellent Giezendanner products, write Giezendanner USA, P.O. Box 818, Pottstown, PA 19464.

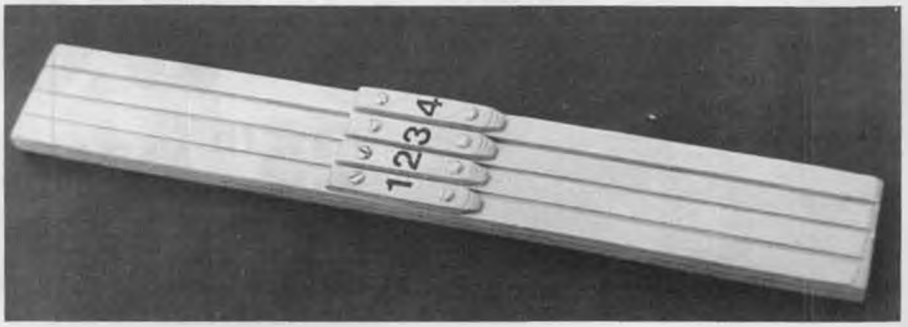
* * *

Remember those two new Sterling kits, the Space Squirt and Piper Tri-Pacer, that we told you about a couple months ago? Well, as an added incentive to buy them and also to save you some money, these kits now include a coupon worth 50¢ toward your next Sterling kit purchase! These coupons must be used by Setpember 30, 1979, and are good only in the U.S. and Canada. Sterling says that "We want every model builder to know, even in a small way, that Sterling is zeroing in on the backbreaking costs suffered by everyone." In addition, Sterling plans to include a money-saving offer in other selected kits in the near future. We'll pass the word as soon as we can.

The coupons in the Space Squirt and Tri-Pacer kits will be *inside* the box top . . . don't miss 'em!

* * *

Last month we told you about the Easy Bailer from Eastcraft Specialty Products, and also said that we couldn't figure out how the bloomin' thing works. Well,



For Rubber Scale fliers, a precision balsa stripper from Gene Dubois.

Gary Rheault of Eastcraft sent us a sample, along with a little more info. If a picture is worth a thousand words, then having the real thing in hand must be worth a million at least. The Easy Bailer is actually nothing more than a simple ball check valve that is mounted in the transom of your boat at the lowest point. Water pressure from the outside closes the valve and prevents any water from entering the hull. When the boat is moving, however, the valve opens and any water in the hull is let out. Simple, huh? The Easy Bailer can remove up to 36 ounces of water per minute and requires no maintenance once installed.

The Easy Bailer sells for $3.95 and comes with complete installation instructions and a piece of wire-mesh screen which can be mounted a half inch or so in front of the valve, to act as a strainer and keep dirt and junk from clogging the valve. See your local hobby dealer or order direct from Eastcraft Specialty Products, 709 Longboat Ave., Beachwood, NJ 08722.

* * *

Hey, Dad, how would you like to have your young son or daughter build models two-gether with you? With the new series of "Two-gether" kits from Hobby Hideaway, you can do just that. These are non-flying scale-like wood model kits that require only assembly and painting on the part of the young modeler. The few wood parts involved are already cut to shape and all hardware is included, along with an instruction sheet containing both printed instructions and sketches for ease of assembly.

The models can be built and a color finish applied in any way the young builder chooses . . . felt markers, paint, ballpoint pen, etc. The finished models

Continued on page 112

Attractive new Tiger Moth kit from Gee Bee Products.

New Cessna 150/152 kit from Champion Model Aeroplane Co.

Also from Gee Bee, a pair of molded plastic wheel pants.

PHOTOS BY AUTHOR

R/C WORLD

by BILL NORTHROP

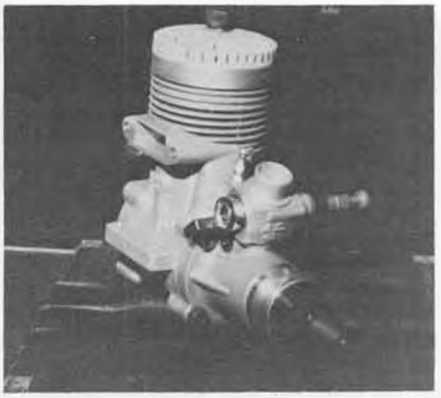
AT THE 25th ANNIVERSARY TOLEDO R/C EXPO

AMA President, Earl Witt, gives official recognition to Don Belote (left) and Bob Hisey for their fine Toledo Expo management.

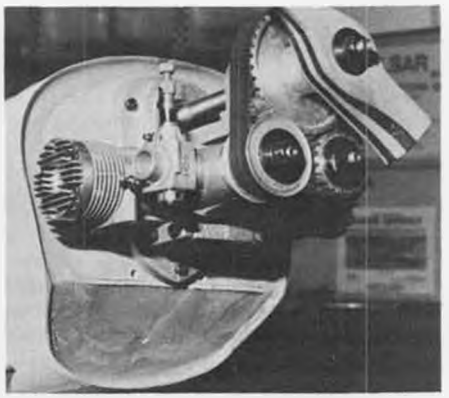
Bob Hisey presents plaque to John Maloney, World Engines, for most continuous years of supporting Toledo Expo by an exhibitor.

• Our first trip to the Toledo Conference was in 1962. That year, with OFB (Old Flying Buddy) Graham Lomax as co-driver, we struggled for 13 hours to cover the 500 miles of Pennsylvania and Ohio Turnpikes between Wilmington, Delaware and Toledo. Mild rain turned into heavy downpour, and heavy downpour turned into one of the worst blizzards in years, as we crossed the border into Ohio.

Somewhere west of Harrisburg, the right hand windshield wiper flew off the arm. To avoid scratching the glass, Graham's handkerchief was wrapped around the arm so at least one wiper



Bob Davis has the answer to high nitro/fuel costs. This is his O.S. 60 diesel conversion.



Is it a twin, or two engines? Belt drive unit combines two engines, by Cass Engineering.

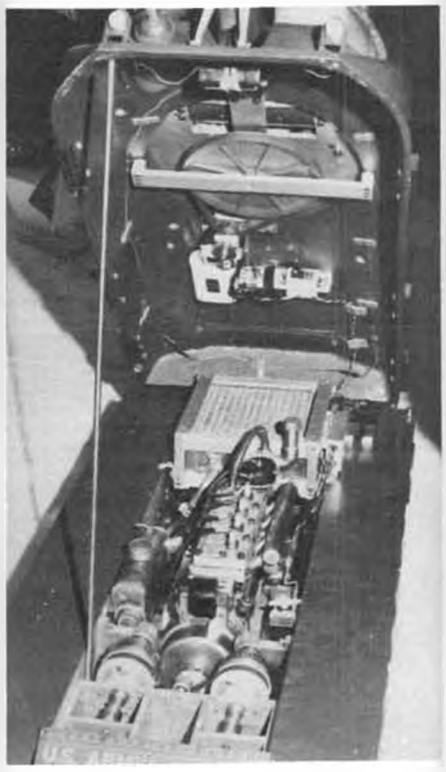
Valve covers on Tom Ingram's Waco, best Monokote winner, were individually covered, glued on, then filleted with narrow strips, using new iron from Top Flite, shown at right.

Functional trophies for 25th Anniversary Award winners should help make believers of the many "R/C Widows".

Jim Funduk, Holly Ridge, N.C., won Military Scale, Best of Show with this P-38L. Anniversary Wright bipe is silver and 14k gold.

Programmable transmitter (note banks of mini-switches) by Werner, shown in Polk's booth.

Jim Finley, the Rev-Up man, will produce this ARF ukie, plus the ARF FB 100 R/C.



Don Hickman, Ohio, built this 300 lb. Sherman tank and the 4-cyl. ignition engine.

could continue and the driver could see . . . as much as could be seen in the heavy rain. As the rain gradually turned into snow, we discovered that the cooling system's thermostat was jammed open . . . consequently the water circulated too fast and did not get warm enough to provide heat or defrosting. But as time went on and the snow piled higher on the road, the more we appreciated the car, a Citroen ID-19. With its front wheel drive and adjustable air/oil suspension system, we soon found ourselves to be one of the few vehicles moving along the white, unploughed, unmarked highway. When we pulled off at a wayside station to get coffee, the suspension was shifted to the highest position, giving us about 12 inches of road clearance. We would thread our way through all of the stalled, deserted automobiles, pull up at the coffee shop door, walk in amongst the stranded travelers strewn all over the seats and

Don Anderson with the "Big Stik", to be published in RCMB, also to be kitted by Bud Nosen models, for Quadra or equal engines.

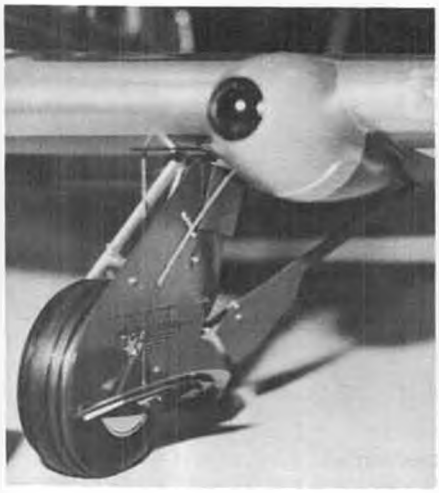
Another view of Hickman's tank, which won Directors Award at Toledo. Stop, go, left, right. Cannon shoots 32 cal. blanks (we hope!)

Quarter-scale Stearman designed and built by Don Godfrey. Span is 86 inches, weight 21 lbs., Quadra power, Zinger 20 x 8 prop.

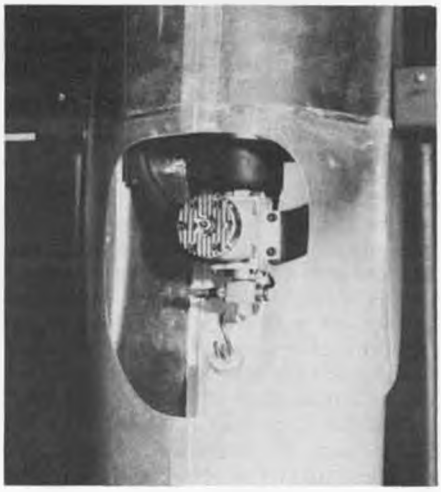
Dario Brisighela, Wisconsin, won 1st in Non-Military Sport Scale with this Stinson Voyager, model of his prize full-scale restoration.

New generation pattern ship by Ken Bonneme, built by Fred Kugel. Took 3rd in Original Design. Previously scheduled for publication.

Steve Sauger, Michigan, FAI Scale Team, took 2nd in Non-Military Scale with this 1934 Lockheed Orion 9-D. Future RCMB plan.

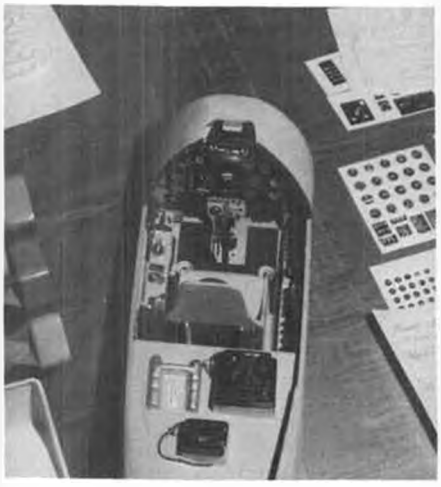


All of Steve's super-detailing on the Orion requires close study.



Engine in the Byron Originals MIG-15 ducted fan model is very accessible. Available soon.

This is Stand-Off Scale? Interior of Dario Brisighela's Stinson Voyager is not stark!



Dave & Al's Scale Products, Akron, O., molds cockpit detail from plastic sheet.

floors, buy coffee . . . and to their amazement, go back out and continue the voyage. We weren't dedicated modelers . . . we were NUTS!!

That year's show was held at the Sunningdale Country Club, which we vaguely remember as being somewhere near the Ohio Turnpike at the Maumee exit. According to the Toledo Weak Signals R/C Club's records, 12 manufacturers exhibited in 1962, and around 1,000 visitors attended. Our 1st place trophy for the best Intermediate design (a Galloping Ghost controlled, streamlined version of our "Square Hare", called the "Smooth Hare") made the whole trip worthwhile.

Carl Goldberg introduced his Falcon 56 at this show, and Bob Baldwin and Weldon Smith demonstrated their Hustler Delta, soon to be kitted by Midwest Products. The Swap Meet was the major function at that time, with the evening auction going well into the wee hours of the morning.

With the help of Walt Schroder's M.A.N. at Work column in June, 1962, we must correct the Weak Signals' figure of the number of exhibitors. . . "Everybody who is anything in R/C had a display . . . Zel Ritchie, the Space Control Man was in from California, with his buddy Jerry Nelson . . . Vern McNaab of Citizenship . . . John Macken and Ken Smalley of Otarion . . . Carl Goldberg with his R/C Falcon . . . Jim Preston of J&J Hobby House with his complete display of F&M Products . . . Tom Dion with all his Glass City Electronics Products . . . the full team, George Poggen,

First Place in Sailplane went to Ken Bates, Saline, Michigan, for this 2100 sq. in. "Merlyn". AR is 10.7 to 1, and weight is 140 oz.

Sea Breeze is ready-to-fly (less radio installation) sailplane by Bob Smith R/C Aircraft. Fuse, wings, stab, all molded epoxy-glass.

Real Peanut aircraft! All were built by Joe Brichacek, of Euclid, Ohio.

First place in Original Design went to R. Sprage, Livonia, Michigan, for this RSC-3 Canard Sailplane. Those long winter months can really get to you!

Bob Schmidt, John Krauer and the rest of Min-X ... both the Josaitis brothers from World Wide ... John Maloney and Russ Brown from World Engines ... Frank Garcher, Bob Baldwin and Weldon Smith of Midwest ... Sid Axelrod with all the Top Flite Products including Ed Kazmirski and his new Tauri ... Jim Mathis with complete G.M. and C&S line on display ... Jack Port of Controlaire ... the Magna Jig man Dave Berg ... Pappy deBolt with his twin Viscount, new visual tanks and other deBolt goodies ... the two lads who are putting out the 'Electra' fiberglass model formerly advertised by Al Kline and etc. ..."

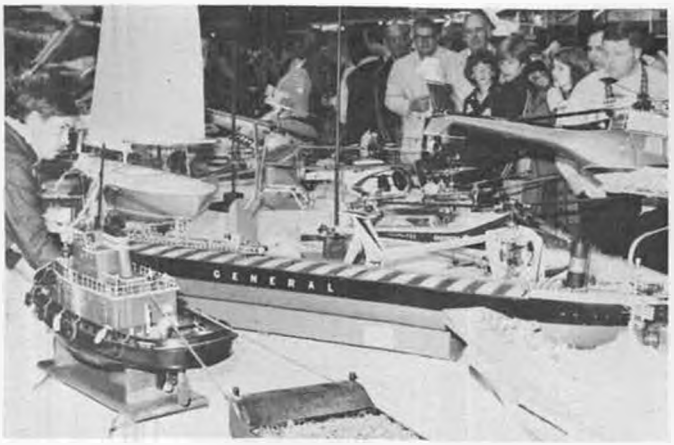
We haven't missed a Toledo Conference since 1962, and have watched it grow at a tremendous rate. In fact, those 1,000 spectators would now be outnumbered just by all of the exhibitors and their helpers, let alone the thousands of visitors who invade the show each of the three official open days!

Enough reminiscing about 17 years ago, but it does help illustrate the progress (changes?) in a relatively short period of time. This year's 25th Anniversary program listed 165 exhibitors, which were mostly manufacturers, but also included AMA and several special interest organizations, as well as model

Dick Van Horn will discuss and handle your technical problems at Pro Line.

Charlie Cannon shows just how small the new Super-Micro servo really is!

International "A" Class by Eugene Salika, Brookfield, Ill. Plank on RIB, glass over.



Many different types of scale boats were on display. The ore carrier could be George Lokinski's, which placed 2nd.

One of several boats displayed by Bob Noble, of Toledo. His fleet included a riverboat, which placed third in competition.

Bill Pistello's "Olympia Beer" was 2nd in Competition Boat-Scale. He's producer of the Mini Marine line of boat kits.

The picture says it all. There's Steve Muck and there are his R/C boats. Dolphin was star of recent Dunlap review.

magazines. The Toledo Sports Arena exhibit complex included the arena itself and an attached flat, rectangular building, all of which contained 258 booths, model display platforms, the Swap Shop and auction area, refreshment stands, restrooms, etc., etc.

We haven't heard the attendance figures for this year, but last year the number was around 30,000. Saturday was the heaviest day, with Friday being busier than last year, and also more crowded than Sunday . . . "Let's go Friday to beat the crowd." Many spectators parked miles from the Arena and took cabs to somewhere near the entrance. If you really wanted to see everything, and take the time to talk to the exhibitors, one whole day was not enough. Many visitors came for the whole 3 days, loading up hotels and motels in a large area surrounding Toledo and taking advantage of the special weekend ticket price.

Our favorite stopping place has always been the Commodore Perry Hotel. A very old establishment in downtown Toledo, the Perry has been thoroughly renovated, but just enough to maintain the old charm while providing modern conveniences. Plumber-type modelers would go ape over the bathroom fixtures! And the valet doors to the rooms are something else. In each side, a curved panel door opens to a compartment where you placed your shoes and hung your clothes to be cleaned and pressed. Put 'em in the door at night and call the valet. He comes and gets them without disturbing you, does his job and puts 'em back in the door. In the morning, you open your side and pick up the finished work. . . Well, the doors are still there, but the valet service these days is limited to food and luggage carrying.

The best attraction of the Perry, however, is the food. The dining room features a huge, rectangular buffet counter. On one corner is a two-foot

Frank Zwick and the F7F Tigercat he built from an R/C Kits . . . . er, kit. Features built-up construction and foam cores.

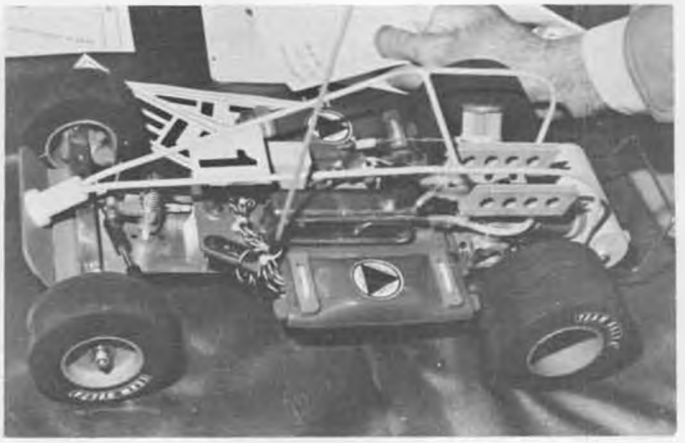
Garry Karner and "1910 Karner Monoplane". O&R Compact, homemade wheels, Douglas fir construction. Weighs 20 lbs.

Tom (Senator K.) Williams and wife Marie, familiar sight and sound for Craft-Air.

Carol French informs a spectator about Aero-trend line of flight boxes and accessories.

Anita Northrop and Walt Schroder personned RCMB booth while yours truly shot photos.

Giezendanner products are marketed in U.S. by Dick Penrod, Pottstown, Pa. These are new heavy duty jobs for big ships.



Bill Campbell's Delta Mfg. produces this glow-powered Dune Buggy sport vehicle. Note protective receiver bag.

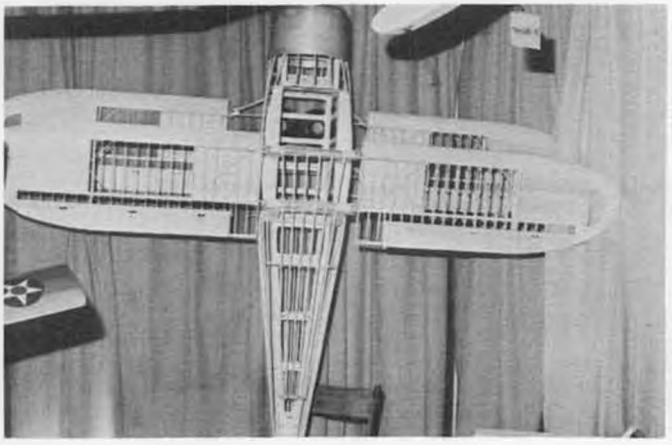
diameter glass bowl full of shaved ice and boiled shrimp, in the shell. This bowl is full of shrimp when the doors open at 6 p.m., and it's kept full until the room closes; whatever the time. The next side and end contain multiple choices of meat, vegetable, poultry, and fish salads, followed by a gigantic pot of homemade soup or chowder (full of clams!). The last side has the big stuff; a standing prime rib roast, fried chicken, roast turkey, fish, and steam tables of vegetables. The chef, a gray-haired black gentleman, carves the roast to your order (automatically cuts off a couple of rib bones when we come by!) and serves up the hot vegetables.

While we're on the subject, we must mention another fine food place in Toledo. The Northwood Inn is several miles out of downtown Toledo, on Summit St., but is worth the short drive. Again a mixture of the old and new, there is a salad bar with some of the wildest (and tastiest) combinations we've ever eaten, a continuous supply of freshly cooked hot buns, and entrees that taste as if each one was prepared just for you. If you go to the Toledo Exposition next year, forget the atmosphere of dining at the top of a tall building where the food quality has fallen to the bottom, and reserve a table at the Northwood Inn.

Besides being one of the top annual social gatherings for those in the model industry, Toledo is mecca for modelers who want to see what's coming for the near and far future in the way of new items. It's also an opportunity for them to meet and talk directly with many of the manufacturers, as well as with prominent individuals in the hobby.

If one were to try to sum up any particular trend in the R/C hobby this year, it could be done in one word . . . BIG. Rather than a few here and there, a majority of the models on display were in the Mammoth Scale category. In contrast, however, the Best of Show

Continued on page 114



Latest kit from M.E.N., masters at lightweight plywood die-cutting, is this 1/4-scale Beech Staggerwing. Spun aluminum cowl.

Bob Dively Model Aircraft, Inc. is producing a kit for the old "Turkey", WW-II's Grumman TBF "Avenger."

COL. BOB THACKER'S TURNER SPECIAL

PHOTOS BY AUTHOR AND BILL NORTHROP

By COL. BOB THACKER . . . Col. Roscoe Turner's famous Thompson Trophy racer is one of the classic designs out of the Golden Era in aviation history. Now you can duplicate it in 2-inch R/C scale.

• Before we get started into our article, I'd just like to make one statement. I do not build, engineer, design, or fly miniature aircraft. All the models that I enjoy are Model Airplanes, and anyone with a few hand tools can duplicate the Roscoe Turner Special.

Now to get into the model, and Col. Turner. The 1930's was the Golden Age of Aviation, and the Thompson Trophy Race, which was held yearly at Cleveland, Ohio, was the premier air racing event in the world, without question. The all-time great was Col. Roscoe Turner. He is the only racing pilot ever to win this prestigious event three times. He climaxed his third win in the Turner Special that I am about to present to you. This particular airplane raced in 1937, 1938, and 1939. The first year it raced, it went under the heading of the "Ring Free Meteor." In 1938, the same airplane flew as the "Pesco Special," and in 1939, it raced as "Miss Champion." Roscoe Turner commissioned this aircraft to be designed and built specifically to his requirements. There were many people involved in this airplane, and it was initially engineered with a constant chord wing, and was very small. Turner decided that it would not support the 800 pounds that it grossed over what they initially programmed it to weigh, and therefore, he had Lawrence Brown, designer of the Miss Los Angeles, take a look at it. That didn't work out too well, and it finally ended up with another famous aircraft designer and engineer, Matty Laird. I believe that he had more to do with the final configuration of the aircraft than any other person. However, there was a slight misunderstanding between Roscoe Turner and Matty Laird, and for the rest of Turner's life, he called the aircraft the "Turner Special." However, if you look closely at the airplane, you will see many of Matty Laird's engineering achievements.

I usually do my diagrams and sketches as I build. The wing of the aircraft is the first thing. Usually, you have to fit the wing saddle in the fuselage, this and that and the other thing, and for this, a completed wing is necessary. Once I get the wing started, I feel as though I'll go ahead and finish the airplane. So let's talk about the wing first.

Actually, it is a conventional construction; foam covered with 1/16 sheet, with hard leading and trailing edges and all-balsa tips. The sticky that I used was Blue Goo. Six ounce fiberglass cloth is laid in the center for strength. The ailerons and aileron linkage might be just a bit different from what you have tried before. I am using 1/4-inch alumi-

Instrument panel duplicates original, according to information provided in text.

The Champion sign was hand painted by a commercial artist, right on the airplane. This Thacker will go to any lengths. . . .

num tubing for torque rods. After you get your wing completely built and sheeted, go ahead and cut your ailerons out, face them, and put them back in. Now, we still don't have any of the aileron mechanical turners installed in the wing. Mark a line from the leading edge of the aileron right to the center of the wing on both sides. Make the line with a felt-tip pen. Put your 1/4-inch aluminum tubing just about where it would go, take your felt pen, and draw two lines, one on each side of the aluminum tubing. OK, now take a razor blade and cut on that line 45 degrees all the way on both sides so that you can lift that 1/16 balsa up and also lift a little of the foam. Clean out that foam to where the torque tube will drop into the foam just deep enough to clear the 1/16 sheeting. In other words, you are cutting a groove in the foam to clear the torque rod.

Now, on your torque tube, plug both ends with about a half-inch of dowel, because that is what you are going to put the pins in. The torque rod is bushed with ply. Just take a rat-tail file and make a nice tight fit only on each end; that is all the bushing you want. And don't bush it in the middle, just leave it clear. When you get all set up, and you have a nice working torque rod, go ahead and use Hot Stuff or Jet or some other quick adhesive to put the top piece of balsa back in and smooth it over, and you are all set. It is very simple and works beautifully.

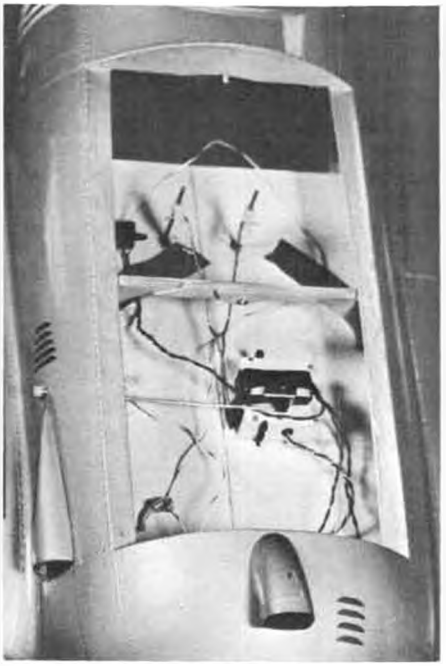
Let's put on the covering and finish off the wing, now that we are talking about it. I'm not the world's greatest man with 3/4 ounce glass cloth and resin, but I'm learning, and that is the way the wing was finished, using K&B's usual procedure. I learned two things with the last wing I covered. Number one is that when you work with resin, and you've put the proper amount of catalyst in there, if you use a deep cup it will scum over, and if you keep using less and less catalyst it won't set up. Well, this is not quite right. Go to any hardware store or ten cent store and get some of those little aluminum dishes that they put pot pies in. If you use one of those, your problems are over. OK, go ahead and put the cloth on, and use the toilet paper routine. I put on one coat of resin, let that set up, and very lightly sand it. Then I put on another coat of resin and squeegee that off, and very lightly sand that. Try as I may, I usually get a few wrinkles on one panel. I talked to an old friend of mine and he said that the best way to avoid wrinkles in the cloth is to attach a few clothespins to the drooped-over cloth. The clothespins have just enough weight to pull on the cloth, and you won't have those little puckers.

I don't mean to bore you with the problems I have, but maybe you people have had the same problems, and there is no need to talk about things that are successful. We all really should talk about the things we're not successful at. Another thing at which I am not really successful is applying a primer. I have always thought that if you sprayed everything, that was the best way to go. Well, I am absolutely convinced that spraying everything is not *always* the best way to go. When you spray primer, which I did the first time around on the wing, it does not fill those pinholes and all the other imperfections that you always end up with. So, I have decided that the first one or two coats of primer should be brushed on. There is something about stirring around with that brush that helps fill up those pinholes.

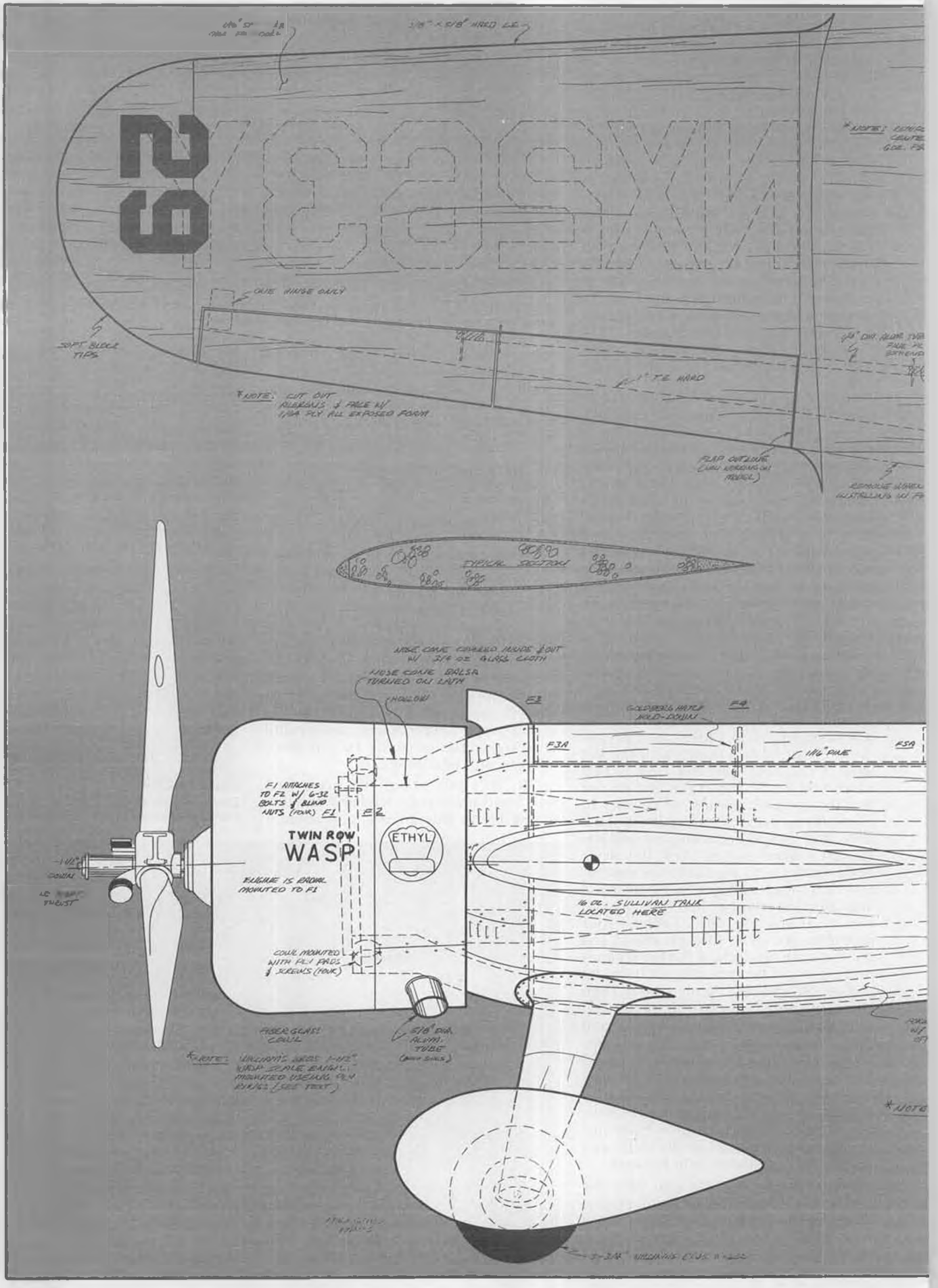
A classic beauty for which justice has been done by the colonel. June 1974 issue of Wings has complete story on the aircraft, and Col. Roscoe Turner.

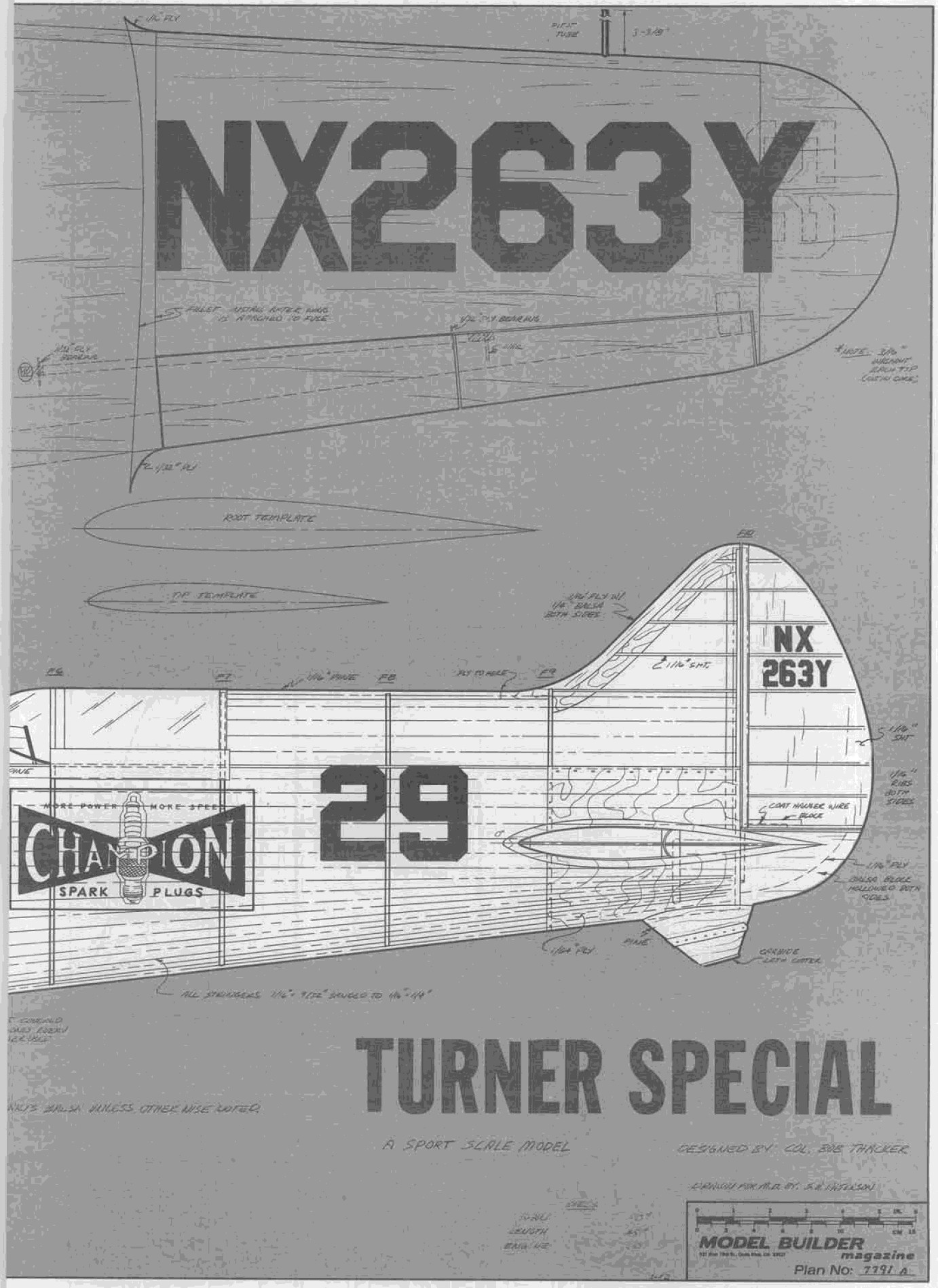
There's another thing I'd like to discuss: in this torque rod business, if you round off the ends, you can pull the rods completely out of the wing and cover, work, and finish your wing, and you won't have to fool with those doggone torque rods. I've been known to paint torque rods into the wing, and it doesn't work out too well. What I'm saying is, don't put that servo arm in until you are actually ready to put your ailerons and final hinge in.

OK, let's talk about the horizontal stabilizer for a minute. It is fairly straightforward. The only unusual part about it

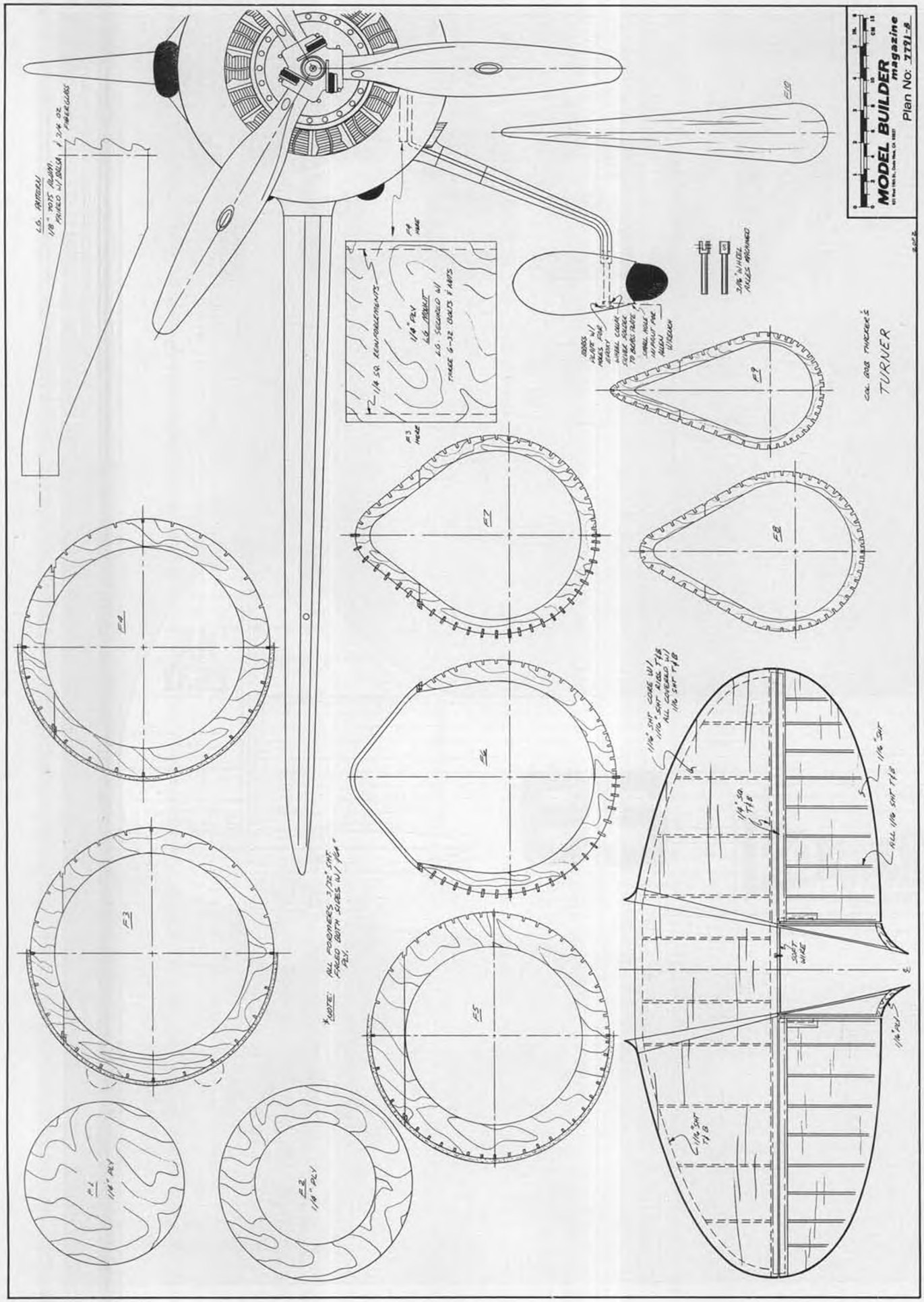

On-off switch double-stuck to aileron servo. Receiver antenna helped by vertical wire.

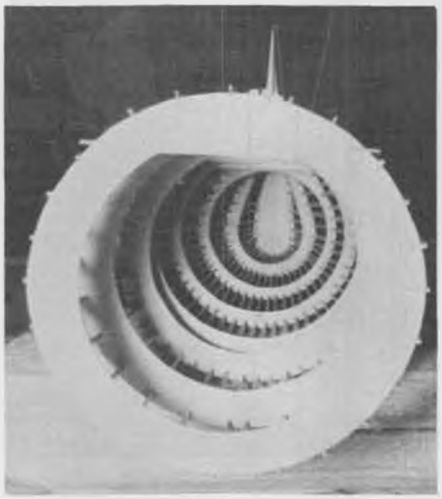
The scale outline has not been changed. As text reveals, original ship started with smaller, straight wing which would have been inadequate. Col. Bob is thankful for change!


WASP
TWIN ROW
ETHYL
F1 ATTACHES TO F2 W/ 6-32 BOLTS & BLIND NUTS (FOUR)
ENGINE IS RADIAL MOUNTED TO F1
COWL MOUNTED WITH PLY PADS & SCREWS (FOUR)
16 OZ. SULLIVAN TANK LOCATED HERE
NOSE CONE BALSA TURNED ON LATH
(HOLLOW)
NOSE CONE COVERED INSIDE & OUT W/ 2/4 OZ GLASS CLOTH
FIBER GLASS COWL
5/16" DIA. ALUM. TUBE
SOFT BLOCK TIPS
CUT OUT RIBS & PACK W/ 1/8A PLY ALL EXPOSED FORM
F1
F2
F3
F3A
F4
F5A
1 1/2" DIAM.

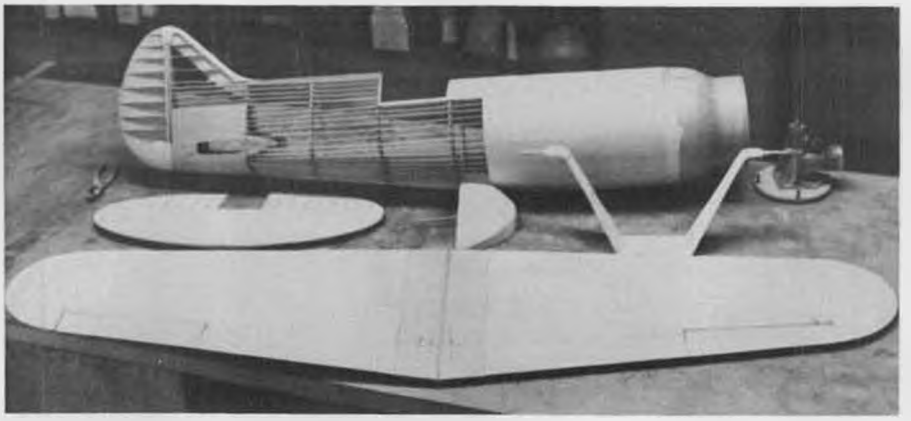


FULL SIZE PLANS AVAILABLE – SEE PAGE 116

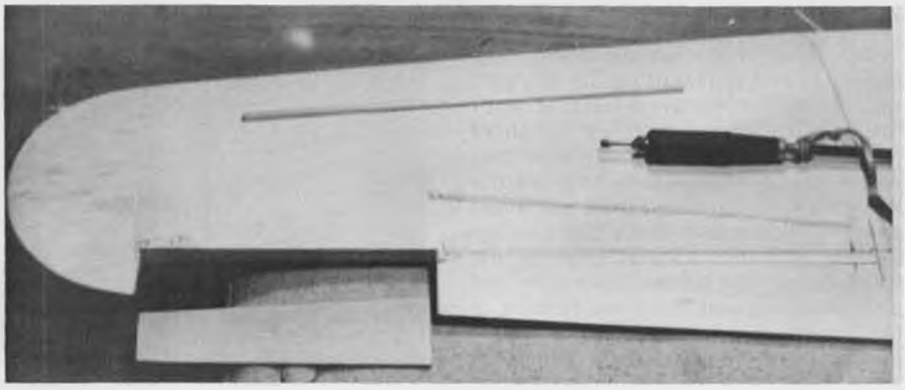

MODEL BUILDER magazine
Plan No: 2791-B
TURNER



Shades of Cleveland models! Construction of fuselage at an early stage.



Some of the basic parts prior to the model becoming a one-piece aircraft. Wing is foam cored and cowl is fiberglass. The rest is cut wood and glue!



Aluminum tube torque rods buried in grooved foam core bend the ailerons. Wing finished with 3/4-ounce glass cloth.

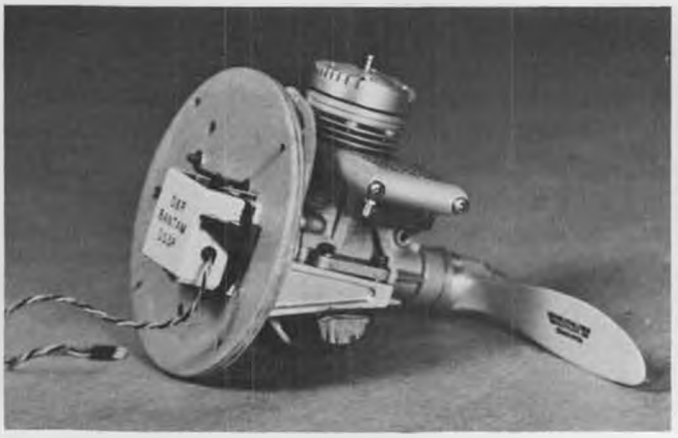
is that the whole thing starts out with a great big piece of 1/16 sheet, and everything is built up on top of and underneath it. The leading edges really end up as three pieces of 1/16 sheet. Go ahead and contour it to shape, and also contour the ribs so that you are ready to start putting the 1/16 sheet top and bottom on. The elevators are nothing more than just a piece of 1/16 sheet and 1/16 strips for ribs sanded to shape. You might run into difficulties at about this stage . . . I did, and that is making the concave and convex surfaces to form a blind hinge line. Well, the only thing I can say is you just make a concave or a convex surface and just make it fit and just keep using sandpaper and dowels and rat-tail files and everything you can get your hands on, and you'll finally end up with a nice, rounded surface. As we get a little bit further on with this, I will tell you how to cover that hinge line, which is another little goodie that I have discovered while working on this project.

Now for those hinges. Williams Brothers used to make a rather unique hinge, using male and female parts, that allows you to use a blind hinge line. They haven't made them for quite some time, so have your hobby shop owner try to get you some. They come in large and small (get the small ones) and work out very nicely because you can put your surfaces on after the horizonal stabilizer and elevators are completely finished, and they go right on beautifully.

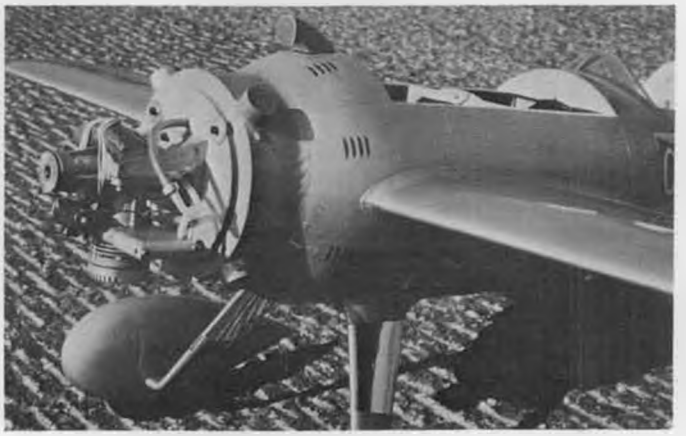
All right, let's take a look at the fuselage now, talk about some of the problems, and how we solved them. You old Cleveland model builders and Carl Goldberg Comet Zipper fliers are going to be happy, because we've used a few of these old but good ideas. What I want to talk about first is the bulkheads and formers. The bulkheads and formers are sandwiches of two pieces of 1/64 ply and with a 3/32 balsa core. Use Blue Goo to make the sandwich and go ahead and cut all those bulkheads out. There appears to be about ten thousand stringers. Well, there really aren't, but there are ten thousand slots you've got to cut. Now, here is the way I do it.

Using a Dremel saw, take the big Dremel saw blade, break off each end, and Scotch tape two or three blades together. That gives the thickness of the slots that we want to cut. Keep fooling around until you get a nice, tight fit. Then mark the formers for where you want those stringers to go, set up the depth and go around and saw all those ten thousand notches. Just Scotch tape two or three of those saw blades on your Dremel, and it'll cut slots just exactly the thickness you want.

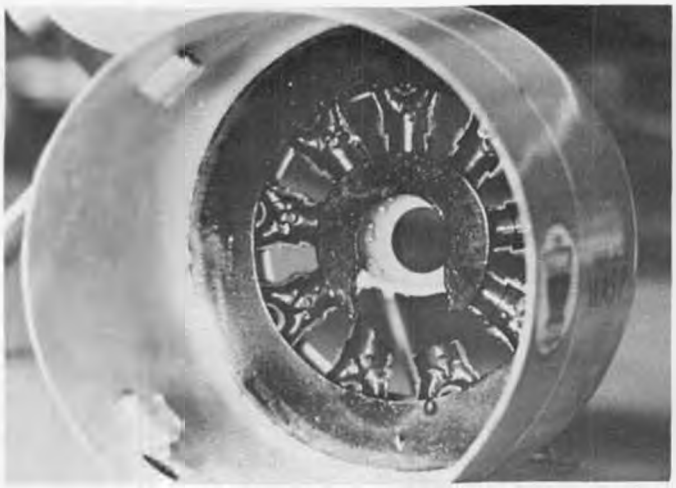
OK, we've got a round fuselage, but we've got to have some flat areas someplace because your workbench is flat, right? Here's what to do: cut the bulkheads along the line that shows where the hatch on the forward part of the fuselage line is. Separate all the bulk-



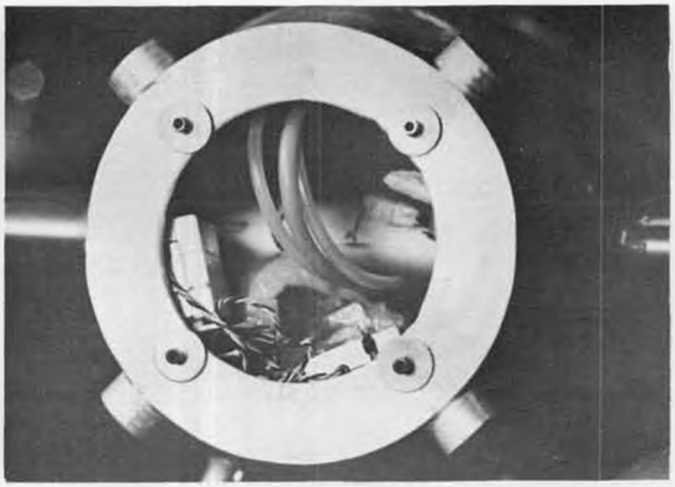
How's this for a servo vibration test? K&B 61 runs inverted. Note big chunk of lead banded to engine mount.



Engine plumbing. Pump and exhaust pressure are employed. Plywood knobs are cowl mounting stubs.



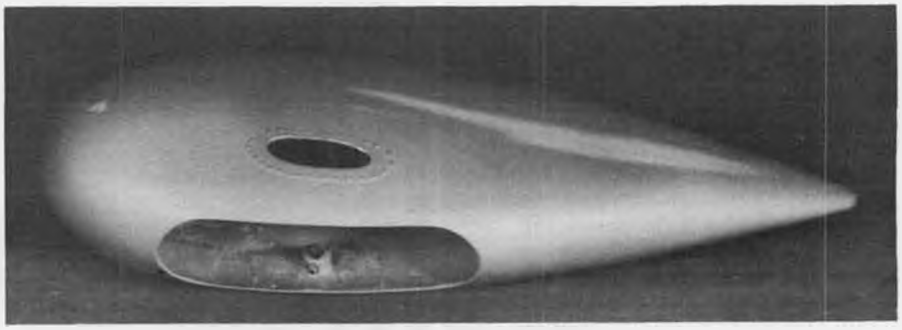
Williams Bros. engine first glued to small ply ring, then glued into cowl, followed by outside ply ring which holds all in place.



Only a retired Air Force colonel could get away with mounting servos that close to engine! One-piece wing goes through fuselage.

heads, turn them upside down, line them up, and start putting the stringers on. Now, the forward part of your fuselage is covered with 1/8 flat sheet balsa. Use only every other stringer, but when you get back to where all the stringers start to show, then use every stringer. Remember that when you are fooling with the forward part of the fuselage. So, line up the bulkheads, and just go ahead and build the bottom of the fuselage. When putting the stringers in, glue one on one side and and then go around on the other side of the fuselage and place the corresponding stringer in place so that you can keep the structure fairly equal.

When you get the stringers in, just hit each one with a little bit of instant glue, and pop the bottom off. Now you're sitting there with the fuselage from the firewall back, and you've got 3/4 of the fuselage finished. Go ahead and glue the top of the bulkheads on and finish the top of your fuselage, and also put the fin and dovetail in the rudder. You'll want to watch a few places there because the plans call for pine and plywood and a few other things, so make sure you use the proper materials. If you don't, you are liable to wind up with a structure that is not too strong. Go ahead and put the 1/8-inch sheet on the forward part of the fuselage. You'll notice that there's a



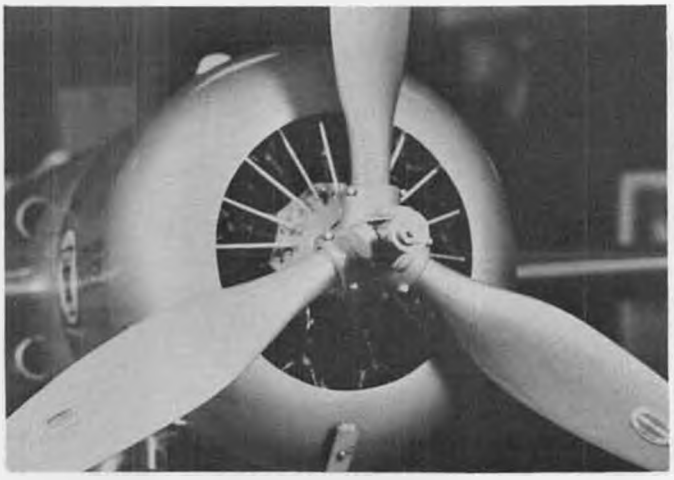
The colonel molded his own wheel pants over carved polyurethane foam molds. After glassing, foam was hogged out with an L-shaped piece of wire in a Dremel tool.

removable hatch there, over the wing, that you are going to have to make in order to put your aileron servo mechanism and things in. Make sure you put the proper sub-bulkheads in. Here's another place where I always have a problem; when I finish up covering these things, I've got material up into the hinge line, which gives me too much depth. So, after you pop the hatch off, put some 1/64 ply spacers in there, then put the hatch back on and finish it.

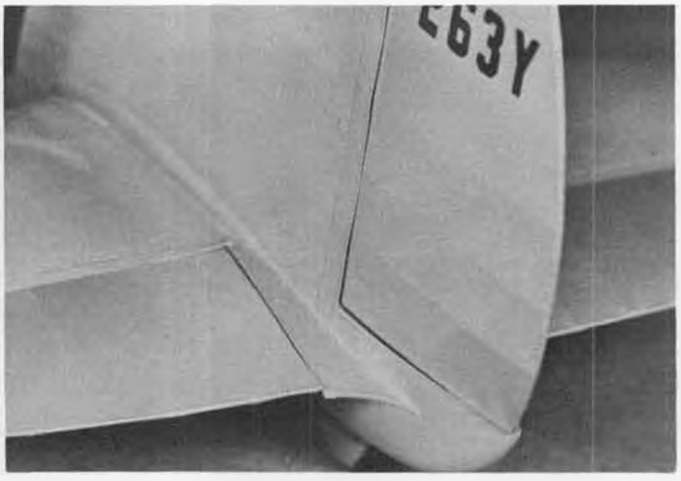
OK, we have the front end planked and we've got the hatch all cut out, and we're all set to go. But that's only back to the back firewall. You've got a great big nose cone that you are going to have to make some way. Now, you can either hog it out by hand, or you can get a ten-inch lathe and turn it in that fashion; however you want to do it, go ahead. When you get it hogged out, put one layer of 3/4-ounce glass cloth inside and outside for strength. You'll also notice that there is a big hole up front, and for you Comet Zippers fliers, everything . . . the radio, the tank, everything . . . goes in through the nose of this airplane. It's a little bit different than what I've handled before, but it works out real nice, and you'll like it because you can get all your weight well forward.

Now that you've got the nose cone on, go ahead and finish sanding the front part of the fuselage. Make the landing gear and axles. On that flat gear, you're going to have to get somebody to

Continued on page 71



Prop hub is made from various bits and pieces, starting with plastic pipe and dowels. Blades are carved from pine or redwood.



Gap fillers on control surfaces are made of tape used in Dymo Label Makers. The colonel describes two techniques in the text.

NAMBA VS IMPBA

By JERRY DUNLAP . . . Are two heads better than one? As far as R/C model boating is concerned, the author doesn't think so.

• There may be those among the readers of this article who really don't know why two organizations exist for governing radio controlled model powerboat racing in this nation. It is for you that this article is written. I would like to think that what I'm about to say is factual and straightforward. Having been actively involved in both model boating organizations, I feel qualified to offer up what is to follow. However, I will state at the beginning of this article that **R/C Model Builder** will provide space to anyone who might wish to rebuke, refute, or rectify any or all of what is about to be written. With that out of the way, let's begin.

In the beginning there was the International Model Power Boat Association, also known as the I.M.P.B.A. This organization was created in 1949 (Happy 30th Birthday), to govern the sport of tether boat racing. Now I rather doubt that very many of you reading this article have ever seen a tether boat. When I first entered this hobby/sport in 1966, there were a few tether boats in my area and they really were something to watch. The faster .60 powered hydroplanes were capable of speeds over 100 mph. The boats would get going so fast that they actually ran in their own roostertails. So it was for this group of hobbyists that the International Model Power Boat Association was created. As radio control equipment gained in popularity in the late 50's and early 60's, the I.M.P.B.A. made allowances for this form of model boating. But model boat racing as we know it today is a far cry from the initial stages of those days.

It was during the middle 60's that this writer joined his first organized model boating group, the Seattle Model Yacht Club, and began finding out about the problems in the existing governing organization, the I.M.P.B.A. I don't think anyone who was actively involved in model boating back in the mid 60's would deny that problems did exist in the I.M.P.B.A. The main problem as I saw it during that time (early to mid 60's) was a lack of aggressive, positive leadership. I know for a fact, since I was a club secretary, that membership was poorly processed, correspondence unaswered, and communication within the organization in a sad state of affairs. I attended my first I.M.P.B.A. Internationals in 1967 at San Francisco. I went to the business meeting looking for answers to my questions concerning the fact that there were so many problems in the organization. I was told the organization needed help. I walked out of the meeting as a director for my region. I began working to improve the International Model Power Boat Association, along with a number of other model boaters who were also very concerned about what was, or may be better said, what wasn't happening in the I.M.P.B.A.

It is the feeling of this writer that an even bigger problem faced by the I.M.P.B.A. during the 50's and 60's was its lack of insurance for its member clubs. Each club, at least we in the Seattle Model Yacht Club, had to find its own insurance coverage. It was through the ability to supply insurance to model boaters that the second national model boating organization got its start. Some of the model boaters in California during the late 50's had previously belonged to or knew of the Western Associated Modelers, Inc., better known as W.A.M. W.A.M.'s primary function has been and continues to be in the area of governing control line model airplane events, especially in the Northern California area. In 1959 a group of model boaters in California contacted Myrtle Coad, backbone of the W.A.M. organization, and asked about forming a model boating organization that could provide them with insurance. And so it was that the West Coast Model Boat Association was formed as a subsidiary association of W.A.M. At that time, most model boaters in California belonged to both the West Coast Model Boat Association and the International Model Power Boat Association. More often than not, their record trials carried joint sanctions from both organizations. However, because of the problems mentioned earlier about the I.M.P.B.A., and because the California model boaters were receiving better service from W.A.M., a movement began in the late 60's to form a new national model boating organization under the auspices of W.A.M. From this movement, the North American Model Boat Association, known as N.A.M.B.A., became a reality in 1971.

By 1971, the I.M.P.B.A. had really straightened out its act, through the leadership of men such as Bill LeFeber and John Bridge. Unfortunately, it was a case of locking the barn doors after the horses had escaped. California became an immediate stronghold for N.A.M.B.A., and the rest of the West Coast followed. However, things went differently in other sections of the nation. While the Midwest remains primarily a stronghold for the I.M.P.B.A., the East Coast, Southeast, and Southwest became real mixed bags as far as model boating organizations were concerned. Some clubs were both I.M.P.B.A. and N.A.M.B.A. affiliated. Many model boaters continue to hold memberships in both organizations. And there have been some rather hard feelings created on both sides during the last nine years. At times it has seemed as though we were fighting a civil war, when what most of us wanted to do was go play with our model boats.

So what's the answer? I'm sure there are many who don't see how the two organizations can ever get together. And I know there are many who do not want the two organizations to come together. But since this is my article, I'm going to tell you how I feel about the situation. And I want you to remember that I've been a director of the North American Model Boat Association from its beginning and I don't even belong to the International Model Power Boat Association.

I don't think the need for two model boating organizations any longer exists. It did exist ten years or twelve years ago. It doesn't any longer. Neither organization is the best and neither is the worst. At this time they are both servicing model boaters equally well. Both are providing identical insurance provisions to their members. It's personalities and pride that still keep us separated. There are members in power positions in both organizations who cannot or will not overlook personalities and the past to see what could be the benefits of a unified model boating organization in the states. We need to stop looking at the situation with a "I'll believe it when I see it" attitude and change to a "I'll see it when I believe it" attitude. To make myself perfectly clear, I think having two model boating organizations doing basically the same thing just plain STINKS!! I am not speaking for anyone

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Flight INSTRUCTOR

Conducted by
DAVE BROWN
8534 Huddleston Dr.
Cincinnati, OH 45236

• To open this column this month I'd like to acknowledge many of the people who have sent in letters which contained questions that I covered in the general section of the column (like the flap question, which I received from many different people), or who simply sent in letters of inspiration. Among those who have sent in such letters are: John Kirk, Towson, Maryland; Charlie "Typewriter" Reed, Raytown, Missouri; Dick Burkhalter, Burbank, California; Pat Jupiter, Seattle, Washington; and Bill Hanson, Bellville, Illinois. Thanks, guys.

This month I have quite a few questions to use, as they built up pretty well a couple of months ago and I'd better use them pretty quick before they become ancient history.

Dear Dave: First of all, I think your column is great, and can't understand the lack of letters. Now, I have a question.

I can see the need for dual rates in Masters and Expert pattern, but would it help on any maneuvers in Advanced and Novice, and is it worth the extra trouble and expense? Frederick Eberle.

Dear Fred: Dual rates in the lower two classes are not a necessity, but they can come in handy for many competitors. I've found that if the rates are set up with high rate being the standard rate for three rolls, normal loops, etc., and low rate used for the straight inverted flight and the precision group of maneuvers, the latter usually are improved, as they are done smoother. Dual rates are also commonly used on competition gliders (I'd better say sailplanes, or someone will be made as H---) and on some Pylon racers to make them insensitive on launch and in flight, but by flipping to high rate they have enough throw for landing. As to whether they are worth the cost, I think there are a lot of poorer investments around.

Dear Dave: How about some tips on the use of rudder during an eight-point roll, a four-point, and a slow roll (the slow roll is about the prettiest maneuver there is, especially the way you do it). I can do a fair slow roll and four-point roll. During the four-point roll I use top rudder on points one and three. I put the top rudder in while I am returning the aileron stick to neutral and take the top rudder out while pushing the aileron stick to right (to roll out of knife edge into inverted, 1 to 2 could be 3 to 4 also). Please comment on this procedure.

The eight-point roll is new to me. I would like your tips before I develop any more bad habits. After reviewing the equipment that was used in the Vegas contest, I wondered why so many used the .90 size glow engine rather than the larger ignition (spark) engines.

Congratulations on your fine finish in the Vegas contest. Keep up the good work and the next time I hope you'll "out hand" Hanno. R.L. Shirey.

Dear Mr. Shirey: Your description of rudder use in the four-point roll sounds fine to me, and a similar procedure can be used for the eight-point roll. Let's say, for instance, you use about 1/2 rudder throw for the four-point, then try using about 1/4 rudder on the 1, 3, 5, and 7th points, and 1/2 rudder on points 2 and 6. The transition from one point to the next should be done as smoothly as possible, and with practice and some small adjustments the maneuver should soon be coming out fine. The slow roll is done in the same way without stopping at the points, and the rudder should be used in a smooth, fluid motion.

I, for one, chose the .90 over a larger ignition engine for a number of reasons. The power-to-weight ratio of the .90 is considerably higher, the .90 would fit better into a smaller airplane, which I felt would fly more similarly to the pattern type airplanes I was used to, and above all, the .90 runs about the same as any other model airplane engine and required almost no learning process to get maximum performance. I don't know what reasons the other competitors had, but I'll bet they were similar. Next year I'll probably use the .90 again, but in a larger airplane and possibly with a prop drive. I was very impressed with Dean Koger's airplane and will probably go in that direction.

Dear Dave: It seems absurd that you received no questions for the January issue of **Model Builder**. *But then I guess January is really August, isn't it? Here are a couple of inquiries that you may or may not want to answer in . . . uh . . . June or July.*

1) Do you build/fly anything other than pattern?

2) Would you outline in some detail how you approach a contest, beginning with the design and building stage? How do you prepare mentally and physically for the terrifying moment of truth? (Or isn't it terrifying?)

3) Incidence and thrust angles must be critical in pattern airplanes. How do you measure these crucial angles? (If your method is too sophisticated for your Instructor column, would you comment on a simple method of measuring thrust and incidence?)

Best regards to you and your wife in 1979. Dean Fuller.

Dear Dean: Would you believe I'll answer your letter in the July issue, which is sent out around the first of June? Yes, I fly some other events, but not very seriously. In the past few years I've flown in contests as diverse as C/L Combat and Indoor Rubber, and I also have been known to fly Pylon, Scale, and Helicopter a few times (I'm lethal with a helicopter, and everyone hides when I fly), but I spend 95% of my time working on the pattern event, as there is this guy in Austria who's been bugging me!

Starting with the design and building stage, I always choose a proven design, as I don't have the time to "de-bug" a new one and prefer to spend the time working *with* a design rather than *on* it. While building, I always take the attitude that the airplane I'm building will be my No. 1 airplane at the Masters or World Championships, and build it accordingly. If a part isn't right, it isn't used. Preparing both mentally and physically is accomplished primarily by flying in as many contests as possible and becoming accustomed to the pressures involved. The moment of truth? It is still terrifying at large contests, and the day it ceases to be will be the day I quit, because this is a good sign of becoming complacent.

I measure incidence on a flat board about 12 inches wide by lining up the fuselage on the centerline and measuring the leading and trailing edge height with a combination square at the edge of the board. The fuselage must be on the centerline of the board to ensure that you are measuring parallel to the fuselage centerline. I usually shim the fuselage (with wing attached) to put the wing at the desired incidence (0° on the Phoenix and plus 1/16 inch on the Curare), and then install the stab parallel to the board. The Robart incidence gauge is handy to check out an existing airplane and is sufficiently accurate.

Dear Dave: I read your column with great interest each month, and I have a question I've wanted to ask for a long time. Maybe you don't remember or have never seen it, but in the April issue of Model Airplane News *was one of the very rare explanations or complete instructions on how to trim out a pattern airplane.*

It was written by the late Jim Kirkland in his A-6 Intruder article, and in the absence of more up-to-date information I have always "attempted" to use it to trim out my ships. Have you read it, and if so, does it still apply? Would you say that any part of it is now obsolete?

Do you continue to "trim" all the time that you are practicing, or do you at some point say "This ship is now trimmed and from here on out it is only a matter of practice"?

I enjoy your column, keep up the good work. Maurice Taylor.

Dear Maurice: The article you mention is probably the best and most complete treatise on the subject of trim ever published, and while a few new tricks have been learned since then, it is still very applicable and if followed will result in an airplane trimmed better than 90% of those in competition today. It would be nice if one of the magazines

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Typical action shot taken at the Torrey Pines gliderport on a typical weekend shows Russell Owens getting towed aloft in a Libelle. Note the sharp drop in the runway.

Owens on a fly-by. High-performance ships are common sight at Torrey.

R/C SOARING

by Dr. LARRY FOGEL

PHOTOS BY AUTHOR

• If you haven't visited the Torrey Pines gliderport, you're missing a real experience. The runway for launching full-scale gliders (on University of California property) ends at the city park. Here at the cliff's edge, hang gliders and radio control model sailplanes are launched some 350 feet over the beach (a state park). On a good day, the air is filled with diverse craft.

Hang gliders come in all shapes and sizes. Most are the Rogallo type (flexible delta wing). Some gliders have fabric-covered ribs and use tip rudders for turning. Still others are biplanes. It's early in that art, so there's lots of room for experimentation. Hang glider aerobatics is prohibited at Torrey Pines, yet you commonly see some very exciting maneuvers. One pilot enjoys taking his dog along for the ride.

The full-scale sailplanes range from the conventional Schweizer 1-26 (single seat, 26th design) to larger ships such as the Blanik. It's not uncommon to see really high performance sailplanes . . . the Cirrus, the Libelle, or the HP-18, the 15-meter span homebuilt recently completed by Don Wemple. This is the 18th design of the HP by Dick Schreder. It weighs 512 pounds empty, 700 ready to fly, with a capacity to carry an additional 200 pounds of water ballast. Red line is 150 mph. The kit cost $5500 and took Don 1500 hours to build (in three and a half years). Compare that to your latest kit cost and building time!

Full-scale takeoff is by means of a tow plane, a diesel-powered winch, or a tow car. Landings are almost always downwind. Transient powered aircraft land here once in a while. Recently a barnstorming biplane came and went, a bit of history recreated in the here and now.

The modelers also put on a good show. We fly when the air is too light for the larger craft . . . and even when it's too heavy for them. Last weekend a 40-knot weather front moved through. A friend from the East Coast was visiting, so

Dickson Pratt, pictured in the May issue working on his creation at a Build-and-Fly contest, makes a close pass for the photographer in an early-model Schweitzer I-26.

The two-place, all-metal Blanik (above), made in Czechoslovakia, is a common sight at gliderports all over the country, not just at Torrey Pines. It's a big ship and sports swept-forward wings. Don Wemple's homebuilt HP-18 (right) is a 15 meter all-out competition machine, took Don 3-1/2 years to put together from a kit.

Well-known hang glider pilot, Burke Ewing, cruises Torrey with his German Shepherd, Curtis, on his back. Burke is flying a Wills Wing SST, one of the new-generation Rogallos.

A Hobie Hawk, towing a streamer, plays tag with a Sundance B fixed wing hang glider. Hope they're not as close as they look.

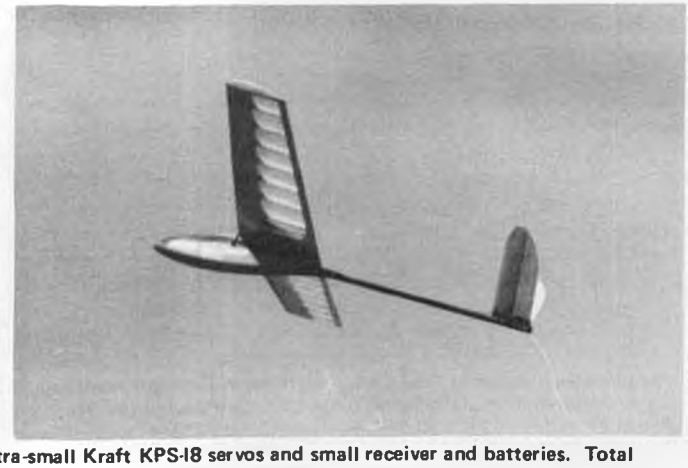
Common sight on an uncrowded day at Torrey. There have been as many as 35 hang gliders in the air at once here, not to mention the models and full-size ships!

I couldn't pass up the opportunity to demonstrate some aerobatics in spite of the gustiness. The Ridge Runner with two and a half pounds of ballast performed as on rails, and landed without incident. It was moving about 70 mph most of the time.

On quieter days you see unusual craft, such as Alan Nelson's 12-ounce swept-forward flying wing. The fuselage is molded of carbon fiber reinforced fiberglass, and the boom is a carbon fiber arrowshaft. The wing is solid balsa, six inches at the root, four inches at the tip, with a flat-bottom conventional airfoil and 3/4-inch elevons. Alan is using the new micro servos offered by Kraft Systems, Inc. Two KPS-18's weigh 1.1 ounce, including the servo mount and the mixer (made from servo arms). The two-channel receiver is less than an inch in length, less than 1-1/2 inches across, and about .6 inches deep. The 225 milliamp 1-1/2 ounce 4-L battery pack offers at least an hour of flying time. For smooth flying, this stretches to almost two hours. You ought to see this one move. It's fast, furious, and fun to fly.

Jay Juniper, who works for Kraft, used a similar four-ounce airborne pack in a V-tailed straight-wing version using the same fuselage. The wing is a conventional single-taper Clark Y, six inches at the root and four inches at the tip. Jay recognizes the value of polyhedral, but says "it's ugly." The 90° V-tail operates through a homebuilt mixer also made of servo arms. Again, the plane weighs in at less than twelve ounces and flies up a storm. It's not quite as fast as the flying wing, but highly maneuverable. Jay also flies a homebuilt full-scale RS-15. He patterned some of his model after the full-scale craft. A towhook under the spar permits hi-start launches. Maybe we ought to have a new class of sailplanes . . . one meter or less.

Judge John Menard designed and built the Westwind I and II. In this case, the II also means two meter. There are some unique features here. The airfoil is similar to some very modern designs. As near as I can tell, it is an Eppler 128 with added Phillips entry. The span is 75-1/2 inches with 10 inches at the root tapering to 7-1/2 at the tip. The overall length



Two shots of Jay Juniper's original design V-tail mini-glider. Uses the ultra-small Kraft KPS-18 servos and small receiver and batteries. Total ready-to-fly weight is less than 12 ounces.

Judge John Menard with his original design Westwind II, intended for two-meter events. Looks like a potent machine.

The Westwind II spans 75-1/2 inches, weighs 40 ounces without ballast. Note the very low fuselage profile.

is 46-1/4 inches. The bird weighs-in at 40 ounces ready to fly, without ballast. The underside opens for access to the radio and the addition of ballast, as required. The elliptical dihedral clearly demonstrates its beauty and value in flight. Incidentally, John has been a judge for 17 years and was deeply involved in jogging until he suffered a knee injury. Now he's joined our sport and is a regular contributor. We appreciate his presence.

Hey, I'm losing track of the story line. If you're in Southern California, you've really got to set aside time for Torrey Pines. But to fly there, you *must* have a current FCC license, be a member of the AMA, and be a member or a guest of the Torrey Pines Gulls Radio Control Soaring Society. This club holds a use permit which establishes that all fliers must be suitably qualified in terms of capability or assistance, understand and obey the flight safety regulations, and have suitable insurance coverage. You can find club members at the cliff almost any time it's flyable. To get to Torrey Pines, take the Genessee exit off Highway 5 just north of La Jolla. Go west through the traffic light at the top of the hill, take the first right, and pass the Salk Institute on your left. You run out of pavement just before the launch point on the cliff edge.

To keep things balanced, let me share some current soaring activities on the other side of this planet. The latest issue of the New Zealand Soaring Society newsletter describes their new national thermal distance record event.

Our columnist's Ridge Runner flying in 40-mph mph winds, with 2-1/2 lbs. of ballast.

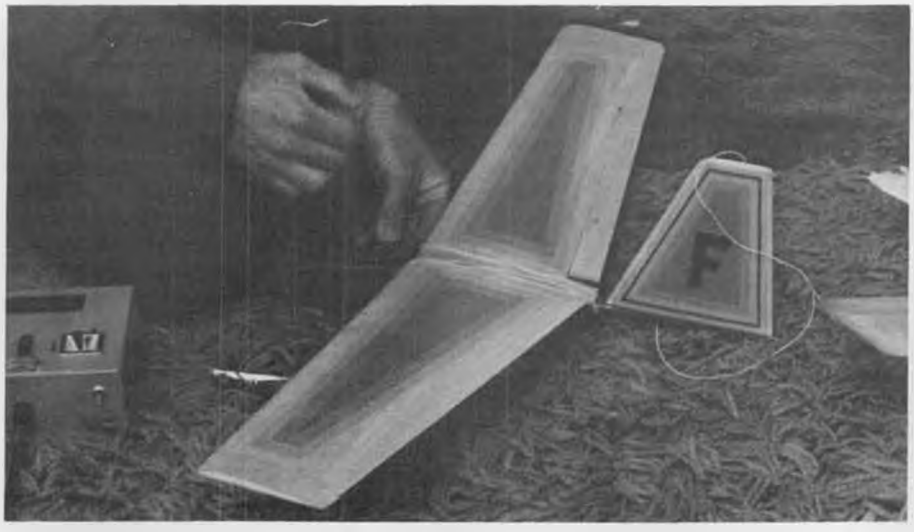
"From the hotbed of thermal records comes the claim for a new distance record set on December 3 by Graham Palmer of the Timaru Club. The existing record was more than tripled and now stands at 9.5 km (5.9 mi.). Graham relates the tale of his record attempt thus:

"Well, the Maestro was in top gear today! Saturday, rain . . . hoped it would clear by Sunday . . . Sunday morning still raining, damn! But the crops sure need it, though. Sunday mid-day, while working on irrigation pipes, I noted that thermals were starting to pop! To hell with the water works! Off to get the Super Bomb, out with the hi-start. First flight of 7 minutes, then one of 23 . . . that's getting better! Have some lunch, then back out to the paddock again. Still looking good . . . even better . . . good thermals all over the sky, not very high, but lift everywhere. Up again for 18 minutes, including a trip over the house to show the 'chief' how well it goes!

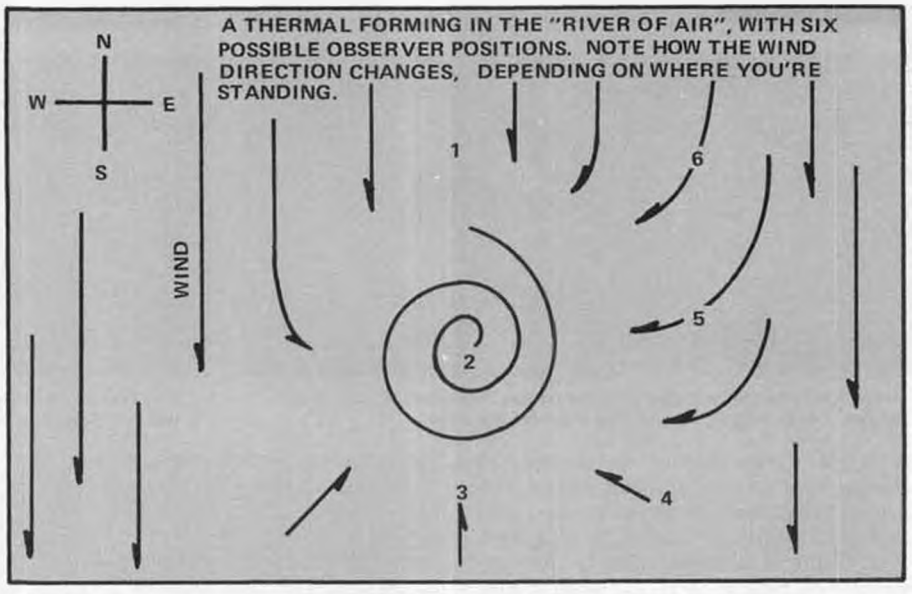
"At this time my right-hand man arrived on the scene. Hey! A cross-country flight could be on! Let's try the long straight road over the river. First flight, up on the hi-start and chase birds straight ahead, birds do a couple of turns and the glider is off, a slow turn downwind while the car pulls up, rip off a couple of loops and down to about 15 feet altitude but the lift is there again, work this as though it was gold while making over to the chase car, climb on to the bonnet and we are away! No really big downs, so we fly along real good, but we're soon down at a distance of 2.5 miles in a paddock alongside the road.

"Retire to the start point once again and back up into the lift, over to the car and away again, really going up well this time but getting a bit off course, but let's

Continued on page 84



Alan Nelson's 12-ounce flying wing is a real performer. Wing is solid balsa, fuselage is glass reinforced with carbon fibers. Can you imagine what the control response must be like? Fast!



A THERMAL FORMING IN THE "RIVER OF AIR", WITH SIX POSSIBLE OBSERVER POSITIONS. NOTE HOW THE WIND DIRECTION CHANGES, DEPENDING ON WHERE YOU'RE STANDING.

RIVER OF AIR

By DAVE THORNBURG . . . Thinking of the air as a huge river makes it easier to predict when and where thermals are likely to be. Try it!

• My favorite thermal story takes place back in the dark ages of soaring, about 1972 or 1973, at one of the LSF Tournaments down in Los Angeles. The site was Mile Square Park: over one hundred contestants, six electric winches side-by-side on an endless tarmac runway. Second day of the contest, weather warm and muggy, with the usual lazy Pacific breeze moving across the runway at the usual skewed angle . . . did anybody ever yet set a winch (or a runway) directly into the wind?

Four ships at 500 feet, riding a wave off to the left of the launch area, S-turning gently back and forth in the light but steady lift. Four pilots praying fervently that their clocks will run out before the lift does. Their prayers are answered (it is Sunday morning) and one by one they slip out of the wave and arc around downwind and slither happily into the landing circles. Up to the winches march the next four pilots, including my hero, Rick Walters, flying a modified White Trash with elliptical dihedral. And he's asked *me* to time for him! O frabjous day!

Naturally, Rick's big bird gets the highest launch of the group (you think maybe I dunno how to pick heroes, hey?). Everybody heads out to the left, looking for that fat wave the last group had. But alas! The wave is no more. Gone with the wind. Four airplanes plunge into the great cavity the wave left behind it . . . plunge in and sink like stones. I growl, I stomp, I pace back and forth boxing my own ears. I want to take all the responsibility for not finding any lift . . . after all, isn't that what spotters are for?

But there just isn't any lift to be found. True, Rick is still high man of the four, but his Trash is coming out of the sky like a cardiac duck, and this is long before anybody thought of pilot-on-pilot scoring. The other pilots land. Rick sinks lower and lower, finally peels off into a wide landing pattern. His big white bird streaks over our heads at thirty feet, still in sink. My stomach feels like a brass doorknob. What rotten luck!

Suddenly Dave Shadel rushes up. "Rick!" he barks, "go right over THERE!" Shadel is pointing out into the deep underbrush to the right of the runway, pointing to a spot maybe a hundred feet beyond Rick's landing pattern. And downwind, to boot! I scowl at Shadel. Who is this guy to tell my hero how to fly? With a flight score already down the tubes, is this character trying to get us to throw away the landing, as well?

But Walters never hesitates: he kicks the big bird up onto a wingtip and flies right down Shadel's pointing finger, right out over that hopeless underbrush. Now he's down to twenty feet, and still flying away from the landing circle! I shake my head sadly. So much for *this* hero, thinks I. Good thing the turkey has such long legs . . . he's gonna need 'em to fetch a plane with, in about another ten seconds.

Suddenly the White Trash gives a funny lurch. Not a big lurch, mind you, but just a small one . . . about the kind of lurch you get when you hiccup in a canoe. But if you're a sailplane pilot, I don't have to describe that lurch to you, because you know it already. It isn't the kind of lurch you can cause by being ham-handed on the controls . . . it's too quick for that, and too subtle, at the same time. It's the long, heavy wing panel that suddenly jumps, twitches just like it had a nerve in it. It's the whole tail-end of the airplane bobbing up a couple of inches in the bat of an eye . . . bobbing up and *staying* up. It's LIFT!

Two circles and the White Trash is holding its own, bouncing and tossing on the turbulent air. Another circle and it begins to rise, standing on one wingtip now, perfectly "cored out" in the very bottom of the thermal's tight vortex. Another circle or two and Rick is out of trouble, spinning smoothly up into the morning haze, letting the plane drift with the lift diagonally across the field.

My hero!

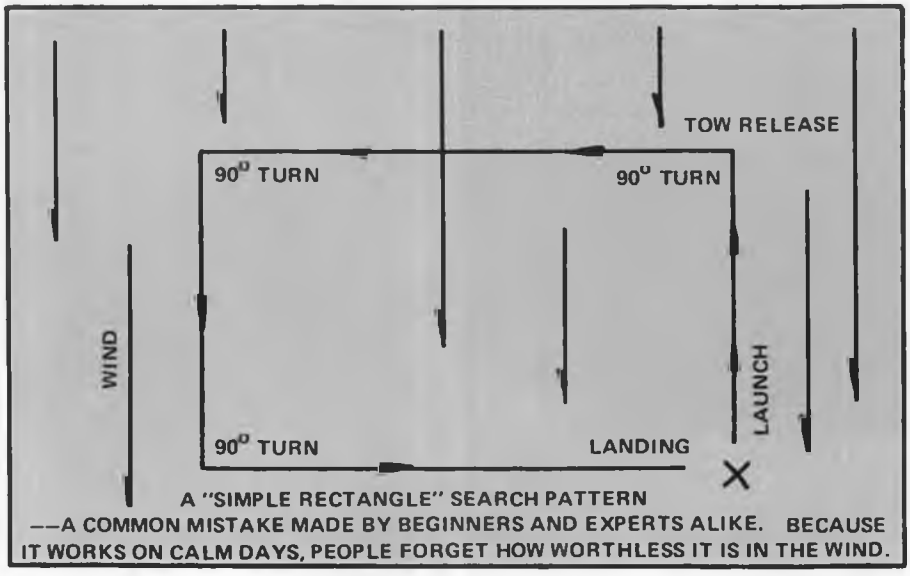
But what about this guy Shadel? What made him suspect that thermal was out there? I thought about it for a minute: Walters couldn't possibly have made it home if Shadel had been wrong. Shadel was really hanging it out, gambling with somebody else's landing points like that. Or was he? When Shadel came running up, he didn't look like any gambler. He looked like he knew exactly what was coming down . . . and what wasn't. "Rick!" he said, "go right over THERE!" I puzzled over this awhile, and finally came to the conclusion that *Dave Shadel could see thermals.*

Suddenly I had two heroes.

* * *

Well, all that happened long, long ago, in a galaxy far, far away. I've had

Continued on page 84



A "SIMPLE RECTANGLE" SEARCH PATTERN
—A COMMON MISTAKE MADE BY BEGINNERS AND EXPERTS ALIKE. BECAUSE IT WORKS ON CALM DAYS, PEOPLE FORGET HOW WORTHLESS IT IS IN THE WIND.

The beautiful DeHavilland DH-88 Comet is really an ambitious project (ask Col. Bob Thacker!). The one pictured above, built by our columnist, spans 88 inches, weighs 13-1/2 lbs., and flies with two HP .40's. A very impressive performer, when Bob can get it off the ground.

1 TO 1 SCALE

By BOB UNDERWOOD PHOTOS BY AUTHOR

THE MEASURE OF MEASUREMENT

"The contestant will provide a scale ruler for the judges. The ruler, when placed on the three-view, will read the dimensions of the model in inches." AMA rules (p. 57 AMA rulebook).

"The competitor must supply a scale ruler which allows the direct comparison of his drawing with the model. The scale ruler can also be supplied in two separate rulers." FAI rules (p. 84 AMA rulebook).

In precision scale events it is necessary to provide a means of directly comparing your three-view presentation to the model. The method for doing this in both cases of precision scale events is to provide a ruler or rulers which can be used by the judges to physically measure the model.

Before we delve into this subject, it must be made clear that this writer is something less than an expert in the ratios and calculations necessary to produce documentation for a precision scale model. When the math gets beyond the fifth grade level (which I teach), I tend to sweat a lot.

Let's assume that you went ahead and spent those few extra hours to produce a full-scale model, and head for the competition scene.

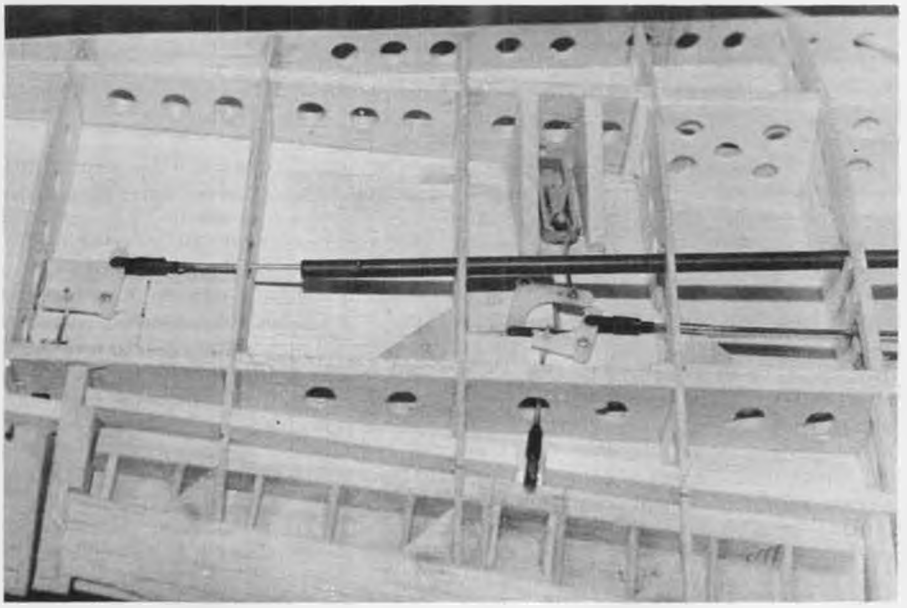
You will note differences in the two forms of precision scale as far as the presentation is concerned. This is true of the scale ruler as well.

In the case of the AMA presentation, a single ruler or scale is used. The ruler is placed on the three-view and must read the dimensions of the *model* in inches. Due to this type of measurement, you will find that you have two options in determining the ruler. If you are lucky, you will find that your model is some *exact* multiple of the three-view. For instance, if your model is four times as large as the three-view, you may purchase a triangular-shaped architect's scale and simply use the side labeled 1/4" = 1", and you will have a measurement instrument. Of course, this type of scale ruler will work with ratios other than 4 to 1, since a number of ratios are represented on the ruler.

Should you find, as is commonly the case, that your ratio between the three-view and model is unusual, you have, again, two choices. You can have the three-view photographically increased or decreased in size to match a standard measurement system. The other option is to reproduce a ruler matching the ratio. On page 57 of your AMA rulebook, you will find a method of doing this. One disadvantage of this method is the fact that you will of necessity be working with small increments that may be difficult to reproduce. One solution might be to draw it in a much increased size and have it photographically reduced.

The FAI ruler, or rulers, uses a different approach to the task. In FAI, the three-view is measured with a *standard* metric scale. Many very accurate metal scales are available, even divided into half millimeters. The ruler which is used to measure the model bears no direct relationship to either the model dimensions or the full-scale aircraft. The ruler for the model is simply the standard metric measure *expanded* by the ratio between the three-view and the model. For instance, if the model is five times larger than the three-view, then a centimeter is *expanded* five times to measure the model. If the item measured on the

Continued on page 89



Sometimes things get a little crowded. This is the interior of the author's Petlyakou PE-2 wing. Pushrods operate the ailerons, outboard split flaps, and dive brakes. Whew!

One of the models that were demonstrated at this year's MB/Astro Flight Electric Championships (see the report in Mitch Poling's Electric column) was Charlie Gilbert's Astro 15 powered R/C helicopter, being flown here by Larry Jolly. Seemed to handle well in spite of high winds.

CHOPPER CHATTER

By JOHN TUCKER

PHOTO BY BOB BOUCHER

• First off, it's good to be back in the world of R/C Helicopters. Actually, I never really left it, but between my regular job and teaching college 3 nights per week, it kinda overtaxed my free time to where I just couldn't continue to write this column every month. Without reader inputs, it's difficult to believe anyone reads the column, and it's also very hard to invent new topics of discussion each month . . . you'd better believe it's easy to run out of steam occasionally! I guess one of the main things that contributed to the return of the column was a chance remark by a reader, "Without Chopper Chatter, I wouldn't know what Charlie Gilbert was doing these days!" Ha! Well, we can't keep 'em in the dark, can we? So, here goes with the latest info I could scrape up!

NEWSLETTER

Be sure to make a special point of securing your own copy of the latest "Kavan News," which is due to be released in the next few days. It contains a wealth of information concerning new products, modifications to both the Bell Jet Ranger and the Alouette 2 helicopters, information on aerobatics, R/C engine performance, and contest maneuvers for the advanced R/C helicopter pilot. Since many of you rely upon the magazine articles for your data, I'll try to pick out the important points and review the details in this and the next issue of **R/C MB** magazine.

HORSEPOWER CURVES

Back in mid-'78, Kavan decided to test all of the .40 cu. in. and .60 cu. in. engines most popularly used in R/C model helicopters, for two reasons: First, to determine the horsepower output and the rpm at which maximum hp occurred, and secondly, to see just what effect his series 107 carburetors would have on each engine's performance. Kavan aluminum brake horsepower props and regular FAI fuel were used for the tests (at a temperature of 70 degrees). The results were then charted so that the modeler could determine which engine was best suited for his needs.

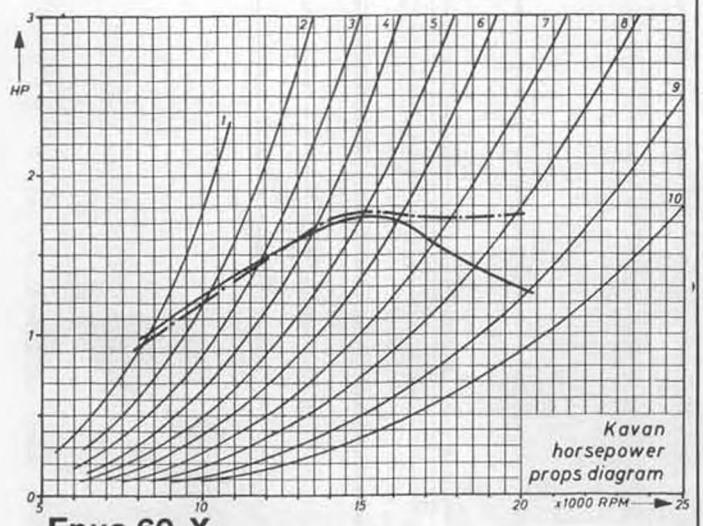
By way of explanation, each chart indicates horsepower vertically along the left edge of the chart, and rpm x 1000 horizontally along the bottom edge. The long sweeping curves, numbered one through ten, represent a constant for each of the ten calibrated test props and are used to plot the performance curves, which are predominantly horizontal and located in the center of the chart itself. The heavy solid curve shows performance of the engine with the original carb as installed at the factory. The broken line indicates the performance with the appropriate 107 Kavan carb installed.

Close examination of these curves reveals much information to the modeler, for example: The Enya .60X engine develops 1.74 hp at 15,500 rpm (with stock carb), then rapidly loses hp with a further increase in rpm. By installing a Kavan carb, the hp is boosted to 1.76 at 15,000 rpm and remains fairly constant at 1.72 hp up to 20,000 rpm. The Enya .60X chart shows that the hp peak occurs over a narrow range of rpm's, as compared to another engine, say the Webra Speed .61, which has a rather flat curve of 1.5 hp over a range of 14,000 to 17,000 rpm. Notice also that the Kavan carb increased the Webra speed .61's hp from 1.5 to 1.73 (a considerable gain), whereas it did very little for the Enya .60X engine except to flatten out and hold the hp more constant at the higher rpm's!

Generally speaking, the Kavan carb equals or betters the performance of the standard carbs, with the exceptions being the HB P.D.P. and HP .61 engines. The HB engines use Perry Directional Porting and the carbs are carefully matched with each engine for best performance. As a final note, take a look at the tuned-pipe performance on the Super Tigre .60X! Here you can see a horsepower jump from 1.4 up to 1.8 hp . . . almost a one-half hp increase with the tuned pipe, but also note the lack of rpm range at 16,500! Not much room to play with on this one. I'm sure you've noticed some of the newer "hot dog" choppers are sporting tuned pipes these days . . . perhaps they've looked at the curves and decided the extra hp is worth the extra weight and effort! After all, that tuned pipe on the SuperTigre produced more hp between 13,000 and 19,000 rpm than before!

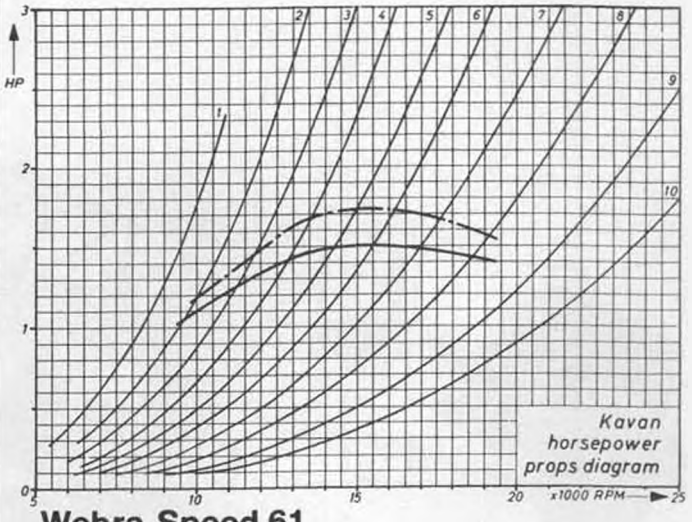
FINAL APPROACH

OK, guys . . . that's it for now. Gotta get my beauty sleep. Don't forget my admonishment in the first paragraph of this column, and get in your ideas, photos, hints, and any other information you might want to pass on the rest of the group. It seems like the industry has not yet shifted into high gear and come out with much in the way of new kits this spring . . . on the other hand, the modelers themselves have really made strides in their performances and abilities to demonstrate maneuvers never before thought possible! So get the lead out (literally), get moving on your favorite heli-project, and we'll BCNU next issue.•



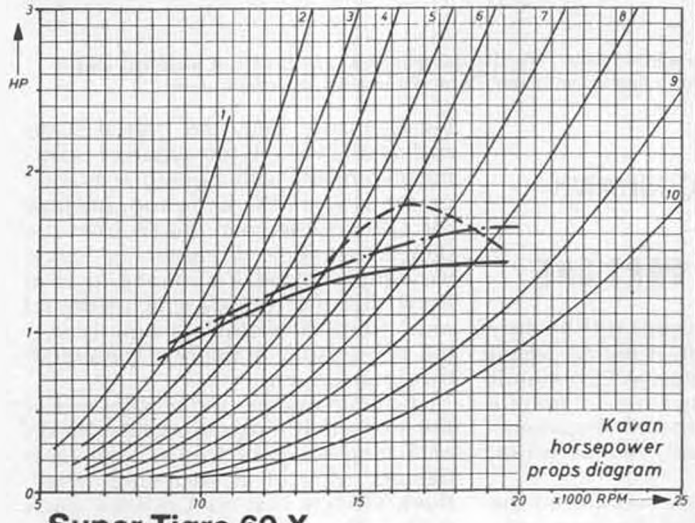
Enya 60 X

—— Orig. Carburetor
—·— Kavan Carburetor No 107



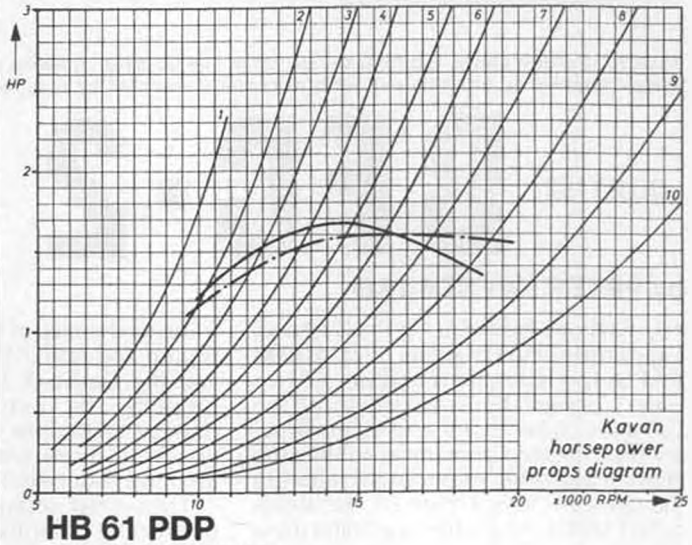
Webra Speed 61

—— Orig. Carburetor
—·— Kavan Carburetor No 107



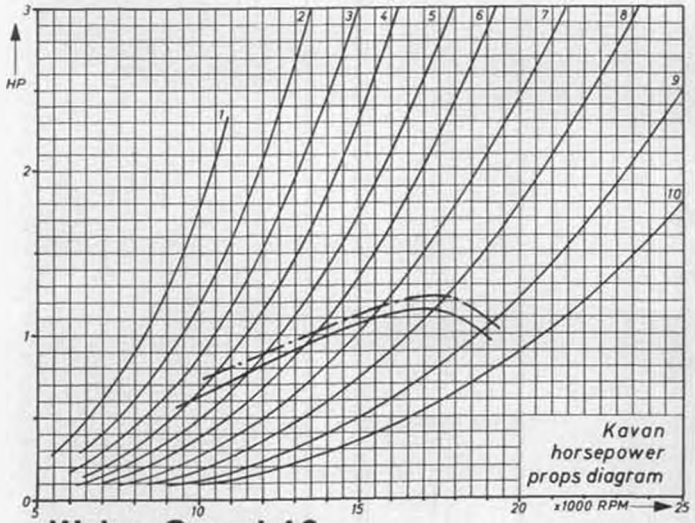
Super Tigre 60 X

—— Orig. Carburetor
—·— Kavan Carburetor No 107
– – – Tuned Pipe



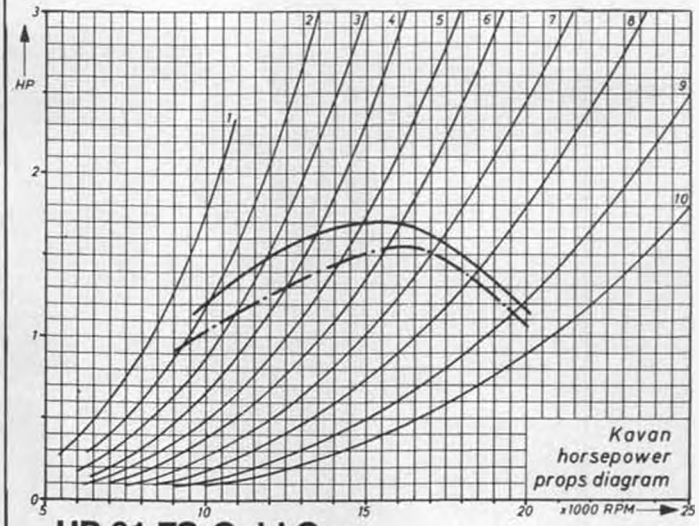
HB 61 PDP

—— Orig. Carburetor
—·— Kavan Carburetor No 107



Webra Speed 40

—— Orig. Carburetor
—·— Kavan Carburetor No 107



HP 61 FS-Gold Cup

—— Orig. Carburetor
—·— Kavan Carburetor No 107

The BFC-2 shown above, 6-B-16, is the subject of the Goshawk drawings presented here. The tail was true blue, and the flight markings lemon yellow. Chevron on top wing was not ornamental, it was used by wing men to line up on leader. Photo from USN via John Burnett.

CURTISS BFC-2 GOSHAWK

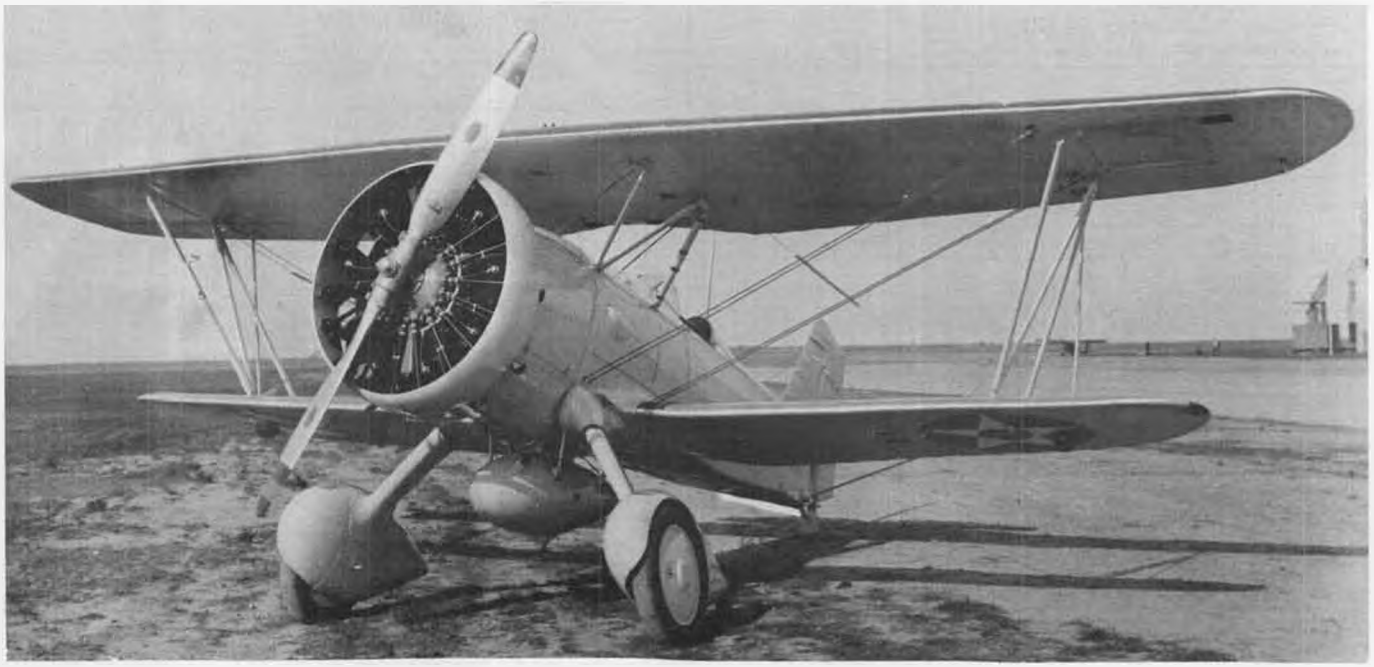
PART ONE

by PETER WESTBURG

• In Krakow, Poland, a Curtiss Goshawk awaits restoration. It is one of 251 Hawks sold to foreign nations and one of two Hawks bought by Ernst Udet for the Luftwaffe. When bombers began reducing the cities of Germany to rubble, the Hawk II and other museum aircraft were moved east into a part of the Reich called Silesia. And when Joe Stalin drew a line on the map of Europe with his dirty thumb and said, "This is mine," Silesia and the Goshawk became Communist property. The Goshawk wound up in a museum in Krakow where it sits patiently on its three wheels, minus wings, awaiting restoration.

Ernst Udet instantly recognized the destructive potential of the divebombing Goshawk. Only the United States had developed the technique of pointing an airplane with a bomb at a target on the ground. We know too well how the Luftwaffe learned the art from the destruction their divebombing Stukas wrought in Poland. It is a strange twist of irony that the country which suffered most from divebombing, now houses the only existing example of the aircraft that pioneered it.

The Goshawk was and remains one of the most interesting and popular Hawks of a long series of Curtiss single-seat fighters. Most of us, including myself, think/thought that the Goshawk was a P-6E with a round engine. Not so.



The first of many changes. This F11C-2 has high-pressure tires, teardrop auxiliary fuel tank, and the pivot point for the bomb cradle has been moved forward. Note that the Navy censor has deleted the arresting gear hook. Photo courtesy of Smithsonian NASM.

WEIGHTS:

NORMAL WEIGHT	4132 LBS.
WITH 474 LB. BOMB INSTALLED	4649
USEFUL LOAD	1095
WEIGHT EMPTY	3037 LBS.

AREAS:

UPPER WING	156-75 SQ. FT.
LOWER WING	94-0
TOTAL WING	250-75
EACH AIL.	10-2
TOTAL AIL.	20-4
FIN	5-0
RUDDER	8-7
TOTAL VERT.	13-7
HORIZ. STAB.	18-1
ELEV.	12-0
TOTAL HORIZONTAL	30-1 SQ. FT.

*** PERFORMANCE:**

MAX. SPEED	202 MPH.
STALL SPEED	64-5 MPH.
MAX. RATE OF CLIMB	1550 FPM.
CLIMB IN 10 MIN. FROM S.L.	15,000 FT.
TIME TO CLIMB TO CRITICAL ALT. (8000 FT.)	~4-2 MIN.
SERVICE CEILING	25,100 FT.

* FROM U.S. NAVY REPT. (NASA-133) DATED FEB. 13, 1933.

10 IN. RADIO MASTS
0° DIHEDRAL
CAMERA MTS.
HOIST FITTGS.
SPAN ~ 31 FT., 6 IN.
PITOT TUBES
1½° DIHEDRAL MEASURED ALONG TOP OF WING
HANDHOLD
SPAN ~ 26 FT.
AIL. CRANK FAIRING
STREAMLINE WIRES
LANDING WIRES ~ 5/16 X 24
FRONT LIFT WIRES ~ 3/8 X 24
REAR LIFT WIRES ~ 7/16 X 20
ROLL WIRES ~ 7/16 X 20
HAMILTON STD. ADJUSTABLE BLADE PROP. ~ 9 FT., 10 IN. DIA.
BLUE
YELLOW
RED
52 GAL. AUX. FUEL TANK
LANDING GEAR IN FLIGHT POSITION
TIEDOWN RING
TREAD ~ 7 FT., 6-25 IN.

FRONT VIEW

OVERALL LENGTH ~ 22 FT., 6.5 IN.

RUD. H. L. 180.5
STA. 0
TRUE BLUE TAIL SURFACES WHITE LETTERS & NUMERALS
SLOT FOR ELEC. CABLE
RADIO ACCESS
CLEAR NAV. LIGHT
INSP. ACCESS
TELESCOPE GUNSIGHT
HANDGRIP
C-4 GUNSIGHT
FLAT BLACK
HEIGHT ~ 10 FT., 5.5 IN.
BFC-2 9338
RUDDER TRIM TAB
U.S. NAVY 6-B-16
1.25
℄ THRUST
2.5 X 6 TAILWHEEL
LIFT BAR CROSSTUBE
BLACK
LEMON YELLOW BAND .50 IN. BLACK BORDER
20-0
OUTLET FOR VERY PISTOL FLARES
RELIEF TUBE
STARTER CRANKSHAFT
STEP
LEMON YELLOW ANTI-DRAG RING
177.50
153.25
128.00
104.00
80.00
48.00
24.00
STA. -37.625
52 GAL. ALUM. DROPPABLE AUX. FUEL TANK
SHELL EJECTION CHUTE
17°
32 X 6 WHEELS & TIRES
STA. 0

THE XF11C-2 PROTOTYPE FLEW IN JUNE, 1932; 27 F11C-2s, (S/N 9265-68; 9270-82; 9331-40) WERE DELIVERED BY MAY 27, 1933. MARCH, 1934, ALL WERE REDESIGNATED BFC-2 WITH MANY DETAIL CHANGES INCORPORATED. AT LEAST FIVE DIFFERENT AFT FUSELAGE DECKS WERE EXPERIMENTED WITH, FROM THE ORIGINAL P-6E TYPE TO A HIGH DECK WITH A SLIDING HALF-CANOPY.
ONLY PHOTOGRAPHIC RECORDS WERE AVAILABLE OF THE MANY CHANGES MADE; THE CONFIGURATION SHOWN IS BELIEVED TO REPRESENT THE FINAL VERSION OF THE BFC-2 GOSHAWK.

STREAMLINED WING STRUT SIZES:
FWD. & CTR. 'N' ~ 1.00 X 2.360
AFT 'N' ~ .786 X 1.854
AILERON OPERATING ~ .714 X 1.685
ALL CABANE ~ .857 X 2.023

RIGHT SIDE
OF BFC-2 S/N 9338 WHEN ASSIGNED TO CARRIER ENTERPRISE. AIRCRAFT No. 16 WAS LEADER OF 6th SECTION OF VB-6.

DATA SOURCES:- XF11C-2 PROTOTYPE ENG'G DRAWINGS FROM FEDERAL RECORDS CTR., MECHANICSBURG, PA.; PHOTOS & DATA FROM NAT'L AIR & SPACE MUSEUM & NAT'L ARCHIVES VIA CAPT. WALT STAMPFLI, USAF; PHOTOS FROM WARREN SHIPP, FRED DICKEY, JR.; PROFILE No. 116.

DRAWING SIZE ~ 28.4 X 41.0

SCALE BAR ~ 1.2 IN. = 1.0 FT.

SCALE:- 1/10 SIZE

PETER WESTBURG APRIL, 1979

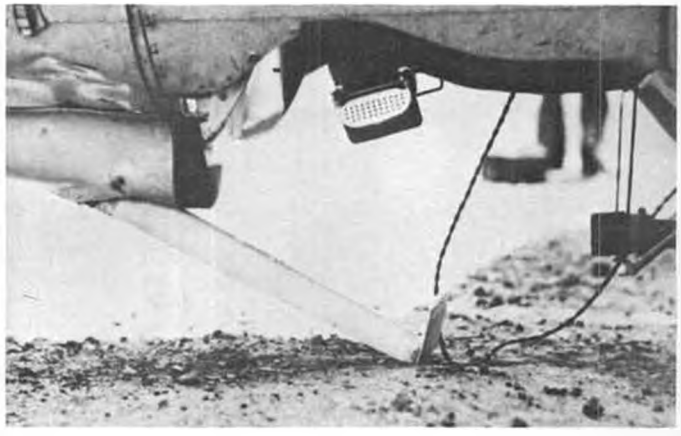
CURTISS BFC-2

High Hat squadron was first VF-1, then VB-2, and finally VB-3. This one, 2-B-18, was the 3rd airplane in the 6th flight. Top half of anti-drag ring was lemon yellow, tail was insignia red. Smithsonian NASM photo.

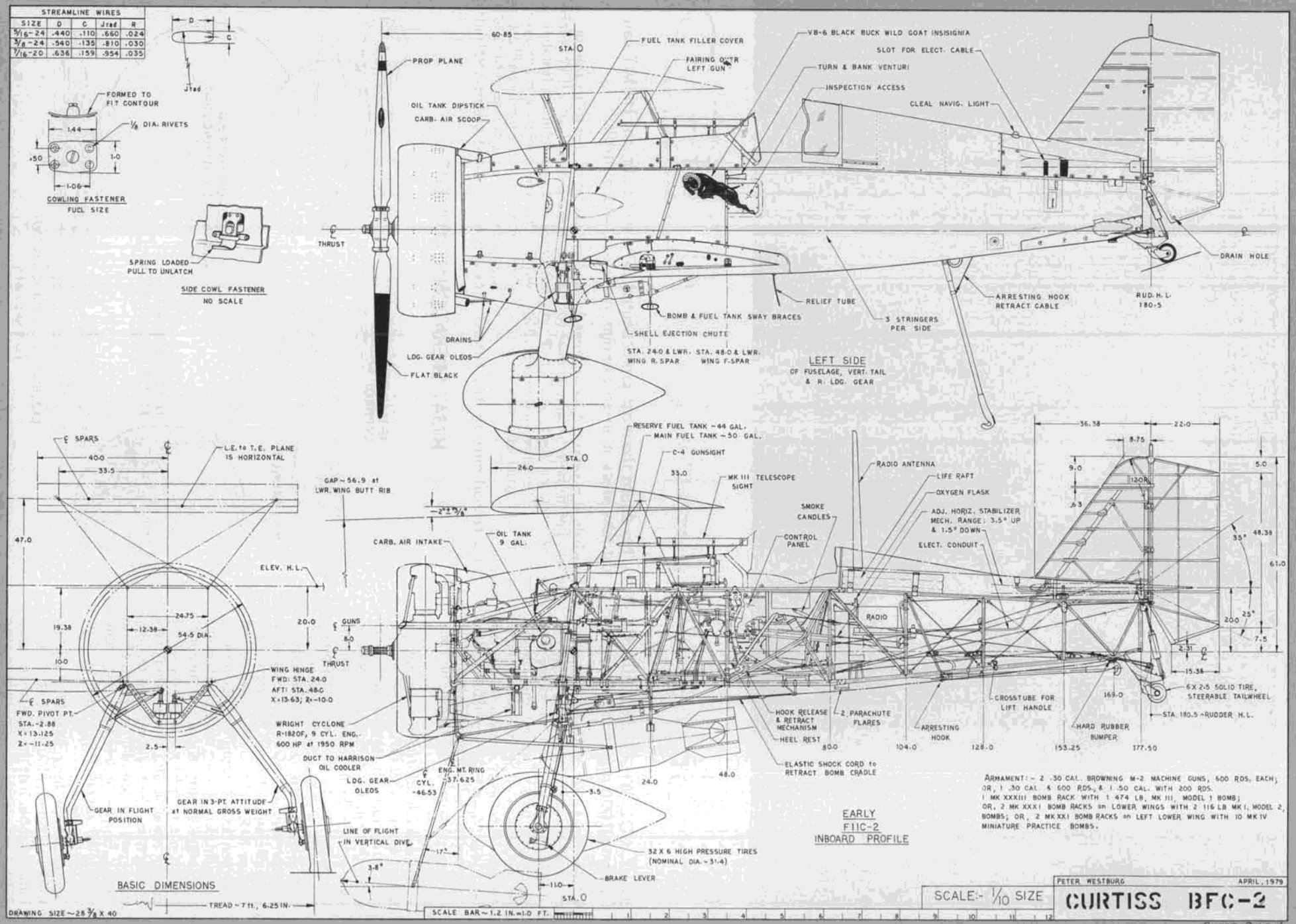
Beginning the confusion, there were two Goshawk prototypes, the XF11C-1 and -2; the first had a 600-hp twin-row experimental Wright radial that didn't pan out, aluminum YP-23 ailerons, aluminum covered tail surfaces, and a P-6E landing gear with 32 x 6 high pressure tires. The -2 was powered by a 600-hp single-row Wright Cyclone, YP-23 ailerons originally, fabric covered tail surfaces, and a P-6E landing gear with low pressure tires. The XF11C-2 flew six months before the -1 and was the true progenitor of the single-seat dive-bomber fighter, though the -1 was the first to be fitted with a pivoting bomb rack for a 474-lb. bomb.

(Editor's Note: Perhaps one of our foreign readers can bring us up to date on the Goshawk in Krakow.) ●

First of 27 production F11C-2s had a basic P-6E fuselage and tail, and the chord of the anti-drag ring has been increased from 12 to 18 inches. Smithsonian NASM photo.



Landing on the Hampton Roads carrier landing platform: " . . . the left tire (of the XF11C-2) blew out; the left wing struck the deck and the plane nosed over and skidded on its back for a distance of about 20 feet." Photo from the Nat'l Archives.


STREAMLINE WIRES
SIZE | D | C | Jrad | R
5/16-24 | .440 | .110 | .660 | .024
3/8-24 | .540 | .135 | .810 | .030
7/16-20 | .636 | .159 | .954 | .035
FORMED TO FIT CONTOUR
1/8 DIA. RIVETS
COWLING FASTENER
FUEL SIZE
SPRING LOADED PULL TO UNLATCH
SIDE COWL FASTENER
NO SCALE
PROP PLANE
FUEL TANK FILLER COVER
FAIRING OVER LEFT GUN
VB-6 BLACK BUCK WILD GOAT INSIGNIA
SLOT FOR ELECT. CABLE
TURN & BANK VENTURI
INSPECTION ACCESS
CLEAL NAVIG. LIGHT
OIL TANK DIPSTICK
CARB. AIR SCOOP
DRAIN HOLE
RELIEF TUBE
ARRESTING HOOK RETRACT CABLE
RUD. H. L. 180-5
BOMB & FUEL TANK SWAY BRACES
3 STRINGERS PER SIDE
SHELL EJECTION CHUTE
DRAINS
LDG. GEAR OLEOS
FLAT BLACK
STA. 24.0 & LWR. WING R. SPAR
STA. 48.0 & LWR. WING F. SPAR
LEFT SIDE
OF FUSELAGE, VERT. TAIL & R. LDG. GEAR
RESERVE FUEL TANK ~44 GAL.
MAIN FUEL TANK ~50 GAL.
C-4 GUNSIGHT
MK III TELESCOPE SIGHT
RADIO ANTENNA
LIFE RAFT
OXYGEN FLASK
ADJ. HORIZ. STABILIZER MECH. RANGE: 3.5° UP & 1.5° DOWN
SMOKE CANDLES
CONTROL PANEL
ELECT. CONDUIT
GAP ~ 56.9 at LWR. WING BUTT RIB
CARB. AIR INTAKE
OIL TANK 9 GAL.
ELEV. H. L.
RADIO
WING HINGE FWD: STA. 24.0 AFT: STA. 48.0 X=13.63; Z=-10.0
WRIGHT CYCLONE R-1820F, 9 CYL. ENG., 600 HP at 1950 RPM
DUCT TO HARRISON OIL COOLER
ENG. MT. RING
CYL. -46.53
LDG. GEAR OLEOS
HOOK RELEASE & RETRACT MECHANISM
2 PARACHUTE FLARES
ARRESTING HOOK
CROSSTUBE FOR LIFT HANDLE
HARD RUBBER BUMPER
6 X 2.5 SOLID TIRE, STEERABLE TAILWHEEL
STA. 180.5 ~RUDDER H.L.
HEEL REST
ELASTIC SHOCK CORD to RETRACT BOMB CRADLE
32 X 6 HIGH PRESSURE TIRES (NOMINAL DIA. ~ 31.4)
BRAKE LEVER
LINE OF FLIGHT IN VERTICAL DIVE
GEAR IN FLIGHT POSITION
GEAR IN 3-PT. ATTITUDE at NORMAL GROSS WEIGHT
FWD. PIVOT PT. STA. -2.88 X=13.125 Z=-11.25
BASIC DIMENSIONS
TREAD ~ 7 ft., 6.25 IN.
EARLY F11C-2 INBOARD PROFILE
ARMAMENT: ~ 2 .30 CAL. BROWNING M-2 MACHINE GUNS, 600 RDS. EACH; OR, 1 .30 CAL. & 600 RDS., & 1 .50 CAL. WITH 200 RDS. 1 MK XXXIII BOMB RACK WITH 1 474 LB. MK III, MODEL 1 BOMB; OR, 2 MK XXX1 BOMB RACKS on LOWER WINGS WITH 2 116 LB MK I, MODEL 2, BOMBS; OR, 2 MK XX1 BOMB RACKS on LEFT LOWER WING WITH 10 MK IV MINIATURE PRACTICE BOMBS.
DRAWING SIZE ~ 28 3/8 X 40
SCALE BAR ~ 1.2 IN. = 1.0 FT.
SCALE:- 1/10 SIZE
PETER WESTBURG
APRIL, 1979
CURTISS BFC-2
SHEET 2 OF 4

Supersonic R/C MODEL

By LT. COL. WILLIAM D. SIURU, JR. . . . No doubt the most sophisticated RPV ever built, the HiMAT can fly up to 1000 mph and will be used to test new ideas in aircraft design, materials, and controls.

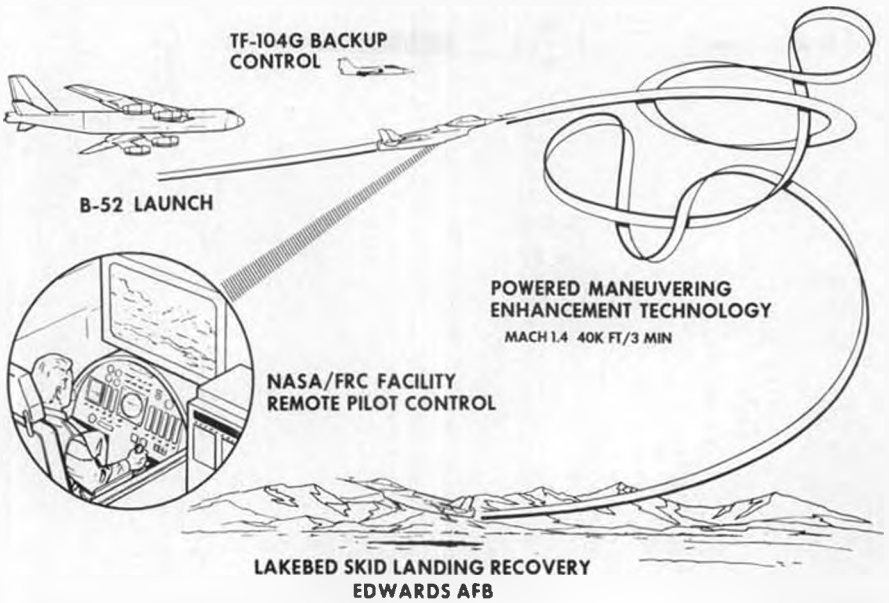
• NASA and the USAF have a radio controlled model that can fly at speeds of 1000 miles an hour or more! This supersonic bird is called the HiMAT aircraft, short for Highly Maneuverable Aircraft Technology. Looking like a craft out of *Star Wars*, HiMAT will be used by engineers to test out new ideas that can be used on combat fighters in the 1980s and 1990s.

While much information can be obtained from computers and wind tunnels, an aircraft must be actually flown to prove that a new concept will truly work. One of the most expensive items in the development of a new aircraft is building a plane that is safe enough for a test pilot to fly, or in aerospace terminology, to "man-rate" the plane. In the past few years, Remotely Piloted Research Vehicles, or RPRVs, have been used to test new concepts without having to make huge investments for man-rated prototypes. RPRVs also allow the time between idea and flight testing to be greatly reduced and some rather risky concepts can be evaluated without endangering the life of a test pilot. These RPRVs borrow much from the radio controlled aircraft techniques used by the R/C hobbyist.

The 22-foot long HiMAT, built by Rockwell International of B-1 bomber fame, is about half the size of an actual fighter and weighs something over a ton and a half. It is powered by a General Electric J-85 turbojet engine similar to the one used on the USAF's T-38 jet trainer. This engine produces 5000 pounds of thrust and has an afterburner.

For a typical mission, the HiMAT aircraft will be carried to an altitude of about 45,000 feet beneath a B-52 bomber. Once released from the bomber, it will be flown in high-g maneuvers similar to those future fighters will use in dogfights. For example, the HiMAT will be able to maintain 8-g turns at 600 miles

HiMAT OPERATIONAL CONCEPT



per hour and 6-g turns at 800 miles per hour at 30,000 ft. altitude. The flight tests can last up to an hour. Once the mission is over, the HiMAT will use skid type landing gear to land on the dry lakebed at Edwards Air Force Base, California.

Throughout the flight, the HiMAT will be flown by a NASA test pilot located in a "cockpit" on the ground. The pilot will have all the normal controls . . . throttle, stick, rudder pedals, instruments, etc. . . . to fly the HiMAT, plus a TV screen. On the screen he will see the same view of the flight as if he were in the cockpit of the actual HiMAT.

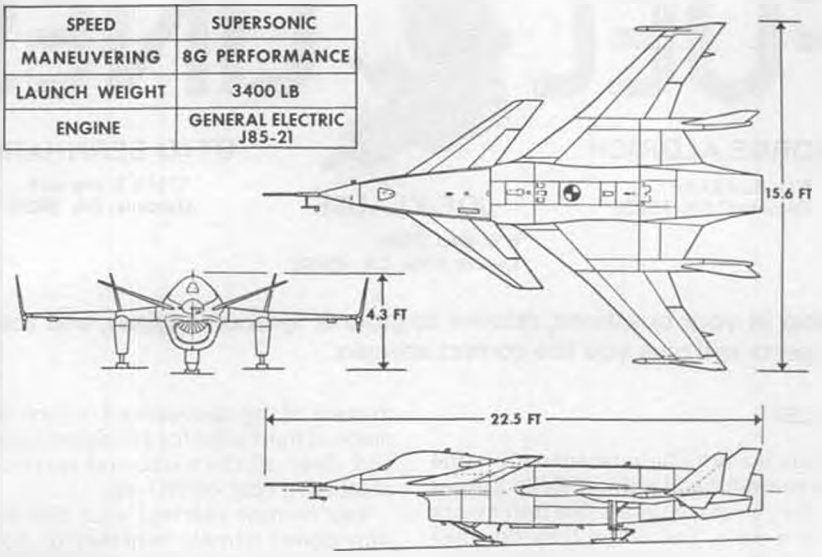
Sensors and a TV camera aboard the fast-flying RPRV provide "real time" information, which is transmitted to computers on the ground. The computers in turn rapidly convert the data to information that can be displayed on the instruments and dials in front of the pilot. In response to the information, the pilot's control commands are instantaneously sent back to the HiMAT by way of the computer. Real time relay and display of the information is vital, for remember that the HiMAT will be flying at up to 1000 miles per hour and even a second of delay could spell disaster. As backup for the ground-based test pilot, the RPRV can be flown from a F-104 chase plane.

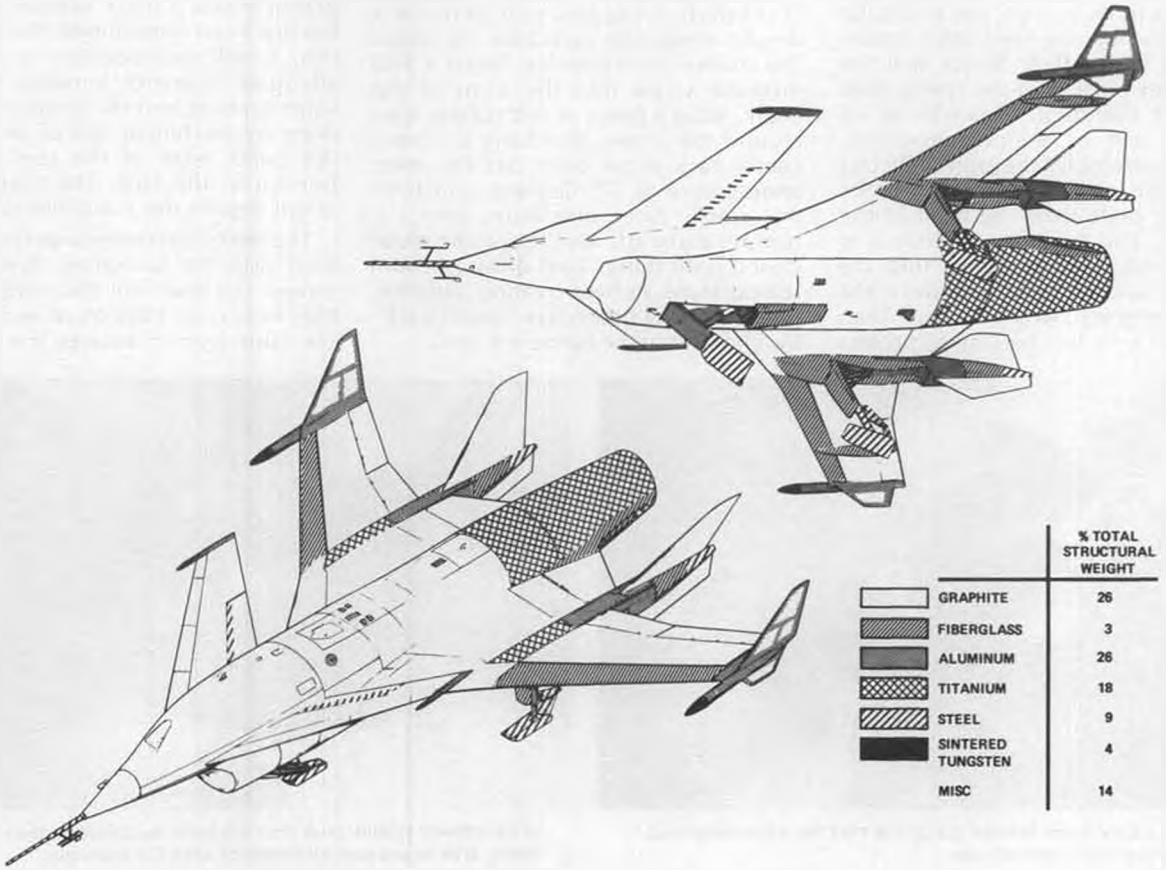
The HiMAT will be used to test new concepts in aerodynamic design, advanced materials, flight controls, and other aircraft components, many of which might be rather risky to try out in a manned airplane. The aircraft is built in modular fashion so that modifications can be easily made. Control elements such as ailerons, elevons, elevators, and flaps can be easily changed. "Fly-by-wire" controls are used, replacing pushrods, cables, and pulleys, thus saving considerable weight. In a fly-by-wire system, small hydraulic pistons move control surfaces in response to commands sent to them over wires from a central control station aboard the aircraft.

For the first time, canards, the wings near the front of the plane, will be used to improve maneuverability at both subsonic and supersonic speeds. In the past, canards have been used to improve takeoff and landing performance and for trim control. About thirty percent of the HiMAT is made out of composite materials such as graphite and fiberglass, materials of the future for aircraft. This is probably the most extensive use of composites in an aircraft to date. Eventually, normal landing gear may be fitted in place of skids so that the craft can take off from a runway at the start of a mission.

The HiMAT is just one of a new breed of test aircraft without pilots. They are being used to test everything from new concepts for airliners that can fly at supersonic speeds without creating a sonic boom on the ground to some very way-out ideas for vertical takeoff and landing craft. •

SPEED	SUPERSONIC
MANEUVERING	8G PERFORMANCE
LAUNCH WEIGHT	3400 LB
ENGINE	GENERAL ELECTRIC J85-21





FUEL LINES

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Send in your questions, relative to glow or ignition engines, and these experts will give you the correct answers.

KLAUSE

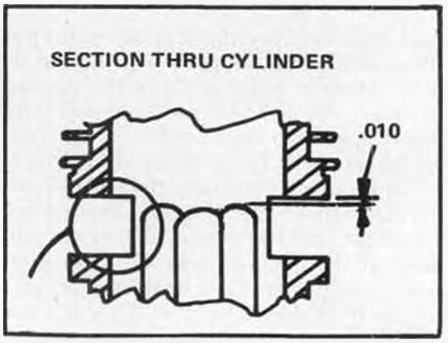
• There's a popular misconception that goes something like this: "Reed valves? Oh, they're the engines that don't work worth a darn, and when they do, they run the wrong direction." This unfortunate notion is probably the result of frustrations that quite naturally develop when aspiring youngsters and naive parents believe the typical, somewhat exaggerated marketing propaganda about plastic ready-to-fly planes. Simply stated, they are led to expect instant success, they are frequently disappointed, and many of them are turned off. Be that as it may, the actual fact is that a reed valve can be a very high performance engine. On several occasions, to prove a point, I've purposely flown a reed valve engine against T.D.'s . . . and placed every time.

OK, what can be done to maximize reed valve performance? Assuming you have a new Cox Golden Bee or Black Widow engine, begin by carefully disassembling it. As you do, pay particular attention to how the reed valve retaining spring is installed. Notice that the cross-center portion of the spring does not touch the reed. This will be an important part of engine reassembly. During disassembly, the only difficulty you might encounter is in removal of the prop drive plate from the front of the crankshaft. The best way to do it is to insert a 5-40 machine screw into the crankshaft, and then push out the crank on an arbor press. No arbor press? Then use a large vise, but be sure to protect the rear of the case with a 1/4-inch thick piece of hard balsa for a cushion. Inspect and clean all the parts, and spray on a protective coat of WD-40.

You've now reached your first decision point; namely, whether or not to use the stock crankshaft. With high nitro content fuels and high rpm's, crankshaft failure is not an uncommon occurrence.

It usually breaks completely across the relatively thin disc webbing just below the crankpin. You can avoid this by using a heavy-duty crankshaft, such as the one shown on the left in the accompanying photgraph. (Note: Several supply sources for this and other custom or stock parts are listed at the end of this article.) If this sounds like the perfect solution to the problem, unfortunately, it isn't. As you can see in the photograph, the heavy-duty crankshaft is not counterbalanced. As a result, you'll experience more vibration . . . especially at high rpm's.

If you decide to stick with the stock crankshaft, I suggest you perform a simple tempering operation to lessen the chances of fracturing. Insert a 5-40 machine screw into the front of the crank, wrap a piece of soft copper wire around the screw, and hang it from a center rack in an oven. Set the oven temperature at 375 degrees, and bake the crank. After one hour, turn the temperature off and leave the door closed until things cool down to room temperature. In heat-treating parlance, this tempering procedure "draws back" toughness into the hardened steel.

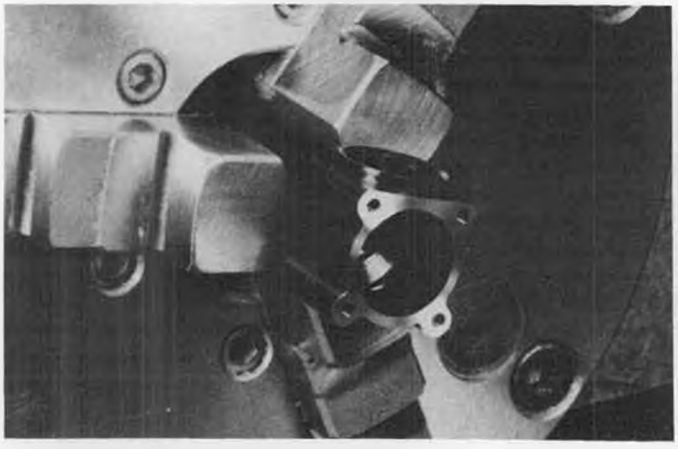


We blew it! On page 27 of the May '79 issue, we showed a diagram of a cutaway Cox cylinder and specified a .010-inch height difference between the ports. That's wrong. The .010-inch measurement is taken from the upper edge of the exhaust opening to the top of the remachined cylinder bypasses, as shown above. Sorry about that.

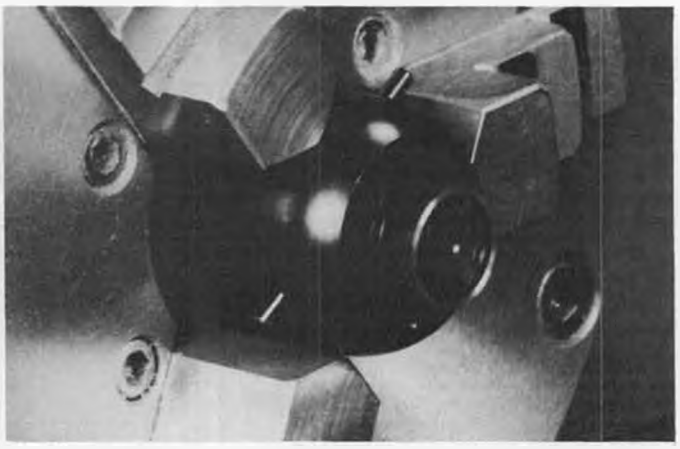
Whichever crankshaft you use, it should be lapped to the crankcase. This procedure is described in detail in the April issue of **R/C Model Builder**. With reed valve crankcases, it is essential that the bearing surface for the front journal of the crankshaft be lapped through the anodized coating. You must be able to see the pure aluminum on the front bearing surface. The reason for this is that the anodized coating, although it's pretty, tends to increase the chances of galling between the crankshaft and the crankcase.

Your second decision point concerns remachining the tank and case to decrease crankcase volume. I suppose it's not really a decision, but rather whether or not you have access to a lathe. If you do, then machine .015 of an inch off the rear of the crankcase. One of the photographs shows a Black Widow case that has just been remachined. Having done this, it will be necessary to maintain adequate clearance between the reed valve housing and the crankpin. This is done by machining .010 of an inch off the outer edge of the reed housing portion of the tank. The third photograph depicts this complete operation.

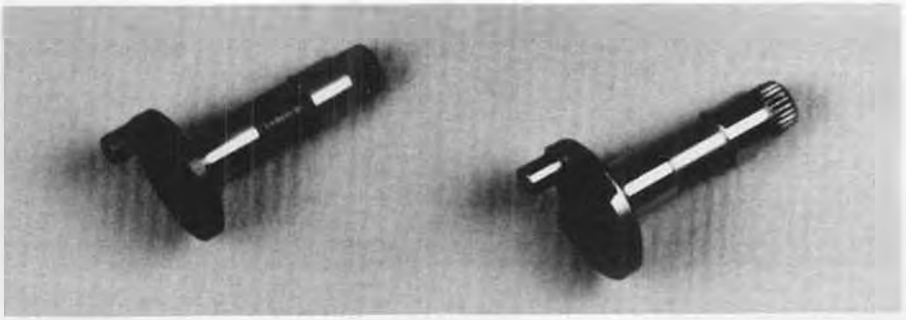
The next step is to enlarge the venturi. Start with the backplate. Remove the screen and ream out the venturi with a No. 44 reamer (.086 of an inch). Using the same reamer, enlarge the throat of



The rear of a Cox Black Widow crankcase that has been machined to decrease the crankcase volume.



A Cox Black Widow tank that has been machined in the reed retainer area to prevent interference with the crankpin.



On the left, a heavy-duty crankshaft. On the right, a stock one. Note the difference in web thickness. Stock cranks sometimes break when used with high nitro fuel.

the fuel line through the center of the tank. Thoroughly clean all the parts, coat them with WD-40, and set them aside in a dust-free container.

There's one more major part to your engine hop-up, and psychologically it's difficult. Physically, it's easy. Just discard the brand-new cylinder and piston as well as the glow head that came with the engine. Replace them with a T.D. cylinder and piston, No. 1775, and a high compression head, No. 1702. It may seem like a waste of good parts, but if you want high performance, sacrifices are necessary. Here's a suggestion about what to do with those new but discarded parts: auction them off at your next club meeting, and donate the money to the club treasury.

You can use the T.D. cylinder and piston in their stock configuration, or you can modify them. This column in the May issue was devoted entirely to reworking T.D. cylinders and pistons. Dig out your copy, and after thoroughly digesting it, you can decide whether or not to use the stock parts.

There's only one decision left before reassembling your reed valve engine. You can use the backplate with the stock needle valve, or you can elect to buy a backplate that's been customized with a precision needle valve assembly. A custom one is superior; however, you can easily improve the somewhat erratic performance of the stock one. To do so, discard the needle spring, and in place of it, slip a number 4 washer onto the needle. It will stop against the shoulder of the needle. Follow this with a 9/32-inch length of medium-size silicon fuel tubing, and then screw the needle into the backplate. Simple, but effective.

Reassemble the crankshaft, case, and prop drive plate by mounting a prop and spinner against the plate. As you tighten the prop screw, the plate will be forced back onto the splines of the shaft. The rest of the reassembly should pose no problems. There are only a couple precautions. First, be sure that the two gaskets are in their proper place. The one between the case and the tank never seems to cause any trouble, but that tiny "O" ring one has caused many a headache. It belongs between the backplate (on the machined, frontal surface of the venturi) and the fuel tubing throat that passes through the center of the tank. It's quite easy to overlook this one, or to lose it. But it's so important that the engine won't run without it!

The other precaution was mentioned earlier: proper installation of the reed retainer spring. If it's touching the center of the reed, engine performance will be degraded, and reed failure will develop. Note: Recent Cox engines have plastic reeds in place of the metal ones formerly used. Whatever one you have, be sure there is no dirt whatsoever around the reed area. In fact, there should be absolutely no dirt anywhere in the engine, and all parts should mate together very freely. One final recommendation. Initially, use three copper head gaskets, and do a thorough engine break-in. (See the January issue of **R/C MB**.)

If you want custom or stock engine parts, they're available by mail order from the following dealers:

Chop's Products Inc., 306 Yardley Commons, Yardley, PA 19067.

Hubschmidt's Hobby Center, RD 1, Ewan-Aura Rd., Glassboro, NJ 08028.

Kustom Kraftsmanship, P.O. Box 2699, Laguna Hills, CA 92653.

Just send them a first class stamp, and they'll return you a complete brochure. ●

BERNHARDT

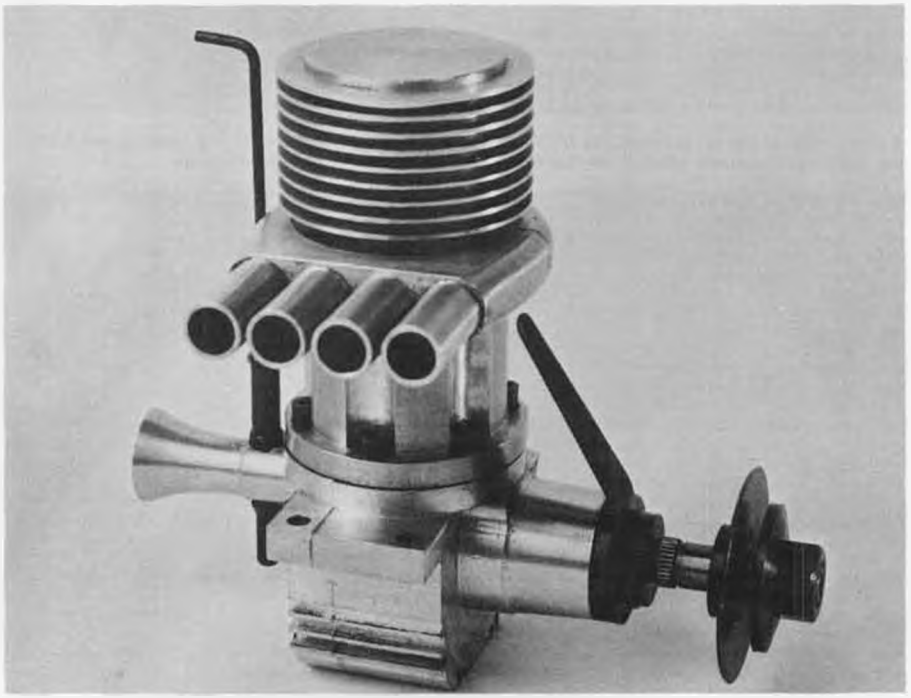
● As stated in my first article on improving the performance of your miniature 2-stroke engine, the larger the charge of fuel mixture that we can deliver to the cylinder, the more power will be transmitted to the piston. Relieving and polishing all intake and bypass ports as outlined in the last two articles will up the performance of your motor, but by far the most spectacular improvement can be obtained by pressurizing the fuel going to the needle valve. Bear with me while I try to explain.

The conventional model engine depends on crankcase vacuum during the upstroke of the piston to draw air and fuel into the crankcase. To draw fuel from the fuel tank, it is necessary to create a partial vacuum at the jet of the needle valve. This is accomplished by restricting the size of the intake tube, causing an obstruction to the flow of air entering the crankcase. The end result is a less-than-full charge of fuel mixture to the crankcase area. If we increase the size of the intake tube so we can draw in more air, then we reduce the vacuum and reduce our ability to draw a sufficient and uniform amount of fuel. The answer to this dilemma is to *force* the fuel to the needle valve. This is referred to as a pressurized fuel system, and allows the use of very large intake tubes for full-volume fuel charges. With a pressurized fuel set-up, the need for fuel draw is eliminated.

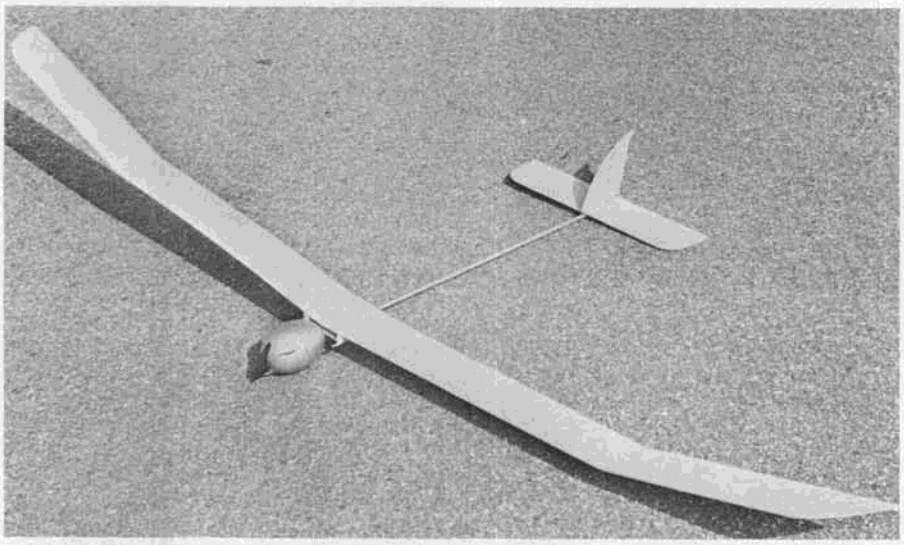
There are various methods for pressurizing the fuel systems of model engines, both ignition and glow, straight intake tube and carburetor equipped. Let's examine a few:

A) Pen bladder or pacifier. These are balloon type fuel containers which must

Continued on page 95



A homemade .30 cu. in. diesel built by Otto Bernhardt in 1946. It features a reed valve, bypass ports all the way around the cylinder, and adjustable compression by means of a crankshaft mounted off-center in a rotatable bearing (!). Photo by John Morrill.

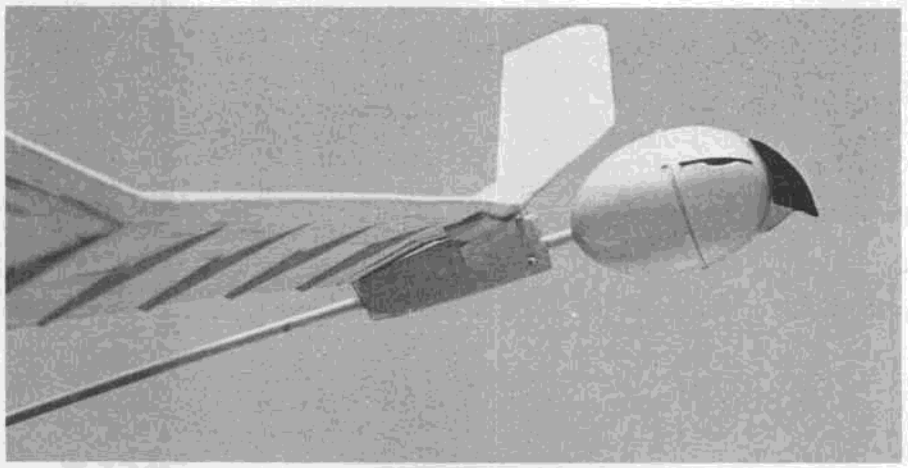


PERCY

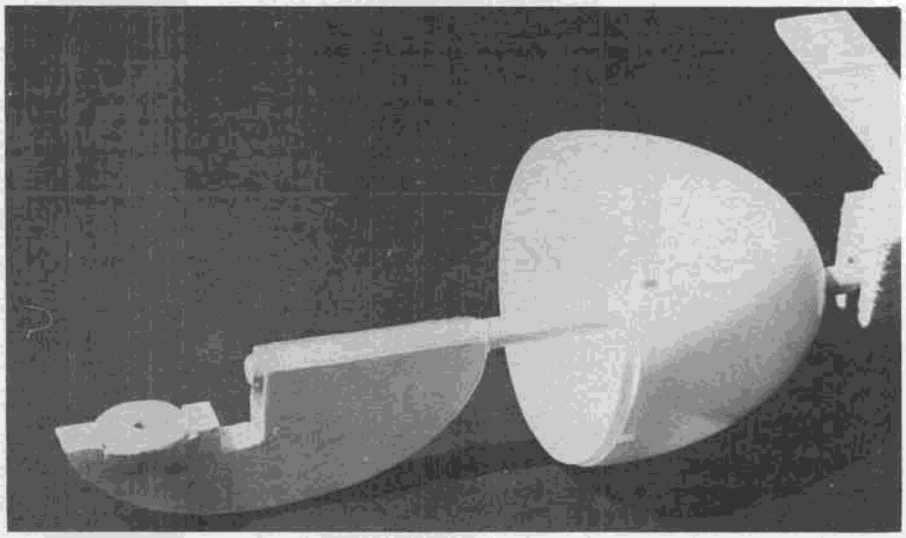
PHOTOS BY AUTHOR

THE PULSING PARROT

By JACK HEADLEY



A good view of the wing mounting block and how the wing fits onto it. The block is slid back and forth on the arrow shaft until the model balances, then is epoxied in place.



Actuator mount is a ply/balsa/ply sandwich and is contoured to fit inside of L'egg pantyhose container, then epoxied to arrow shaft. Rear half of egg shell is also epoxied in place.

• This is a single-channel model which can be built in a few evenings, requires no complicated construction, and uses very little in the way of materials. In fact, you may have all that's needed already on the workbench. If not, and you're looking for something to fly this weekend, rush out and collect the following items:

Two sheets 3x1/16x36 medium hard balsa.

One sheet 3x3/32x36 medium hard balsa.

Two lengths 1-1/4x5/16 trailing edge strip.

Two lengths 1/2x3/8 hard balsa strip.

One arrow shaft (1/4-inch diameter).

One L'egg Egg (You may have to buy some pantyhose to get this plastic container, but who knows, this may earn you a Gold Star!).

After a few basic knife cuts, a glob or two of glue and epoxy here and there, the above items will instantly turn into Percy, the Pulsing Parrot, which may well turn out to be the single-channel equivalent to the 'Obie 'Awk.

The following sketchy notes suggest which bits to stab the balsa knife into first.

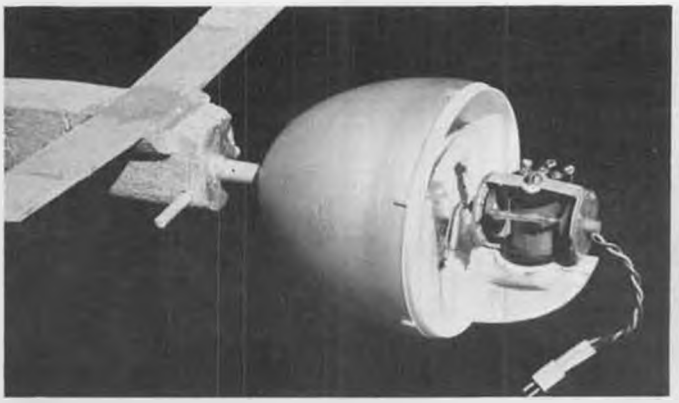
WINGS

• The all-sheet wing uses the Jedelsky airfoil, which consists of a small chord main wing section followed by a large chord flap. In our model the main wing section is made from the 1/2x3/8 strip plus the 1-1/4 inch trailing edge piece. The flap portion is simply 1/16 sheet, cemented on top of the trailing edge strip, then stiffened at intervals with small triangular ribs. Four panels made in this way are used to construct the complete wing.

Each of these four panels is made in a similar manner, and construction begins by cutting an appropriate length of trailing edge stock, plus a similar length of 1/16 sheet. These two are then cemented together, and the ribs attached next. (The wing panels are built upside down, as shown on the plans.) When all four panels are completed they are epoxied together, with the aid of the plywood wing joiners, and at the correct dihedral angles. Add the 1/2x3/8 leading edge after this assembly has dried, then sand to the final airfoil section, as shown on the plans. The final item is a triangular gusset at the center section, which gives the wings a little more rigidity.

WING MOUNTING BLOCK

Select a small block of balsa, slightly oversize to the dimensions shown on the plans, and drill a longitudinal hole through this (1/4-inch diameter) for the arrow shaft. Now trim down the block to its final size. Make the wing platform from 3/32 ply, score down the middle, then gently crack to the center section dihedral angle. Apply epoxy over this crack. Trim the wing block to accept the platform, then epoxy it into place. A couple of small triangular pieces, used to give additional support to the wing platform, can now be glued into place.



Two views of the completed nose section with the Ace Baby Twin actuator mounted in place. Receiver and battery are wrapped in foam rubber, then packed into the egg. Note the 1/8 sheet frames which support the rear half of the egg shell.

RADIO INSTALLATION

The plans show an installation for the Ace radio and the Baby Twin actuator, and if you're going to fit this system I suggest you follow this scheme, as it took me quite a long time to work it out! For any other radio I would suggest a little doodling on the plans before attempting an installation, as there's not much room in the plastic egg.

Back to the Ace system. The first item to make is the ply/balsa/ply sandwich, which holds the actuator in the correct position relative to the arrow shaft. On the front of this sandwich is a small platform onto which the actuator is bolted. Epoxy this sandwich onto the arrow shaft, and when dry assemble the actuator and torque rod, and check for free actuation. Cement into place the 1/8 sheet frames, which support the rear portion of the egg, then epoxy this portion of the egg shell into place.

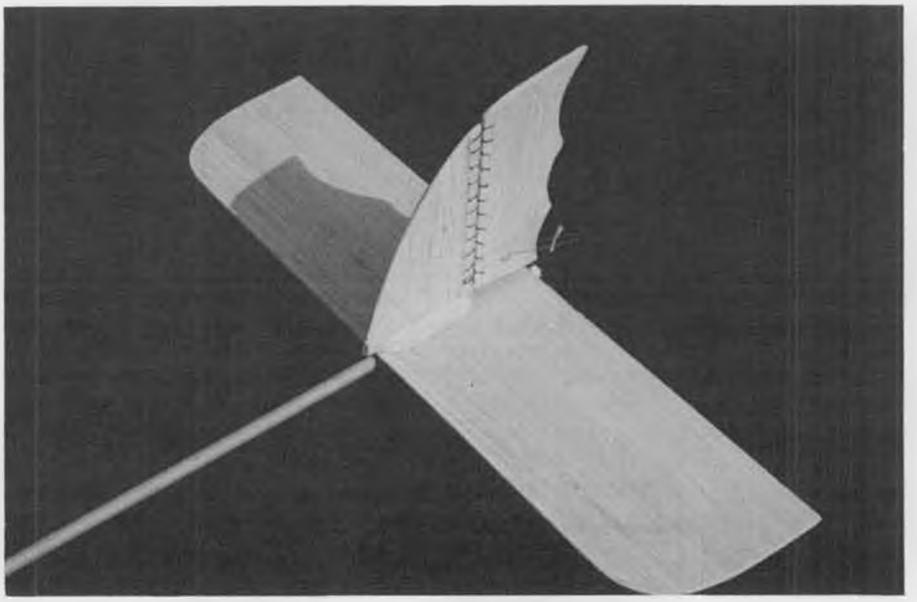
The locations of the receiver and battery are indicated on the plans, and these are packed in place with scraps of foam rubber. Drill a small hole in the egg shell for the antenna wire.

MODEL ASSEMBLY

With the radio installation satisfactory, the pieces can now be removed from the inside the egg, and the remainder of the model completed. Cut the tailplane from 3/32 sheet and also the fin and rudder, then assemble the fin and tailplane. Hinge the rudder to the fin with carpet thread.

Now slide the wing attachment block onto the arrow shaft, and locate roughly in place. Epoxy the tail assembly on the rear of the arrow shaft, making sure that it's correctly aligned. The radio pieces are now replaced in the egg shell, and the torque wire fitted finally, and checked out. When the rudder pulses in a satisfactory manner, the final step, that of balancing the model can begin.

Strap the wings onto the attachment block, then slide this block up and down on the arrow shaft until the CG is as shown on the plans. Mark the location of the attachment block on the shaft with a pencil, then slide the block back, coat the shaft with epoxy, then slide the block forward to the pencilled position. Again check that the wings and tail are in correct alignment before the epoxy sets up.



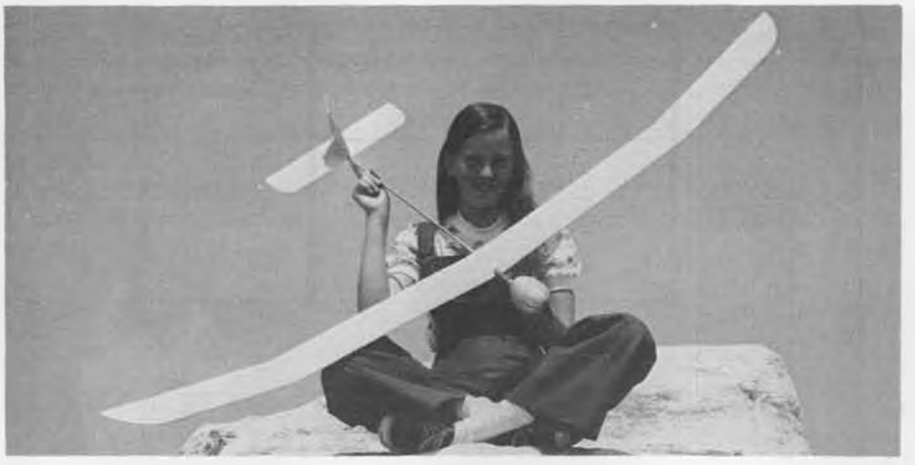
Percy's tail surfaces are simplicity in themselves. Figure-8 thread hinges are used on the rudder, are about the lightest and most friction-free type around, ideal for single channel.

FINISHING

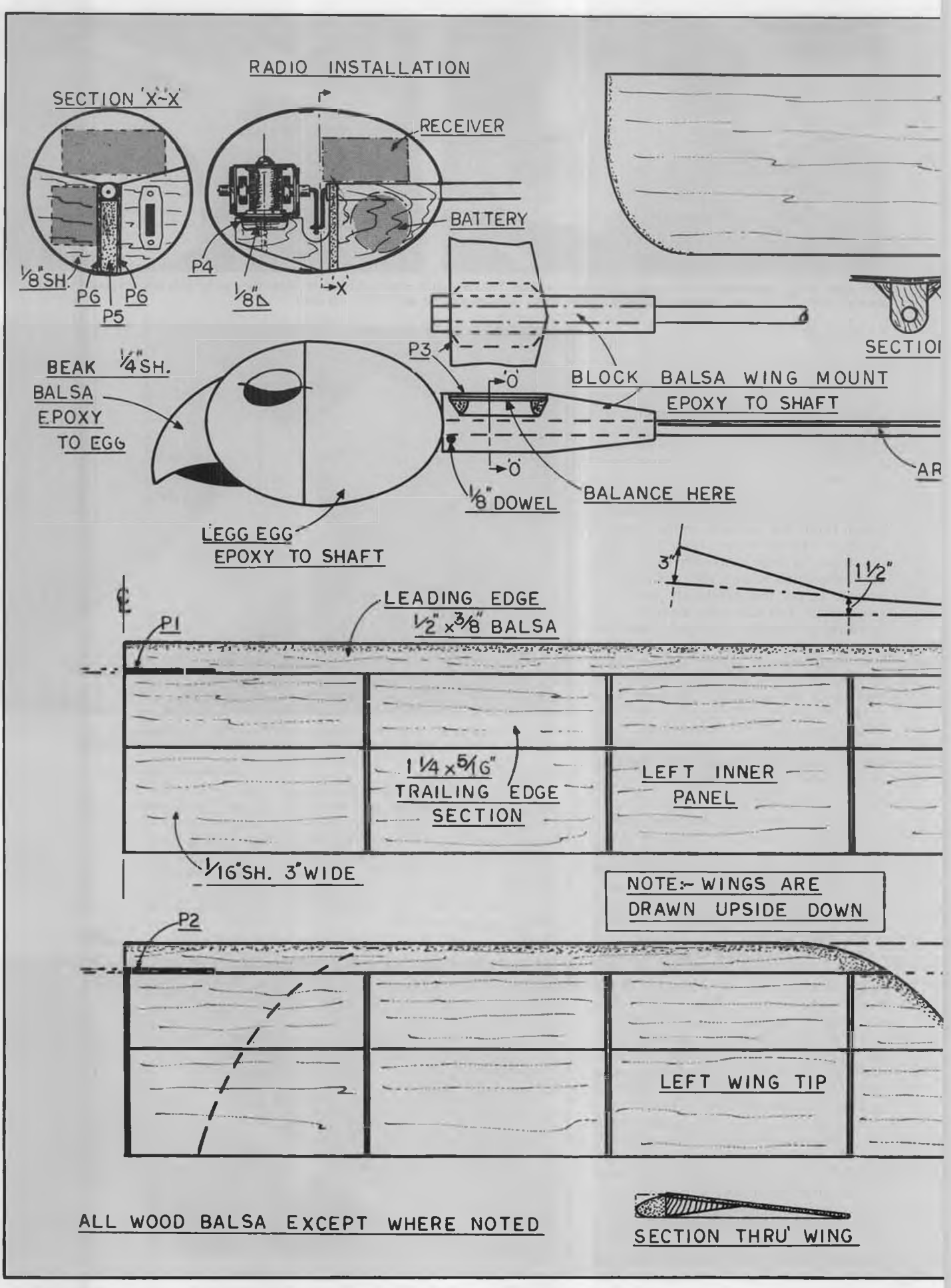
Decorate as desired with the usual caution about adding too much weight on single-channel models. My prototype was given two coats of clear dope on the wings and the tail, the egg being sprayed silver, after which the face was painted on. The eggs do come in various colors, however, and so even this last step may not be required.

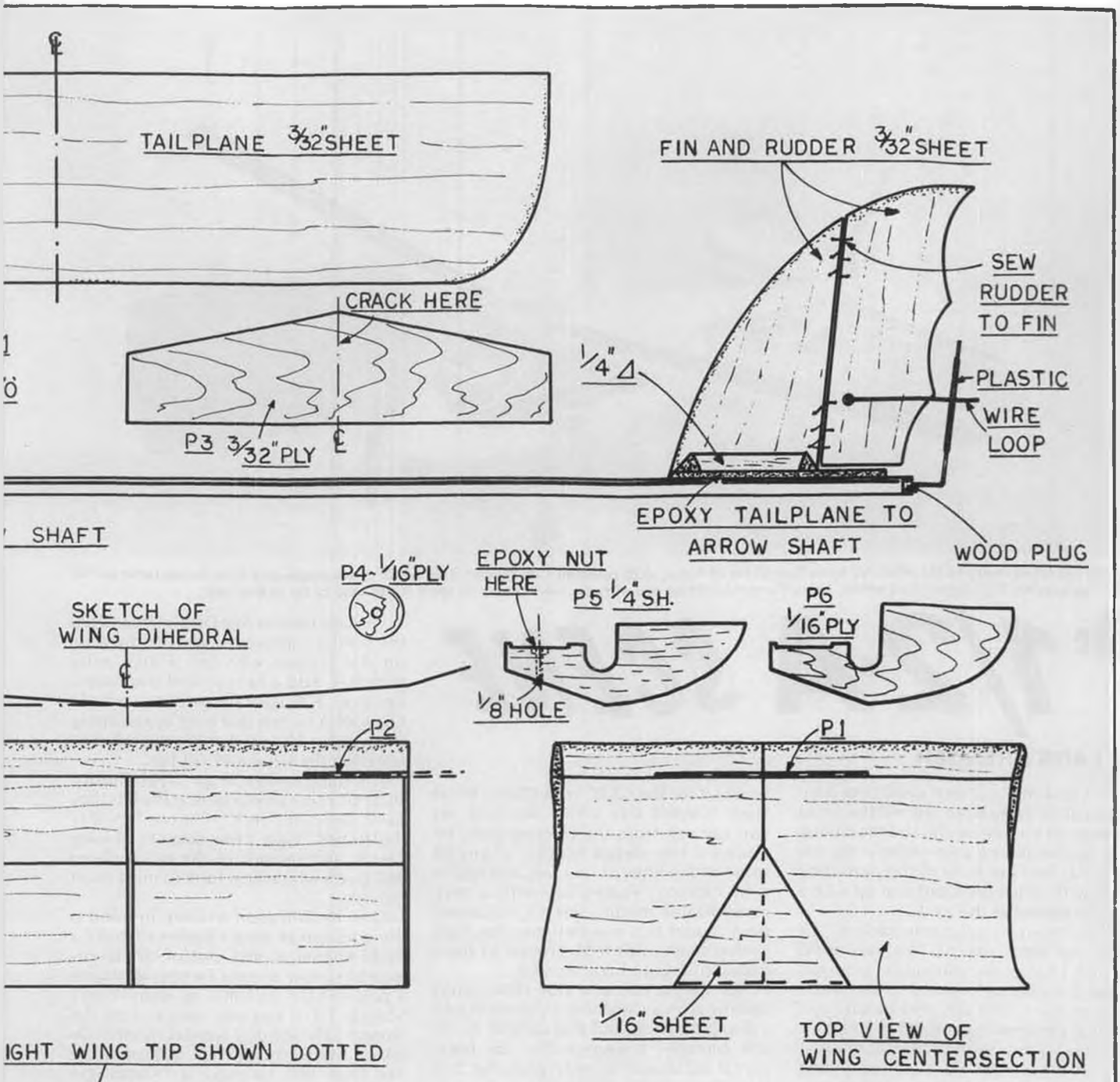
FLYING

Pin the rudder in the central position, then try a few hand launches into a grassy area before attempting serious soaring. Correct any tendency to stall or dive with small changes in the wing incidence or small weight additions. Next try a few short soaring flights, to check the rudder control. After this it's all yours, so happy pulsing! •



The author's pretty daughter, Lisa, with Percy, the Pulsing Parrot. Model is the ultimate in simplicity to build, and just think of all the different expressions you can put on that egg!


RADIO INSTALLATION
SECTION 'X-X'
RECEIVER
BATTERY
P4
1/8" SH.
P6
P6
P5
1/8"
X
P3
BEAK 1/4" SH.
BALSA
EPOXY
TO EGG
BLOCK BALSA WING MOUNT
EPOXY TO SHAFT
1/8" DOWEL
BALANCE HERE
LEGG EGG
EPOXY TO SHAFT
3"
1 1/2"
LEADING EDGE
1/2" x 3/8" BALSA
P1
1 1/4 x 5/16"
TRAILING EDGE
SECTION
LEFT INNER
PANEL
1/16" SH. 3" WIDE
NOTE:- WINGS ARE
DRAWN UPSIDE DOWN
P2
LEFT WING TIP
ALL WOOD BALSA EXCEPT WHERE NOTED
SECTION THRU' WING



WING AREA = 230 SQ. IN.
WEIGHT = 9 OZ.

FOR SINGLE CHANNEL RADIOS

Plan No: 7712

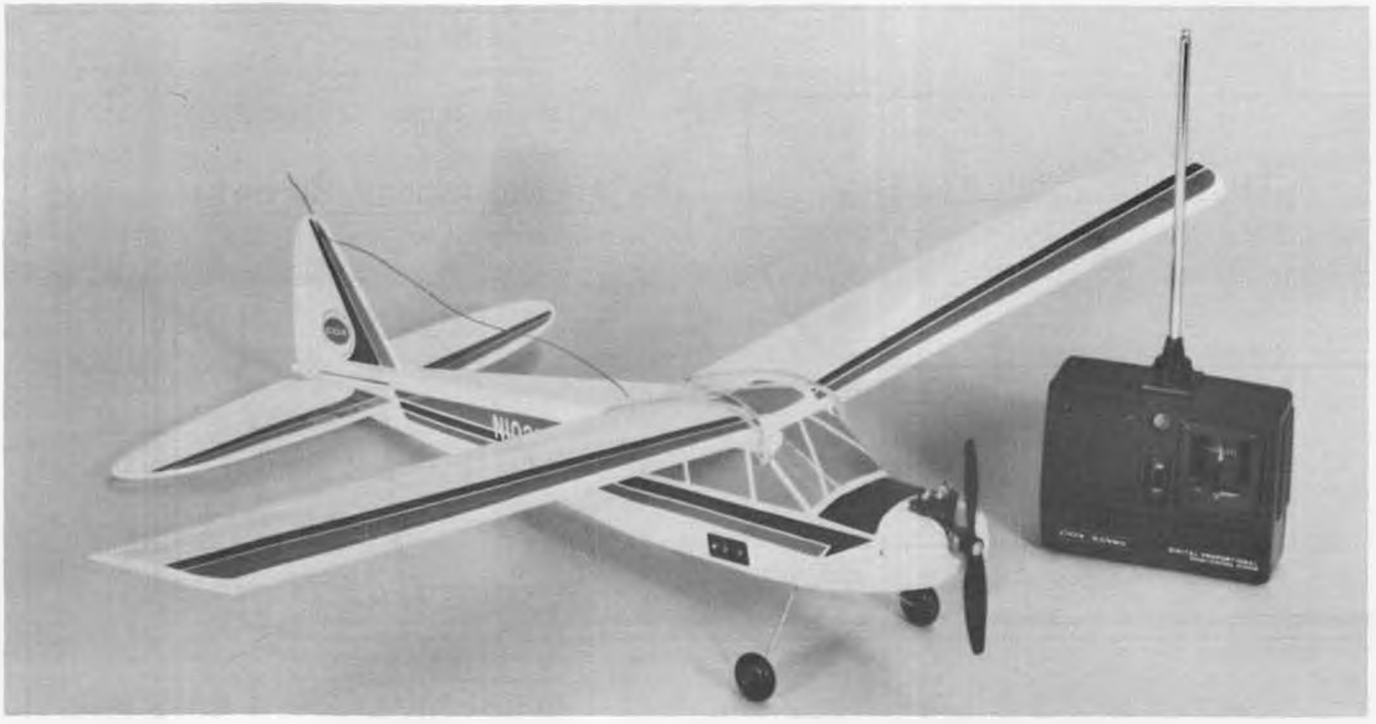
MODEL BUILDER magazine

PERCY

DESIGNED AND DRAWN BY B.O.H.

SCALE IN.

FULL SIZE PLANS AVAILABLE – SEE PAGE 116



One of the latest ready-to-fly offerings from Cox is this all-foam, .020 powered Cub trainer. The model uses a single-stick Cox Sanwa radio on 49 mhz, requires no FCC license to operate. Larry Renger is testing one of these models now to see if it's as easy to fly as they say.

The 1/2-A SCENE

By LARRY RENGER

• "Kit bashing" . . . that's what the train buffs call it. They have refined the art of taking a kit for one model and modifying it to be something else entirely. By this method, they get most of the parts they need with little effort, but end up with a unique model at the end.

Most model airplane modelers "kit bash" to some extent. We vary a tip outline, change the vertical tail contour, shove the canopy forward of aft, add a cowl or leave one off, and usually add original decorations and color schemes.

If you have a definite plan in mind at the outset, you can do some really neat things. For example, Steve Whittman had a kit for the GMC 1/2A Chaos. What Steve wanted was a P-51 Mustang. As you can see from the photographs, he added a few detail blocks, changed some of the lines on the tail, and with a new canopy, ended up with a very recognizable model. Since it was based on a model that was designed for high performance, this P-51 proved to have excellent flight characteristics.

Now, what can you do? How about starting with a Goldberg Jr. Skylark, add a duplicate wing, and end up with an .09 size biplane? I suspect that the horizontal tail should be enlarged a bit, but even that is not a necessity.

Would you believe that this P-51 started out as a 1/2A Chaos by GMC Models? It's Steve Whittman's bird. Surprising what a few outline changes and a realistic paint scheme can do!

Perhaps take an Ace Dick's Dream, flip the fuselage sides over, and put the wing on the bottom with just a little extra dihedral. Add a canopy and you have a unique .020 sport model for single channel. You can jazz it up by sweeping the wings a bit and slanting the tail, plus restyling the wing and tail tips.

The thing to do is to go to your hobby shop and take a fresh look at the kits they have. Keep in mind *"what can I modify this to be?"* Even a few degrees of wing sweep and rework of the tail surfaces will give a whole new look to most sport models.

One modification to keep in mind is the addition of wing nacelles to make a multi-engine model out of single-engine kits. How about a Tweedy Bird with a pair of Max .10 FSR's, or even Webra Speedy 1.8 cc engines hung out on the wings? Talk about a special model! Or take a Midwest Little Stik and use three Tee Dee .09's to make a "Klutzvogel Trimotor" scale (?) model. The possibilities are endless.

Egad . . . how about four Tee Dee .020's hung on low engine nacelles on a GLH, then droop the wings and paint it like a B-52. If you are going to play around, you might as well have fun!

Don't be limited by the world of real aircraft. Pick styling and detail characteristics of some particular era of aviation and then design a scale model of a non-existant airplane. Just do your own thing and then lie a lot to the scale judges. You won't win the argument, but they *will* remember you. I think that the "Golden Age" from 1918 to 1939 had a unique flavor of individuality to it. A multitude of small factories and specialty builders turned out a terrific variety of designs. The paint schemes were great then, too.

Moving away to a new subject, I received a letter from Bob Sargent, 1694 Wright Ave., Rocky River, Ohio 44116. He sent drawings and rules for a Half-A Carrier event as flown in the Cleveland area. It seems that 1/2A "Formula V" racing was highly active around there several years before it became an AMA event, and they also started flying carrier at the same time.

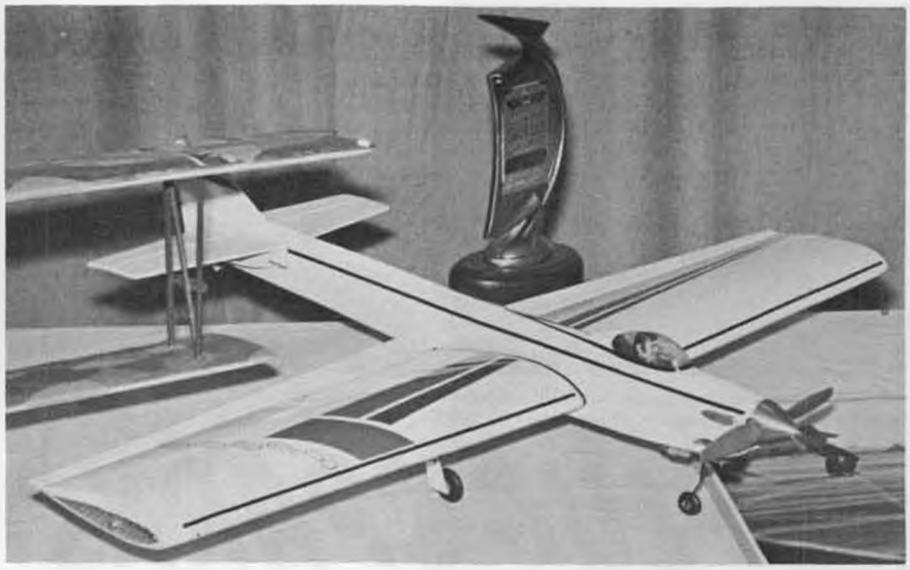
Bob has the plans and rules available for both F-V and Carrier models through "Aerotique Aeromodelling Specialties" at the above address. I have received a variety of his drawings including a 3-line bellcrank system based on commercial 1/2A components. Drawing quality and detail are excellent. Send a SASE for a list of available plans and supplies.

Now, on to the pictures! First up, we have a model which is a good beginning and intermediate trainer. Midwest has a well-made model of the Cessna Cardinal. You can fly it single-channel pulse, or use a digital radio of one, two, or three channels. I would recommend that for single-channel you use a Black Widow, A Tee Dee .049 for two channel, and an .09 for three channel throttled use.

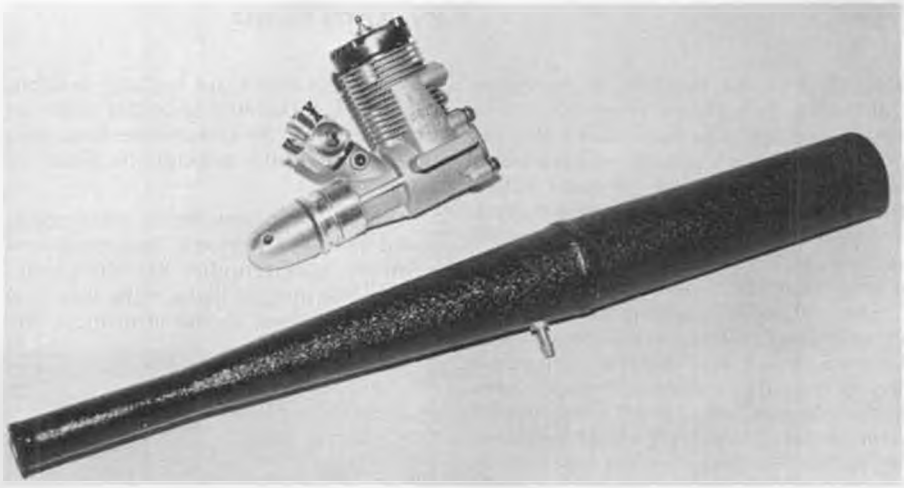
This kind of model can be flown unfinished, painted with one of the new urethane paints, or covered with some of the low-heat plastic film materials. I would recommend at least some clear around the engine compartment and behind it to keep the foam from getting heavy with soaked-up oil.

The outstanding features of bead foam models are, of course, the rapid and relatively low skill assembly requirement, and the fact that 5-minute epoxy will allow you to field repair practically any damage you might inflict on the model.

Third photo is of the much-touted Webra Speedy 1.8 cc engine and its matching tuned pipe. I have one and it is gorgeous. The engine features ball bearings, Schneurle porting, and a rear exhaust. The head is the button insert type, so variations due to plug length and gasket thickness should be long gone. Believe it or not, I have completed my QB-10L airplane and am testing all the .09 and .10 engines. Last one to go on it will be the Webra. I intend to give all my results at one time, so hold your breath for a few months.



Bob Whitely has won the 1/2A Stunt event at the Nats three years in a row, used this model for two of those wins. Uses a foam core wing, weighs 10-1/2 ounces.



Our columnist considers the Webra Speedy 1.8 cc engine to be the most powerful .10 available. Tuned pipe has something to do with it, no doubt.

Fourth photo is one taken at the International Modeler Show. Bob Whitely has now won the Cox-sponsored 1/2A Precision Aerobatics event at the Nationals for three years in a row. He did it twice with the airplane shown. This model features foam core wings made by Bob Hunt, of Control Specialties.

Engine is, of course, a Tee Dee .049, and full flaps are used. The airplane weighs just 10-1/2 ounces.

Continued on page 96

The all-foam Cessna Cardinal from Midwest is a good choice for the first-time R/C flier, as it goes together quickly, flies well, and is easy to repair, using 5-minute epoxy. Doesn't have to be painted and can fly with from one to three channels.

Excellent construction jobs on both Bill Crovella's .020 Strato Streak and Sal Taibi's Scram. Photo taken by Bill Crovella.

Ardent free flighter Bill Bowen has discovered that R/C Old Timers are fun, too. Playboy powered by a S.T. .35.

PLUG SPARKS

PHOTOS BY AUTHOR

By JOHN POND

• Nestled in the foothills of Northern California, just above Marysville, is a small town called Browns Valley. It is this place that the SAM 30 boys have been staging their so-called "Browns Valley Internationals." While the name may be a trifle ostentatious, you can't argue with success, as this meet is growing in stature a little more each year.

SAM 30, which started with the nucleus of Hal Cullens, Nick Nicholau, and Loren Schmidt, has grown to the point where they are now attracting members as far away as San Diego!! Their slogan (like Avis), "We try harder because we're number two," is most representative of this enterprising club. A rapidly expanding membership and growing activity are the hallmarks of SAM 30.

Recently the columnist and his wife had the pleasure of being the guests of Nick and Neva Nicholau, the mainstays of SAM 30. Over half of the club turned up at one time or another for the cocktails, buffet dinner, bull session, and general all-around camaraderie. This lasted to the wee hours of the morning, as the writer can well attest to the next morning of the contest. Another way to lose a contest! Get killed with kindness!!

The next morning dawned with overcast skies and a persistent low fog up to ten o'clock. The field, which is not readily accessible to the uninformed because of a washed-out bridge, was large enough, but was completely surrounded by all sizes of trees. Some of the better fliers discovered, much to their consternation, that the trees were actually closer than they looked, as quite a few of the models ended up in the trees.

The most spectacular of these was Karl Tulp's 15-foot Dallaire, which literally came down branch by branch. Although not badly damaged, Tulp was unable to make any more flights. This was unfortunate for the rest of the modelers, as he promptly brought out his very reliable regular-size Dallaire Sportster with an O.S. .60 four cycle and proceeded to put up a time good enough to place in Texaco.

Actually, the best flights were registered in the afternoon, but most surprisingly, Speed Hughes' Boehle "Giant" posted the longest flight in the morning lift. At one time, in the afternoon, the Texaco event looked like a gaggle of hawks, with no less than five models flying in the same lift. And the writer along with a few other fellows were sitting there with all officials posted!!

SAM 30 has always been noted for excellent outdoor barbecues at their contests, and this meet was no exception. Despite the good flying conditions, few modelers could resist the call for lunch. The girls were pleased as punch that the boys polished off what was on hand. Neva Nicholau and Meriam Schmidt are to be commended on their output!

The best part about having the girls at the meet is that they take over the registration and recording desks and literally run the meet. Ask C.D. Loren Schmidt how hard he worked. He was

Easygoing pace is typical of the Browns Valley "International" meets put on by SAM 30. Trees surrounding the field reached up and grabbed several models out of the sky ... see text.

None other than SAM President John Pond himself, with his scaled-up (to 12 feet!) Rod Doyle Folly II. Powered by an OPS .60, and has two pounds (!!) of lead in nose to balance.

Ted Kafer almost won the Texaco event in the closing minutes with his PB-2 at last SAM 30 Browns Valley contest.

Charlie Critch finished his Powerhouse just in time for Browns Valley meet, placed in Antique. Anderson Spitfire power.

flying more than directing! What a good deal for the SAM 30 boys.

A new gimmick has been developed that the New Jersey clubs might do well to adopt. The most active clubs in Northern California are SAM 21, SAM 27, and SAM 30. When the SAM 30 members came out with red and white jackets with matching caps (with SAM 30 numerals on them, natch!), the other clubs were approached with the idea of adopting other colors to identify their club members. It didn't take long for SAM 21 to adopt blue and white as their motif, while SAM 27 will use green and white. One thing for sure, a person won't have any trouble identifying the various club members once he is wise to the color arrangements. Also helps fellow club members to spot each other quickly on the field. It will be interesting to see if the other clubs adopt this idea.

Anyway, we seem to have digressed. Results as supplied by Neva Nicholau went something like this:

TEXACO
1) Speed Hughes (Boehle) 39:53
2) Ted Kafer (PB-2) 32:24
3) Karl Tulp (Dallaire)..... 31:41
4) John Pond (Dallaire) 22:40
5) Loren Schmidt (Buccaneer) ... 21:58

ANTIQUE
1) George Hindman (Miss Philly) 22:11
2) Warren Pickering (Lanzo)..... 20:36
3) Charles Critch (Powerhouse).. 19:17

Long-time free flighter Dave Rader's first O.T. R/C ship, a Playboy with much-lowered dihedral. K & B Stallion .35 is just the right power for this model for a beginner in R/C.

4) Speed Hughes (Miss Philly) ... 13:41
5) Loren Schmidt (Buccaneer) 9:26

LIMITED ENGINE RUN
1) Ed Solenberger (Playboy) 18:27
2) Jim Kyncy (Playboy) 17:50
3) John Pond (Playboy) 16:09
4) Loren Schmidt (Gas Champ) ... 4:14
5) Joe Borzelleri (Lanzo) 4:02

MOTOR OF THE MONTH

This month's motor is more or less a follow-on to the article we did on the Hetherington Meteor. Of the many size engines made by Bob Hetherington, the next most common to the Meteor .23 was the .49 cu. in. size, drawings of which are featured. The columnist is indebted to Karl Carlson and particularly Dick Dwyer for obtaining information from Bob. He states the following *sand-cast* engines were produced:

	Manufactured	Sold
Meteor .15	1	None
Meteor .19	6	3 or 4
Meteor .23	175-200	All
Meteor .49	30	All

The last two motors were of copper-brazed steel manufacture. Bob states the above figures may not be entirely accurate, but are the best he can recall from memory. In addition, he made and sold 120 compressed air engines, primarily through Desmond's Store in

Charlie Critch (left) picks up goodies from C.D. Loren Schmidt. Manager Hal Cullens in background. SAM 30 meet.

Jim Kyncy won several prizes at SAM 30 contest, including a partial kit made by C.D. Loren Schmidt. Hal Cullens on right.

Another Folly II, this one an 8-footer by Ed Solenberger. Flies well with an Anderson Spitfire up front. Flew at SAM 27 meet.

Parker Abbot showed up at the SAM 27 contest with a brand new, untried Lanzo Stick, with O.S. 4-cycle. Flew great!

Yipes! Nick Nicholaw of SAM 30 struggles to get his Boehle "Giant" up on a wing tip for the photographer. Spans 14 feet 8 inches.

downtown Los Angeles and Terrence Vincent, who ran a concession in the Fifth Street Store. No mail orders were ever filled to the best of his recollection.

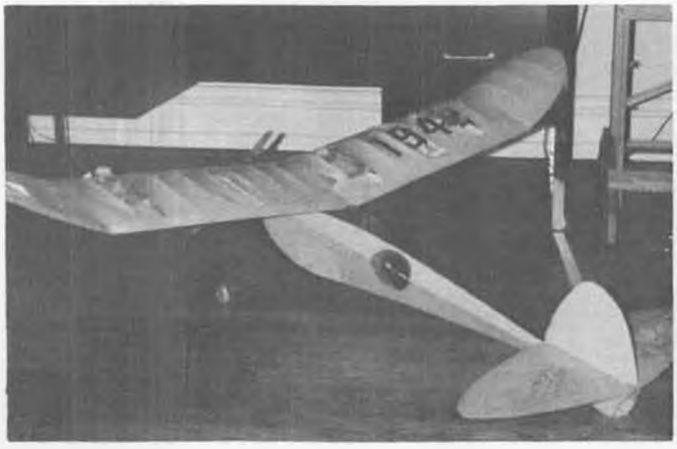
As Bob pointed out in the previous article, Hetherington got started in the engine business by first building compressed air motors of aluminum. (Most C.A. engines were built of brass. Bert Pond, of Hoosier Hot Shot C.A. fame, used brass fishing ferrules for pistons and liners.) When Bob's motors came out, the Depression was in full swing, and although all motors were sold, the demand wasn't that great to warrant continued production.

Hetherington got started in gasoline two-cycle engines early in 1932. The motor looked somewhat like a Brown Jr., but was anything but a howling success. The bore was .875 inches with a 1-inch stroke. Far from discouraged, the next engine was a .49 with a .875-inch bore and .812-inch stroke. The cylinder was made of cast iron, with an aluminum sleeve with fins to cool the cylinder. The head was screwed into the bore. The finned sleeve worked but was not entirely practical. Cylinder heads that screwed onto the outside of the cylinder sleeve were also tried.

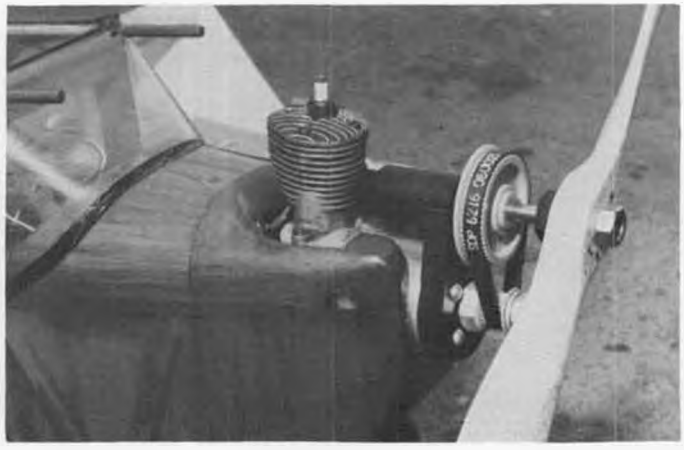
Another brainstorm tried was the attempt to remove the piston baffle (Bob was 30 years ahead of his time, with Super Tigre and Fox using flat-head pistons). This was done by drilling holes at an angle through a thickened section of the cylinder wall. (A novel bypass idea!) The idea worked, but the engine would not two cycle unless the needle valve was very carefully adjusted.

The biggest problem was that as fuel in the tank dropped, the fuel mixture would lean out, and in many cases, the engine would stop even if adjusted rich at first. Bob feels the cause was not enough capacity in the bypass holes.

All sorts of ideas were tried. Some



Bill Englehart's original Class B So-Long is in remarkably good shape after hanging in Bill's hobby shop all these years.



Talk about a purist! Bruce McAvinew mounted an old Dennymite cylinder on the Astro 10 in his Long Cabin, seen at Electric Champs.

engines were made with the cylinder screwed into the crankcase, and some cylinders were flanged and bolted in the crankcase. Still other cylinders were attached to full crankcases which included the exhaust port and exhaust (as per drawing). After making several .49 size engines like this, about a half dozen .19s and one .15 engine followed. To the best of his knowledge, Bob says the .15 was never run.

About 1940, Bob got the idea of making an engine of steel, held together by copper brazing, as a result of a magazine article describing a European automobile engine made that way. Work on the Meteor .23 commenced in 1940 and continued for ten years. At the end of that time, business fell off sharply and any work done thereafter was experimental.

For those collectors wondering where the serial numbers went, Hetherington states he never bothered to number his engines in any way. So, if you have a Hetherington engine, hang on to it; there weren't that many made!!

To back up a little, when Hetherington made his first engine, he had no experience on which to draw. There simply wasn't any information available on engines small enough to be used to power airplanes and boats. A few engines had been made by individuals, and some of these engines were described and pictured in library books. Information was generally so sketchy that to make an engine, the most basic principles and methods had to be learned the hard way, through experience.

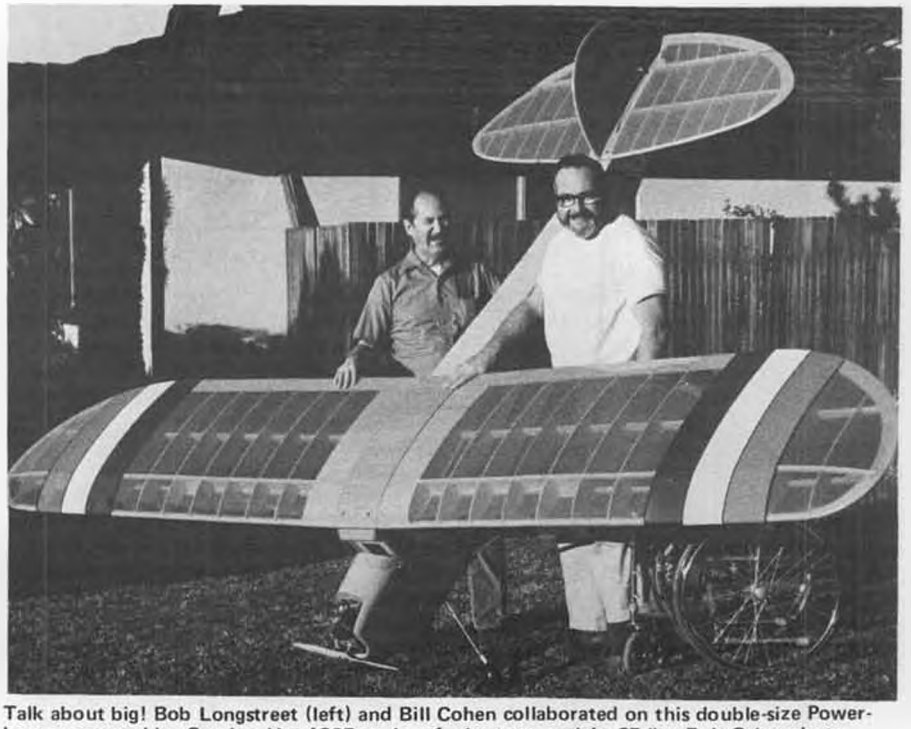
After the first engine, the .875-inch bore was employed and used on all engines until the introduction of the .23. Various designs were tried. All early engines had sand-cast aluminum crankcases. Cast-iron cylinders were used, as were steel cylinders. More than half of the engines were made in the large size (.49).

As previously noted, all sorts of experiments were made; cast-iron pistons without rings, aluminum pistons with rings, and various ideas for timers. Spark plugs were not available and had to be made using glass tubing with a very small hole through it. Later on, this problem was solved when one of spark plug manufacturers made up a batch of very small plugs to be given away at the Chicago pair. These plugs, incidentally, would be considered large by today's standards.

As can be seen on the drawing, various porting ideas were tried. The first idea was to have the intake port just below the exhaust port. Some intakes were placed in the rear of the engine, while others had the intake placed on one side with the exhaust on the opposite side.

Still other designs were made in which the intake was through a thin plate, or flutter valve, located at the rear of the crankcase cover.

The name "Meteor" was adopted in 1935 and a few more engines were sold locally. Occasionally, a few orders from distant states were received as a result of some small advertising. All the large engines had a stroke of .812 inches to give a displacement of .495 cubic inches. Although he made many experimental engines, Bob always felt that lapped pistons made the best runners.



Talk about big! Bob Longstreet (left) and Bill Cohen collaborated on this double-size Powerhouse, powered by Quadra. Has 4325 sq. in. of wing area, weighs 25 lbs. Bob Oslan photo.

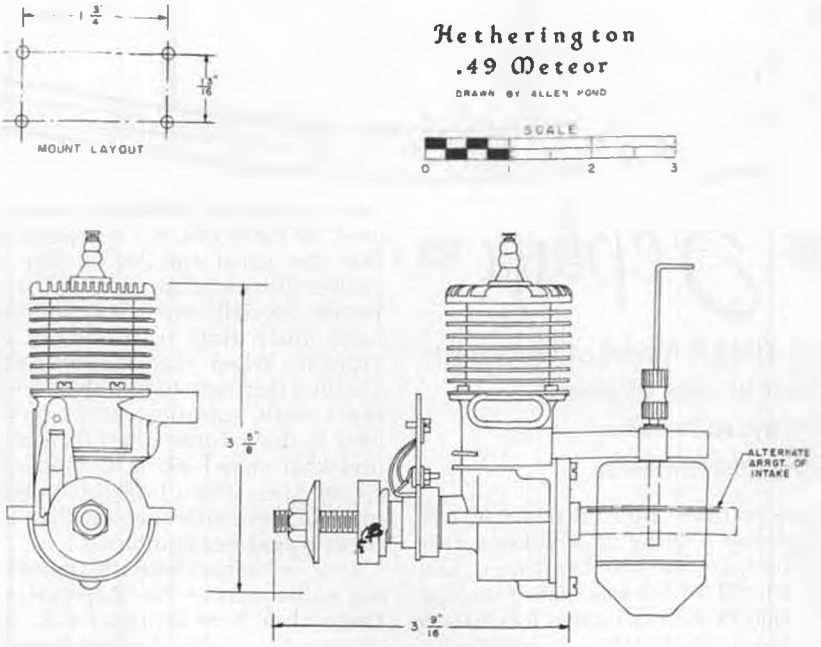
OLD TIME ENGINE PRODUCTION

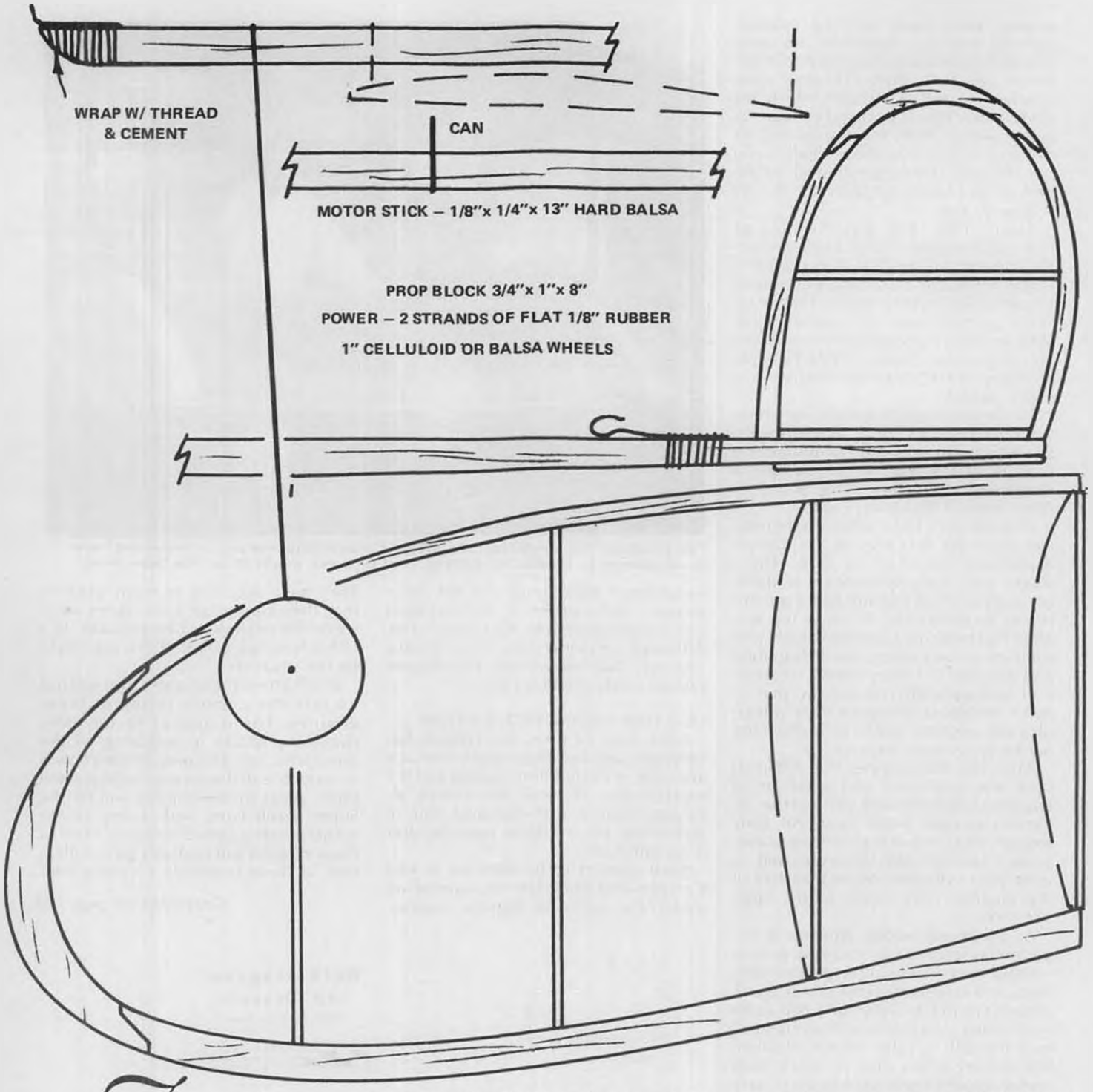
From time to time, this column has been advising the various readers what is available in old ignition engines and the reproduction of same. Sometimes, although there is a 60-day lead time in publishing, the would-be manufacturer is caught short.

Such appears to be the case of Karl Carlson and Dick Dwyer, operating under the name of Replica Engines. They have acquired so many projects that they cannot give out dates as to when the engines will be available. In a rather long talk with Karl, this appears to be the situation:

Vivell Motors: Karl states they will not go into the manufacturing of these engines. There appear to be some stumbling blocks in acquiring all the dies, items, etc. The present idea now is to assemble all the parts on hand and sell same. Most of the engines will be the Super Vivell types with a few of the earlier models added for spice. Most of these engines will probably go to collectors, as there is already a waiting line;

Continued on page 109





Zephyr

OLD TIMER Model of the Month

Designed by: Abe Bergman

Drawn by: Al Patterson

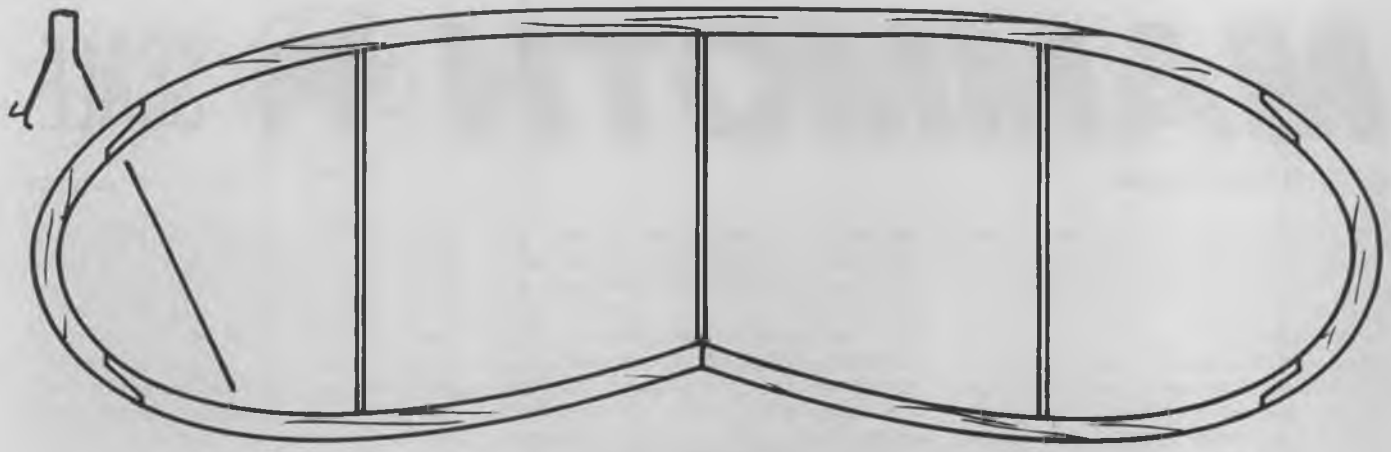
Text by: Phil Bernhardt

• Have you ever noticed that **R/C MB** will publish a string of well-known or potentially competitive Old Timers, and then there'll be full-size plans for some obscure little R.O.G. rubber job that no one has ever heard of before, sometimes by an equally obscure designer? There's a reason for that. Sometimes our draftsman, Al Patterson, has to spend more than the usual amount of time on a project (this month it was Col. Thacker's Turner Special), and as a result doesn't have much time to spend on other projects. When that happens, there's usually a mad rush to find an O.T. model that's small, appealing, and won't take long to draw. More often than not, we find what we're looking for in an issue of *Flying Aces*, which probably published more of these little skeeters than all the other magazines combined.

That's what happened this month, and we came across the Zephyr in the December 1936 issue of *F.A.* It was designed by a fellow by the name of Abe Bergman, and while he may not rank on a par with such greats as Carl Goldberg or Sal Taibi, ol' Abe sure knew how to design an attractive little model. One of the problems with publishing a model like this is that you can't say for sure just how the thing is going to fly . . . unless you build one and find out. And since we had two weeks before the magazine was due at the printer, and since I was between projects and had nothing else to do, I decided to do just that. Besides, it's been a good six or seven years since I've built anything like this, and it would be a good change of pace from so many R/C projects.

I have to admit that I did change the construction, in the interest of having a stronger model. Take a look at the plan,

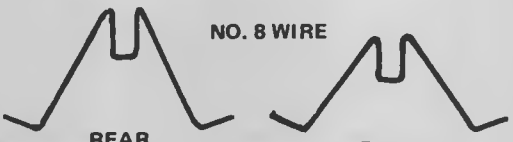
Continued on page 97



ALL WING, STAB & RUDDER PARTS FROM 1/16" BALSA SHT.

L.G.

NO. 8 WIRE



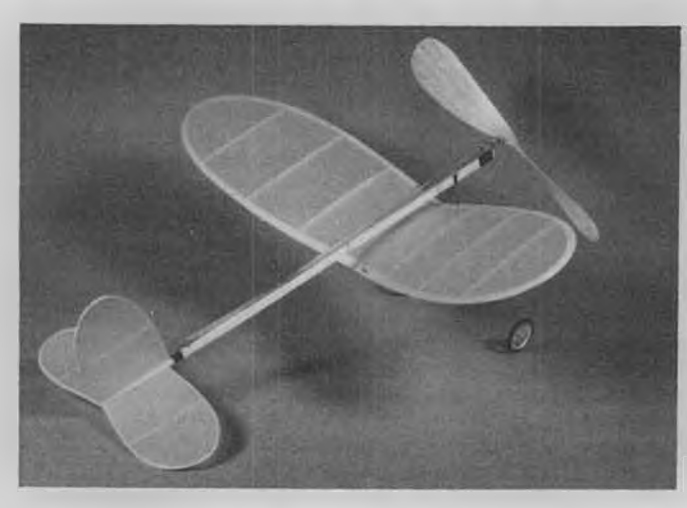
WING CLIP

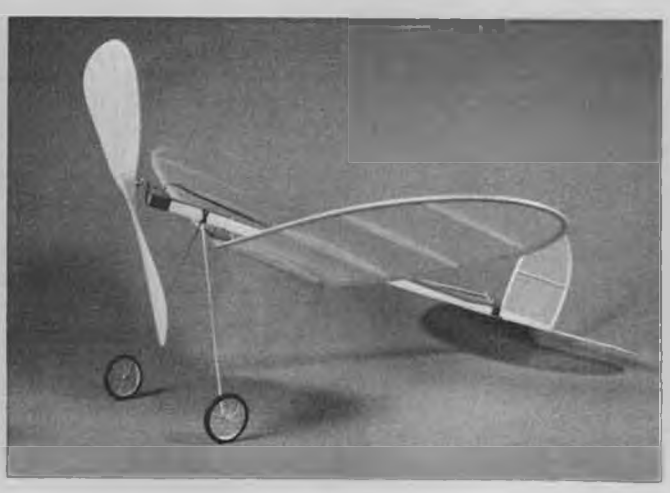
DESIGNED BY:
ABE BERGMAN

ZEPHYR

PUBLISHED IN
DEC. 1936 F.A.

2-1/4" DIHEDRAL
EACH TIP





MAMMOTH SCALE

By RON SHETTLER

PHOTOS BY AUTHOR

• BREAKTHROUGH! One of the hardest "secrets" in the world for people to keep, whether they be scientists, engineers, doctors, or manufacturers, is the knowledge of a product or technique which appears to help reduce a problem in their field *though they had not checked out the side effects first.* It is doubly hard when leaks via the grapevine, news media, etc. get the facts wrong, promise more than is possible, and create a flurry among unqualified do-it-yourselfers, which could cause an extreme safety hazard in the hands of those who mean well but simply do not have the qualifications to do the job safely or realize the full implications of what could happen if they goof. No, we are not talking about a cure for cancer, but like treatments and medicines available for this human problem today, Dario Brisighella's overbalanced flywheel does help the Quadra engine in a problem which is shared by all single-cylinder reciprocating engines today, that of not being able to totally balance out the forces, which we call "vibration" as a catch-all term. This type of overbalance will not help all other engines, as each design has its own separate problems.

In overbalancing a flywheel or in doing any flywheel modification you open up a can of worms. Flywheels, like steam boilers, are to be treated with great respect because a failure is a catastrophe which could result in serious injury, or worse. Hence, flywheels are designed by some of the most careful, qualified engineers in the business, and it doesn't end there. *Production* flywheels must pass a rigorous burst test where the flywheel is run up to speeds which are far beyond its normal intended use in order to provide a safety factor. This safety factor is necessary to make allowances for possible defects not caught in production inspections, installations, or product use. *Any* modification to a flywheel necessitates that it be treated as a totally new design or product, and it must pass the same tests as a new design by the manufacturer.

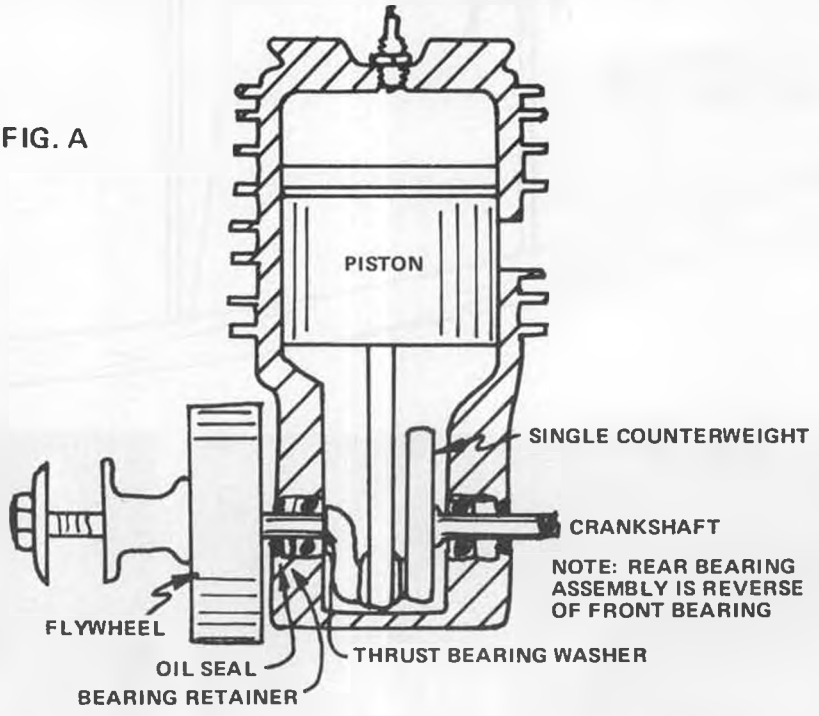
Dario knew what he was doing, had his math right, and the only thing that remained was to check the side effects. The time absorbed in this was, for us, probably the most frustrating period ever experienced by anyone. One of Dario's stock flywheels (purchased without his knowledge) was spin-tested to 24,000 rpm without failure by the manufacturer. This in itself was an engineering problem, as the delicate test equipment was designed to spin *balanced* flywheels, not deliberately unbalanced units. A special spindle with counterbalance had to be developed for this test. As a matter of interest, the engineers and specialists in the field, with years of experience with flywheels, *evacuate* the test chamber when a spin test is being performed. They no more trust the results of their extensive slide rule, formulae, or computer readouts than an experienced gunsmith trusts a weapon to a game of Russian roulette.

A second flywheel, also purchased without Dario's knowledge, was tested in actual running conditions. On this date, March 31, it has over 100 hours of gruelling test cell operation on it. Our concern for running this test was how the bearings, crankshaft, and other components would react to a stress which was not calculated into the original design. At this point in time, no problems have developed. We have emphasized that the modified flywheels were purchased without Dario's knowledge. This was done to ensure that we tested the product that the customer would normally receive. Whether Dario can maintain this standard of quality is up to him, and not within our control.

Present product liability claims have made all manufacturers wary (to say the least) of the possibility of lawsuits. If some of the money spent on legal protection could be used to engineer better products, we'd all be better off. If you could read some of the reports of claims made against manufacturer's products, you would seriously wonder if the user of these products was required to have any common sense at all. If an injury occurred as a result of the use of our product, legal protection by the use of disclaimers, insurance, adequate warnings, etc. wouldn't give us any satisfaction of a job well done if better design or more testing would have prevented it. The motivation required to produce any good product includes pride of workmanship and knowledge of customer appreciation. But *please*, unless you are prepared to spend a lot of money paying *qualified* people to certify your flywheel mod, *don't attempt to do it yourself.* In any case, you are not going to be able to improve on what Dario has done, and his exchange price of $10 plus $2 for postage is very reasonable for a custom job. Dario's address is: Dario Brisighella, 1032 E. Manitowoc Ave., Oak Creek, Wis. 53154 (Telephone 414-

TYPICAL LAYOUT FOR SINGLE PIECE ROD, SINGLE PIECE CRANK, DUAL BEARING SUPPORT OF SINGLE COUNTERWEIGHT

FIG. A



ADVANTAGES: SINGLE PIECE ROD AND CRANK (LONG LIFE, LIGHT WEIGHT, RESISTANT TO DAMAGE).

DISADVANTAGES: COUNTERWEIGHT NOT CENTERED UNDER PISTON AND ROD, RESULTING IN ENGINE NOT BEING AS CLOSELY BALANCED AS WITH A DUAL COUNTERWEIGHT. THIS DISADVANTAGE IS LARGELY OVERCOME WITH DARIO BRISIGHELLA'S MODIFIED FLYWHEEL.

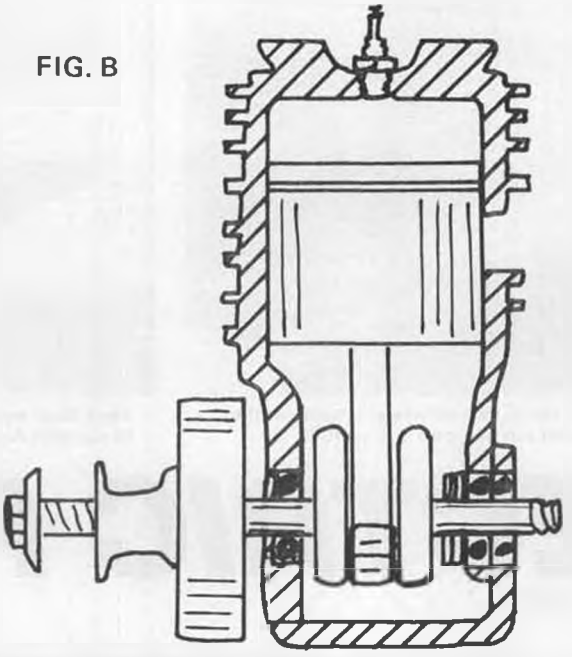
762-7155). Dario does not want to make a lifetime work out of this project, so we will be providing this mod on future engines and providing an exchange service as soon as possible. This is another case where a modeler using original thinking with the proper help and qualifications has rendered a service not only to modelers but possibly also to future engine design.

At this point it may be well to re-emphasize that Dario's mod is *not* a better balance job of a flywheel, and that the stock flywheel (used also on many other competitive products) specifications are well within the range where imbalance *of the flywheel itself* is not a significant contributing factor to what we broadly term vibration, irregardless of the product on which it is installed. It is rather a *deliberate unbalance* requiring considerable skill and knowledge. Advertising tends to point out the products best features only, but what the customer needs to know is all the facts, so here are some factual answers to the questions most asked us.

QUESTION: Is the Quadra flywheel mod absolutely necessary?
ANSWER: If your aircraft is built to suit the powerplant, no. Thousands of Quadra fliers around the world are using the engine as is and have run more hours on the airframe, radio, and engine than could normally be expected on a standard .60 powered aircraft without problems; however, the mod will reduce vibration problems.
QUESTION: Have some modelers experienced vibration problems?
ANSWER: Yes. This was usually traced to construction which was not suited to these large displacement engines. More care must be taken to ensure that wings, tail surfaces, and fuselage are properly mated together to form a total mass of weight, not several separate item loosely connected. Generally speaking, in single-cylinder engines, the larger the displacement the more severe the combination of forces add to what we term as "vibration amplitude."
QUESTION: If two or three horses are developed in a single-cylinder engine, isn't the destructive vibration damage equal, regardless of the size of the engine?
ANSWER: You're comparing apples and oranges. Shock of any kind is destructive, although the heavier amplitude, lower frequency vibration developed by large gas engines generally attacks items such as tail surface to fuselage joints, cowl attachment screws, "N" strut fittings, and canopies on thin-shelled fiberglass fuselages, etc. The higher frequency shock vibration at lower amplitude of standard model engines finds its way into radios, servos, and lighter weight objects such as wheel collars, glue joints, etc. As a point of interest, I've never had to clean the pots on my servos in a year and a half of steady use in my Quadra-powered models, whereas I had to do this about

Continued on page 98

FIG. B



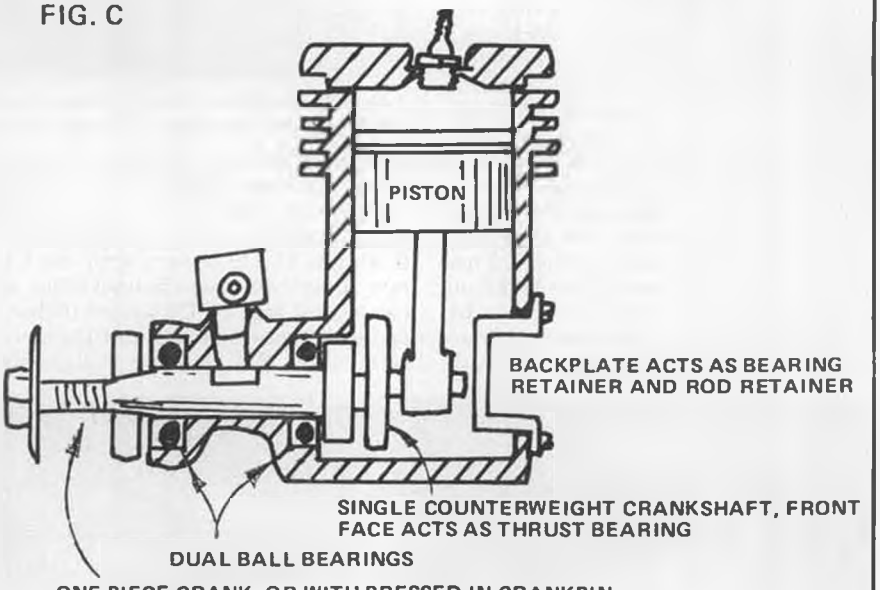
TWO PIECE ROD WITH DUAL COUNTERWEIGHTS

ADVANTAGES: BETTER BALANCE POSSIBLE IF BALANCE BETWEEN COUNTERWEIGHTS IS ACCURATE.

DISADVANTAGES: EASIER TO DAMAGE, HARDER TO MAINTAIN CRANK ALIGNMENT IF TWO PIECE HEAVIER ROD AND ROD BEARING ARE NOT TO STANDARD OF SINGLE PIECE ROD. POSSIBLE TO DISTORT ON ASSEMBLY. CAP ATTACHMENT SUBJECT TO FAILURE.

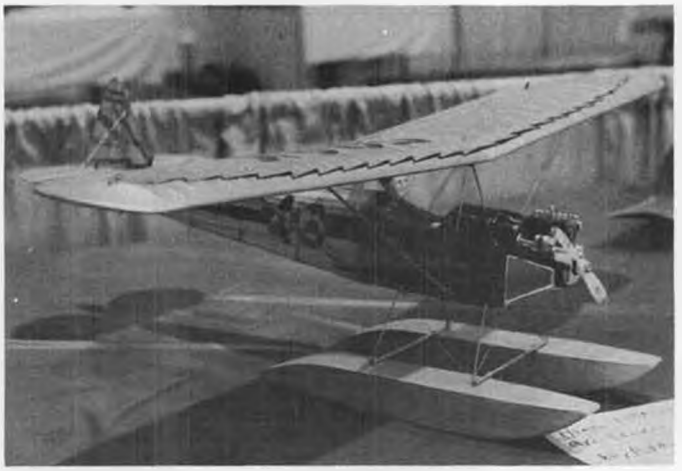
TYPICAL LAYOUT FOR CANTILEVERED CRANKSHAFT (SHAFT INDUCTION)
1 OR 2 PIECE CRANK, ONE PIECE ROD USED ON MOST MODEL ENGINES

FIG. C



ADVANTAGES: LIGHT WEIGHT, SIMPLE TO MANUFACTURE, SINGLE PIECE ROD, GOOD PRIMARY CHAMBER PUMPING ACTION.

DISADVANTAGES: WEAK ROD JOURNAL, ROD COULD RUB EXCESSIVELY ON BACKPLATE. BEST BALANCE NOT POSSIBLE.



Addie Naccarato's nicely-built Heath Parasol was on display at the Pasadena IMS show. Same model can be flown F/F or R/C.

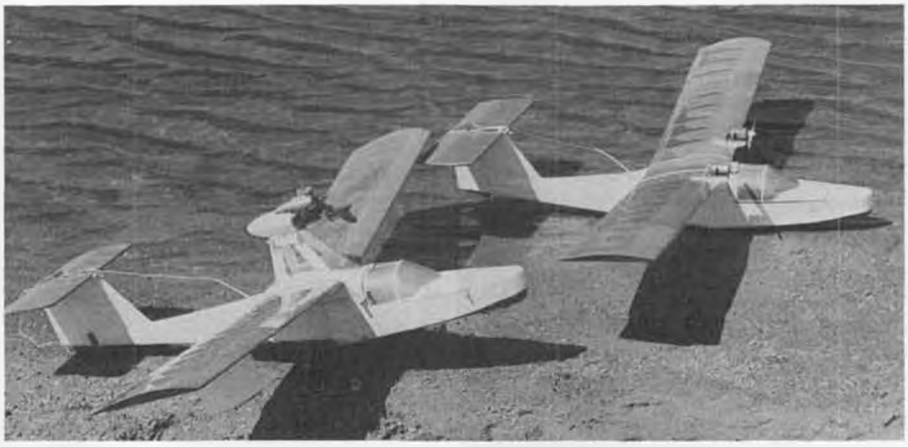
Hank West poses with his Hurricane and Mitch Poling's Me-109, both 14 oz. with Ace single channel and Astro 020. Both fly well.

ELECTRIC POWER

By MITCH POLING

PHOTOS BY AUTHOR

• Last month I said that I thought the Astro 020 was the most fun per minute than any other flying, and now I've just got to repeat that. I also think it is by far the most fun for the money, and the performance is even better than ever, thanks to a new bearing in front that boosts the power 15%. That is a hefty increase. I was unaware of the difference this change made when I wrote the last column, as I hadn't used the new model then (not really new, it has been on the market for a year). When I did start using it, my 020 planes acted like they had been supercharged. My Me-109 was going up at intercept speed until it was a dot in the sky, the Request was almost getting lost because it was going out of sight, and the Electric Tern, my 020 flying boat, now is capable of beautiful take-offs from water. I called Bob Boucher of Astro Flight to see if the motor was really as good as my planes were saying it was, or if suddenly the air was getting better! Bob confirmed that the 020 has picked up 800 rpm (now above 13,000 on a 5-1/4x3 prop), and that it was by accident! The new bearing was put in to beef up the front end to prevent crash damage. It did that, and gave the power boost too. Now, that is a lucky accident!



Two of Neil Whitman's original design seaplanes, both using the same fiberglass hull. Model in background has twin Astro 020's, one in front has an O.S. Max .10. Good fliers.

I think my Electric Tern is the smallest radio controlled plane capable of ROW. It weighs 15-1/2 ounces with the Cannon Super-Mini two-channel radio, and has a wing area of 178 square inches. It takes off beautifully in about 100 feet on calm water. Rough water is a problem because the wing tips catch in the water, and I cannot keep it on a straight course. I don't use the wing floats shown in the photo any more, as they create more problems than they solve. Once they catch, they are dug in for good. The only way to get a wing tip up while on the water is with rudder, and it is a lot easier to lift a wingtip than a sunken float, so that's the way I do it now. Nelson Whitman, who has more experience with electric flying boats than anyone else I know of, came to this conclusion long before I did. The photo of his twin Astro 020 flying boat shows no floats. It weighs 38 ounces, uses twin Astro 020's, and has a wing area of 371 square inches. Neil says it will take off from the water, but only marginally. That was a year ago. I'll bet with the new 020's it would ROW with no problems at all.

Bob Sliff was one of the brave souls who flew in the gusty winds at this year's Electric Championships at Mile Square Park. His Rearwin Speedster placed 4th, flies with Astro 15.

Addie Naccarato (T and A Hobbies, Burbank, Calif.) had a superb Heath Parasol on floats on display at the Pasadena IMS Show. It was built from the Gene Thomas Classic Model kit and is powered by the Astro 020. Addie covered it with silk and dope and put on

Larry Jolly won the Powered Sailplane event at the Electric Champs with his Electro Lite. All Electric Champs photos by Bob Boucher.

Bob Sliff steadies his Playboy Cabin in the stiff wind. The Astro 10 powered model won 1st in the Old Timer event.

a lot of scale detail, and still came up with only 13 ounces for the free flight set-up with floats. It even has a pilot! Addie also plans to fly it R/C with the Cannon Mini two-channel radio. In this configuration, it should weigh about 18 ounces, quite reasonable for the 020. I'll bet that it will take off from the water, especially with all the wing area it has, about 260 square inches (37-1/2 inch span).

It looks like I started to write about 020 planes in general and wound up writing about 020 seaplanes instead! Seaplanes are neat and a challenge, plus I live near a lake, so it is hard to resist! The Electric Tern makes a pretty sight as it lifts off from its takeoff run, much more exciting than taking off from land. Anyhow, the seaplanes do great with the 020, so you can bet other designs will, too. Tony Naccarato suggested that a scaled-down Custom Privateer or Chet Lanzo's Puss Moth with Hal Cover's floats (plans available from **Model Builder**) would also make excellent electric seaplanes. I think so too; let me know if you try it!

So far, most of the 020 planes I have described are controlled by the Cannon Mini two-channel system. The 020 will haul a heavy two-channel radio, but performance drops off considerably once the weight goes over 18 ounces. I strongly recommend either the Ace R/O pulse or the mini digital systems for the best performance with the Astro 020. I have used the Cannon Super-Mini system for almost three years, and I recommend it. The two-channel set-up is less than four ounces; less than the receiver battery pack weight in some other systems! If you are handy with kits, you can save some money by ordering the Cannon set as a kit from Cannon Electronics (13400-26 Saticoy St., North Hollywood, CA 91605). The kit includes airborne Ni-Cds and a dry transmitter pack. The Dunham super-mini servo is standard with this kit, but I think the Bantam Midget is offered as an option. I do perfer the Bantam Midget servos, as they are very fast, powerful, have an excellent mechanical design, and have the low profile that is so important in small planes (not much headroom!). I have built these kits, and I am quite pleased with their performance. If you have assembled kits before, the directions are sufficient; if you are a beginner at kits, I recommend help and advice from someone who has had experience. The transmitter is a delight; besides having a very powerful output and excellent range, it has a very good stick feel, and is light and easy to hold. It is compact and goes easily into my field box.

Mr. Astro Flight himself, Bob Boucher, took 2nd in Scale at the Electric Champs with this 69-inch Porterfield Collegiate. Bob plans to kit this one soon . . . watch for it.

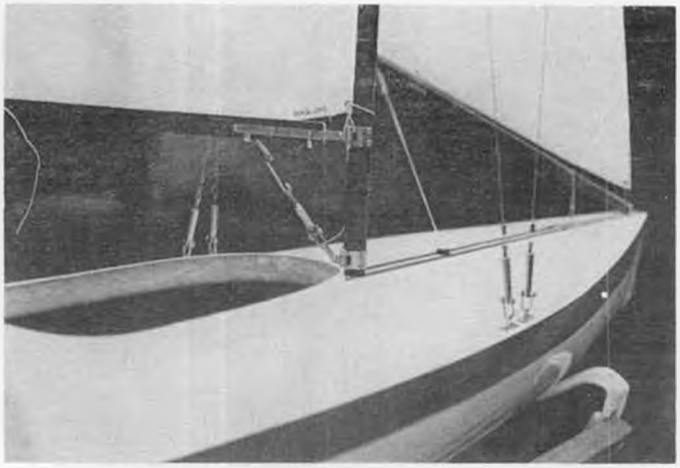
The Dunham and Bantam Midget servos are also available from Ace R/C (Box 511B, Higginsville, MO 64037), Novak Electronics (1915A, S. Evergreen St., Santa Ana, CA 92707), and Litco Systems (Box 90, E. Hanover, NJ 07936). I have assembled both servo types from the Ace kits, and the directions for the kits are quite good. As mentioned before, I strongly recommend the Bantam Midget, as it is the best servo, midget or otherwise, that I have ever used. There is

Continued on page 101

These P-68's by Kevin Flynn (model in foreground) and John Sczary captured 1st and 5th places respectively in Scale.

Steve Neu won 1st in Aerobatics and 3rd in scale with his little Cessna Conquest, powered by two Astro 020's. Excellent flier.

Terry Allen's 36/600 shows deep bulb and vertical stem common to length-controlled (36-inch) formula classes.



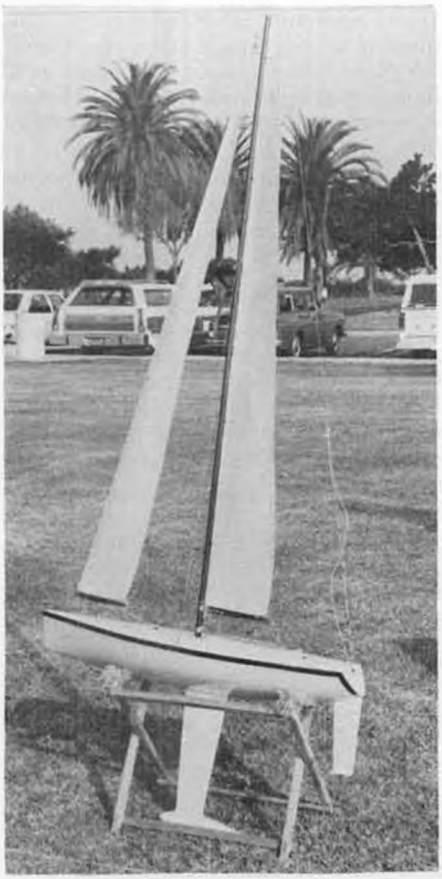
Boom Vang arrangement is strong, easily adjustable, and can be assembled from commercially available parts.

PHOTOS BY CHUCK BLACK

STRICTLY SAIL

By ROD CARR

• During the winter months there is a usual upsurge of interest in hull design. I have received a number of inquiries this past season that seem to show a lot of common misconceptions. It has become popular to try to fit a design to serve in two different AMYA formula classes. The 50/800's and 36/600's are the likely candidates for such fiddling. This column will explore the essential characteristics of sail area, length, and displacement. I hope the result will convince budding naval architects that single enlargement or reduction is *not* the way to go about such a project.



Jim Gale's 36/600 MAGIC DRAGON sports a carbon fiber mast and unusually high aspect ratio sailplan.

For an example, let us consider the scaling up of a 36/600 DIEGAN into the 50/800 class. All comments and formulae can be arranged to accommodate going between any two classes. One will be saved a lot of time and materials if he will take the time to do the calculations first, and slap fiberglass second.

Our first consideration is the existence of scale factors for lengths, areas, and volumes. Pretend that we own a boat which has a hull which is a 1-inch cube, and a 1-inch square sail, and displaces 1 pound. Let us enlarge it by doubling all the dimensions.

Note that the length doubles, and we can find any length on the bigger boat by multiplying the corresponding little boat length (such as the beam) times the scale factor of 2. Area is similarly determined, but the scale factor is 4, or 2 squared. The displacement goes from 1 pound to 8 pounds (1 lb. x 8), even though the length only doubles. This is because displacement is volume of water displaced and varies by the cube or third power of the length scale factor. In summary, by doubling the length of our 1-inch boat, we have simultaneously increased the sail area *4 times* and upped the displacement *8 times*.

In order to assess the effect on performance, it is helpful to utilize a few ratios. First is the displacement/length ratio. The displacement in pounds is divided by the overall length in inches. The answer is the number of pounds per inch of length. It tells us whether a boat has a heavy displacement or light displacement. Planning hulls should tend toward the latter. The use of this ratio allows comparison of different classes of boats. In figure 1, a representative sample is plotted. We see that not only

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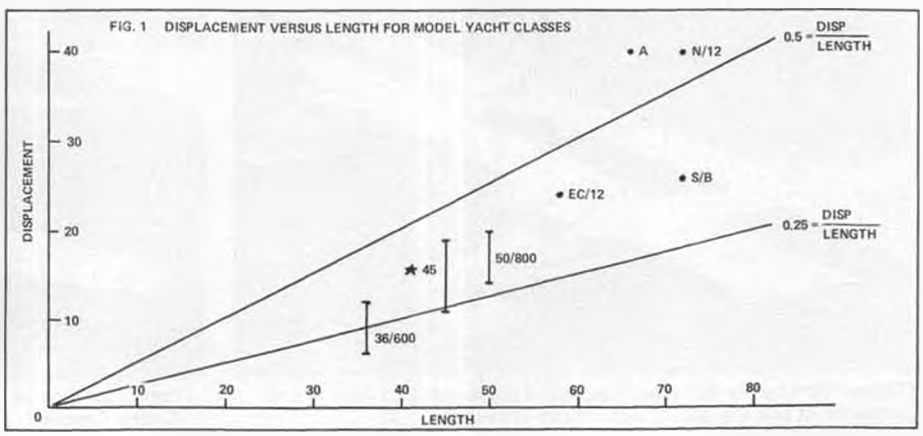
WHAT HAPPENS TO LENGTH, AREA, AND VOLUME WHEN SCALING UP OR DOWN

	1" BOAT	2" BOAT	SCALE FACTOR
Length	1"	2"	2 = (2)
Area	1"×1" = 1 sq. in.	2"×2" = 4 sq. in.	4 = (2^2)
Volume	1"×1"×1" = 1 cu. in.	2"×2"×2" = 8 cu. in.	8 = (2^3)

FIG. 1 DISPLACEMENT VERSUS LENGTH FOR MODEL YACHT CLASSES



Last year's Interscope Porsche 934, 1/8-scale gas car, built for Danny Ongais. Ted Field, Mr. Interscope, on left.

A 1/8-scale Interscope Porsche 934 at Riverside International Raceway during a full-scale practice session.

R/C AUTO NEWS

By CHUCK HALLUM

• The 1/12 scale R/C cars have really taken off since electrics were introduced. I felt originally that 1/12 scale cars (gas) were more fun and much less costly than 1/8 scale cars. In fact, I really learned how to turn right and left going in all directions with a 1/12 scale car. Shortly after the electrics came out, I stated that eventually 1/12 scale would go all-electric. It seems to be going that way.

One-twelvth scale electric R/C cars and racing are entirely different in nature than 1/8 cars and racing. With 1/8 cars you've got the starting, idle setting, clutch, fuel, and the mess to worry about. On a 1/12 electric car, after it is charged off the your automobile battery, you put it on the track and off you go for about 10 minutes. It's a ball . . . no idle problems, no overheating problems . . . just drive until the car quits. The only problem is that you have to wait 20 to 30 minutes before you can do it again. When you are testing and making car adjustments, this wait can be a pain. On other occasions, the charge time allows you to relax and shoot the bull with other drivers.

In general, the 1/12 electric cars handle better than the 1/8 gas car because the electrics are relatively heavier and/or have less power for their weight. The lower power-to-weight ratio really makes the competition pretty close in the races. About the only time there are controllability problems is on the low speed corners and starting, when motors torque is high. The motor has enough torque to cause low speed spin-out problems until just before the batteries conk out.

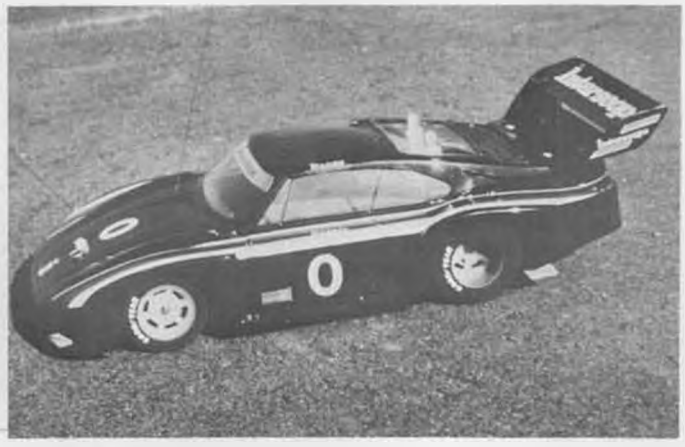
From a performance standpoint, the mid-motor layouts look like they perform much better than the cars with the motor behind the axle, but both are fun to drive and the older behind-the-axle motor cars are a little cheaper. Many competition electric car manufacturers are turning out cars as fast as they can make them. And most of these machines really go. There are lots of toy R/C electric cars that really can't take a beating . . . like in competition . . . but with their low price, they really sell around Christmas time. My bag would be the competition cars, of course. I appreciate performance, not mass production cost-cutting.

I've only driven two electric cars myself, but watched quite a few. Since the competition is really close in both production and modified classes, any advantages can really help. From a single approach, the general areas for advantages are: 1) Driving, 2) Power/speed, 3) Handling, and 4) Reliability. The 1/12 scale electric car is really a constrained trade-off of the first three times. Reliability is always a factor and means doing a lot of preparation and practice to determine weak or wear points and get experience with the car.

In all classes the trade is really between top end speed, which really zaps the batteries at low speed, and initial acceleration, which makes the car a handful initially and during low speed acceleration . . . but the batteries last longer. Of course, in the modified classes, if the batteries last more than about 8-1/2 minutes, you'll start rewinding again or changing gear ratio. Depending on the gearing you have chosen, you have to get the car set up properly. That means weight, weight location, tires, steering geometry, aerodynamics, etc., etc.

Almost everybody realizes that with a fixed amount of energy and a given time to disipate it, minimum weight is important. Everything that isn't necessary or required goes (that is, it is taken out of the car). Weight location and tires you'll have to experiment with, but I'd guess a

The Belcher Racing Porsche 935 belonging to Gary Belcher. Body sports some handmade Trimcote decals (see text).



A 1/12-scale electric car with Interscope Porsche 935 body detailing. Construction details in text.

60/40 rear/front weight distribution and possibly not a super low C.G. to control the bottom end torque. On steering geometry, be sure all wheels are pointing in the right direction . . . don't use any extra toe-in, all it does is slow the car and throw away power. Aerodynamics is something that most people talk about but really don't do enough about.

I'm going to give you a whole paragraph about aerodynamics, as related to me by a close friend, Chuck Kimbrough (1/8 steel clutch shoes, new 1/12 steering servo saver, etc.). When he puts his car on the track it looks like a 1/16 car because it is LOW. People notice, but don't realize that that is why it leaves them in the dust on the back straight because of the decreased drag. Several people have asked Chuck if they could use his engine, but it doesn't tach out on the dyno any better. Chuck also experimented with the rear wing and found he consistently lost about 30 seconds of running time just putting about 10° more angle on the wing. That tells you how important drag is in 1/12 scale electric cars.

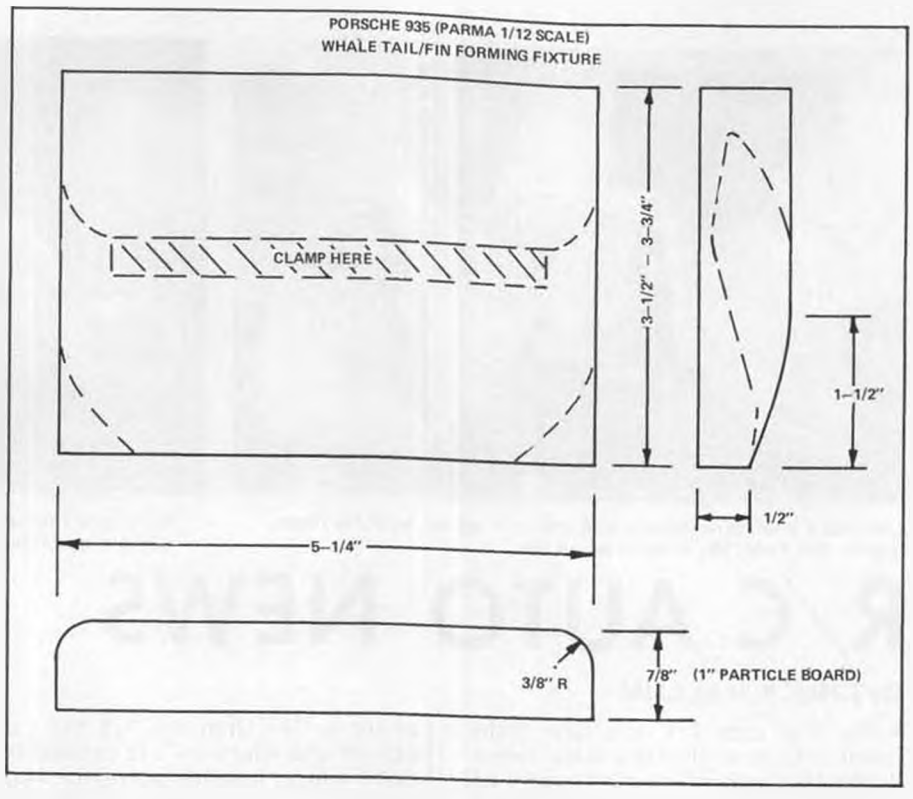
Differentials are making a big hit in 1/8 scale cars. Will they come in to 1/12 scale? Certainly differentials control power oversteer, but maybe go too far. One electric car currently has a differential, and several individuals are trying them out. But time will tell if a real advantage can be shown by the differentials. Other than that, most competition 1/12 electric cars are pretty standard in their design.

One other thing that is a necessity on the electrics is front wheel bearings. In 1/8 scale gas cars there is so much power available, and fuel consumption is of little concern, that a slight drag increase is not much of a penalty. But on electric competition cars, with their limits, a slight drag is very important.

There are quite a few other details that I see and hear the racers working on to get that last little bit of performance from their cars. Time will tell if any of these ideas are really good.

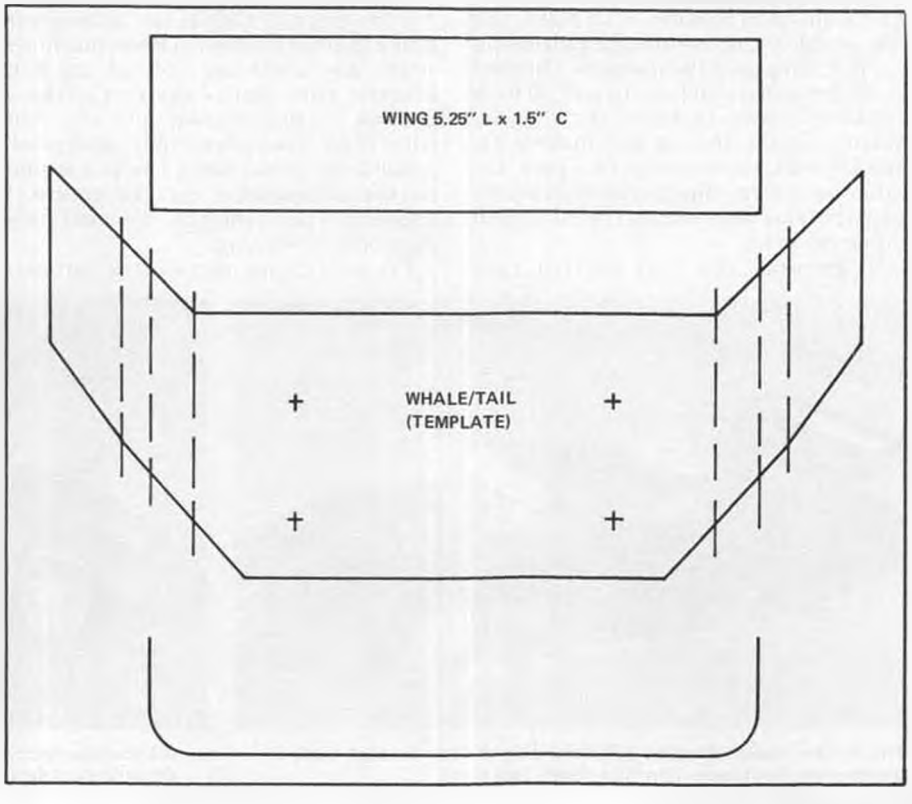
* * *

There are a couple of pictures of cars which I built for Danny Ongais. During the off season (hah) I get a change of pace making cars like these. I started with a PARMA 935 Porsche. In order to make the 1/12 scale cars more reailistic, I fabricated a whale tail/wing using a wooden form. Sketches of the form and wing parts are shown in a couple of the figures. I cut the whale-tail from 1/16-inch Lexan, clamped it to the form (at the rear), carefully heated it with a heat gun and pressed it around the form with a small wooden block. Try to heat the Lexan slowly and uniformly or you might blister it. After forming, sand the wing parts to prepare them for painting before putting them together. Put doublers (or small angles) between the wing and tail fins for strength. Now it's time to paint the tail/wing assembly. When it is completely dry it can be pop-riveted to the body.

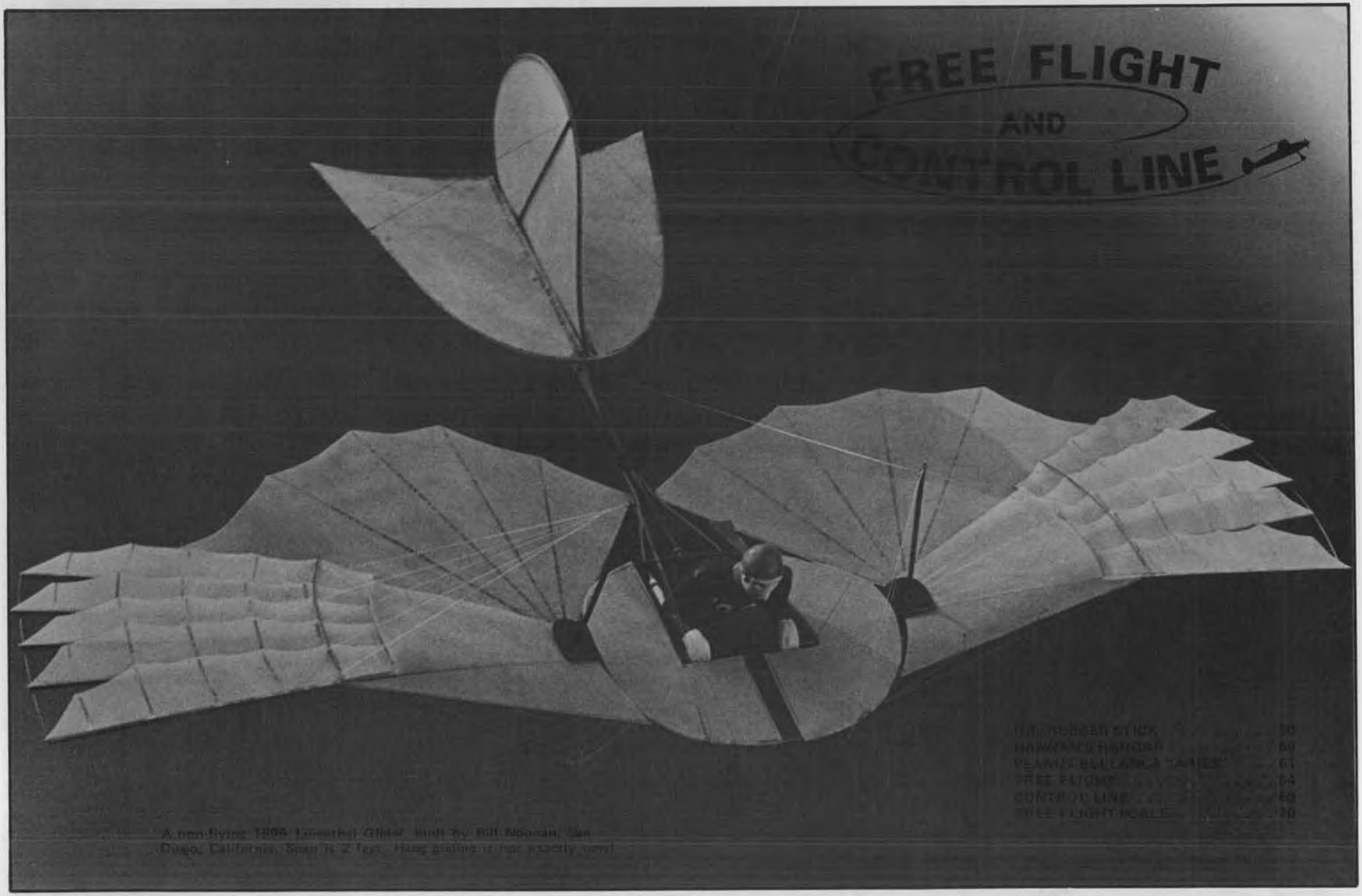


I had quite a bit of fun putting on the details. On the Interscope car I used ChartPak rub-on letters and then put a coat of clear polyurethane over them. Some of the striping is color slide opaque striping on white Trimcote, then cut to size to give the white stripe around the color stripes. The fun part is when you finish . . . and it looks good.

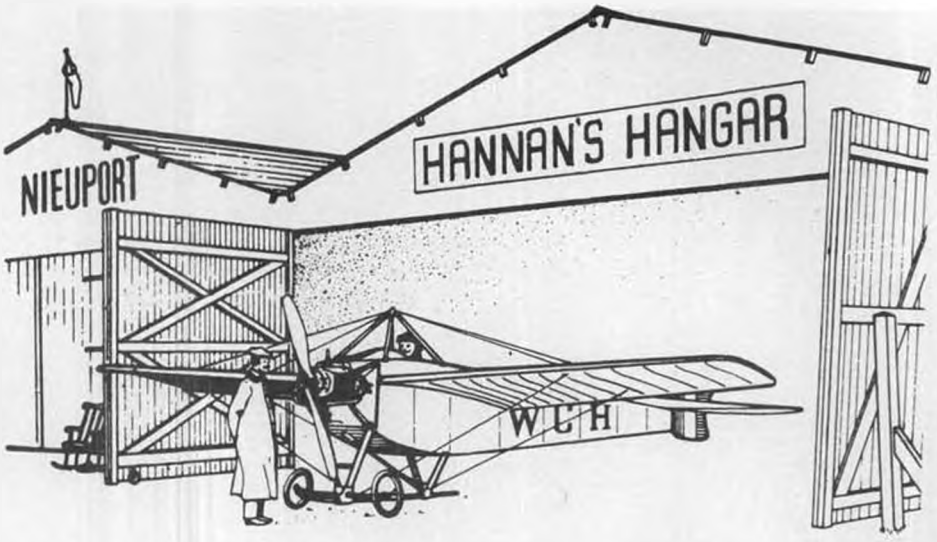
So if you're building a 1/12 scale electric car . . . have fun. But be sure to pay attention to the small details, such as wheel bearing friction, toe-in, etc., because that may be the difference between winning and losing. And don't forget that practice, practice, practice makes perfect. One spin-out can cost the race too, so easy does it. •



FREE FLIGHT AND CONTROL LINE



A non-flying 1899 Lilienthal Glider built by Bill Noonan, San Diego, California. Span is 2 feet. Hang gliders it not exactly new!



"Cups and medals tarnish. Knowledge and skill last a lifetime."

• Our thought-provoking lead-in line this month is from the Jasco Catalogue & Handbook No. 7, as reprinted by Ira Keeler.

CROSSWINDS

From an editorial by Dennis O. Norman, of the Cleveland Free Flight Society, we abstracted this inspirational message: "Ours is a tiny fraternity and yet its size and the distance separating the individuals has drawn us closer together and enhanced our love of the gentle, constructive, and inspiring pastime which we share. So much of life is beyond our control and frustrating. It is good that we have found an activity that permits us to create fragile things of beauty which we can share with all those who care to share them with us." Amen!

MUSEUM NEWS

The relatively new "Flying For Fun" display in the National Air and Space Museum, Washington, D.C., continues to be a most popular attraction. Featured are hang gliders, boomerangs, kites, frisbees, an Aeronca C-2, and flying model aircraft. We understand this latter class was largely the inspiration of curator Bob Mikesh, who constructed some of the models during his youth. Bob also published 3-view drawings in model mags many years ago, incidentally.

One type of model displayed caused unanticipated controversy: It seems cruelty-to-animal prevention-minded people complained about the fly-powered models. Edwards Park, writing in *Smithsonian* magazine, warded off the flak this way: "Cruel to the flies? Nonsense! Getting up in a tiny little airplane would be more fun for them than getting swatted on the kitchen linoleum." Of course, we have yet to hear a response from a fly's point of view. . .

Bob Farrenkopf wrote in to tell us of his recent visit to the U.S. Air Force Museum in Ohio, where exhibits are being continually improved and expanded. Among the aircraft acquired are an O-47B, Helio U-10D, Stinson L-1, Me 262, Me 109, PT-17, and a World War One Cacquot observation balloon. The AF Museum is also well-known for its extensive collection of models and aircraft accessories.

Meanwhile, work continues on the San Diego, California Aerospace Museum. While progress on the building is behind schedule, donations of money, aircraft, and memorabilia for the massive reconstruction program have been most gratifying. The Spirit of St. Louis reproduction is ready to go, and

Continued on page 103

The Peanut King himself, Walt Mooney, examines his latest creation, a 1924 Czech "Kunkadlo." Photo by Fudo Takagi.

Well-known modeler Bill Watson is seen here rolling a structural tube of carbon fiber for the Gossamer Albatross.

Gossamer Albatross pilot candidate, Dave Saks, shows one of the foam riblets. Black tube structure is fuselage frame.

The Gossamer Albatross is a marvel of construction and design. Spans 96 feet, yet weighs less than 60 pounds!

PHOTOS BY FUDO TAKAGI

Bellanca ARIES T-250

By WALT MOONEY . . . Walt's latest Peanut is a nice change of pace from the antique and WW-1 models seen recently. A good flier, too.

• Every year since the late forties, Frederick Warne (Publishers) Ltd. of Great Britain puts out an annual issue of "The Observer's Book of Aircraft." Compiled by William Green, with 3-view silhouettes by Dennis Punnett, these are a delightful source of information on the latest and most important aircraft in production. On page 27 of the 1978 issue is a three-view and data on the Bellanca Aries T-250.

Because the recent Peanut articles have been mostly on antique or WW-I aircraft, it seemed appropriate to select a modern aircraft for this month's design. The Bellanca Aries is a high-performance low-wing design with retractable tricycle landing gear and a T-tail. It is a very clean aircraft with its gear retracted and has an almost slab-sided fuselage, which lends itself to simple lightweight Peanut construction.

With the exception of the dihedral angle, which has been increased slightly, there are no intentional deviations from the scale configuration. The model shown in the photos weighs 15 grams complete with a 14-inch loop of 3/32 flat brown Pirelli rubber, and has flown 57 seconds officially at a Flightmasters West indoor Peanut contest to take first place. This was in a basketball-court-sized Junior High School gymnasium with about a 25-foot ceiling. Most flights were on the order of 48 seconds, ending with an impact against a wall or a backboard. Finally it missed everything and threaded its way through five climbing ropes tied to a wall and managed to land on the floor for its best flight of the day.

It is not a superlight model and can be safely flown outdoors, where lights of over a minute have been consistently flown. Outside, a loop of 1/8-inch flat rubber is used for power. Because the rear motor peg is relatively far back, the larger motor requires a little ballast in the nose to maintain the CG shown.

The model is relatively simple to build, with no strange or exotic methods or techniques required in its construction.

All the structure is balsa. The comments on hard and firm balsa on the plans should be followed if (like me) you want a model that can be flown indoors and outside. If you have an indoor flying site continuously available, all the balsa sizes can be reduced slightly and all the nose cowling blocks hollowed out and a balsa prop carved, which should result in a model that weighs around 9 or 10 grams ready to fly, and is capable of significantly better indoor duration.

The model was covered with Japanese tissue and finished with two thin coats of dope on the wings and tail and three coats on the fuselage. Side windows are simulated with black tissue. The passenger silhouettes were cut out of the window area prior to doping them in place on the lighter-colored fuselage covering. The passengers' facial features were drawn in with colored felt pen after the final coat of dope.

The windshield has some compound curvature. It has to be made by vacuforming over a carved balsa mold if the proper shape is to be obtained. A simple wrap-around windshield can be used if a vacu-form is not available, with no detrimental effects on the flying capability and only a slight penalty from a scale standpoint.

Color trim was contrasting colored Japanese tissue. Movable surface outlines, baggage door outlines, cabin door outlines, landing gear retracted outline, and engine cooling air inlet are depicted with India ink.

Wheel locations in the extended condition are shown so that a model can be built with the gear down, if desired. The added weight and drag coupled with the smaller propeller will result in shorter flights, but the unassisted take-offs and landings that can then be made may increase your pleasure, so take your choice.

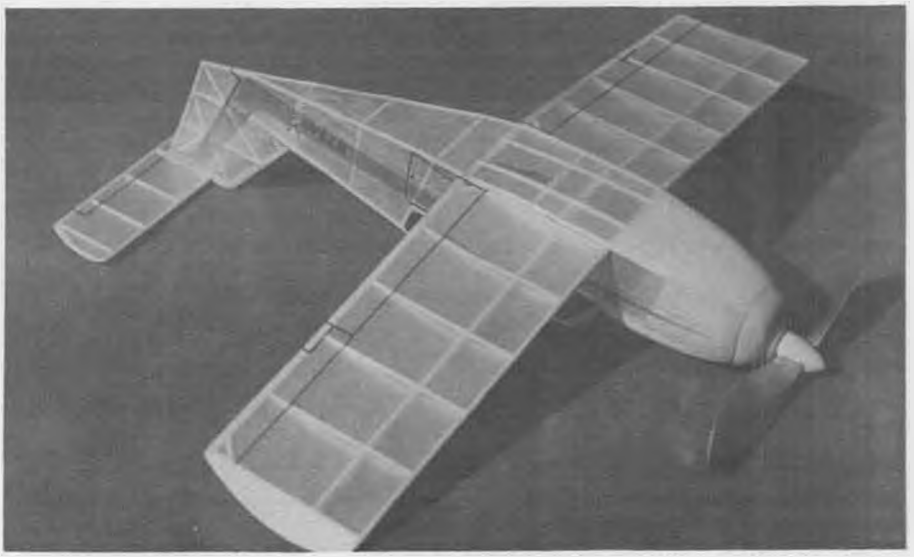
The model shown is adjusted for flight by the following adjustments. It flies in smooth left-hand circles, which tend to be tight in the beginning and wider as the motor runs down.

ADJUSTMENTS

1) Both wings are washed out about 1/8 inch at the tips. That is, the trailing edge is higher at the tips that at the fuselage. This results in a smaller angle of attack at the tips and elminates tip stalling.

2) The propeller is adjusted to point slightly downward. This is called "down thrust" and is drawn on the plan. It keeps the model from pitching up under high power settings. The stronger the rubber motor, the more down thrust is likely to be needed.

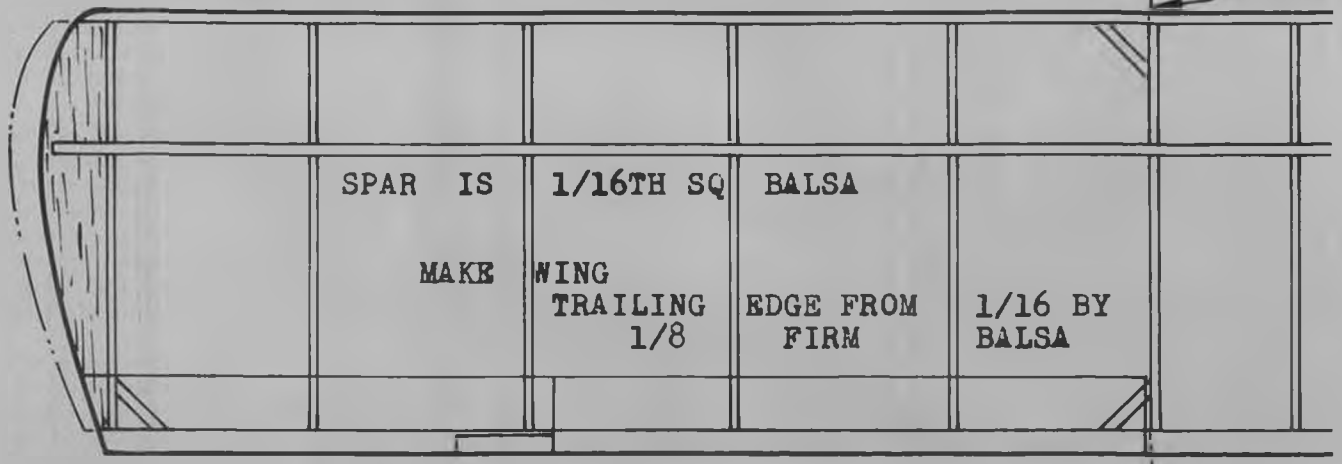
Continued on page 106



Underside shot shows the sliced ribs and relatively simple overall construction. Best flight so far has been 57 seconds at a recent Flightmasters West indoor Peanut contest.

MAKE THE WING LEADING EDGE FROM FIRM TO HARD 1/16 BY 1/8 BALSA. AFTER ASSEMBLY CARVE AND SANDPAPER TO RADIUS.

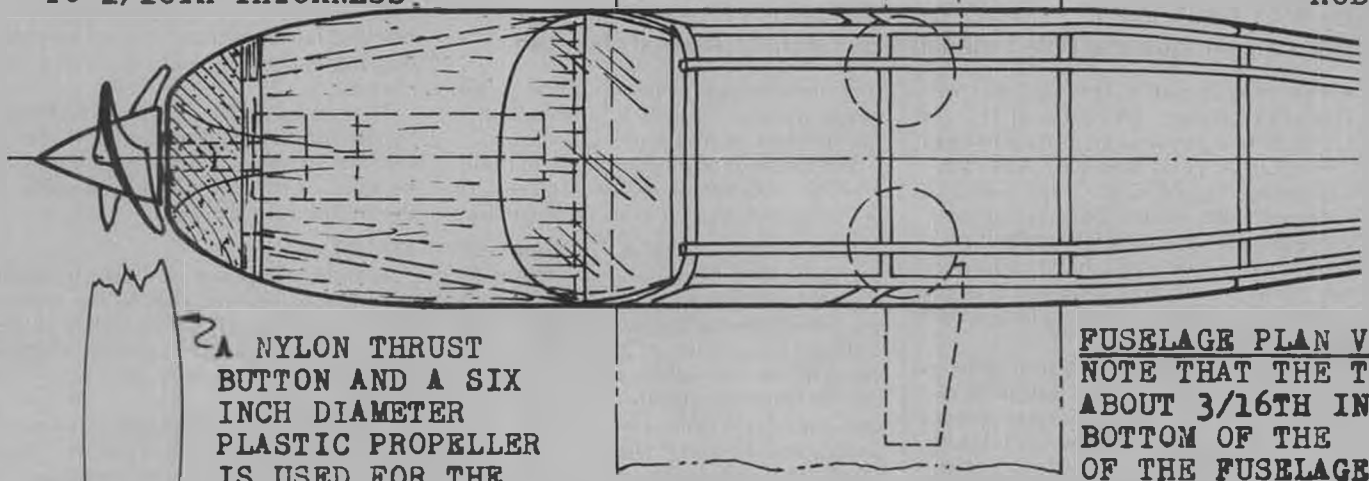
DIHEDRAL BREAKS



WING PLAN

BALSA BLOCKS ARE USED TO MAKE THE ENGINE COWL CONTOURS. USE MEDIUM TO SOFT BALSA AND HOLLOW OUT THE TOP COWL PIECE TO 1/16TH THICKNESS.

NOTE POSITION OF RETRACTED LANDING RUBBER

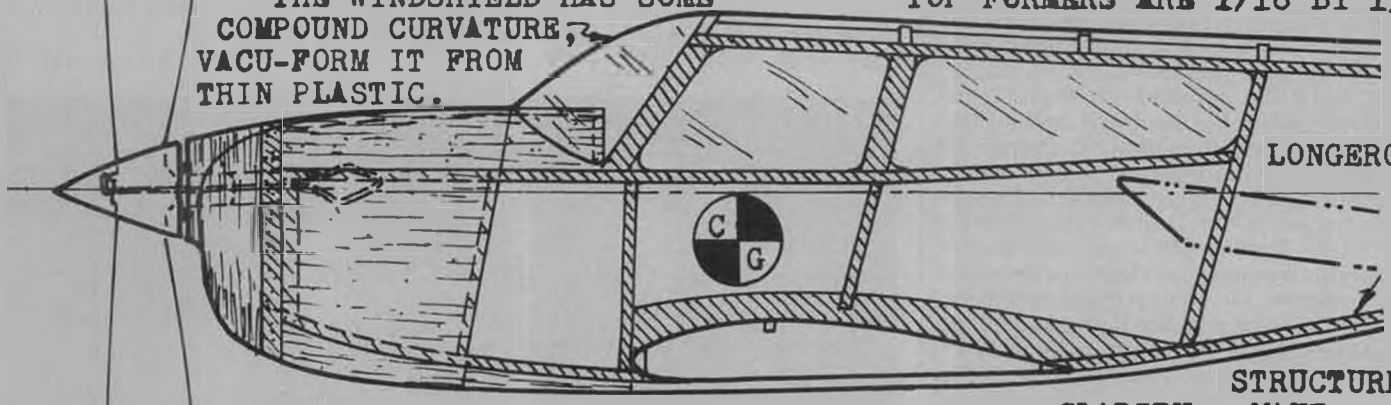


A NYLON THRUST BUTTON AND A SIX INCH DIAMETER PLASTIC PROPELLER IS USED FOR THE RETRACTED LANDING GEAR MODEL.

FUSELAGE PLAN VIEW
NOTE THAT THE TOP ABOUT 3/16TH INCH BOTTOM OF THE OF THE FUSELAGE.

THE WINDSHIELD HAS SOME COMPOUND CURVATURE, VACU-FORM IT FROM THIN PLASTIC.

EXCEPT FOR THE WINDSHIELD TOP FORMERS ARE 1/16 BY 1/8

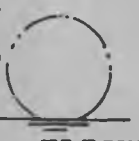


LONGERONS

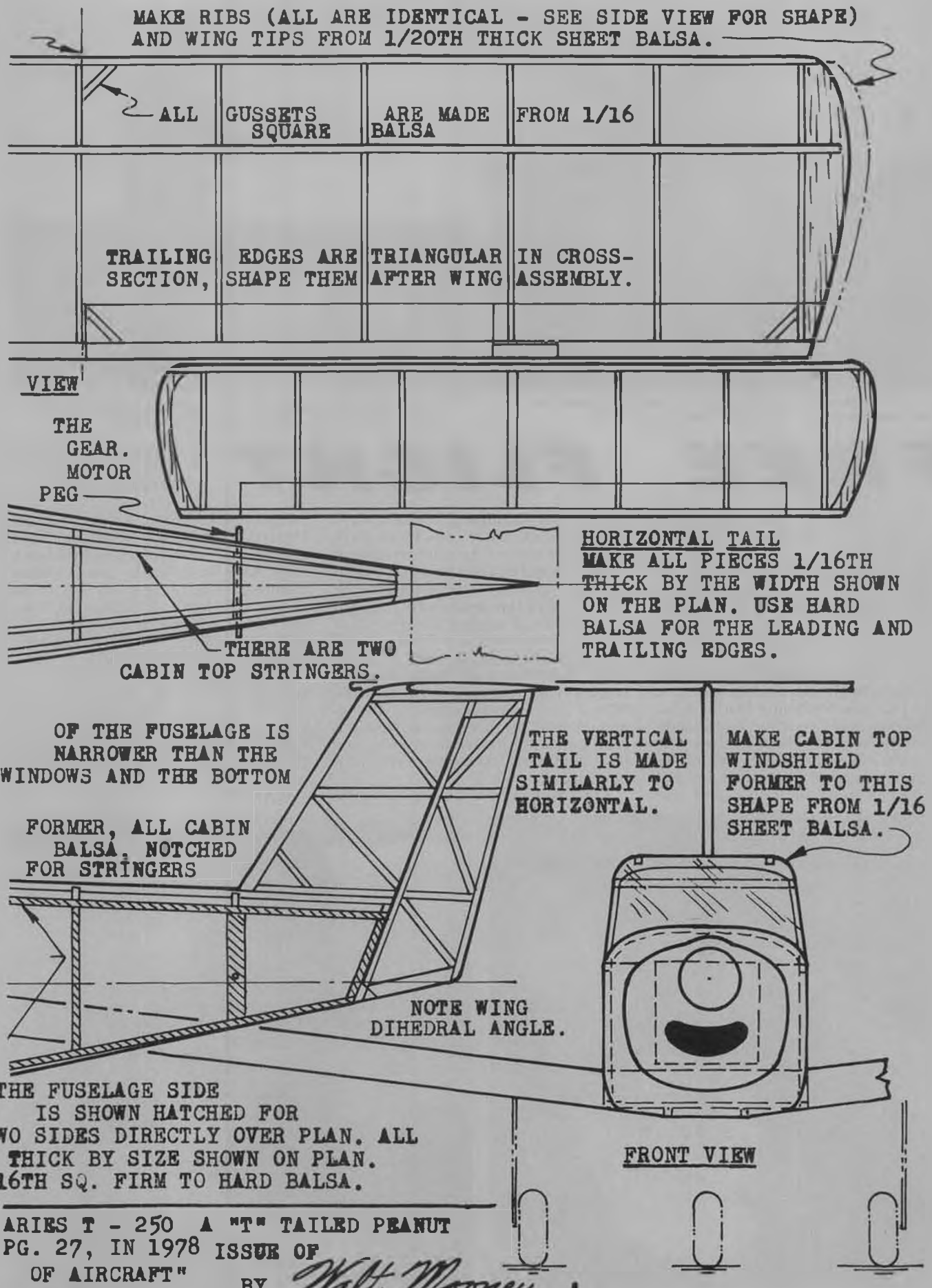
STRUCTURE CLARITY. MAKE PARTS ARE 1/16TH LONGERONS ARE

FUSELAGE SIDE VIEW

WHEEL LOCATIONS ARE SHOWN FOR THOSE WHO WANT TO MAKE AN EXTENDED LANDING GEAR VERSION. A SHORTER PROP WILL BE REQUIRED FOR R.O.G. FLIGHTS.



BELLANCA 3 VIEW, "OBSERVERS BOOK W. GREEN & D.



ARIES T - 250 A "T" TAILED PEANUT
PG. 27, IN 1978 ISSUE OF
OF AIRCRAFT"
PUNNETT BY Walt Mooney

Even a Misery Meet can have bad weather. Steve Helmick demonstrates wind strength while holding Guntis Seitins' A/2.

John Landerman with Wakefield at postponed Misery Meet. See text for his comments on Wake props and front ends.

FREE FLIGHT

by TOM HUTCHINSON

PHOTOS BY AUTHOR

• A couple of weeks after sending in my last column, word about our missing FAI Team Selection Program did make it across the Oregon Trail to my doorstep. While it isn't exactly official yet, I'm sure the following program will be approved (there isn't time for any changes, actually) by the program participants.

If you'd like to try out for a spot on the 1981 U.S. FAI Free Flight Team, now is the time to begin. Start out by writing to AMA HQ (c/o Micheline Madison) for model processing vouchers and Qualification Performers Affidavits. Cost is $5 per event (No charge to Junior entrants). Fly your model at any scheduled FAI Qualification Trails (you could also obtain your Qualifying Affidavit from the Trails C.D., but it costs $6) or AMA sanctioned contest. A minimum score of 14 minutes out of a maximum of 7 flights qualifies you for the semi-finals to be held on Labor Day weekend of this year. A good enough score at the semi-finals will entitle you to fly at the final trials sometime next year. Oh, yes, the qualifying flights must be made between January 1 (retroactive) and August 14, 1979. If you've already exceeded the 14-minute time at an earlier contest this year, get your Affidavit from AMA, and have the C.D. at this contest verify your performance on it.

As far as the World Champs goes, the information I reported last month (from England's *Free Flight News*) has been verified by copies of correspondence from AMA supplied by present team members. You can get any details by writing Bill Hartill (7513 Sausalito, Canoga Park, CA 91304) or AMA HQ.

1979 NORTHWEST FAI SYMPOSIUM: WAKEFIELD DEVELOPMENTS

The following accounts were excerpted from the *Bat Sheet*, just about the most complete and informative free flight newsletter around. Send $3 to Tom Cashman, 2521 S.W. 323rd St., Federal Way, WA 98003, for 12 issues of droppings.

WAKEFIELD/UNLIMITED FRONT

"Bucket" Johnson of Montgomery, Alabama, with his Rebel flag Monokoted Class C "Centaur." Photo by Dave Linstrum.

Jeff Everson, of Miami, Florida, flew his Manhattan Cabin to 1st place in recent MIAMA meet. Dave Linstrum photo.

ENDS, by John Lenderman

The purpose of a front end is to allow the stored energy in the motor to drive the prop with a minimum amount of energy loss. Low friction is a necessity, as the motor exerts considerable pull. Alignment is critical; John estimates there is a 5-10% energy loss if side thrust is used with a single-bearing front end. Thus, a double-bearing arrangement is desirable, particularly in Coupe and Wakefield, where motor weight is limited. Currently, John uses the FAI Supply ball bearings, but notes a tendency to crush his noseblocks (ply/balsa/ply sandwich) on hard landings. Bob White reportedly settled on Teflon bearings after testing a variety of bearing types. The bearings should be far enough apart to assure proper alignment. It's hard to say what lubricant is best. The North Koreans used a very viscous grease, while John finds that 3-in-1 oil works fine.

Next consideration is the propeller. It must track smoothly with both blades in the same plane. Interchangeable blades and noseblocks are worth the extra effort. As far as variable pitch is concerned, John is skeptical. After experimenting for a year, Manny Andrade found the pitch that worked best was the one the blades were originally carved to.

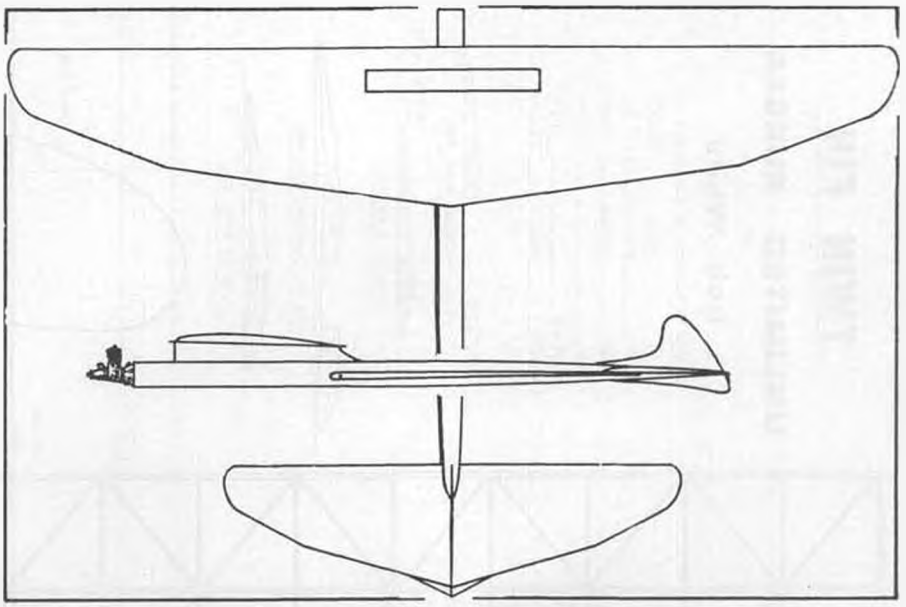
John has stayed with the tension type stop at the back of the noseblock rather than the newer Montreal stops. He feels the last 5% of the winds don't add duration and may even hurt if the resulting transition to glide is not smooth. Most Montreal stops let the motor unwind completely. If it is set to stop before completely unwinding, the resulting sudden stop can fling off the prop blades. There was some debate on this. Tom Cashman agreed with John, but Keith Martin thought all the winds were helpful, and Norm Beattie felt the torque curve dropped off so rapidly at the end of the motor run that any duration loss was minor.

Some final suggestions John had were: 1) Key the noseblock; 2) Once the noseblock is shimmed properly, glue the shims in place; 3) Rectangular fuselages may not look as pretty, but they are easier to build, align, and hold.

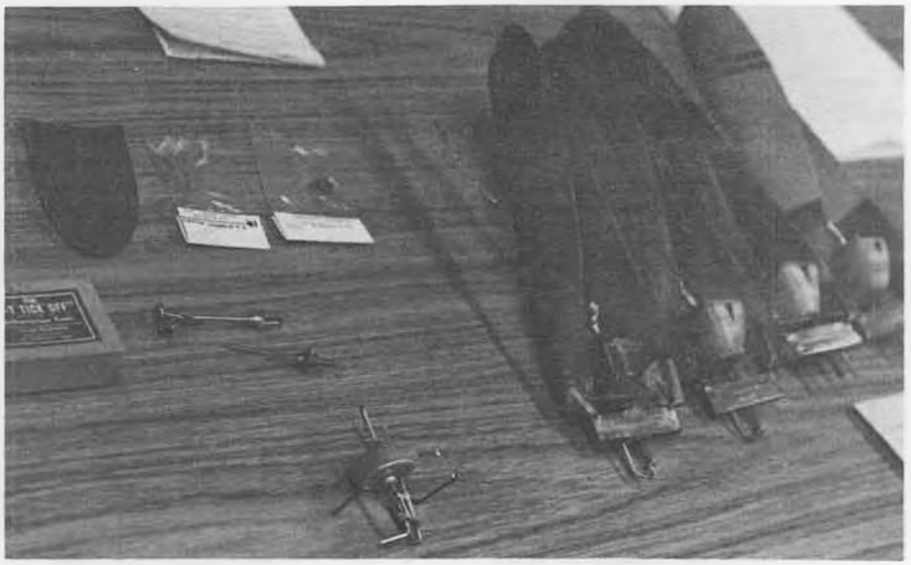
TORQUE-CONTROLLED TAILPLANE INCIDENCE, by Norm Beatty

There is no one right approach to Wakefield, Norm cautioned. For example, those trying to duplicate Walt Ghio's performance with his Finals-winning design may be disappointed unless they build a similarly super model, adjust it perfectly, use excellent rubber, and fly it on the right type of day. Norm's approach is different: a fast-climbing Wakefield with high pitch stability in the glide.

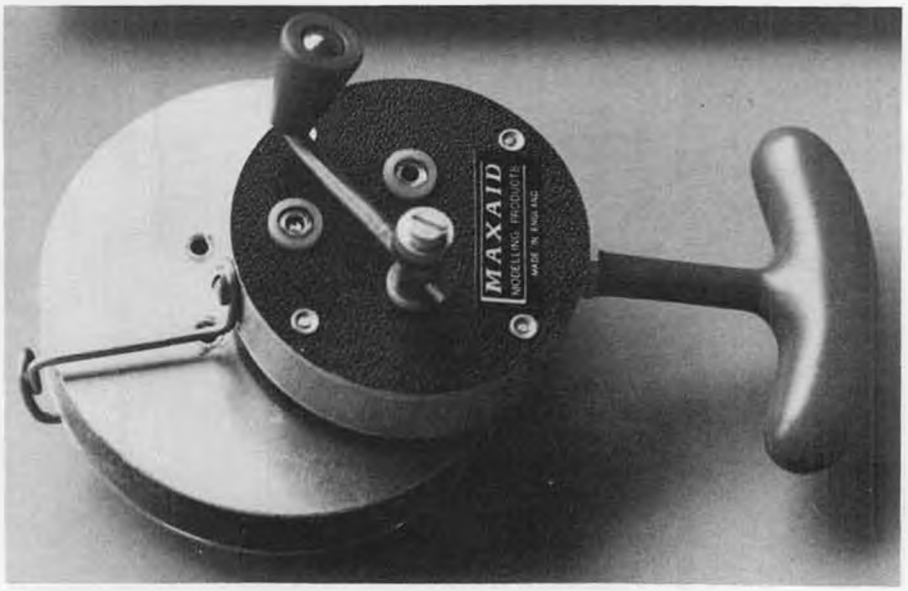
Frank Zaic pointed out in *Circular Airflow* that free flight models generally use rearward CG locations in an empirical compromise between pitch stability (requiring forward CG and higher incidence) and the ability to handle increased thrust without looping (rearward CG, lower incidence). Wakefields



JULY'S MYSTERY MODEL



Lineup of John Lenderman's Wakefield front ends and props shown at N.W. FAI Symposium.



Maxaid tow winch is a nicely designed, well-built unit. Details in text.

PLANS ORIGINALLY PUBLISHED IN JUNE 1973 *FLYING MODELS* MAGAZINE.
Full size plans available from FM. Order Plan No. CF-300, price $2.00.

TWIN FIN

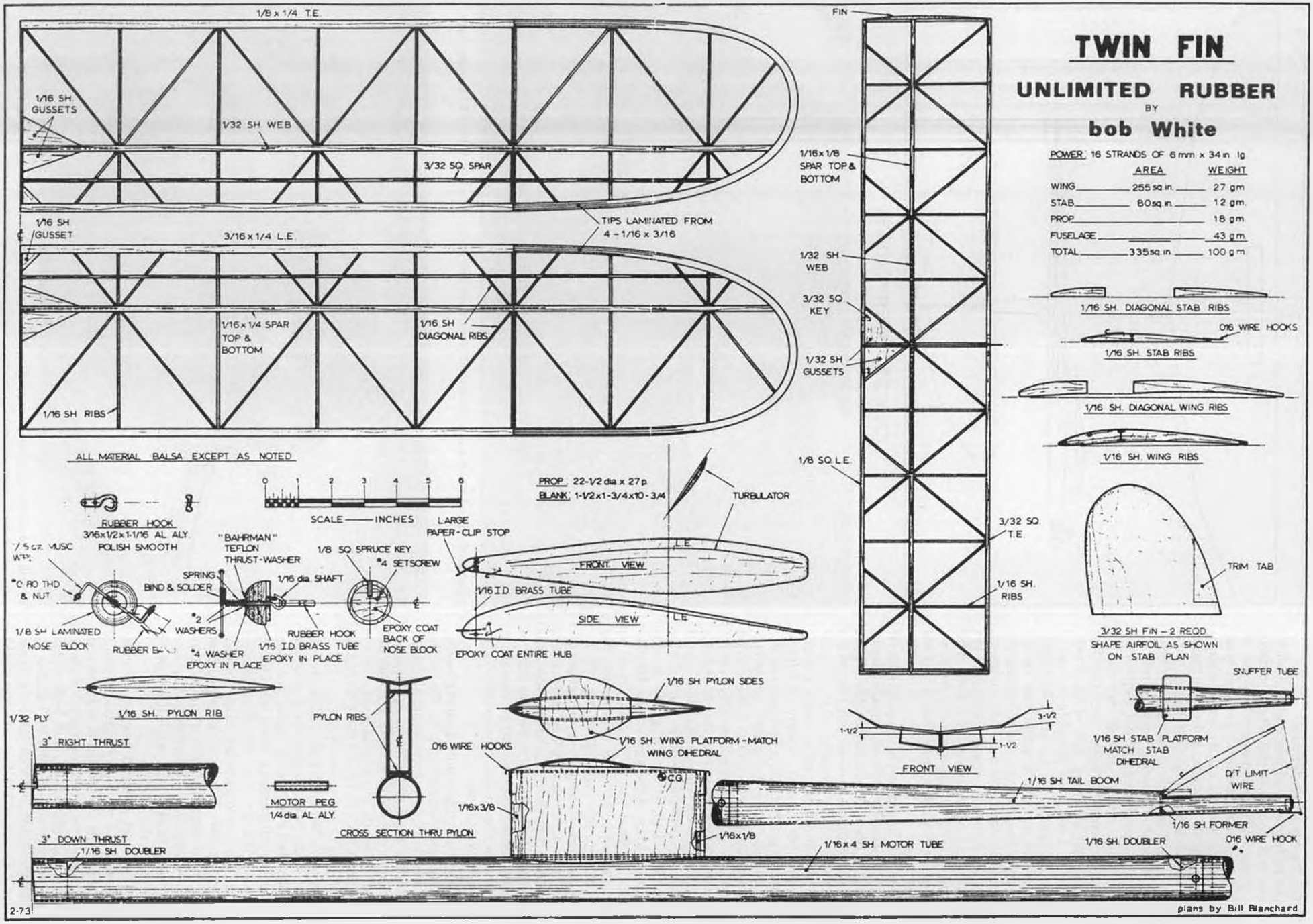
UNLIMITED RUBBER

BY

bob White

POWER 16 STRANDS OF 6 mm x 34 in lg

	AREA	WEIGHT
WING	255 sq in	27 gm
STAB	80 sq in	12 gm
PROP		18 gm
FUSELAGE		43 gm
TOTAL	335 sq in	100 gm



have particular problems, as the long rubber motor results in fairly high angular inertia, while the thrust varies greatly over the motor run. Thus, while a gas model with low inertia and constant thrust can use a 2-position VIT to control both climb and glide, such a 2-position system is not optimum for Wakefield. Norm developed his torque-controlled VIT system to get the best of both worlds: rapid climb without looping and good glide stability.

Torque-controlled VIT is not new; Parmenter's *Charisma* and Xenakis' *TART* had this feature. However, Norm's system incorporate a further refinement of McGillivray's; a cam that allows varying the incidence in any way desired throughout the climb. What's more, it is simpler and sturdier than other VIT systems. It is easier to build than a front end, according to Norm.

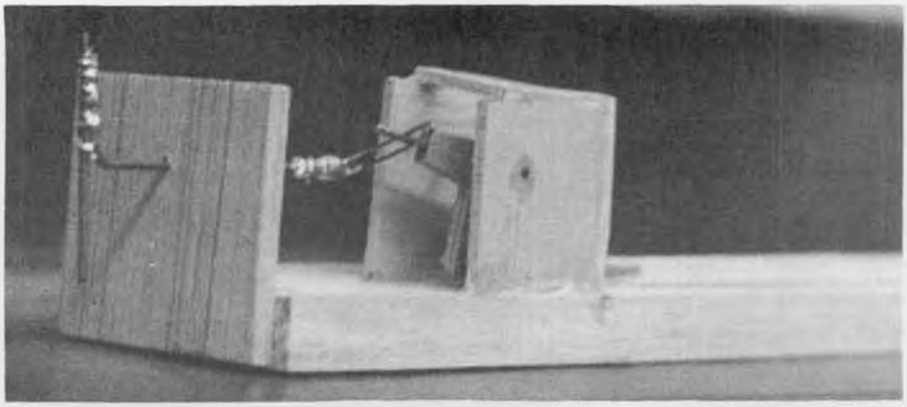
Note in the drawing how the cam is accessible and can be modified on the field to eliminate power stalling, looping, or "mushing." With good rubber, you can start off at nearly 0°-0°, while if you're test flying with old motors, the incidence will be appropriately increased. The rudder is controlled by the Montreal stop.

Flying such a model requires launching techniques similar to F1C practice: a *practiced, consistent* firm upward launch, plus a bit of courage. Norm doubted the system would be useful in Mulvihill, since it would be better to put the extra weight in more rubber. Nor would the VIT be very advantageous in a 12-strand long motor run Wakefield.

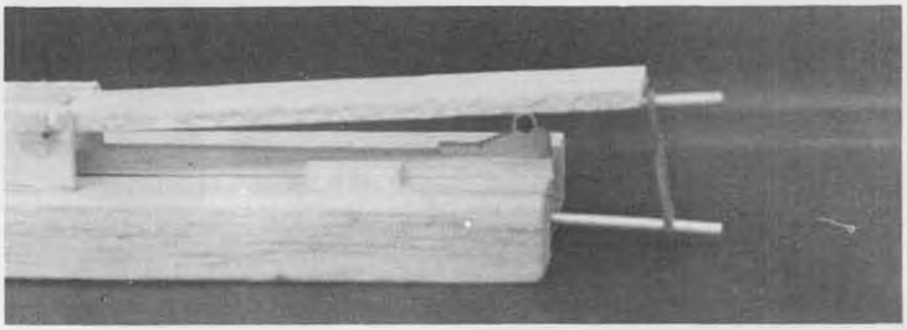
(Hope that the drawing plus the photos of Norm's mock-up give you a picture of how the system works.)

MODEL OF THE MONTH:
BOB WHITE'S "TWIN FIN"
UNLIMITED RUBBER (MULVIHILL)

A couple of weeks ago, I received a surprise package in the mail from Bob White. Inside was a cassette from Bob answering some questions about his World Champs preparations and news of his new Category I Mulvihill record, breaking George Batiuk's long-standing



Motor end of Norm Beattie's torque-actuated Variable Incidence Tail system for Wakefields. Motor torque twists wire, provides motion to stab trailing edge.



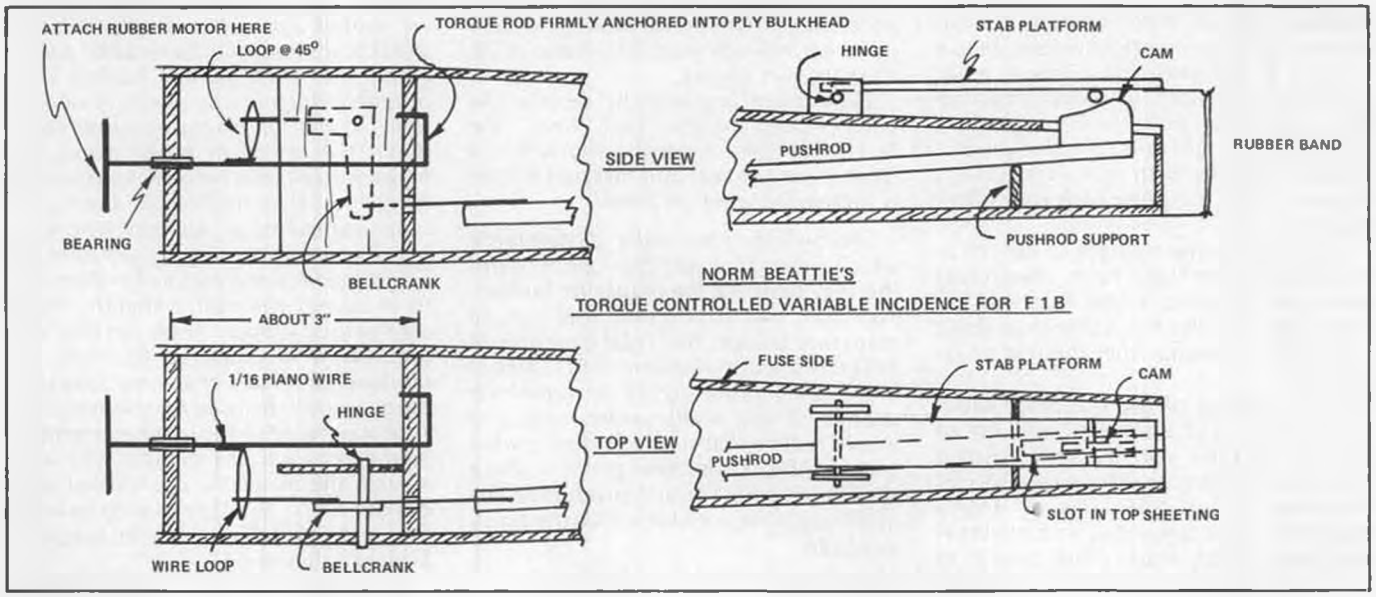
Stab end of Beattie's VIT system shows cam, which can be varied in shape to provide exact incidence variation with torque desired. See drawings below for clarification.

former mark by about 20 minutes! Bob totaled 88 minutes, 24 seconds on March 11 at the California Eagles contest at Taft. He made 11 flights, dropping out with *only* 10:24 while trying for the 13-minute max.

Bob's been trying for this record for a long time (to go with his Cat. II record), ever since finishing second to George Batiuk on that record day back in 1969. It took 10 years to get the right combination of weather conditions, even at Taft, to permit those long 10-minute-plus flights without going out of sight. The early spring and late fall are the only times of year when there is enough lift that is not of the "trashmover" variety that takes models away, even when DT'd. But flying at those times of year at Taft is chancy business. The weather isn't nearly as predictable as during the warm months, and you're very likely to get wind, rain or fog. But there are some times when you get the most fantasically flyable air in the world. (Sometimes, the very next day after the most miserable of days, too. This was the case when George Batiuk and Lee Polansky both set their fantastic earlier records.) This was apparently the case, and the Godfather was prepared for the occasion.

Bob used his old, original Twin Fin model, which now has a new fuselage and completely restored prop. Bob used a couple of old Wakefield motors, "with a bunch of knots in them," wound up

Continued on page 107



From l to r, Mike Gale, Charlie Johnson, and Big Joe Klause display their winning Big Goodyears. Joe outdid all in the last final with a 6:48. Johnson was pilot for both.

Here they are, folks, the Mission Bay Prop Twisters. Photo taken in January . . . just one nice day after another in So. Cal.

Control line

By "DIRTY DAN" RUTHERFORD

PHOTOS BY CHARLIE JOHNSON

MORE HEAT

You probably can recall the subject of the April C/L column, can't you? All manner of stuff about the AMA, its magazine and such. Naturally enough, John Worth took time to respond, and his letter follows.

Dear Dirty Dan,

You let me down. I feel like the kid who finds out his hero is not all he seemed to be. Here I've been thinking that you were a straight shooter . . . a little rough perhaps, but basically a guy who tells it like it is.

But now, after your April **Model Builder** *column, I don't know if I can believe what you write anymore. In this case, I know you don't know what you're talking about, whereas on control line stuff . . . engines, fuels, props . . . I figured you could be depended on. But if your thinking is so fuzzy on AMA, I wonder if it is the same with your other stuff.*

The least we have a right to expect, as readers, is that you have researched your info. Instead, I find that you are shooting from the hip rather than firing only after knowing what the real situation is.

Your analogy of the magazine situation leaves out an important bit of history. Maybe you weren't around then, but it wasn't that long ago. Model Aviation *was on the scene as AMA's magazine for many years, with advertising, and nobody made a fuss over it. In fact, the only complaint then (in the '50s and early '60s) seemed to be that we should have had more advertising, that industry wasn't doing very much to support the Academy. It never has . . . not to the extent that it should. Industry sponsorship of the Nats, for example, has never been more than 25%.*

In my case, Model Aviation *was in existence before at least four of the current commercial magazines were born. Furthermore,* Model Aviation *is what the majority of its members would have it be. The optional period of magazine subscription . . . from 1975 through 1978 . . . proved that, with the percentage of members paying extra for it increasing each year; 70% did so in '78, of their own choice.*

Even more importantly, despite the current dues increase and "heat", the fact is that current membership is 96% of what it was last year and that percentage is increasing week by week.

Meanwhile, you make a statement which shows that you don't understand the very basics of the magazine budget. You note that it is "cute" that our '78 magazine budget had total expenses of $453,000 out of an income of $453,600, as if the $400 profit figure is something strange. If you really understood, you would realize that such a budget is what it should be; a minimum profit so that a maximum goes toward producing the most magazine possible within the funds available.

Remember that it is a budget . . . a goal, a target. It is intended to plow back any surplus into magazine improvement. The fact is that, even though we are a non-profit organization, we have to pay taxes on magazine profits. So we try not to have any profits. That's what the budget is based on, with a slight safety factor. The idea was that members were paying extra for the magazine so we were obligated to give them all we could for the money.

But we didn't do so good in that respect last year. We blew our '78 budget by not spending enough! So many people voluntarily subscribed that we ended up with a surplus of over $10,000, instead of a mere $400! Meanwhile, the AMA general budget lost a bundle (which is why we increased the dues) so the 10K magazine surplus went down the drain. In other words, the magazine last year helped avoid an even bigger loss than might have been.

So instead of a situation where we used general money to support the magazine (as some people have accused us of doing), the truth is that the magazine helped support AMA. But that's not the way it is supposed to work. We pledged originally that only magazine money would be used for the magazine. That was the philosophy when members paid extra for it. It's still that way, even though the magazine is provided without option . . . $8 of the dues goes to the magazine, and that's what the magazine budget is based on.

Regardless of all that, AMA's being in

the magazine business hasn't hurt anybody. As I said, four magazines have come on the scene since the Model Aviation *of the '50s and they, plus those which were around before, are still around (exception:* American Aircraft Modeler, *which went down the tubes due to management problems rather than the economics of the field).*

During all this, all of the editors and publishers have done better than the AMA employees involved. All apparently have better cars and houses than the AMA people. So it's a little irksome to hear the cries of anguish about how AMA is "hurting" the others. The fact is that all have prospered, all have grown stronger, all have more circulation than they had 5 years ago.

One last point: opinion is one thing, and yours is as good as mine. But inflammatory statements are something else. You say that you want AMA to be "more honest about reporting on where the money goes. . ." That suggests we are less honest than we could be, and that is where my respect for your opinion evaporates. What would you have us report differently?

I think it's a clear case of put up or shut up. I challenge you to point out anything dishonest about our financial reporting. Keep in mind that we pay over a thousand bucks a year to be audited by an outside CPA.

Dan, you owe (and so does Northrop) your readers something more factual than the suspicious speculation in the April issue. Our books are open for inspection at any time, and they are audited. There's nothing dishonest about them.

I'm not mad at you; only disillusioned. You have let me down. I hope you will be at the MACS in Long Beach in April so we can talk more about this . . . I think you owe it to yourself to understand the AMA side of the story. Sincerely, John Worth, Executive Director.

I am tempted to just let you read the letter and then not comment further. In a situation such as this, I have the advantage of being able to take some more shots from the hip . . . if nothing else, getting in the last word, and I know John Worth well enough to know that he won't get involved in trading punches via the mail and this column. With this letter he has stated his case . . . I probably won't hear from him again until we meet in person someplace.

The only point I would like to make is that it has been difficult for anyone to really research an article like I wrote. Yes, I did pretty much write that "from the hip" and do not have reams of documentation to back me up. I will stand behind what I wrote, however.

Part of the problem is that even if I did gain access to the AMA books, I would hardly know what I was looking at. So why try to get such a thing in the first place? I have to pay an accountant to do my taxes, after all. I tell him what I earned, and where I spent it, and he does the rest . . . even the workings of my own set of books are a complete mystery to me.

Vic Garner (left) and *Model Aviation's* Bill Lee display their Goodyears. Photo taken at the Merced Speed and Racing meet in November. Bill was out West "On business."

If nothing else, my "HEAT" article was a great way to blow off steam about some of the AMA policies that I find questionable, and if the response to that article is any indication, a large number of you people reading this column on a regular basis agreed with the article.

TO THE POSITIVE SIDE

The previous writings about the AMA were intended to be the first of a two-part look at the AMA. I have had my say, as has the AMA's Executive Director.

But surely isn't all bad news, no good news. Let's look at the '79 dues. Something like $25 to join. I have had lots of complaints about this, both from newcomers and the old guys who have been around for years.

At first, the thought of such a price for dues is shocking. But as a C/L competition flier, let's look at it closer. You are building a model or bunches of models and plan on competing at a number of different contests this coming year. Some of these will be local contests, others far away, you may even want to go to the Nationals this year. Now then, what is it worth to you to know that your models will be legal and competitive

Continued on page 108

Rich Brasher looks puzzled, Frank Tomicich (middle) doesn't know the answer; could it be Greg Hill's mystery fuel in the Francisco can? It's 70% nitro, 10% prop. oxide, 10% NPG.

FREE FLIGHT SCALE

By FERNANDO RAMOS

• On July 8, 1979, the Flightmasters are going to hold for the first time ever, a contest pitting the Earl Stahl designed scale models against those designed by Paul Lindberg. At first glance, one might think that the object of the contest is to see who was the better flying scale model designer. Not so. These two gentlemen have probably done more for rubber scale than anyone else. This contest will have several different facets. One event will be an endurance type where the top four flights of unlimited attempts will be scored (a max of 60 seconds). The flight points will also get the FAC bonus points added for type of airplane, e.g., +20 for biplane, +25 for working multi-motors, etc.

Another event will be realism of flight. This will be judged for realism of R.O.G., flight, and landing approach. Yet another event will be a mass launch, a la the Thompson Trophy. The outcome here will pit the top Stahl against the top Lindberg model. There will also be a special added attraction, the "Wonderful Builder Award," which will be awarded for the best concours d'elegance!

Anyone building scale models for many years can readily recognize the difference between a Stahl and a Lindberg design. Each style is so distinctive that their signatures are not required on the drawings. Mr. Stahl's building techniques differ quite a bit from those of Mr. Lindberg. The former used the half-shell method of construction, which is used extensively by Guillow and Sterling today, for many of his WW-II type aircraft. Mr. Lindberg uses the conventional method of building a fuselage. Bulkheads are glued all around the fuselage to give the desired form. One item that the Lindberg designs have that the Stahl do not, is that all of the models have movable flying surfaces, including ailerons. Lindberg models were finished to look more like a static model than a flying one, whereas the Stahl models were definitely a flying type.

Since September of last year, I have been involved with a model airplane club through 4-H, with five boys (age ten) and two junior members who are only six years of age. To say that this has been an interesting experience is a mild understatement. Naturally, I want to get them started with scale models, but this isn't very practical for several reasons. The biggest one, of course, is that there are absolutely no kits to choose from that can be easily built by beginners. In fact, there are no kits of any kind that I have been able to find that can truly be called a "beginner's" kit.

I realize that manufacturers, in order to hold down costs, have to cut corners where possible. This usually results in about the poorest selection of wood possible. Nothing is more frustrating to a beginner than to have all the parts break off from the so-called die-cut sheet. Many of the better kits available are framed with 1/16 square, and this size of material is quite difficult for beginners to handle. Cutting from print wood is also a difficult experience for these youngsters. In other words, there is, in my opinion, nothing available for the genuine beginner.

After watching the boys struggle through a couple of efforts, I decided to have them scratch-build some old time designs. I have two of my own boys (age 6 and 10) working on them presently. The six-year-old is building one of my all-time favorites, the Pacific Ace, and the older boy is building a Best-by-Test Airflow. Both are doing very well. The others will be following suit with some kind of "oldie" which will not be too difficult for them, yet will be a good flier.

So, to help the beginner with some kind of simple, straightforward design, the Flightmasters are planning to have a contest through their Newsletter, *Scale News and Views*.This will be for scale-like models that have a wingspan of from 20-24 inches, use 3/32 square for the basic framework, and are rubber powered. I would like to see other scale clubs in the country get involved so that there could be a good starting point for those just getting started in modeling. We truly need something that will help get more people into our hobby, and giving them a model they cannot successfully build is one surefire way of keeping the numbers down in this great hobby of ours!

Too often a beginner will tackle one of many WW-II kits, where the box's cover sold the kit. There is no question that the scene depicted on the box gets one's imagination really clicking, and I'm certain that all of us have gone through this at one time or another. The sad thing is that so many of these kits will never be finished, for a myriad of reasons, but I'm sure that it can be attributed to the complexity and quality of the materials furnished.

Many modelers, whether beginner or not, wonder what the secret is to building light. It seems that no matter what they do, their models always come out heavier than desired. Of course, there are some who build heavy because they are trying to make their models crash-proof. Well, forget that one! More weight requires more rubber for power, which means a higher flying speed. More speed, more inertia. . . more damage. Thinking light should be a major concern when building *any* flying model. The same principle applies to building full-size aircraft. You'd be surprised at how many homebuilts are much heavier than the designers had intended them to be. So, weight is a factor with all aircraft.

It always amazes me to heft an R/C kit from the counter. A person with back trouble better watch out lifting one of these monsters. It makes me wonder just how much the end product will actually weigh? With so many modelers starting out with R/C and R/C-oriented building practices, it's no wonder that these modelers have trouble building a small, light rubber model. No question in my mind; R/C models are, in general, overly built, but that's another story!

What can be done for the uninitiated who has tried to build light but was not successful? After all, a rubber model's performance (scale or not) depends greatly on the total flying weight. It's nice to have a super-scale, well-detailed model of a Mustang, but to have it fly from your hand to the ground in less than five seconds . . . Well, let's find out what can be done to help build light.

In nearly every construction article, even R/C ones, the old cliche of being very selective in choosing your wood really holds true, particularly in rubber-powered models. Granted, it is not always easy to find good, strong, yet light-weight balsa, but it can found. For a more readily accessible source, SIG is probably the most consistent and they do have a separate contest label on their lighter balsa. Another good source which carries high quality balsa is Superior Aircraft Materials (Box 8082, Long Beach, CA 90808). They have many sizes of wood that others do not carry. Both of these companies ship by mail.

Now that you know where to get the wood, let's get started building.

Since many of the commercial plans available are geared for the general modeling public, they are usually over-designed. For starters, if the fuselage is framed using 3/32 square stock, see if you can't get by just as easily with 1/16 square. If 1/16 square stock is used in the kit, you might get by with 1/20 square. This alone will save quite a bit of weight. Whatever stock you decide on using, choose very firm pieces for the longerons. Since the fuselage is under compression when the rubber is being wound, you don't want weakness here. Use some of this same stock for several of the vertical members of the fuselage just ahead of the wing. I do this because I want added strength up front, and the added weight (regardless of how slight) is better in construction rather than placing a hunk of clay under the nose.

For the bays immediately behind the wing's trailing edge, I use one-half the thickness for the vertical members. That is, 1/32 x 1/16 for a fuselage framed with 1/16 square stock. These are set flush with the other edges of the longerons. Only where the motor peg goes will I use sheet stock, just wide enough to do the job. When framing the fuselage sides, the cross members from the nose to the wing's trailing edge are made from 1/16 square. Aft of the wing they will be made from 1/32 x 1/16 material. At this point, the weight savings is 50%. The weight savings may only be mea-

sured in fractions of grams, but it all adds up. The same procedure will be done for models framed with either 3/32 or 1/8 square stock.

When picking out material for the bulkheads, choose the lightest possible, because they will not provide any strength to the model; they are for shape only. In fact, I would cut them down to half the thickness called out on the plans. Any bulkheads ahead of the CG can remain the same size material called for. If sheeting is going to be used around the nose and cockpit area, again the lightest possible wood should be used. More often than not, sheeting material can be cut down to half the thickness called for.

Wherever stringers are required, I feel that it is best to use 1/32 x 1/16 or 1/32 x 3/32 cut from extra-firm sheeting. These, set on edge, are more realistic and are not as susceptible to bowing between bulkheads after covering. The same holds true whether you are building a Peanut or a Jumbo. Stringers too large in size take away from the realism of the model.

Another way that weight can be trimmed from a fuselage is to use the correct size wire for the landing gear; simply stated, a size which will provide just enough support for the model without being flimsy. With too stout a gear, not only will there be an excess of weight, but it will not give the shock absorbing properties a model needs.

The rudder and stab can be kept light by first laminating the outlines and then using half the size of material called for for the bracing. The spar material should be the same as called for. Some of you may believe that this won't make much difference in the total outcome of the model's weight. Not so, every little bit adds up!

The wings are another area where considerable weight can be saved. Laminating of the trailing edge and tip alone can save quite a measurable amount of weight. In addition, spliced wing ribs, or ribs of 1/32 sheet instead of 1/16 sheet can really trim down the weight. Lightening holes in the ribs is another way to knock off more of those fractional grams. This is recommended if the height of a rib warrants it.

The way the spar is used for wing construction can save weight. By using several 1/16 square spars on the top and bottom of the wing, instead of a couple beefy ones, you can help the cause along. However, I prefer to use the latter mostly from a standpoint of appearance.

If any of the forementioned hints are to be incorporated in one of your next projects, care has to be observed when sanding in preparation for covering. The 1/32 x 1/16 bracing has a real knack for breaking when you least expect it. All surfaces should be pinned down during the water shrinking and doping stage. This will insure that your lightened structures will not warp out of shape. Use only two coats of 50/50 *plasticized* dope and thinner. See if this won't help you make some strides in performance!

I don't know if any of you have seen the latest in women's hair sprays, but in order to get away from the freon issue, many companies have come out with a pump sprayer, a la Windex. These sprayers really atomize the spray into a very fine mist. I took one and cleaned it out with water and tried it for water shrinking . . . it really works super! If your wife is still using the freon-propelled variety, give her the pitch on saving the environment so you can get one of the new type sprayers for your hobby. •

Turner . . . . . *Continued from page 22*

help you machine a tongue-and-groove axle, if you can't do it yourself. The landing gear fairing, which was balsa on the real airplane, is also balsa on this one. I put the landing gear fairing on with contact cement (Blue Goo), and it is also covered with 3/4-ounce cloth and resin. I hope there is enough give to that Blue Goo so the fairing won't pop off when it flexes, but we'll see.

Now for the cowl. The cowl can be made in several ways. I suggest you get a big hunk of polyurethane foam and put it in a wood lathe, and sand it to shape. Put about four or five layers of six-ounce cloth on it, and finish it that way, and when you get all through with it, go ahead and hog out the insides and you are all set with a nice cowl. Now, I didn't do that.

A so-called friend of mine, Eloy Marez, talked me into making a wood form out of pine, and then making a plaster of Paris mold out of that, and then setting up resin, and resin cups, scissors, brushes, dowels, boxes . . . we took up a two-car garage, about seven evenings and almost a friendship. You never saw such an operation to make one little ten-inch cowl. Yes, we have a lovely cowl, beautifully made, and we can make a thousand more cowls, but I don't want to make any more cowls, I only wanted to make one. Actually, Eloy, I'm only fooling. Thanks a lot for a hell of a lot of good hard work, and the cowl is beautiful.

We used one layer of 3/4-ounce cloth to start with, and then six layers of six-ounce cloth. On a scale airplane, weight forward is no problem, so we ended up with a gorgeous (and strong!) fiberglass cowl. As long as we are talking about the cowl, let's go ahead and finish it off. Use K&B primer brushed on, sand it down, then go ahead and shoot it.

The dummy engine installation that I used is a little bit different than normal. Start with a Williams Brothers 1-1/2" = 1' Wasp scale engine and build only the front half, and glue it to a piece of 1/16 plywood (cut it out so you'll have some air passage, of course). Then epoxy the whole mess to the front end of the cowling. From the back, epoxy a 1/16 ply ring in place so it's flush around the cowl and with the back of the motor. It absolutely locks the motor in the cowl, and will never come loose. I've run three airplanes in this manner and it works out just great.

Let's see what we still have to do on the fuselage. We haven't attached the landing gear yet. Use three 6-32 bolts and make up a piece of 1/4-inch ply that will just snuggly fit between the two bulkheads. Go ahead and cement that 1/4-inch ply through the nose. Cut a slot in the fuselage big enough to drop the gear in, bolt it in, and replace the cut. You can now finish the gear and put the fairings on. The fuselage won't roll all over the damn table now that you've got the gear on.

Now let's drop back to the empennage section of the airplane. You'll see that some 1/64 ply goes around where the horizontal stabilizer goes through. Now, the only way to get that 1/64 ply in there is this: you are going to have to take an Uber Skiver or razor blade and cut 1/64 of an inch off each one of the stringers. Use two pieces of ply, with the seam along the bottom of the fuselage. It goes on quite nicely, as there are no compound curves.

Along about now, you have to start thinking about what you are going to use for pushrods. Now, I opted for what I call, at least for me, a full cockpit. So there are no pushrods going through the center section. So what do we do? Well, here is what I did. I made my pushrods out of piano wire. Chuck a piece of long wire in your Dremel tool

and drill holes on each side all the way along those bulkheads, all the way up to the forward firewall. One set of holes is for the elevator, the other set is for the rudder. You are going to have to cut and try until you get those things where you want them. Now, snake the piano wire through those holes and then wrap each end of the piano wire with fine copper wire, and solder the copper wire. You'll have to experiment with the size of the copper wire to where a DuBro or any other clevis will screw on, and it works very nicely. I put my servos just inside the forward firewall on each side. The throttle servo goes right on the removable firewall motor mount. Then, of course, drop the tank in, stuff the receiver in, hook up the servos, bolt the motor mount firewall to the fuselage, and you're all set to go. Now, I attach my servos with, Heavens to Betsy, servo tape! I've used servo tape for many, many years, and I've never had a failure. Now I'll get all kinds of static from the radio people, but I know one servo manufacturer who does say that in particular instances he will use servo tape in his airplanes, so it can't be all bad. If you're absolutely against servo tape, go ahead and use individual servo trays.

As for the forward windscreen, you're just going to have to make a form for it and pull some acetate over it. If there is any demand, which I doubt, I will send my form to Hi Johnson, and if you really want a windscreen, write to Hi and he'll pull one for you. Likewise the cowl; I think I am going to send the whole blooming thing over to Bob Holman. If there is enough racket from the field, I'm sure he'll go ahead and make up some cowls for this airplane.

So where are we? Well, we've got the pushrods in, the rudder on, the front is made, the gear is on, but we haven't popped the hatch off. So, from the inside, find your seam and run pins all the way through so you'll get marks on the outside. Run the pins along where the hatch is going to pop off, and after you get fairly well marked with pinholes from the inside out, then you can take a razor blade and cut the hatch out. When you do, get yourself one of Carl Goldberg's new over-center grippers and put one right in the center of F-4.

OK, go ahead and fuelproof everything forward of the trailing edge of the wing on the inside. For fuelproofing, you might as well stick with resin, then you'll know what you're doing. When that's done, take a crack at finishing the fuselage. Put Coverite on the rudder and elevators, and put two or three coats of nitrate dope on the horizontal stabilizer and cover it with wet silkspan. One or two coats of K&B primer (brushed), sanded, and then one coat of primer like you did on the wings, and sand that off. The open bays on the fuselage aft of the wings are covered with Coverite; two pieces, seamed at top and bottom. Instead of me going into a long dissertation on how to handle Coverite, Coverite has at last put out a good idiot sheet on how to use their material. If you get that, and use it, you will find that you will do a beautiful job. The only thing I will say is that, when I started using Coverite, I shoved that iron back and forth. This is the worse thing you can do, because Coverite will ravel on the edges. So don't shove it around; you have to press it down, not shove it. The forward part of the fuselage where there is bare wood is handled the same way as the horizontal stab; two or three coats of nitrate dope, wet silkspan, and primer.

We're not really going to final finish this thing until we get the wing and horizontal stabilizer glued in place. Go ahead and put the horizontal stab in now. Cut the holes on either side and shove it in, and put the elevators on. Block up the fuselage straight and level on your workbench. Draw a line on each side, indicating the centerline of the root wing rib. Now, if you are going to cheat or make an error in one direction, err on giving yourself just a hair of positive incidence in the wing. I'm not going to talk about degrees because neither you nor I can understand degrees when we're working with a ruler on a table. Give yourself about 1/16 of an inch incidence when you draw the line on the side of the fuselage. Measure out from the centerline of the wing to the point where the fuselage is going to be, and make a template to fit the wing at that place. Draw the outline of that rib on each side of the fuselage. Go ahead and cut that big hole. Shove the wing in and keep cutting away at the hole until you get a nice fit . . . not a testing, grinding fit, but just a nice fit, and keep working to where you get that hole just about the size that you want. Then, on one side or the other, on the bottom edge of the hole, keep relieving it until you can shove the wing all the way through. But you say, you can't do that with a tapered wing. That's true; cut off the trailing edge of the wing at the same location where the wing goes into the fuselage. In other words, don't have a wing with more chord in the middle than you really need. Be sure to keep the material that you cut off the fuselage, because it is glued back on once the big fat center section of the wing gets by.

Now, the only other things we haven't made are the pants. I can assure you that I didn't go anywhere near Eloy Marez when I decided to make these pants. Get yourself some four-pound polyurethane foam and shape the pants to fit. I used two layers of six-ounce cloth on each side. If I was making the pants again, I would use three layers of six-ounce cloth. I put the cloth on one side, then on the other, etc., until finished.

Now we've got a solid pant. To make room for the wheel, take a piece of piano wire and put an L shape in it, chuck it in a Dremel tool, and hog out the foam. However, I would recommend that after you get all that foam hogged out, go back and reinforce the wheel cut-out with one more layer of six ounce cloth.

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The last thing to fabricate is the scale prop. The plans show the profiles on the blades. Make them out of pine or redwood; I happened to make mine out of redwood. The prop hub was a bit of a problem; what to make it out of? Well, I thought and I thought and I thought, and finally went down to the local plumbing shop and got some one-inch plastic pipe for the hub. The counter-balance weights are cut from plastic and dowels. The front forward spinner is turned on a lathe. You will notice that when you finish the prop blades, the shanks of the blades are a little bit smaller than the plastic pipe. So, bush up the inside of the hub with two or three layers of 1/64 ply. I finished the prop with K&B Superpoxy. To simulate the long bolts that actually hold the whole hub together on and the real prop, just use a piece of small brass tubing, cut a slot in the hub, and Hot Stuff them in place. On each end, put a small hex-head bolt that you can get either from Proctor or from your local train shop. It builds up quite nicely and really makes the nose of your aircraft stand out.

Now your airplane is completely together and you've wasted at least half a day or two days or maybe a whole week of evenings, sitting there admiring your handiwork and telling yourself what a great model builder you are. However, some parts are primered and some not primered, so go ahead and finish up your priming job and other things that are not really ready for final color. Use two or three coats of primer sanded nice and smooth, and get all the pinholes, bad nicks, and dings out with DAP spackling compound. I've used DAP for many years and it works great for me. The only thing you have to be careful about when using DAP to fill dings is that it is water soluble. If you start to sand with wet sandpaper, you are going to lose what you have. Use your sandpaper dry if you've used a lot of DAP.

Now for the fillets. On the leading and trailing edges of all the fillets, cut pieces of 1/64 ply, as an outline (when looking

IT'S A...

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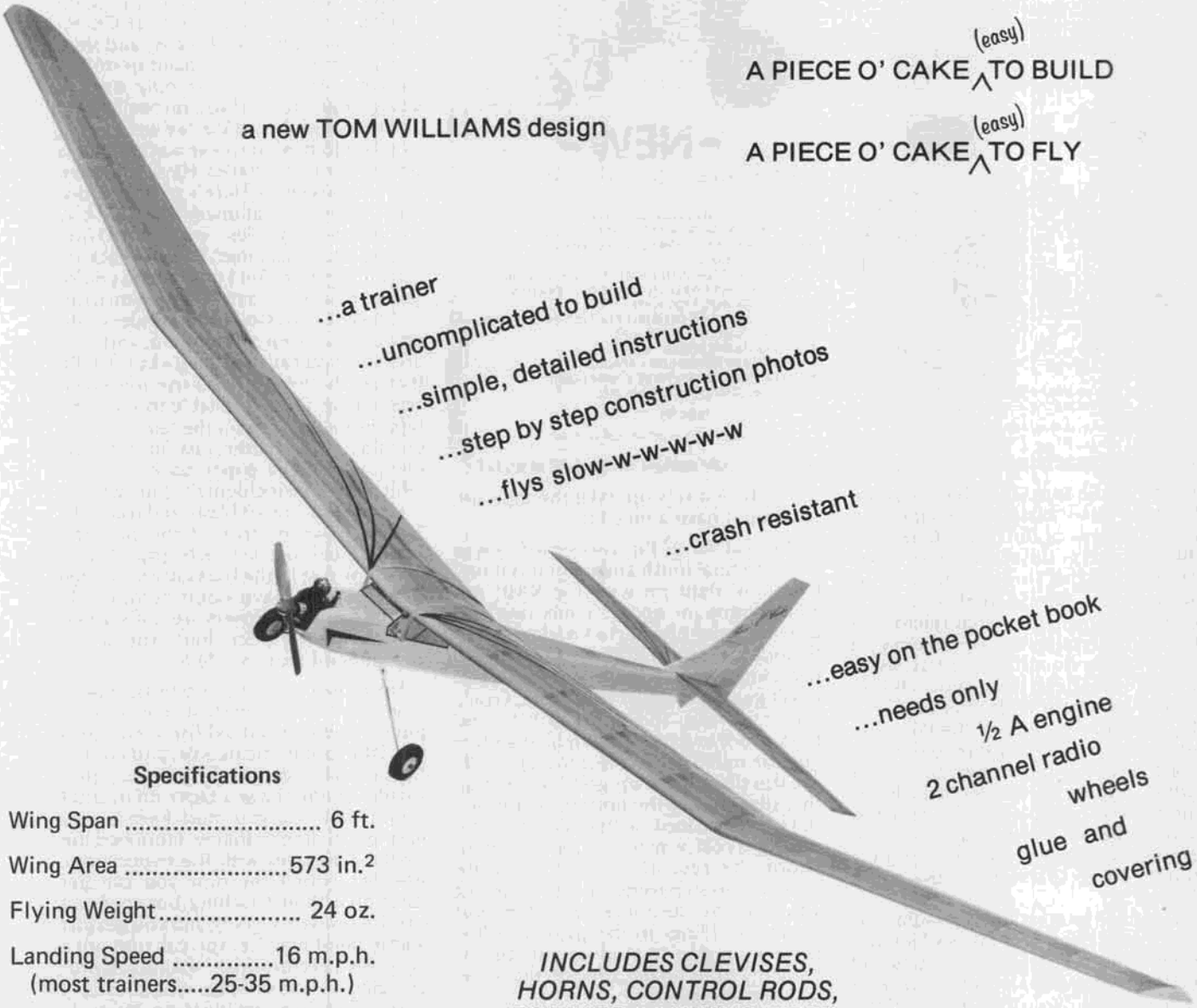

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down from the top), and glue those on. OK? Now take black vinyl tape and outline the area of the fillets. One layer of black tape. For the actual fillets, I used Hobbypoxy, the three or four-hour Hobbypoxy . . . No. 2, I think it is . . . and micro balloons. How much micro balloons? Until you get a consistency of about like pie dough. Almost as dry as pie dough, or after it has set up a while in the cup, to where it doesn't look real shiny. If it looks shiny in the cup, you don't have enough micro balloons. Roger? Use the old finger and water routine, putting those micro balloons right in there, but go easy. Don't put too much on, because you're going to have too much sanding to do, when you get through. So go sparingly on the micro balloons.

OK, you've let it set up overnight, and it's nice and hard. Use rat-tail files and dowels and sandpaper and fingers and everything else and smooth it down to that black tape. You have to be a little careful, and it does take a little bit of finesse. You want to get it to that black tape, but not below, so when you take the tape off, you have a nice thin ridge which indicates the extremity of the alclad fillets that were put on the real airplane. I used this system throughout on this airplane, and it worked very nicely. By the way, you have to paint the fillets once or twice with some Hobbypoxy or K&B clear before taking the tape up. Don't let the epoxy set up, but put it on while the tape is still there, and then just before it sets up, take the tape off, and you'll have a nice line.

Well, as far as I'm concerned, we're ready to final finish and paint this thing. Continue right on with the K&B; use K&B aluminum epoxy. I mix one and one and one; one part of A, one part of B, and one part of thinner. And to help just a little, when you are shooting silver, don't get too close to your work. I use a Binks airbrush, and find that if I stand back a foot or a foot and a half, the silver goes on much better. I also found that if I stir the silver paint up good and get all that silver out of the bottom of the can, the silver also looks a little bit better. Put on a light coat, wait fifteen minutes, then shoot the rest of the color on. Be prepared to stop frequently to clean out your gun, because silver is nothing but aluminum filings in the paint and it is certainly prone to stop up the gun. It certainly stops up the airbrush that I use, so be forewarned.

Well, now, here we are. We've got a beautiful racer, and we are ready to put all the good dinglebobs on it. What are we going to use for dinglebobs? Well, for lettering, I used Super Monokote, and I just don't think you can beat it. Slip the Monokote underneath the big letters on the plan and use a pin to go around and hit all the areas all the way through the plans into the Monokote.

Take the Monokote out, connect the pinholes up with a razor, and plop, out falls a nice letter. Now to get that letter on without scratching. Make sure the epoxy surface is good and clean, put a baby sock over your iron, and just iron it on. If you try to put it on with just that metal iron, I can assure you, you will scratch the Monokote. All of the lettering with the exception of "Twin Row Wasp" was done with Super Monokote. The "Twin Row Wasp" is rub-off letters that you can buy at any stationary store. But how about those "Champion" and "Ethyl" signs?

There isn't any way that a mortal model builder like myself, who can't even draw a stick man, could be able to duplicate that. So I had the Ethyl Corporation made as a decal, and I prepared the background material for the Champion sign and got it all ready, and then had a commercial artist paint in on the airplane. And that is the only way it's going to get done. If you remember, up at the start of this article, we were going to talk about what to use for gap fillers on the control surfaces. Have you been thinking about it? Here's what you do: go down to the stationery store and buy some tape that goes into those Dymo Label Maker machines. Peel the backing off and lay it on. But I must admit you're going to have to do this before you paint it, I forgot that. Go around underneath now, where your ailerons are, and with acetone, you can take the sticky off. I did that on the wing. If you use too much acetone, as I did, it is liable to warp the tape just a little. So on the tail surface, I got smart, or smarter. Just flip the tape over, where the paper backing is . . . which is white, incidentally (buy white!) . . . and take a razor blade and trim off a 1/8-inch wide strip of the backing paper; peel that 1/8-inch strip off and leave the rest of the backing on. The tail surface gaps have been completely covered and the covers are not warped in any manner. So that's the way I recommend that you do it.

Now, the other little goodie is, believe it or not, that this is my first time I've ever put on rivets. I used old Titebond with a No. 20 hypodermic needle, and cut the hypodermic needle off flush. In other words, I didn't have a taper on it, and I found that yes, you must have a very light pencil line to follow. I touched the working surfaces with the hypodermic needle. I don't see how you can get them on without touching, but once you get the sequence going and you get just a little bit of practice, you can turn out a very, very professional-looking job with actually no experience whatsoever. I worried about matching rivets. You see, there are two rows of the things. You don't have to worry; you'll be surprised how easily your eye will go right along to that other rivet as you sequence the whole thing. Don't stop your sequencing because that glue is just sort of oozing out of there, and as you go along it will give you just the right size drops. If the phone rings or something, just let it ring until you finish the end of that strip. You will find if you get out of line, and you go back after the rivets are dry, you can pop them right off with your finger-

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nail, but it's very hard to get the same size drops again.

Now, what did I use for power? And so forth and so on, and what did my airplane actually turn out to be. I'm using a K&B .61 pumper, a Sullivan 16-ounce tank, and an 11x7 prop. The CG is as shown on the plans, about 24%. The model weighs 8-1/2 pounds, including 8 ounces of nose weight, which is a little bit more than I wanted, but is still well within reason. The 420 total square inches of wing area gives us a wing loading of somewhere in the neighborhood of 40 ounces per square foot. Not light, but reasonable. If anyone would like to go further into research on this airplane, I would strongly recommend getting a magazine by the names of *Wings*, Vol. 4, June 1974. It gives complete three-views, cockpit details, and a very good rundown on Roscoe Turner himself. If for any reason you are having trouble building the model, please drop me a line through this magazine with your phone number, and I will call you collect and will be most happy to discuss any problem you are having.

We can talk about engineering and designing and building and painting and everything else, but the real nitty gritty is . . . how does it fly! I'm as much concerned as anyone on a first flight of any airplane even if it is from a well-known kit. I would like to tell you how the model was set up for the first flight.

The CG was set at 24%, as shown on the plans. The wing incidence is *not* as shown on the plans. The plans have been corrected, and I will go into that a little bit later on. Now, the throws on the flight control surfaces are total throws from one extreme to the other. The elevator is 3/4 of an inch, the rudder 1-1/2 inches, and the ailerons 1/2 inch. That was for the first flight. Some of the concerns I had was how the airplane would handle on the ground with just a tail skid, and unmovable at that. Was the CG guessed at properly, and how would it handle with that rather excessively high wing loading?

Well, to tell the truth, I cranked it up and taxied out, and with a little bit of throttle, the airplane was easily controlled on the ground (the winds were very light). On my first takeoff, I held a little back stick until the airplane moved about fifteen or twenty feet, relaxed the back stick, fed in a little bit of right rudder, came up all the way on the power, a little bit of back stick, and off we went. My first thought was *My, the ailerons are extremely quick*, and they certainly were. The ailerons are much too quick, and therefore, I am going to cut their throw down. Do not use that 1/2 inch total travel on the ailerons. Much too quick.

After I got up and straightened away, I carried just a tinge of right aileron correction for trim and about 1/16 of an inch of up elevator. I rolled the airplane, I made many low passes, a few go-arounds, and landed with a wheelie, and the airplane just handled beautifully. It had no nasty traits of any kind, and I am extremely pleased that the airplane turned out as well as it did. It is true, it flew just like a bird, beautiful in the air, but with that unmovable tail skid, it really isn't the most graceful thing on the ground.

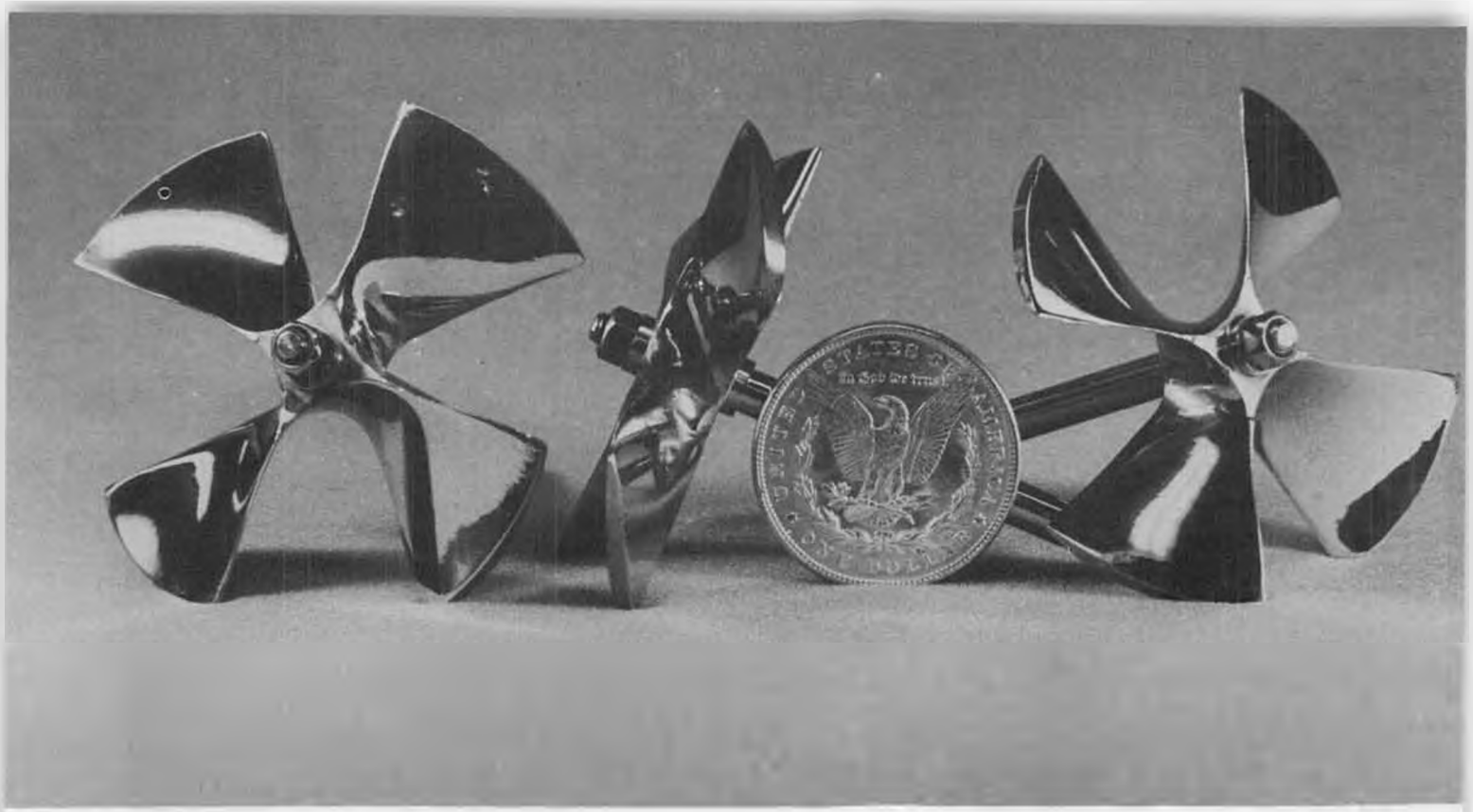
Give yourself time and follow the plans, which should indicate 1/16 of an inch of incidence. In the real airplane there was no washout in the tips, and evidentally, when I set my wing up at zero-zero, with the washout in the tips, I ended up with a little bit of negative incidence. So, just a little bit of incidence, and you won't have to carry any up elevator. Good luck, and good flying! •

Power Boats . . *Continued from page 23*

other than myself. I'm sure that many will disagree with my position. Fine, write in your opinion. I always contended that you shouldn't criticize unless you have an alternative. Since I've obviously just criticized what I consider the existing mess in model boating, it follows I have a suggestion. I do, and here it is.

Since neither the I.M.P.B.A. nor N.A.M.B.A. could tolerate joining with the other, and dropping their name in favor of the other, the solution is simple . . . drop *both* names. It is my suggestion that a new organization be formed, calling it the American Model Power Boat Association. I further suggest that the American Model Power Boat Association use as its governing policy the guidelines found in the Rulebook of the American Power Boat Association wherever and whenever possible. For those who may not know, the American Power Boat Association is the governing/sanctioning body for full scale powerboat racing in the United States and Canada. I find the District Director method of governance used by both the I.M.P.B.A. and N.A.M.B.A. to be unacceptable in this time of increased diversity in our hobby interests. I believe that the method used by the A.P.B.A. is much more equitable, in that each special interest group is responsible for establishing and maintaining its own rules. Model boating now has at least four very definable special interest groups: Deep Vee or Offshore, Scale Hydros (20s, 40s, and 60s), Competition Boats (Riggers, Monos, and Vees), and Outboards. I know for a fact that those of us who have tried establishing rules for outboard classes in N.A.M.B.A. have been hindered by those who don't even race the class.

If each side would be willing to give some, this suggestion could become a reality. It is my personal belief that the need for two model boating organizations no longer exists. I further believe that model boating in this nation would be better served if we had only one organization. Let's stop the nit picking, petty bickering, and self-serving rhetoric. We chose to be two organizations. We can also choose to be ONE!!



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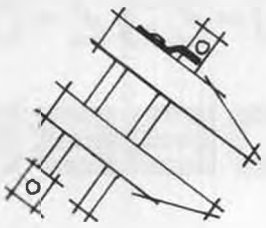

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(Question: Could the new organization also include a special interest category for those specializing in operating scale boats? Model ship builders certainly could add a large number of bodies to the total count, giving model boating more clout when dealing with other national or federal organizations. wcn) •

Instructor . . . . *Continued from page 24*

would reprint it, and I'll see if I can arrange this. I normally consider an airplane trimmed after about 50-100 flights, but have never been able to say that I'll never touch it again, as the trim changes as the airplane ages. As the wood dries out it doesn't remain the same, oil soaking changes the balance, paint and various dings and hangar rash keep an airplane from completely stabilizing, so I'm constantly "tweaking" an airplane, sometimes for the better and sometimes for the worst.

Dear Dave: Locally we enjoy your "Flight Instructor" column and hope you will continue writing it.

I fly R/C and also a full-scale Beech Bonanza and Baron in my tool and die business. About every third year I go to the Reading Air Show, where the U.S. Aerobatic Team is always well represented and where they put on part of the air show and solicit funds for their cause. Their show is usually ended with someone doing a Lomcevak.

Approximately five years ago, Mary Gaffaney was part of the team, and incidentally, her flying was head and shoulders above the other members. She ended by doing a Lomcevak and her Pitts tumbled end-over-end, but the fuselage centerline was always in a plane oriented straight ahead with the wings oriented parallel to the horizon. The maneuver was very thrilling to watch and very clean compared to any others I have seen, and I have seen many.

My question is: Would you show a sketch of a Lomcevak similar to those shown in the FAI Aerobatic schedule of the AMA rulebook? Also, a word description would be a help. Al Carlino.

Dear Al: The Lomcevak is a maneuver invented in Czechoslovakia a few years ago and the name, when translated, comes out "headache"! It is basically an end-over-end tumble with the wings parallel to the horizon. It is normally done by climbing at a 45° angle and entering an outside snap; after about 1-1/2 turns the elevator is pulled to up and the throttle cut. If all this is done properly, some airplanes will then tumble end-over-end. With models this is more difficult to do than in full-scale, as the models don't have as much mass to work with. I have one airplane, the Zlin, which will do this fairly readily, probably due to the short moments, and has the habit of doing it at the damndest times (like after the descending 1-1/2 snaps in the Vegas pattern). Draw it! Hell, I can't even spell it!

Let's get some letters in, as the mailbox hasn't gotten much use lately except for bills and Sal's NSRCA correspondence. Dave Brown, 8534 Huddleston, Cincinnati, OH 45236. •

Soaring . . . . . . *Continued from page 27*

get really high this time, so we just drive along slowly as the wind drifts us, all the time climbing just under the clouds, pull the flaps back to zero and we are away, pass the first landing point at maximum height. Hell! Main road up ahead! Yell to Peter, 'I had better get into the car!' . . . lose a bit of height during this maneuver but soon back into the good stuff and drifting along at reasonable speed. Not doing too well now, let's go! Wind much stronger now! Car doing 35 mph, glider straight and level with no flap. Down to about 100 ft. now. Trees, wires, fences coming up. Round the trees, over some power lines, more high tension lines coming up. 'Better catch up with the model Peter,' down to 50 ft. pop over some more wires and down to telegraph wire lines, over the road, crops everywhere, better land on the side of the road. Mowed recently just for the job!

"Flight time for the distance of 9.5 km was 19 minutes, which shows an average speed of 20 mph."

Congratulations, Graham, for this achievement. Just for the record, the New Zealand thermal endurance record is 1 hour, 21 min., 02 sec. Their slope endurance record is 3 hours, 20 min., and their slope closed-course distance record is 2.6 km. If you think you can better these, grab the first plane for New Zealand and try.

By the way, you might want to read the new book entitled *Man-Powered Aircraft* by Don Dwiggens, Tab Books, Blueridge Summit, PA 17214 (Modern Aviation Series No. 2254, $5.95). It's an interesting summary of the history of this branch of modern aviation, including a description of the latest in achievements. •

River . . . . . . *Continued from page 28*

other heroes since then, and learned something valuable about thermal flying from each of them. Each, in his own way, could "see" lift, just as Shadel could. Each had his own tricks, his own spotting techniques, his own search patterns, but they all seemed to have one thing in common: somewhere in the back of their heads, they carried around a fairly accurate picture of the air we fly in, and that picture *always looked a lot like a huge river* . . . a river of air.

Whenever they stepped out onto a flying field, they stepped into this imaginary river, and the first thing they did was to orient themselves to it: note which direction it was flowing, and how fast. They were never at a loss about wind direction . . . they seemed to have some kind of internal computer that

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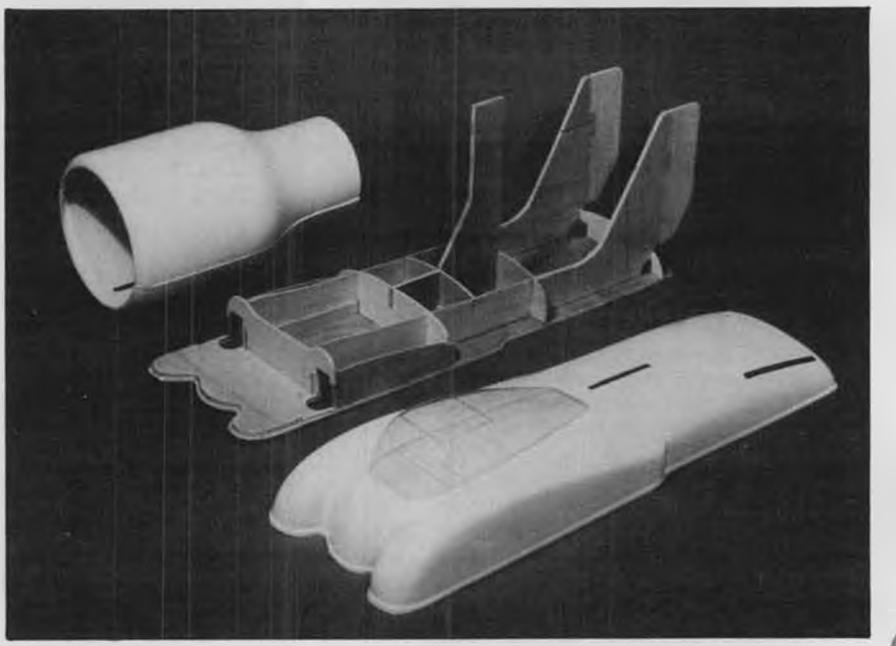

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kept track of it constantly. When the wind picked up, they noticed; when it slowed down, shifted a few degrees, became cooler or warmer, they were the first to know. They were aware that a river is almost never still, that it's always flowing in one direction or another, that the days when cigarette smoke truly climbs straight up are few and far between.

This "river of air" concept is so simple, so obvious, that you would suppose everyone must be aware of it. Not so. I've seen some really well-known pilots navigate the river as if it were a stagnant pond . . . and fall right out of the sky doing it. Consider this example:

Local expert Dewey Downstik, always the first guy on the field to fly, steps up to the high-start with his "Windhawg 2000" and heaves it up into a perfect launch, releasing the parachute directly over the stake and probably 700 feet above the earth. The chute falls right back down the launch arc, for our wind is 8-10 mph and (praise be!) straight down the field, for once. Not one to waste time, Dewey goes into his search pattern immediately. He learned a long time ago that a sailplane flying directly away from its pilot is hard to see, and almost impossible to detect lift with, so he wouldn't *think* of heading straight upwind. Even if he did find a thermal directly upwind, the stupid thing would blow right back over his head, and not many folk can fly a thermal well when it's right above them.

So he avoids mistake number one, by simply turning off to one side. But in so doing, he falls smack into mistake number two: the "simple rectangle" search pattern. He comes off the launch, turns 90° to the wind, and pushes out to the left as far as he dares, watching the plane carefully for any signs of lift. As luck would have it, the air is dead. So he makes another 90° left turn and streaks downwind, again without seeing any of the telltale bumps and grinds that spell thermal. Now poor Dewey has completed three sides of the simple rectangle: up the launch, across the entire left half of the field, and back downwind parallel to the high-start. All without hitting any lift. His only hope is to work back across the field toward where he's standing, hoping he may hit a thermal on this last long leg of the rectangle.

Anyone care to bet that he will?

If conditions were reasonably calm on the field, he just might. His chances of bumping into a bump on this leg of his search pattern would then be just as good as his chances on any other leg. But it *isn't* calm, remember. All the time Dewey has been airborne, the wind has been pushing its river of air across the flying field at 8-10 mph. So when Dewey starts home, crosswind, along the last leg of the rectangle, he isn't flying through virgin air any more — *he's flying right back through the same air he checked in his first crosswind leg!*

While he was busy moving across the river, the river itself was busy moving downstream, as rivers will. Then old Dewey turned downstream himself, and outraced the current. (Of *course* he outraced the current. Otherwise, the plane would have stalled and fallen out of the sky, right?) So he navigated the same "waters" twice . . . and if he didn't find that big whirlpool he was looking for the first time, then his chances of hitting it on the second crossing were slim indeed.

"Ho ho," you say, "that's a beginner's mistake, that rectangle. Nobody I know would do that!" Well, I saw it happen more than once at the World Champs in South Africa. You might watch for it at the next contest you attend. And let me know if you see anybody pick up lift on that final leg.

So what should our friend Dewey have done, to avoid scouting the same air twice? My heroes would all agree that his first turn (90° to the left off the top of the launch) was OK, although most folk feel that a 45° turn which sends the plane tacking diagonally upwind is even better. (Reason: the farther upwind you locate your thermal, the longer you get to ride it.) But Dewey's big error was in making the *second* 90° left turn. He would have been far better off, at that point, to do a quick upwind 180 and fly right back across the same track, ending up about where he came off the high-start. This tactic *looks* redundant, but it really isn't, because even though he's flying over the same old ground, the air is all new. The object of thermal hunting, remember, is not to cover as much *ground* as possible, but as much *air*.

And that's why the "river of air" concept is so useful. It helps a pilot keep in mind the air's constant, uniform downwind movement. It helps in visualizing the path of a thermal . . . or a downer . . . as it "flows with the river" across the field. It helps explain more or less what happens to the air as it passes around and over the obstacles that surround our flying fields.

I use the "river of air" image a lot when I'm orienting a new glider pilot. Almost everyone has watched water flowing in a shallow, rocky creekbed . . . even if only on the Coors beer commercials. If I can get my beginner to visualize the air as a river, this automatically answers a lot of his questions about the strange "radio glitches" he always gets when he flies into the lee of parked cars and buildings. And he won't be as shocked when he flies down behind the tree-line on the upwind side of the field and gets caught beneath an invisible "waterfall" that pushes him right into the ground. Conversely, he'll learn more quickly how to take advantage of the slope lift in front of the tree-line at the other end of the field. And the "river of air" helps him to see thermals as mere whirlpools in the river, whirlpools that never stay in one place, but drift constantly downriver with the current.

Dave Shadel had his eye on the river that Sunday morning at the LSF Tournament, and that was how he knew exactly

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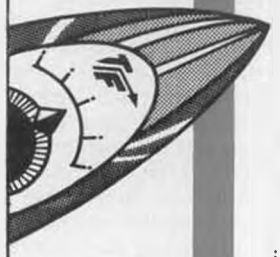

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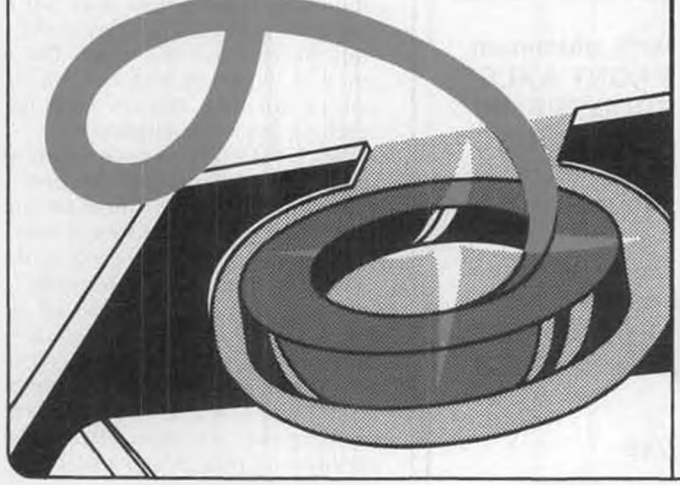

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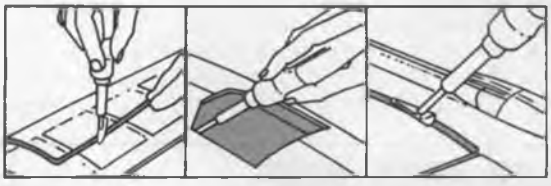

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where to tell Rick Walters to go. Shadel studied the four planes in the earlier group and correctly surmised that what they were riding wasn't a wave at all, but a "pulsing" thermal or series of small thermals. (A surprising number of "waves" turn out to be thermals.) Of course he couldn't be sure of his diagnosis at first; after all, the four pilots in the air all thought it was a wave, and flew it like a wave. But just about the time those four pilots were landing, while Rick and I were busy scurrying around collecting transmitters and clothespins and scorecards, Shadel *felt the core of the thermal move through the area.* So he knew just what he was doing in sending Rick out into the underbrush. No gamble there . . . Dave "saw" that thermal just as clearly as if it had been painted kelly green.

And what he saw looked a lot like a whirlpool in the river of air . . . a lot like that funny drawing with all the numbers in it, back at the head of this article. What that drawing illustrates is the top view of a flying field, with a fat thermal starting to form right in the middle of it. The wind is blowing north to south, and the numbers 1 to 6 represent modelers standing on the field. What we want to talk about is how the air feels to these six people, while the thermal is sitting there. For simplicity, let's think of our thermal as a classic whirlpool, or miniature tornado, crouching there and sucking up hot air molecules like a giant vacuum cleaner. (See note at end of article.)

To the person in position 1, the wind has suddenly increased. It's been blowing from the north at 5-6 mph all morning, and just now it feels like it's doubled! It feels cooler, too . . . but that might be only the chill factor at work on our skin. Is the wind actually increasing? Should we pack up and go home? Or is it just a thermal forming, somewhere downwind? Let's ask Number Two. . .

Number Two: "Wind? What wind? It's dead calm on this field, man! And getting warmer, too! What do you mean, 'pack up and go home'? There's no wind out here. Oh, maybe a little warm gust now and then, but not from any particular direction. And just *feel* the heat! This is my kind of flying weather. Right, Three?"

Three: "Can't say I feel all that much heat, but at least that damn north wind has stopped. Wait . . . I think it may be switching around to the south . . . yep, there it is: a south wind. We'd better turn the high-starts around."

Four: "Hang on a minute, I've got a light southeast wind over here. Now it's northeast. Now it's southeast again. Yep . . . it's definitely southeast. Well, maybe east-southeast. Hold it, it's changing again. . ."

Five: "Did you say northeast wind? You're right . . . northeast quartering to due east. Looks like we're going to have to run the high-starts *across* the field, today."

Six: "Yer all daft! The bloomin' wind ain't changed a pint since we come out here! It's still a-blowin' from off yonderways somewhere (he points vaguely northeast) at about, uh, whatever speed it's blowin' at right now, I reckon. Hell, I don't pay me no mind to them things . . . I just come out here to FLY!"

Obviously, the chap who "don't pay me no mind" to the river of air is in for a lot of good healthful exercise, chasing that high-start. Talk to him a little more and you'll probably find that he's one of those folk who see thermal soaring as "mostly luck: you go up, and there's either a thermal out there with your name on it, or there ain't." We have a special word for this kind of person when he flies in competition: he's called a "loser."

The other five pilots were at least aware of the wind velocity and direction, even if they weren't sure what to make of the information. If only they'd put their heads together, they could easily pinpoint the thermal in their midst, for it's almost axiomatic that *in light conditions, surface winds tend to blow directly toward a nearby thermal.* Hence the wind reversal at point 3, and the wind shifts at 4, 5, and 6. The only clue No. 1 had was the sudden increase in velocity, while 2 felt like the wind had stopped completely. All of these things are deviations from the normal flow of the river, but they will do you no good unless you're keeping a constant eye on the river, as Dave Shadel did, so you know exactly what the "normal flow" is.

One final point. Our senses often deceive us in the matter of wind direction, because most people unconsciously orient themselves not to the wind, but to objects on the ground: a tree line, a fence row, the street beside the flying field, even the high-start or winch line itself. These are rarely exactly parallel with the wind. Just *try* getting the average pilot to allow for the crosswind when he makes his chute release, so the line falls straight back to the launch area! And how many good fliers have you seen who bail out of a thermal and fly off to one side, then return later and go looking for that same thermal straight downfield from where they left it? But thermals don't move down the field; they move *down the wind.* The difference is worth remembering. Unless you've got Rick Walters' long legs, for fetching back lost airplanes.

NEXT MONTH: A nice round dozen ideas, stolen from my heroes, about thermal technique . . . how to find 'em, feel 'em, fly 'em, and forget 'em.

Note: To say that a thermal looks "just like a whirlpool or a tornado" is an insulting oversimplification of nature. There are probably at least as many different shapes of thermals as there are of modelers' wives. The commonest basic shape is apparently that of a toroid, or doughnut. Scientists tell us that the air pattern of this doughnut is upward through the hole in the middle, rolling out the top and spilling back down the

sides to the bottom, where at least some of the air gets sucked back through the system for another trip. Add to this picture the spinning motion of the vortex, or whirlpool, that feeds fresh air upward into the doughnut's center, and the whole thing gets ridiculously complex. It starts to look (in my head, at least) something like a tornado wearing a life preserver. Or maybe an assembly diagram for a bias-ply tire. If all this toroid-talk tickles your fancy, I recommend an article in Scientific American *(206:130-4) entitled "The Soaring Flight of Birds."*●

1 to 1 . . . . . *Continued from page 29*

three-view spans six cm, the model item will measure six cm on the five times expanded scale.

If the ratio between the three-view and model is an odd one, we once again have some options. Of course, you can vary the three-view size, however, this is not necessary. An easy method to accurately develop the increase in size for the model ruler is to place a standard metric scale on a *known* dimension of the three-view. The two can then be photographically increased to the proper size. A ruler can then be manufactured by matching the markings.

The method used in the FAI rules has some advantages in that the ruler is easier to produce for odd scales. Where the AMA ruler would require duplicating small increments, the FAI ruler utilizes much larger increments, making the use of fine, delicate divisions unnecessary.

I have used strip aluminum available in hardware stores and make the markings with a permanent black marker pen. You may find that when you are transferring the markings from the photographically-reproduced metric measure, the markings have grown considerably fatter during the blow-ups.

There are a few items which are important for you to consider. Time and time again, the modeler will use the basic full-scale dimension to produce the model. In addition, by using the scale factor, other measurements will be taken from the three-view. Then when the model is *finished,* the modeler sets about to produce the ruler measuring device from the three-view. It's at that time that he discovers he has produced a model that does not fit the available documentation. Indeed, when he lays the ruler on his three-view model, all he succeeds in doing is proving the inaccuracy of the model. 'Tis a pity.

Should you have photographic work done by a printing company, hopefully you can be in attendance when it is done. You may find as well that such work tends to be somewhat expensive.

Check with your printing expert to determine which materials he uses that are the most stable as far as expansion and contraction. Some "papers" are not very stable, but various plastic-based materials may prove more suitable.

While speaking of scale presentation items, let me tell of a recent experience when I had an opportunity to judge some sport scale models using the standard AMA rules. The models, judged statically only for a build-a-plane program, were very nicely done. The workmanship was high. The models comprised several WW-II varieties along with a couple of civilian aircraft and a modern jet type.

When the three judges were shown the presentations, a wide variety of information was available. It ranged from a nicely put together book of six pages of material to much less. To my knowledge, only one of the individuals represented by the models had flown in competition. It was that presentation which was the most complete.

Some of the difficulties encountered with the others included the following types of items (please bear in mind that these comments are in no way a judgment of the model, rather they are designed to show how the judges felt they could be better served in judging the model):

Civilian: Random selection of snapshots loose in plastic notebook folders. No indication of what to use for color samples, etc. No three-view given (I realize it is not required).

WW-II fighter: Model did not match any photo or drawing included as to markings, etc. One outline side view shown and a three-view, but not of the

same model aircraft. No indication of which was to be used for outline judging.

Civilian: Originally no three-view provided, but was given to judges shortly after start. One black-and-white photo in presentation with a written description of colors.

WW-II fighter: One color drawing with additional chips to use for insignia colors, which were considerably different than those shown on the color drawing. Three-view outline which had small drawing inserts indicating modifications (clipped wings, rudder shape, etc.) from original. Notes included indicating what to use for what.

WW-II fighter: Three-view color drawing with commercially available color chips to use for color documentation rather than drawing.

In most every case the judges had an opportunity to talk with the modelers and discuss the model and presentation with them. In most cases, the modeler indicated that the presentation was kind of a rush job due to the early nature of the contest (middle of March) and that they had just barely gotten the model finished. The concern was to make the conversations educational (both judges and contestant), looking toward competition later on.

Probably the biggest problem for the judges came in the area of color. Aside from the fact that the judging was taking place inside at night under the fluorescent lights of a banquet hall, several things were perplexing. For instance, in the case of two of the WW-II fighters, the modeler was indicating to the judges that the insignia colors on the color drawings were inaccurate; however, the basic paint jobs on the models worked at matching the drawing. It's difficult not to see this as counterproductive, since what the modeler is attempting to say is that, "My drawing contains accurate color representation for the basic paint scheme but the insignia is wrong." I am certain that this is possible, but are there not seeds of doubt planted in the judge's mind?

In the case of the second civilian model, perhaps I am the one at fault. The modeler involved indicated that the rules state that a written description of the colors may be used in lieu of color photos or drawings. This is true; however, color photos of the aircraft do exist, and indeed, he had some with him. His concern was that the photos (some magazine and some snapshots) did not match one another, nor what he *knew* the shade to be. (He indicated that he was professionally involved in the paint field.)

I understand his dilemma, since photos rarely do match. My inclination, however, would be to use one of the photos available (probably the snapshot) and match it. Better yet, since he is working with a commercially available color system, a chip should be available. He left me somewhat unprepared to accept the written description, knowing that color documentation of some type does exist. Had the model been an aircraft from the early years, I would have felt more secure in accepting the description.

I trust that the individuals involved in this portion of the article will understand that this is not a treatise designed to admonish them. Their efforts were very commendable; so much so that the growing difficulty which exists in scale was ever present. The quality of the models continues to escalate, causing increasing difficulty for the judges in separating the models. In years gone by, it was only necessary to separate the wheat from the chaff. Now we find ourselves separating wheat from wheat!

There are, perhaps, complaints concerning the fact that sometimes judging becomes too critical in Sport Scale. This may easily be true, especially in that old bugaboo: the fine details. However, in some contests, if some of the more subtle features are not considered, we'd go into the flying in a dead tie. While some folks would love this, the event is still flying *scale*. By subtle features, I am *not* referring to the panel lines, etc., but rather the differences such as a nose extended, a wing chord widened, a tail moment lengthened, etc.

I sincerely hope that you concentrate hard on making your presentation clear, concise, and accurate. If possible, never plant seeds of doubt in the judge's mind. Since his job is already difficult, don't add to it by making him make a million mental shifts to unlock the code of your presentation.

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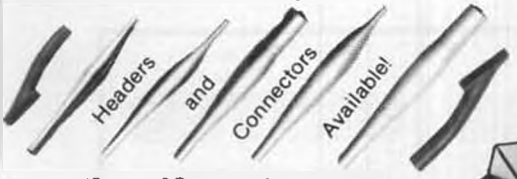

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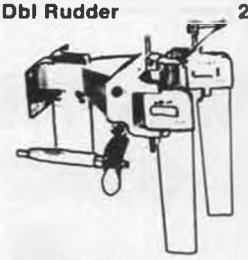

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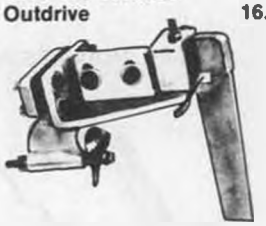

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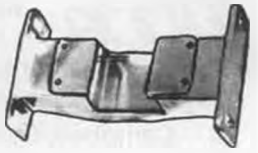

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material which ranges through most of the sizes which are required; however, as on my Hiperbipe, you may encounter a problem beyond one of size, called shape. The materials commonly available have a shape which is rather sharp at the edge: . The Hiperbipe used a much more rounded section, more in the shape of a true oval:

In order to attack this problem, I tried several sources and methods, all of which proved unsatisfactory. My biggest problem revolved around the fact that the wires had to be functional . . . *very* functional. Therefore, I needed a means of anchoring them in the wing and fuselage so that they would withstand a reasonably heavy load.

The system which was eventually used involved a piece of music wire strung through 36-inch lengths of aluminum tubing. A loop or fitting was then silver soldered in the end of the wire, enabling a screw or nut to be used to anchor the wires firmly.

The tubing was, in slow stages, crushed around the wire, achieving the necessary oval shape. A problem developed early in this technique in that the wire tended to rattle within the tubing. This was overcome by coating the wire with epoxy prior to inserting it into the tubing. While the glue was setting up, the tubing was crushed, slowly and carefully.

You will find that you will need to experiment with the wire insert and outer tubing sizes in order to prevent the tubing from having to crush too far. As this happens, there is a tendency for the tubing to bend at an angle what I presume is some type of joint.

The tubing will then need to be carefully finished with a fine file, followed by increasingly finer grades of sandpaper down to No. 600. Then, by using rubbing compound and polishing compound, you can achieve a look of stainless steel. It helps, of course, to coat the finished material with some clear spray to prevent tarnishing from occurring later.

They not only look good, but they will support a whale of a lot of load and can be made with simple tools. Oh yes! Don't use a crushing tool that has notches in it (such as pliers) if possible. Perhaps you can face the jaws with soft pieces of pine in order to avoid putting marks in the aluminum.

ADMONISHING

I recently mentioned to the leader of this magazine that I regretted not having more photos to provide for this column. He suggested that I admonish you (assuming there is a you out there) concerning this subject. He further suggested that if the readers did not wish to continue to see my models in the photos, the way to get around it was by sending some of their own. When you do, please make certain you identify what it is, where, and all those nice little details we love to read about, such as size, power, stuff, and things.

Should you have color slides which ordinarily are not used by the magazines, I can use my handy-dandy gadget I bought to copy them in black-and-white. It's a Prinz zoom slide duplicator and it fits right on the front of my Nikromat. By inserting the slide in a holder and aiming it toward strong light, I can make negatives of the slides. There is even some adjustment for cropping. I have found that it tends to increase contrast, but the way I make prints, that's generally not a problem.

Therefore, send along your B&W's or a duplicate color slide and I'll try and get you in the magazine. Super interesting shots are always nice, like *flying* models *flying*. However, don't let it be a fly speck on a sea of sky that makes one wonder whether it was just a dirty lens.

In the meantime, until you get those to me, there is a picture of the writer's DeHavilland DH88 "Comet." Wingspan: 88 inches; weight: 13 lbs., 8 oz.; power: 2 HP .40's; finish: K&B Superpoxy; retracts: modified Rhomair. It flies great when I manage to get it off the ground (which my friends will tell you is infrequently).

SHORT SHOTS

A second page of supplemental material for the Scale Data Source Guide has been mailed to members by the National Assn. of Scale Aeromodelers (NASA). This guide, prepared by Jamie Gielens, has been very well received by the members and has drawn interest from individuals outside the organization.

In addition to the sources, the organi-

zation is building a library of photos which are available at cost. An encouraging note in this respect is that because of an arrangement set up by Jamie with a local high school in his Canadian province, NASA can make the photos available for about 25 cents per 8 x 10 B&W and 50 cents/8 x 10 color (plus postage).

Members of the group have been encouraged to send Jamie any negatives or photos which can be copied to add to the collection. Originals will be returned.

One note which must be made is that the Guide, at present, is made available to members of the Association only as a membership benefit. If for any reason a present member has not received his or her copy, please let me know at 4109 Concord Oaks Dr., St. Louis, MO 63128. Include your membership number. Memberships in the organization can be obtained by writing Noel Allison at 4174 W. 120th St., Apt. C, Hawthorne, CA 90250. Dues are $5/year and include a regular newsletter. •

Fuel Lines . . . . *Continued from page 39*

be filled with a fuel pump because of their natural resistance to being inflated. The fuel capacity of these rubberized containers are very limited; however, they are very popular with the modern free flighters because of their simplicity and lightness. They are available in most model shops.

B) Crankcase pressure. This system depends on the pressure developed in the crankcase by the piston on its downstroke. A small fitting is usually attached to the back cover plate of the engine to which one end of a section of conventional fuel tubing is attached. The other end of the fuel tubing is attached to a metal tube located at the top of the fuel tank. In operation, pressure is developed by the downstroke cycle of the piston and it is this pressure that is transmitted through the fuel tubing to the gas tank. On the upstroke cycle of the piston a partial vacuum is also transmitted to the gas tank. A complete revolution of the crankshaft results in subjecting the fuel tank to both a pressure and vacuum condition, however, the higher pressure will easily overcome the effect of the vacuum, and the net result is a postive pressure forcing the fuel to the needle valve. This is probably the most common and popular type of fuel pressure system.

Another not-so-common crankcase pressure type is one where the pressure line leading to the fuel tank begins at a fitting located directly opposite the intake tube on the crankcase. This type is open to the crankcase only during the downstroke cycle of the piston for maximum pressure to the fuel tank, and is shut off by the crankshaft during the upstroke cycle of the piston when the crankcase is under a partial vacuum. This type provides the highest amount of pressure to the fuel tank.

C) Muffler pressure. The principle of muffler pressure operation is similar to the crankcase pressure types, except that the pressure fitting is from a tap in the exhaust muffler. This type is adaptable to engines with carburetors and is quite popular among R/C fliers.

All of the forementioned fuel pressure systems have one thing in common: They allow intake tubes of larger-than-average size for maximum charge of fuel mixture.

Starting an engine equipped with a crankcase pressure fuel system requires the use of an electric starter instead of hand starting, because fuel starts to flow just as soon as you start cranking, and the danger of flooding is quite great. When cranking with an electric starter, the needle valve or fuel line should be closed off and opened only after full starter rpm's have been attained. This is done with the ignition points fully advanced. Any backfiring tendency will be eliminated as long as fuel is not allowed to enter the intake tube until the starter has brought the engine up to full starter speed.

In these last three articles on obtaining more power from your ignition engine, I have only repeated what has been said many times in the past. After all, two cycle engines all operate on the same principle, although some are considerably better engineered and manufactured. Gasoline for fuel and ignition for combustion is slowly making a comeback. Many fine modern glow engines are adaptable for conversion to ignition operation, resulting in lower

fuel costs and greater economy.

If you have completed all the steps as outlined in these last three articles, your engine will now be as mechanically refined as it can be made. If you are using it for racing, there are a few additional refinements that may add a bit more performance, but these would depend upon the individual engine. Choice of fuels will also have a great effect on ultimate performance, but that's for another article. One thing you might want to play around with is changing the length of the intake tube to obtain a ram induction effect of the intake air. This consists of increasing the length of the intake tube sometimes as much as seven to ten inches. Try using telescoping tubes for establishing the correct length. The final increase in speed will surprise you. •

ALDRICH

"PURPLE SHAFT"!

We were going to lead off with a stronger word, but that's not nice . . . but damn it, we don't feel very nice, or cordial, or even pleasant.

A few months ago we told you a little about how nitromethane was made and how the price has risen drastically since its originator, Commercial Solvents Corp., sold out.

What actually transpired is umimportant, for just as sure as gasoline is over 70¢ a gallon on the east and west coasts (regular is 64.9¢ in Texas), nitro has been "elevated" to as much as $19 and more per gallon! Not only that, but it is rationed!

Let's back up a bit. For quite a few years, the only manufacturer of nitromethane, namely the IMC Chemical Group, Inc., has been pushing a product of theirs called "Comsol 55." This compound is 55% nitro *by weight*, but only 45% by volume. The remaining 55% (by volume) is methanol. Good old cheap menthanol. Cheap? Yeah, cheap when you have to pay over $6.70 a gallon for methanol when anyone can buy it for a fourth that amount? Nuts!

What we are getting at is that it is much easier, and thus less expensive, to mix fuel with straight nitro than to use Comsol 55. It takes roughly twice as much Comsol 55 to make a given percentage of fuel as it does with "pure" stuff. Think of the added freight YOU must pay, not to mention the storage problem for the manufacturer. Fifty-five gallons of Comsol 55 weighs 425 lbs., while the same amount of 100% nitro comes in at 500 lbs. Twice as much fuel can be made for almost the same freight cost per drum.

Well, friends, come April 1, 1979 . . . about two months ago as you read this . . . *nitromethane jumped 63% in price.*

Not only that, but anyone who did not buy Comsol 55 last year cannot buy any this year. Those who did buy Comsol 55 will be allowed to buy 1/12 *per month* of what they bought last year! Those who bought pure nitro through a distributor, because they had to in order to get it, will get NONE! Keep in mind that all the nitro made comes from IMC Chem. Group, Inc., the only manufacturer. They made their profit from distributor sales, where everyone but Fox, Cox, and K&B must buy. Yet all others will not be "allowed" any nitromethane in the diluted Comsol 55 form.

Does all this sound like sour grapes? Maybe so, but I hate to be ripped off, for any reason. I'm told there's enough oil reserves in Texas alone to supply the U.S. for 200 years. Alaska has only been scratched. California has a bunch, too. But the "rearrangement" in Iran, a country not much bigger than some Texas counties, has brought on such a "shortage" that we will have to pay over $1.00/gal. for gas by summer, we're told. This may all be true, but I'll bet you a big steak that next year, all the major oil companies will show 300 to 500 percent profit gains, just like they did in the 1973 "shortage."

What does this mean to us, the modelers? Higher fuel prices, pal. Unjustified, but higher! The larger companies that have a warehouse full of supplies can hold the line longer, but inevitably the price of fuel will have to go up.

Why don't we just drop nitromethane and go to FAI fuel . . . that'll show 'em. I wish!

Dow Chemical and Pittsburg Plate Glass buy over 7 million pounds of nitro per year for paint. All the drag racers and modelers together don't use 1% of this amount. In short, there ain't no use. Why fight it? There's nothing we can do about it. The government sure won't listen, much less do anything about it. Just like Proposition 13 wouldn't work and the government sure as hell wouldn't do anything about it . . . would they? Wait a minute, who *is* the government, anyway?

Unless something startling does happen soon, what it's going to come down to is Joe Bigbuck will win 'cause he can afford the nitro.

We've never been known for mincing words or opinions, right or wrong, over the years. Back in 1966, and again in 1972, we pleaded (even to WCN) that a 10-point spread was not enough for scoring the very good to the very bad in aerobatic events.

Now, right here in this here number No. 1, best-reading pulper going, we gotta say it: it is time, model persons . . . let's drop nitro from our fuel, this here party has got it rough!

It'll be easier on our engines, models, and bank account! •

Half-A . . . . . *Continued from page 45*

Next photo is of a unique new offering from Cox Hobbies. This gem is the "Radio Control Cub Trainer." Based on the radio used in Cox's low cost cars and running on a 49 megacycle frequency, this aircraft requires no license to fly, and is designed for the absolute beginner. The powerplant is Cox's Pee Wee .020, and construction is bead styrofoam. The radio is already installed when

you get the model. Assembly is absolutely minimal; no gluing required. I will reprint the complete sequence:

1) Apply decorative stickers and snap the landing gear in place.
2) Install batteries (not included). (You will need 10 AA pencell Alkaline batteries.)
3) Install one-piece wing with rubber bands (included).
4) Fuel-up and Fly!

I have obtained one of these Cub models and a beginning flier to go with it (she isn't included either), and we will do a complete product review very soon.

So, until next month, may your batteries remain forever charged and your wings unwarped. •

Zephyr . . . . . *Continued from page 50*

especially at how the tips are spliced onto the wings and tail surfaces. Those joints and the tip grain direction are enough to make one's hair stand on end! Instead of this, I laminated the wing and tail surface outlines from 1/32 sheet, adding extra laminations at the wing t.e. to get the extra thickness. To keep the plans authentic, we have shown the original construction, but the laminated structure is strongly recommended.

Instead of carving a prop from a balsa block, I made a laminated slat prop using the technique described by Fred Hall in the March '79 issue of **MB**. As far as I'm concerned, it's the only way to go. As a side ntoe, the slats were glued together with Titebond that had brown RIT dye mixed in with it, so that the separation lines between the slats would be more visible on the finished prop.

The model is equipped with one of the adjustable propeller bearings dreamed up by Paul McIlrath, allowing precise side and downthrust adjustments. The flying surfaces are covered with orange superfine tissue, and a pair of 1-inch Hungerford spoke wheels add the appropriate Old-Timerish look.

The Zephyr is a very stable flier, due no doubt to all that dihedral. The longest

test flights were with one loop of 3/32 contest rubber from Peck-Polymers. Average time was 40 to 50 seconds, with one flight of 1:04. I also tried adding a loop of 1/16 rubber to the 3/32, which resulted in a much faster climb but shorter flight time because of the much shorter motor run. Except for moving the wing forward slightly, no adjustments were necessary, and I was having a ball until the batteries in my homemade electric winder went dead. Rats! Something tells me that WCN was back of this, as I was flying in the morning, before showing up for work, and if the batteries hadn't quit I probably would have stayed out all day.

Building and flying the Zephyr has been a very enjoyable experience, and I'm sure that anyone who builds one will feel the same. Have fun! •

Mammoth . . . . *Continued from page 53*

three times a year flying the same servos in standard models. So the answer of whether one or the other is more destructive really depends on the aircraft and how it is constructed. Anything which can reduce vibration is appreciated, so Quadra users should nominate Dario "Modeler of the Month."

QUESTION: Can't you take the good features of each engine and come up with a better one?

ANSWER: The only thing any manufacturer can do is select the best *combination* of engineering features to suit his needs. Remember, I said "combination." It is technically impossible to combine the best features of individual component and come up with the ideal combination. There is a weak link in any engine. This weak link is sacrificed to gain by the features it allows in other components. A single-cylinder engine's main features are simplicity, light weight, and lower cost (due to a lower parts count and simpler basic design of components, resulting in easier repairs with simple tools). While the Quadra is designed for a long life span, at the end of which it can be overhauled, many engines on the market are designed as "throw-aways" to reduce original and replacement cost. In many applications, this may well be the right approach. The folks who are producing the Quadra engine can't bring themselves to build a "Kleenex" engine, but do appreciate the engineering required to achieve power at throwaway prices.

Let me list some of the desirable features of *individual* components, and you will see that no engine contains them all as a working combination.

1) Crankshaft: one-piece forged, hardened, and stress relieved, with dual counterweights each side of the rod. The crankshaft should be supported by a minimum of two *roller* bearings (balls do not have load carring capacities of rollers) located on both sides of the rod journal.

2) Rod: one piece of material which will resist distortion fatigue, of minimum dimension and weight, allowing at least one roller bearing at the big end, and hardened to prevent premature wear at the wrist pin.

3) Piston: of light weight, preferably single ring (in two-cycle fuel/oil mix lubricated engines only) with sufficient wrist pin boss bearing area to prevent "pound out," etc.

4) Engine block: preferably with integral combustion area (no separate head), light weight, and designed for equal controlled expansion with piston regardless of engine temperature, hardened cylinder (chrome-plated aluminum with no separate liner preferred), surface treated for oil retention, all parts integral with castings (as few gaskets and seals as possible).

5) Ring: lowest drag possible consistent with good seal, preferably rotatable (non pinned).

6) Flywheel (if used): of minimum size and weight consistent with smooth operation and located as close to support bearings as possible.

I realize that these aren't *all* the important parts, but they are sufficient to show what desirable component combinations are possible and which aren't.

Now for the facts. If you want the desirable features of a one-piece rod, it precludes using a two-counterweight crank, or alternately, a single-piece crank because you can't thread the rod over a counterweight. Generally, the

Semi-big fun scale

Fokker D VII

Quick build up
Kit OL781 $97.50

FOKKER D-VII:

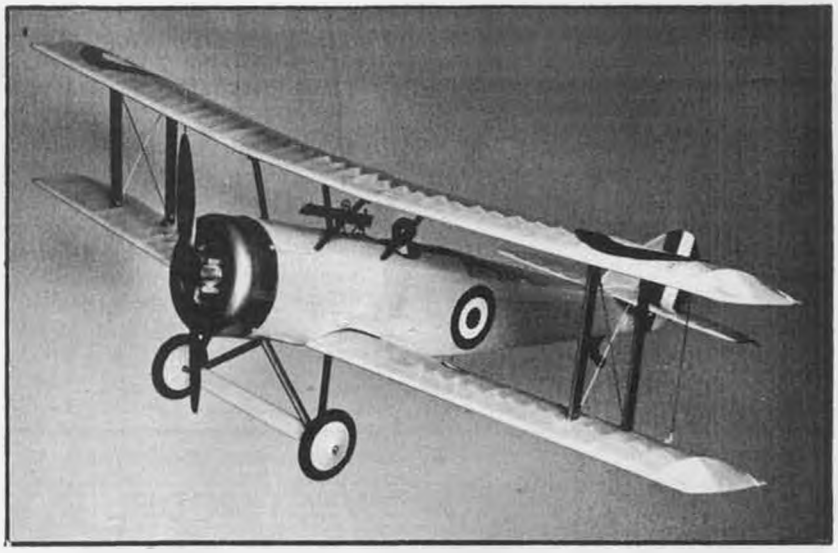
Engines .60 size
Wing span 72"
Wing area 1488 sq.in.
Weight 10 lbs.
4-channel radio required

Sopwith Pup

Quick build up
Kit OL792 $119.50

SOPWITH PUP:

Engines .60 size
Wing span 67½"
Wing area 1586 sq. in.
Weight 10 lbs.
4-channel radio required



KIT FEATURES:
- 2 full sized rolled plans
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- machine cut hardwood parts
- machine cut and pre-sanded plywood parts
- preformed balsa blocks
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Accessories included:
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- Scale pilot
- Self adhesive decals

Hardware package includes; aluminum motor mounts, pinned hinges, snap links, control horns, nylon bolts, landing gear strap, socket head bolts and blind nuts, plus all necessary fittings.

See your dealer or order direct postpaid

Prototypes flew great with a K&B .61 and 14-4 prop.

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smaller the rod, the more difficult it is to provide the strength in a design which requires a rod cap which is fixed with screws or bolts. It is usually conceded (especially in single-cylinder engines) that the rod bearings are by far the hardest working parts in the engine (also the most prone to failure!). Two-piece rods also preclude the possibility of an unbroken race for the rollers to run in. The two resulting "cracks" don't make for good roller operation, especially if the cap is distorted or cap location not correct in relation to rod due to manufacturing errors, running stress, or incorrect assembly procedure. Therefore, if a one-piece rod is of uppermost importance in a manufacturer's mind, it precludes using a dual counterweight crank unless you resort to using a multi-piece crank. This, if used, means a generally more bulky crankshaft which is weaker, must be jig assembled, and prevents rod installation or removal without the proper tools and knowledge of procedure. It also has the problem that, if stopped abruptly (and model engines do that far too often!), the alignment could shift, which could damage the engine if run further. The least effect would be the requirement of a complete disassembly and rejigging of the shaft.

The reason dual counterweights are desired is that they allow this weight to be equally dispersed on either side of the rod and piston for better balance. In the case of the Quadra, which has sacrificed this feature in favor of the one-piece rod and crank, the ideal counterbalance can't be achieved because it is effectively off center, and this causes a second imbalance (see diagrams A and B). *Dario's deliberate unbalanced flywheel mod makes the flywheel act as a second minor counterbalance.* Since the flywheel is removable on all engines anyway, and is protected by a shearable key, it provides the best combination of desirable features. It allows the use of a one-piece crankshaft. The rod journal is supported on both ends. The one-piece rod is retained and the undesirable features of the single counterweight are greatly diminished through the use of the compensated flywheel balance.

Model aircraft engines generally use a single counterweight and often a pressed-in rod journal which is not supported by a bearing on both sides. The pressed-in pin sacrifices the one-piece crankshaft to allow the rod pin or journal to be better finished and made of a different material than the crankshaft, as an extremely hard crankshaft is often one which fatigues, cracks, or snaps under a sudden shock such as when the engine is stopped suddenly, especially when the walls are thinned to allow larger gas passages. (We won't discuss how this sudden stop is achieved!) See diagram C. This is referred to as a cantilevered crankshaft. In itself this is *not* a desirable feature, but *does* allow a one-piece rod. The rod in this case is held on the journal by either the centering effect of the wrist pin end or the close proximity of the backplate on which it rubs when end thrust would tend to make it slip off. Another drawback of dual counterweights is that more space is required in the crankcase (primary chamber on a two-cycle engine). This increased undisplaced volume results in a less efficient pumping action, which is an important factor in the performance of any two-cycle engine. Even with a single counterweight web, the added unnecessary volume created by the web itself has been attacked by manufacturers by filling in the open segment of the counterweight with a light material and going to great lengths to make sure that it stays there.

I hope this rather long-winded answer cover the question adequately and that you will now be aware that every engine manufactured today compromises something to allow the best features in performance advantage of individual components to shine through. In the final analysis, pretty is as pretty does, but remember that *any* reciprocating engine will fatigue and damage *inadequate* structures (even full-size aircraft are not immune). Dario's mod *will help* a Quadra engine but *will not help* a two-counterweight engine. It has its own problems.

QUESTION: Can you remove the flywheel and still run the Quadra and other engines? If so, on which ones? Is there any advantage in doing so?

ANSWER: A flywheel on any engine will tend to soak up power impulse shock on

firing and release it as stored kinetic energy during the non-power cycle. Some of this energy is lost. The non-flywheel equipped engine thus tends to run rougher, especially at lower speeds. On standard model aircraft engines the propeller itself acts as a flywheel, and most modelers have long ago discovered how vicious a model engine can become if run with small, light props. Here the quest is for speed, and for speed you are usually prepared to sacrifice quite a bit. On some engines marketed today it is not possible to mount the flywheel due to the location of the carb or other component in the flywheel's running path. Removing the flywheel on the Quadra eliminates the possibility of using Dario's mod to improve total balance. Eliminating one on any engine may save *nose* weight, but the *total* weight is often increased by the compulsory use of batteries, which can limit your flying time. Conversion to glow will result in a weight saving, but *only for short flights*. The added fuel load which has to be carried for glow operation soon makes up for the flywheel/mag combination. A Quadra type engine will run about an hour on 32 oz. of gasoline/oil mix. If the glow version uses 2 to 3 oz. per minute, that's at least 120 oz. for the same flight time.

Next you're going to ask, "Who flies for an hour anyway?" The answer is an ever-increasing number of fliers who don't have to share a frequency for lack of fliers or other reasons, and now find they can practice their flying without worrying about running out of fuel. Generally, the pump carb on large ignition engines such as the Turbo/Homelite, Hustler/Homelite, Husky, Evra, O&R, Roper, and Quadra allows the engine to run from start to finish without complaining about tank or fuel height, and if the tank is mounted on the CG, trims don't change either.

People who were learning slowly (to say the least) to fly conventionally powered aircraft which didn't allow them time to settle down and still have time to practice are now moving ahead by leaps and bounds with big aircraft. The slower appearing flight speeds give time to observe correction to mistakes made previously. Little changes in flight position which make the difference in smooth performance are now being added for real seat-of-the-pants flying. No roll button needed here. You flies it like you see it!

This article was written one week from Toledo, so next month should see a lot of pictures of mammoth models. The thrust test machine is still not ready, but will be for next month (everyone gets three chances!). •

Electric . . . . . *Continued from page 55*

also an excellent 1/2A receiver sold by Royal Electronics Corp. (3535 S. Irving St., Englewood, CO 80111). They also sell the Bantam Midget servo kit. The price for the receiver kit is $22, and it is well worth it. It has superb range and stability, and makes a great combination with the Bantam Midget servos. One word of warning, though: use a mini soldering tip when assembling this kit! I used the Exacto 25-watt pencil iron with a regular tip, and it was much, much too big. I wasn't ready for that; I have used this iron on all the other kits with no problems, but the directions for this kit call for a 1/16-inch soldering tip, and you had better believe it! I had severe problems with too much solder, and had to clear out a lot of solder bridges, a painful process. So, file down the tip or wrap 1/16-inch copper wire around the iron to serve as a tip. The receiver was worth the effort, a "best value" for price and performance, and slightly less than 1 oz. in weight, for the four-channel version.

I should note that all these kits worked without any major problems. I did have to troubleshoot a couple of them due to some wrong connections and solder bridges, but the only equipment I needed for this was a voltmeter (20,000 ohms/volt) and a signal tracer (really just

an audio amplifier with probes) I bought from Radio Shack. Well, enough for now, keep it simple, fly electric, and have a ball! •

THE 1979 ELECTRIC CHAMPIONSHIPS

Due to poor flying weather, this year's Electric Championships, held at Mile Square Park, was sort of a bust. There were only 10 entries in F/F and 26 in R/C, many fliers choosing to keep their models in their cars and not risk the high winds and occasional drizzles. The free flighters found their models drifting pretty far downwind . . . Gene Wallock, for instance, had his Astro 020 powered Ranger go into a residential area, where he found it sitting on someone's driveway (talk about luck!). As it was, no officials were recorded in Electric 020 Replica or Jr. F/F, only one in Endurance, and three in Scale. It's too bad about the weather, as some fliers came quite a ways to take in this meet, notably Bob Haight and Chuck West of Las Vegas. Those who did post official flights flew early in the morning, so early that everyone was done flying before our photographer arrived, and that's why there aren't any F/F pics. We'll do better next time . . . honest.

The R/C'ers who flew had their hands full just trying to keep their models right side up in the gusty winds, let alone trying to do aerobatics or a scale flight routine. Probably the best show was put on by Steve Neu, who placed 3rd in Scale and Powered Sailplane and 1st in Aerobatics, thus becoming the Grand Champion. Steve is a hard guy to beat!

Well, about all we can do is hope that next year's Championships will be blessed with great weather and a good turnout of fliers and spectators alike. Many thanks to Astro Flight and **R/C Model Builder** for putting on this one-of-a-kind meet!

F/F RESULTS
SCALE
1) Irv Aker ..... Inland Sport
2) Tom Laurie ..... Eaglet
3) Bill Warner ... Richards Monoplane
ENDURANCE
1) Jim McDermoth ..... Hummer
020 REPLICA
No official flights
JR. F/F
No official flights

R/C RESULTS
SCALE (9 entries)
1) Kevin Flynn P-68
2) Bob Boucher ..... Porterfield
3) Steve Neu ..... Cessna Conquest
4) Bob Sliff ..... Rearwin Speedster
5) John Sczary P-68
AEROBATICS (5 entries)
1) Steve Neu ..... Cessna Conquest
2) Larry Jolly ..... Mini Star
3) Bob Sliff ..... Monocoupe
4) Bob Boucher ..... Sportster
5) Bruce McAvinew ..... E Fly
OLD TIMER (4 entries)
1) Bob Sliff ..... Playboy Cabin
2) Bruce McAvinew ..... Long Cabin
3) Ross Thomas ..... Long Cabin
4) Ernie Payne ..... A.T. Sportster
POWERED SAILPLANE (8 entries)
1) Larry Jolly ..... Electro Lite
2) Ken Banks ..... Ocitillo 2000
3) Steve Neu ..... Super Monterey
4) Dale Black ..... Miss Fragility
5) Brian Curry ..... Electro Lite

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Sailing . . . . . *Continued from page 56*

does displacement increase with length, it increases faster than length. The table below gives the disp./length ratio for these boats.

CLASS	DISP./LENGTH
36/600	0.16-0.33
Star 45	0.24-0.42
50/800	0.28-0.4
SB	0.36
EC/12	0.41
Newport 12	0.55
A-Class (Tracer)	0.606

We see that the ratio overlaps for the 36/600's and 50/800's. The Diegan has a disp./length of 9.6/36, or 0.267. We can use this value to calculate a target weight for the 50-inch version by substituting into the ratio: displacement/50" = 0.267. Therefore, the displacement should be about 15.35 lbs.

Another ratio which is helpful is the sail area/displacement (SA/DISP) ratio. The area (square inches) of sail area is divided by the displacement in pounds. The resulting answer is the number of square inches that are assigned to push each pound of boat. In the DIEGAN, the SA/DISP. = 600 sq. in./9.6 lbs. = 62.5 sq. in. per pound. Remember that we hoped for a 15.35 lb. 50-inch boat in the paragraph above, based on displacement/length. Now we can calculate the amount of sail area the 50-inch boat must have to maintain 62.5 sq. in. per pound: 15.35 lbs. × 62.5 sq. in./pound = 959.4 sq. in., sq.

But the 50/800 rule only allows us 800 sq. in., so we must operate at a reduced sail area. Our actual SA/DISP. will be 800/15.35 = 52.1 sq. in./pound. We've lost 16% of our potential power because of the class rule controlling total sail area.

Geometrical areas scale in the ratio of the squares of the lengths. So $50^2/36^2 = 1.92$. If we just make the sail rig proportionally larger, it will have 600 sq. in. × 1.92 = 1152 sq. in. But again, we will only be allowed 800 sq. in., so we lose 352 sq.

in. or 30.5% of what a scale model of the 36-inch boat would have.

Volumes scale in the ratio of the cubes, or third power of the lengths. In our case we have $50^3/36^3 = 2.69$. This tells us that the 50-inch boat must weigh over 2-1/2 times what its little brother did, in order that the boat sits on its design waterline. This works out to 25.82 pounds! This is 10 pounds more than we had hoped for, based on the DISP./LENGTH argument previously made. But the actual displacement must be 25.82 pounds!

We may calculate the true SA/DISP. ratio now: 800 sq. in./25.82 lbs. = 30.98 sq. in. per pound. This is half the power per pound we had in the 36/600 version. The boat is going to be heavy, ponderous, slow to accelerate, and *dead last!!*

The SA/DISP. ratio of contemporary 50/800's is 50 to 60 square inches per pound. In summary, when you scale up a successful 36/600 to 50/800 size, you get a boat that is too heavy, short on sail area, and completely uncompetitive.

The obvious question is: can the reverse work? What if we scale down a 50/800 to a 36/600? Well, the scale factors will be as follows:

Length scale factor: $36/50 = 0.72$

Area scale factor: $36^2/50^2 = 0.518$

Volume scale factor: $36^3/50^3 = 0.373$

If we use a 16-pound 50/800, we find:

SAILS: 800 sq. in. × 0.518 = 414.4 sq. in. sails. But since we're allowed 600 sq. in., let's use it, even though we are over-canvassed.

DISPLACEMENT: 15.5 lbs. × 0.373 = 5.78 pounds total weight. Good luck on building it.

So, when one scales down a 50/800, the 36-inch boat that results is too light and unable to carry 600 sq. in. of sail. We've not been able to transfer the good match of sail area, length, and displacement which made the 50/800 a winner.

What to do? Take the bull by the horns and design to the class rules. Carry all the sail allowed and design hull beam, keel depth and so on to fit the class. It has been said that the ideal yacht would be a sailplan connected to a keel bulb with no hull to interfere! As far as I can see, the hull should be considered as a structural member which maintains the required geometry between sailplan and keel. (It also keeps the R/C gear dry.) The hull should service the sail/keel combination, not vice versa. Too often, the keel and sail plan are put on a hull. WRONG. The keel and sail plan should be designed . . . usually under rule constraints, then a hull fit between which has minimum bulk, minimum weight, and minimum drag.

In a future discussion I'll go into what one should be expecting to happen to the prototype hull as a new design is worked over in early tuning trials. Prototypes never earn beauty contests; to expect them to interferes with the evolution of the rigging and gear placement. If you decide to design, be ready to build 3 models, with the third one ready to look good in competition.

In the meantime, send your $10 AMYA dues to Secretary, 7013 Ansbrough Dr., Citrus Heights, CA 95610. The evolution of formula classes and the control of one-design classes rests in the hands of skippers with boats registered with AMYA. Have a voice in the affairs that affect your boat by being an AMYA member.

I'll take questions at 7608 Gresham St., Springfield, VA 22151, if you'll provide a stamped, self-addressed envelope for my reply. •

Hannan . . . . . *Continued from page 60*

may be flown from nearby North Island Naval Air Station before being placed in the collection.

An important addition to the museum are some 40 scale models of Golden Age aircraft, formerly in the collection of Herbert W. Browar, of Los Angeles. Many other miniatures, ranging from tiny "solids" through large R/C types, have also been obtained.

Most difficult to replace have been early aviation publications, so vital to the library. Curator Ed Leiser and Archivist Bruce Reynolds are particularly anxious to acquire books and magazines of the pre-1930 period. This includes both model and full-scale aviation-related offerings. All donations are tax deductible and donors are personally acknowledged, in the event any of you readers may care to support this more worthy effort.

NASA NOW AOSA

According to *Replica*, newsletter for March, The National Association of Scale Aeromodelers have changed its name and logo. NASA had, of course, "already been taken," and the organization had become international in scope, with the joining of foreign model builders. Thus, the change to Association of Scale Aeromodelers.

SCALE '80

Preparations for the World Championships scheduled for 1980 in Canada are well underway, according to C.J. Vandenbelt, chairman. Three categories are scheduled, including FAI R/C Scale, Stand-off R/C Scale, and Control Line Scale. F/F Scale has not been scheduled, owing to concern regarding site size limitations. However, Bob Underwood of AOSA is spearheading an effort to include F/F Scale, with an offer to provide all necessary officials and trophies for the event. The thought is that certain types of F/F Scale models may not require much space, based upon experience at the Woodvale, England Internats.

AMA Executive Director John Worth has pointed out that participation from at least five countries is required in order for such an event to gain recognition by the FAI.

WORDS TO LIVE BY

From 97-year-old college professor Hildebrand, confirmation of what model builders have always suspected: "It's what you start that's most exciting, rather than what you finish."

HOW TO FINISH

As if to reply, Col. Bob Thacker offers this advice: "Spraying will *not* fill anything! You *must brush* on the 'oogue' to work it into the pores. Then, after sanding, you can apply the spray. I have spoken!"

GOVERNMENT R/C?

One in a series of IRS television commercials relating to income tax, features an R/C model being flown. Wonder what that cost the taxpayers?

FAMOUS FLIERS WALL

At the Mission Inn, a national historic landmark in Riverside, California, is St. Francis Chapel with a wall commemorating the visits of aviation notables such as Orville Wright and Amelia Earhart. Worth seeing if you are in the neighborhood!

SO NOW YOU KNOW

The pronunciation of WACO has long been a point of controversy among enthusiasts, especially those from Texas, but did you know where the name came from? According to the American Aviation Society Newsletter, it was based upon Buck Weaver's name. Seems he was the chief financial backer of the company, the Weaver Aircraft Company, which yielded the initials WACO. Rhymes with TACO.

DOG-ON GOOD DEAL

From *Aircraft* magazine, June, 1912: "Probably the first dog to enjoy an aeroplane trip was that taken aloft by Robert G. Fowler at Spartanburg, South Carolina, on April 20. It was a bulldog belonging to J.P. Gwyn, an attorney of Spartanburg. It was intended at first by Mr. Fowler to give the dog a ride free of charge, but the business ability of Charles L. Young, Fowler's business manager, cropped out and a passenger fee of $50 was charged for the ride, which lasted 22 minutes."

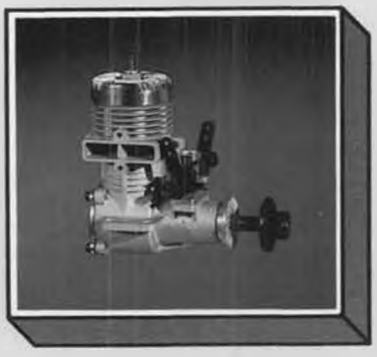
AVIATION MAGAZINES

Publications have played a vital but seldom recognized role in the progress of aviation. P.T. Capon, of England, wonders which one was first? Of course, a number of early periodicals were devoted to ballooning and *speculation* about heavier-than-air craft, but reporting on actual functioning hardware seems not to have commenced on a regular basis until the early 1900's. By 1909, France boasted some 14 "Aerial Journals," Great Britain had 5, and the United States 3.

The British *Aeronautics* magazine began in 1907; *Flight* in 1908, an outgrowth of *Automotor Journal*, which in turn originated as *Automotor & Horseless Vehicle Journal*. *Aero* began in 1909 and faded away during 1913. *Aeroplane* started as a weekly publication, edited by controversial C.G. Grey, and appeared during June of 1911.

In the United States, recognition for flying machines was slow to appear, and the first comprehensive account of the Wright brothers' flying activities appeared in, of all places, a beekeepers' publication! Written during 1905 by Amos Ives Root, it offered learned descriptions of the experiments which were largely ignored by other sectors of the media. We especially enjoyed this

FOX 25 BUSHING



Bore ..... .680
Stroke ..... .680
Displacement ..... .25
Weight .....6 oz.
RPM with 9-4 prop 12,000

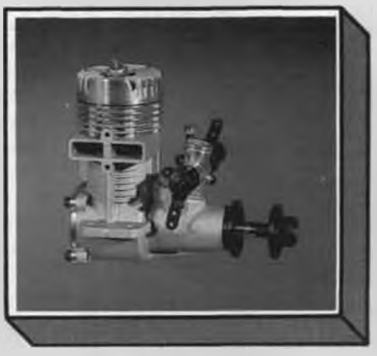
The Fox 25 power output is surprisingly great for an engine of this size and weight. It will easily fly most airplanes designed for 29 to 35 size engines, and yet weighs less and burns less fuel. On the other hand the Fox 25's light weight makes it ideal for airplanes normally calling for a 15 or 19 size motor. If your 15 or 19 size airplane is building up too much weight and is getting hard to get off the ground, install a Fox 25. Some of the construction features are: Main bearing SAE 660 continuously cast bronze, 7/16" diameter, piston is machined from mehanite bar and the cylinder from leaded steel. Connecting rods are machined from solid bar.

12500 Fox 25 Bushing with C.L. Type Intake $26.95

22500 Fox 25 Bushing with R/C Type Carburetor 36.95

90222 Conventional Silencer $7.95

FOX 29 BUSHING



Bore ..... .738
Stroke ..... .700
Displacement ..... .29
Weight .....7½ oz.
RPM with 9-6 prop 12,000

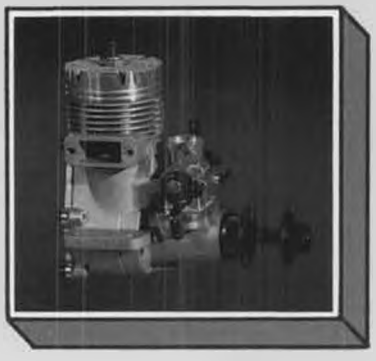
The Fox 29 was first introduced in 1957 and has since gone through various series of refinements. While it is not quite as powerful as the more modern schneurle ported engines, it will give you more power per ounce of fuel and more power per dollar than any other 29 we know of. Our present version has been debugged for 20 years and you can expect a minimum of problems. Parts are generously proportioned, crankshaft is a full ½" diameter. The R/C version features a longer crankshaft and an exceptionally linear simple to operate type carburetor.

12900 Fox 29 Bushing for C.L. $27.95

22900 Fox 29 Bushing for R/C 39.95

90222 Conventional Silencer .. $7.95
90412 ½" Prop Extension 3.00
90413 ¾" Prop Extension 3.00

FOX 45 SCHNEURLE BUSHING



Bore ..... .850
Stroke ..... .790
Displacement ..... .45
Weight .....11 oz.
RPM with 10-6 prop 14,000

The Fox 45 for 1979 is built in the same set of castings as the Fox 40 and differs only in the cylinder, piston, wrist pin and head button, in that these are designed for a larger bore. The piston on the Fox 45 is made of cast aluminum and is fitted with one unpinned ring. Like the Fox 40 the motor is very easy starting, extremely non-critical on needle valve adjustments and easily the most powerful bushing 45 on the market. The power output is well over one horsepower and it will handle R/C ships designed for 60 size motors and yet give you lighter weight and better fuel economy. The most significant change for 1979 model is a switch to a bell shaped combustion chamber and a replaceable head button. This gives a substantial power increase. Other changes less important are the switch to the steel thrust washer which is better when power starters are used, and a restyled exterior which is pleasing to the eye. We continue to use the Eagle type carburetor which is one of the most responsive, most linear carburetors on the market. On a horsepower per dollar basis the Fox 45 is probably the best value on the market. Try a Fox 45 and you will be glad you did.

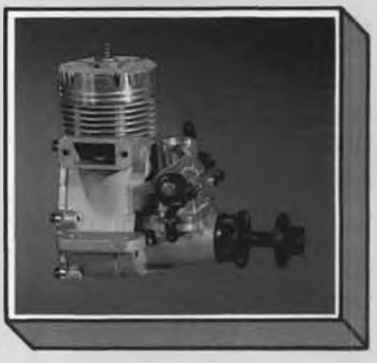
14500 Fox 45 Schneurle Bushing for C.L. $41.95

24500 Fox 45 Schneurle Bushing for R/C 51.95

90252 Conventional Silencer 7.95

90302 Tuned Muffler $19.95
90412 ½" Prop Extension 3.00
90413 ¾" Prop Extension 3.00

FOX 40 BUSHING



Bore ..... .800
Stroke ..... .790
Displacement ..... .399
Weight .....11 oz.
RPM with 10-6 prop 13,000

The 1979 model Fox 40 Bushing features improved cylinder porting plus an improved button type head. Result: a bushing 40 that will really haul a model. The mehanite piston's design allows some of the bypass gases to go through it, keeping it cool and eliminating any freezing problems. The crankcase features a large rear cover and a very efficient schneurle porting arrangement. Yet with all this power, the Fox 40 performs very well at slow speed. The 40 R/C will idle and take the throttle better than any other. A flange mounted carburetor means zero crankcase distortion. The crankshaft is a generous 9/16" diameter on the main and has a replaceable prop stud. Removing two screws and changing the intake assembly will convert your R/C to a control line motor. While it's one of the lowest cost 40's on the market, it will outrun many ball bearing motors.

14000 Fox 40 Schneurle Bushing for C.L. $35.95

24000 Fox 40 Schneurle Bushing for R/C $45.95

90252 Conventional Silencer ..$ 7.95

90302 Tuned Muffler 19.95

90412 ½" Prop Extension .. 3.00

90413 ¾" Prop Extension .. 3.00

FOX
MANUFACTURING CO.
5305 TOWSON AVE FORT SMITH, ARK 72901
PHONE 501 646-1656

quote: "Shall I tell you how they cured it of bobbing up and down? Simply by loading its nose or front steering-apparatus with cast iron. In my ignorance I thought the engine was not large enough; but when *fifty pounds* of iron was fastened to its 'nose' (as I will persist in calling it), it came down to a tolerably straight line and carried the burden with ease."

Some 75 years later, builders are still adding ballast to the noses of their models!

THOUGHT FOR THE DAY

Dr. Ing. Alberto Jona, Italian aeronautical consultant, as quoted in *Aeronautical Journal*:

"Man has always wanted to fly and dreamed of having wings like the angels. "True, sometimes he has more terrestial thoughts, dreaming instead of fauns and sylvan gods. Is it a wonder that a gentle breeze of folly blows on all aviation ventures worthy of remembrance?"

BIRD'S NEST

We have presented news of "Daring" Goehring's man-powered aircraft in this column previously, and now it is our pleasure to report a visit to the home of the "Gossamer Albatross" and "Gossamer Penguin" MPA's. Designed to compete for the Kremer English Channel crossing prize, these machines are much lighter than the famous "Gossamer Condor."

At the invitation of Dave Saks, model builder and a key member of the MacCready team, we were privileged to examine the aircraft and discuss their design philosophy. Dave is involved not only in the fabrication efforts, but is also a candidate for backup pilot, having successfully flown Albatross number 1. Other model builders involved in the program include Bill Watson, a winner in the Pasadena IMS Show indoor R/C competition, and Tarus Kiceniuk Jr., also well-known for his "Icarus" series of hang gliders.

The two "Albatross" craft are of 96-foot span, while the "Penguin" is about 1/3 smaller. All three are incredibly light for their size; a remarkable tribute to the team which designed and constructed them. One can't help but feel that by comparison, most model aircraft are greatly overbuilt!

Chief pilot Bryan Allen, Dave Saks and other potential pilots keep themselves in shape on exercise machines and bicycles, in preparation for the arduous task of pedaling their way across the English Channel at about 11 mph, which may require about two hours. The distance approximates that of Catalina Island from the California coast. Under the Kremer rules, the flight may be as close to the water as desired but must not exceed an altitude of 50 meters (about 160 feet) except briefly, to preclude undue thermal assistance. Three chase boats are slated to follow in case of need.

By the time you read this, these modern-day Louis Bleriots may already have flown into history, but at this time we can only wish them the very best of luck, and thank them for sharing at least a glimpse of their activities with **R/C Model Builder!**

SILLY SIGN-OFF

According to Walt Mooney, Central Park in New York is a most dangerous place to fly Peanuts . . . "You might be a-salted," he explains. •

Peanut . . . . . *Continued from page 61*

3) The horizontal tail has a 1/16-inch shim under the trailing edge to give a little more up elevator than shown on the plan. This requirement may vary from model to model and a shim at the leading edge would look funny when the horizontal tail was above the top of the fin, so the original's up elevator shim is not shown on the plan.

4) The rudder part of the vertical tail is warped to give a left turn. The trailing edge is about 1/16 of an inch left of the top centerline of the fuselage.

5) The center of gravity is as shown on the plan. Ballast the model as required with modeling clay to put its balance point at the CG shown.

If, when your model is completed, it does not have these surface adjustments automatically, which is unlikely, they should be put in by warping the wings and vertical tail. After the dope is thoroughly dry, I use the kitchen stove to provide enough heat to allow the dope to soften and allow the warps to be put in place. Open flames and doped surfaces are all too compatible, and besides, not very much heat is really needed, so I advise you to hold the model in such a way that your hands are between the stove and the model. If your hands don't get too hot, neither will the model. Of course, another heat source, such as an electric hair dryer, is an excellent method. Simply hold the surface in the desired position in the heat for a short time and then, still holding it, remove it from the heat and allow it to cool. Check it after a few minutes and make another correction if required.

I prefer a dry source of heat to using steam, as has been suggested in the past, because balsa readily absorbs water and then tends to slowly revert back to its original shape. Also, dope that is not thoroughly dry still has a small percentage of volatiles in it which will tend to make your adjustments temporary.

Having fun flying your modern Peanut. •

F/F . . . . . *Continued from page 67*

650-700 turns, and let the air do the rest. He piggybacked a few flights, but mostly waited for conditions to be right on the other flights. On a few flights the model was up very high and binoculars were required . . . this helped on one flight when the fuse was a bit too long. Such a marathon maxing effort requires a large, capable chase crew. In this case, Irv Aker, Bob Tymchek, Bob Piserchio, and Jason Kendy helped with the chasing, while Toni White did the fuse-lighting honors each time.

You know, I can't think of a more deserving model this month. (Plans are available from Flying Models . . . No. CF-300 . . . or from the NFFS.)

BOB WHITE'S
WORLD CHAMPS PREPARATIONS

Also included in Bob's comments were some thoughts about getting ready for the World Champs. He doesn't plan to build any new models, just a wing or prop to try out. His main effort will be on keeping sharp, particularly on thermal picking, and getting the best possible prop/plane combination. Right now, he's already selected the 3 models he wants to use at the World Champs. (His criteria is to pick those models that

center themselves in lift the best.) His main method of preparation will be to hit EVERY contest, since he feels that competition experience is the best way of sharpening his skill. He plans to use his old "turkeys" in these contests, and may be beaten, but feels that this is a good way to keep from becoming overconfident. He'll probably fly his good models in testing sessions, but will do his most intensive practicing about 2 weeks before the Champs. He hopes to be able to get completely ready, then put the models away and relax and renew acquaintances the week before the contest.

As far as rubber goes, he's tried out the new Pirelli. He feels it's like the old Pirelli, maybe even better. You do have to be careful about winding it, though. The new Pirelli is not very tolerant of hot weather. Bob says if the temperature goes above 90 degrees, he'll switch to FAI rubber or Vintage Aero. These don't have as much power for the calm air rounds, but take the heat better. Bob's already tested his rubber and has the motors selected for World Champs, too!

MAXAID GLIDER WINCH

If you use a "twanger" circle towhook, like the Maxaid, you've probably found that a good towline winch is a necessity. The stretchy monofilament used, hand-over-hand, by those who employ latched towhooks just doesn't give the same kind of "twang" as nonstretchy Dacron or Micron. The hand-over-hand technique of towing without a reel doesn't work with these lines, which tend to snag in the grass.

Finding a good winch is difficult. The FAI Model Supplies winch is most available, but doesn't have enough rigidity to winch the model up at the end of a circle (the gears strain, groan, and flex). Graupner used to make a nice towline winch (the Schuco-Hegi), but I don't know if they are still available. I personally use the winch produced by Bob Wilder, and so do most of the Southern California Nordic fliers, but availability is very limited.

The winch shown in the photos is now being produced by Elton Drew, former A/2 World Champ and manufacturer of the Maxaid towhook. He sent me a sample to try out, but the weather hasn't been conducive to that lately. First impressions are of a nicely-made, compact unit. Gear ratio is about 9:1, which should enable a quick wind-in of line. The T-shaped handle is a nice touch and should allow a good grip on the handle, even in a trashmover. The winding handle folds down, so you can slip the entire winch in your pocket while chasing (or you could hook the T-handle in your belt). The line spool doesn't need any special tools for removal . . . a big plus in contest conditions.

All in all, it looks like a well-thought-out design by someone who knows the desires of towline fliers. The only misgiving I have is whether the relatively short winding handle can generate enough leverage to winch up a A/2, but I'll try it out and let you know.

Order one from Maxaid Modelling Products, 2 Downfield Close, Alveston, BRISTOL BS12 2NJ, England. The winch costs $21, plus $2 for airmail postage (assuming $2 = 1 pound, approximately). Spare reels are $2.80.

By the way, next month look for an update on the twanger tow system. After a few years' experience with the system, there have been some refinements made which take care of the previous problems experienced and make it the best possible circle-tow system for the average flier. Watch for it!

MYSTERY MODEL

One of the problems with selecting mystery models for this column is to pick out designs that are distinctly different and identifiable. This month's model certainly qualifies on that point. It's a 1/2A model with elliptical dihedral, very low pylon and a spoiler D-T system that qualifies for the Nostalgia event. Good luck! If you can identify it, send your entry to the **R/C MB** office to see if you made it in time for the free subscription.

DOPE, EPOXY, ETC.

(From the Phoenix MAC newsletter, Al Lidberg, ed.)

"If you've been having problems with fuel affecting supposedly fuel-proof dope or epoxy, the information contained in a booklet recently published by Pactra might be of interest. We have sometimes had problems using the relatively mild (30%) nitro content Cox Red Label fuel. Later, when we got some special (super blast?) fuel from Aldrich, we *really* had problems. At times, any part of the model that was handled during starting or where raw fuel dripped, soon wrinkled and became soft and sticky. I wrote to George about the problem, thinking that the very hot fuel might need something equally exotic in the way of paint. He replied that he never had any problems. Skip Tracy also reported no problems, even when using higher nitro fuels in speed models, provided the epoxy film remained intact. Anyhow, after all this, I really wondered what was wrong . . . not al-

ways, but enough messed up dope/epoxy was happening often enough to be discouraging.

"While the booklet (*PACTRA FINISHING SYSTEMS*) is written about Pactra products, it's probably safe to apply the information to other brands. One thing that turns out to be very important for fuel-proofing is proper drying time for both the dope and the overlaid epoxy. Many authors mention the need for 48 hours or so drying time before putting on the epoxy. Pactra points out that 72 hours drying time must be allowed for Aero Gloss dope (which is more nearly an acrylic lacquer than a true dope in its present formula . . . TH) before coating with either Formula-U or Aero Poxy.

"Equally important is knowing that Aero Gloss dope, by itself, is resistant to 25% nitro, Formula-U to 30%, and Aero Poxy to fuel with *any* nitro content, *but only* after drying for 3, 7, and 7 days, respectively. So if we get impatient and don't wait long enough before subjecting the model to raw fuel, problems can be expected. Wait the extra week and you'll have a plane that won't get soggy so soon."

Al's report reminds me of an incident I had a few years back. I'd just finished a new model, let the finish set up for 3 weeks, and the first time raw fuel hit the Hobbypoxy, it curdled! I wrote a letter to Bev Smith, who called me to find out more of the details. Found out the trouble was caused by using polyester resin as an undercoat around the firewall area. This contains a wax, which comes through the finish over a period of time, and the epoxy won't bond firmly to it. His recommendation was to use only epoxy resin as an undercoat around the firewall areas, and I haven't had any trouble since. For areas not directly exposed to raw fuel, I use nitrate dopes and sanding sealers (Gliddens lacquer sanding sealer is a good one) as a base for covering with tissue before applying the epoxy, with good results.●

C/L . . . . . *Continued from page 69*

anyplace you go in the United States? Come on, think about it. . .

Now that you have thought, would you not agree that it is easily worth at least $25 knowing that your Rat, Combat, and Stunt planes are not only legal locally, but all over the rest of the country as well? With the cost of engines and building supplies being what it is, surely you have to agree that 25 bucks is cheaper than two or three complete sets of Combat planes, each set being built to rules used in various parts of your contest flying territory.

A couple of years ago I added up what it cost me to be competitive in the various events I flew at that time. Added to that was the cost of just getting to the contests, eating while there, and so on. It came up to a rather startling figure, not one I regretted, as I am pretty good at getting more than my money's worth of enjoyment out of any hobby activity, but I'll tell you that an extra $25 one way or the other on that sum sure didn't mean much.

This same idea of benefits to dollars spent can be applied to other aspects of AMA membership. The insurance program, for instance, can be argued to be worth the price of admission by itself; in fact, there are many people who join AMA for the insurance alone.

How about the NATS? Even though only a small percentage of AMA members take in any given NATS, there are lots of direct benefits from this National Championship competition that are passed directly along to all modelers in the form of better and safer equipment. This equipment generally helps you to more fully enjoy your modeling activities, so can be classified as a good return on your investment in the AMA.

Even though I personally disagree with the approach taken in keeping AMA members informed by publishing a magazine such as *Model Aviation*, I will agree that it is indeed a very well-done magazine, easily worth the price charged. Bill Winter deserves congratulations for the finished product; it is just the kind of magazine you would expect him to put out . . . and he has put out some fine stuff in his time.

When everything is considered, the positive and negative aspects of AMA weighed against each other, we have a national organization that is of a positive benefit to not just competition-minded fliers, but to all active fliers.

There will always be problems along the way, just as you would expect with an organization made up of so many people representing such widely-varied interests and activities. And as there will be problems, there will be people such as myself standing by, ready to point them out. . .

DROP YOUR HEAD AND SAY GOODBYE TO NITRO

Something that all of us have come to take for granted is nitromethane. All of us use it in varying percentages. It has

been an easy way to get more power without fiddling with the internals of the engine to any great degree.

About two weeks ago, I talked to George Aldrich in relation to other things and he passed on the word that not only has nitro taken another big jump in price, but that he can't get as much as before. At that time he figured on dropping the higher nitro fuel, selling only 5% and 10% mixes.

Just the other day, I talked to Duke Fox and he told me that while he has been using around a drum of nitro (55 gallons) a day, his present allocation of the stuff is down to only three drums per month!

According to Fox, the problem comes not only from the situation of having one company being the sole supplier of nitro, but the fact that lots of natural gas is used in making it. When the price of natural gas was deregulated, the people up north were willing to pay a lot more money for it than the nitro producer had been shelling out.

It comes down to the modelers either not being able to easily afford the high nitro fuel or (more likely) not even being able to buy it, assuming they are willing to grit their teeth and pay up.

In certain competition events, 60% nitro fuel is commonplace. Your next gallon of that kind of brew might just set you back anywhere from $35 to $40. Of course, that price is suggested retail for commercial fuel, but even the home-brew artists will soon see fuel expenses go way up, assuming they can even get nitro anymore.

All is not lost, as our engines will run quite well on straight fuel (no nitro), but you will have to drop the cylinder head down some to get the compression bumped up, might have a few new things to learn about setting needle valves, and so on. What I will really miss is not being able to tip the can of nitro to get more power. Even on straight fuel, the power is still there; it is just harder to find it.

Another interesting item from Fox is that he is working on developing conversion kits that can be added to existing Fox engines and that will make them more willing to run fast on straight fuel. If this scarcity of nitro is a long-lasting thing (and at this time it looks that way), we will probably see most of the engine manufacturers do something similar.

An interesting side to this is that development and acceptance of diesel engines will take place faster. I keep hearing about conversion kits for K&B .40's, Fox Combat Specials, and so on, but it is only hearsay so far. Bob Davis has proven that the Cox .049 engines can be converted to diesel fuel and run very well besides. In doing so, he disproved many notions about diesel motors; maybe now he can lay to rest the widely-held belief that diesel engines of over .15 displacement don't run well, plus being prone to acting as if they are hand grenades.

But until something is done, heavy nitro users will be seen to be suffering from withdrawal symptoms. •

Plug Sparks . . . *Continued from page 18*

however, one can never say for certain that there won't be engines for others seeking them.

Hetherington Engines: As announced several issues ago, Carlson and Dwyer would like to sell this project off. One of the big problems with any would-be producer is the lack of production drawings. Not many people know it, but Hetherington never kept or made any drawings of his engines. Matter of fact, some of his engines were made of so many pieces that they could be regarded as custom made. As time permits (providing no sale of the Hetherington project is effected), Carlson will produce engines from the stock on hand. No question about these engines being collector's items. If you are looking for "runners," forget this project.

Super Cyclone Engines: Sad to report on Super Cyclone engines; lack of good dies prevents any production. Carlson states that just about all parts are gone; hence, no engines can be assembled.

Anderson Spitfire Engines: Here is a project that has a lot of promise. The main problem right now is getting the premises at the Carlson building in shape to properly locate all machines to best advantage. This means new partitions, siding, sound insulation, thermal insulation, and proper flooring. The

earliest estimates from Carlson indicate that by the first of 1980, things may be humming. Right now, the problems of material procurement, subcontracting of machine work, honing, assembly, and distribution are the major factors to be overcome. It appears with the present rate of inflation, the new Anderson Spitfires will be priced between 100 and 150 dollars, depending on whether Carlson and Dwyer go direct or deal through dealers.

Ferguson Engines: For those interested in real machine shop projects, Replica Motors offers the Ferguson Condor in four-cylinder and two-cylinder casting sets. Inspection of these castings at the recent Region 2 Collectogether showed the units to be excellent subjects. Of course, the drawback to these casting kits is that you have to make up your own crankshaft, piston, connecting rod, cylinder head, and needle valve. With the machining drawings included in the kit, this shouldn't be too big of a headache. Best idea is to write for prices.

Baby Cyclone Crankcases: Here is an item that is near and dear to any modeler who has ever owned and run a Baby Cyclone engine. As many of us have found out, installation of a Baby Cyclone in an untried model is a real hazard. Any hard blow on the ground generally cracks (if not pulverizes) the crankcase. The pot metal (known as Dow metal) simply had no real strength or resistance to impact.

The good news is that Replica Engines will soon be producing Baby Cyclone crankcases from a bearing-quality zinc alloy of 53,000 p.s.i. strength. The metal is so good that it will not be necessary to put in a bearing sleeve for the crankshaft. The material is better than cast aluminum!

The long-range plan is to produce other hard-to-get Baby Cyclone items, such as exhaust stacks and timers. In addition, for those who are do-it-yourself types, casting kits will be made available of the crankcase parts.

At present, no orders can be taken, as the patternmaker has been incapacitated and has been unable to make up the required patterns. Whether it is health or too darn much workload, Karl says it is just a question of time until they will be made available. So hang in there fellows, there is hope yet!!

Talisman 60: This is a casting kit that Karl has been putting out on a fairly regular basis. It consists of eight castings with complete machine shop drawings. For those fellows who want to rush in and buy a kit, Karl wants it known that crankshafts, rods, and piston rings are not provided.

You can actually make the Talisman in a variety of sizes, but the most common piston is 1-inch diameter. If you can't make your parts, McCoy or Hornet crankshafts, rods, piston rings, etc. can be readily adapted to this motor. The columnist is not sure of the availability of McCoy parts, but it would seem that parts shouldn't be too hard to obtain through private purchases and trades.

Carlson also wishes to thank all those fellows who have written to him and have so patiently waited for answers to their letters. Carl says all previous orders will be honored as far as possible. Those wanting to know the status of their letter requests should write to: Replica Engines, 14600 Ramstead Drive, San Jose, CA 95127.

With Dick Dwyer now handling the corresponding end of this firm, things should improve immensely. No question about it, for a fellow who only works part-time at the production of engines and parts, Carlson is a real busy guy!! Again, a reminder: direct all inquiries and questions to Dick Dwyer. He will answer!

CONTEST TRAIL

As most readers will agree, this column is heavily contest oriented. This seems to be the best way of letting the rest of the boys know what is cooking in the Old Timer field.

The latest CIA (Central Indiana Aeromodellers) newsletter, as ably edited by Harry Murphy, announces the 1979 O.T. schedule:

June 10: 18th Annual Aeronuts (Bong)
June 24: Midwestern O.T. F/F Champs (Wright-Patterson AFB)
July 8: Lansing Pelicans O.T. Meet (Bong AFB)
Aug. 26: COFFC F/F Meet (Wright-Patterson AFB)
Sept. 9: Aeronuts 17th Fall O.T. (Bong)
Sept. 30: CIA 7th Annual (Wright-Patterson AFB)
Oct. 14: SWOFF Annual (Wright-Patterson AFB)

As best as can be gleaned from the list of contests, these are the ones that feature partially or entirely O.T. F/F events. As "Murf" puts it, "Ya know about it, be there!"

LAS VEGAS BASH

It has been repeatedly pointed out by this columnist that the best time of the

year to fly Old Timers in the Las Vegas area is in February. The latest VAMPS Annual was no different this time . . . simply fabulous weather!

Rather than list a whole flock of winners, the best idea is to hit some of the highlights. Readers of this column will remember "The Rock" event, wherein all entries of five dollars each are placed under a rock. Then, the guy with the most nerve amd luck can win the meet and the contents under the rock. The rules are simplicity themselves: No restriction on gas; time the model until it lands or goes out of sight.

Jerry Sanford, flying his huge ten-foot Fiske Hanley, decided he needed a bigger gas tank. There was nothing available on the field for a gas tank but a "V-8" juice can. Jerry bent the can a little, then kinked it a little harder until it fit behind the engine.

Needless to say, Jerry won the meet, as he had over a 20-minute motor run. His model was visible from the field for better than 30 minutes. The juice can installation worked perfectly.

Mark Fechner and his wife, Nikki, came down from Salt Lake City and won C Pylon and Class A-B Cabin, respectively. Mark also snuck in first in the C Cabin event with his trusty Buzzard Bombshell. Surprisingly, the SCAMPS, who generally win heavily at this meet, were able to win only the A-B Pylon Event (Rudy Calvo) and .020 Replica (Abe Gallas). Northern Cailfornian Cliff Silva surprised everyone by winning the Scale event with his Corben Super Ace as originally designed by Don Garafalow of New Jersey.

With over 80 entries, you could call this meet a resounding success, or even in a lesser degree, terrific! As pointed out previously, the weather was so terrific, two days of flying were completed with only one lost model. Great stuff!

SCIF KICK-OFF

Easterners will be ready to tear this magazine to shreds (after the VAMPS Contest report, and now this) when they read of the highly successful March meet put on by the Southern California Ignition Fliers (SCIF).

As Ken Sykora, SCIF Flightplug Newsletter editor, pointed out, the temperature was perfect; too mild for a jacket and just cool enough to keep you from hugging the beer cooler all day!

Sykora reports that several strange crashes by models exhibiting perfect flight patterns previously had the boys running around looking for voodoo dolls in their competitor's tool boxes. It was indeed sad to see excellent flying models suddenly go beserk. This should be plenty for the second guessers to talk about in the next few meetings.

As usual, the SCIF club had an open house banquet at the Topper Restaurant. Among the general hilarity was Bruce Chandler telling a joke so bad that Carl Hatrak got up and left in the middle of his soup. Upon his return, Hatrak then told a joke so bad that everyone left in the middle of the fish! More darn fun!

We won't give any results of the contest, but it was interesting to see Andy Faykun win with a rubber design from Orr's Dept. Store, called the Chieftain. Same old story. As soon as someone uncovers a new legitimate design and wins with it, he is immediately challenged! Andy has the boys looking at the other Orr Dept. Store designs now!!

COLORADO COOKING

Got a great postcard from Les Payne, of the Model Museum Airplane Club, who asks if you remember the good old days, when models looked and flew like real planes, were simpler, cost less, and everyone seemed to be having a great time.

The Model Museum is once again greatly active, giving a very ambitious flying schedule for 1979. They will have monthly contests on April 22, May 20, June 10, July 15, and August 12. At the end of the year, they will stage the Rocky Mountain Championships on September 15 and 16 with a full Old Timer event schedule. It is simply great to see one of the original O.T. pioneers getting back into the swing of things!

OLD TIMER RUBBER

Note the title "Old Timer" rubber, not old time rubber. This idea of taking any Class A or B gas model design and redesigning it for a lighter frame to utilize rubber for power is the latest brainchild of Gordon Codding.

He has been pushing this idea locally in Kingman, Arizona, starting first with a Miss Tiny (amazing how it starts to look like a rubber-powered Modelcraft Pacific Ace!). Gordon sez he sold the Miss Tiny rubber model in no time flat and is now busily engaged in turning out a flock of plans. How about it? Do you remember rubber-powered models like the Junior Zipper, Junior Clipper, Guillow Flight Leader, Peerless Blackhawk Jr., and a flock of others? If you are interested in possibly staging a new class of Old Timer flying, write to Gordon Codding, 3724 John L. Avenue, Kingman, Arizona 86401.

Incidentally, if any of you oldsters remember Bill Barnes, then you will readily recall the Bill Barnes Silver Lancer, twin engine Charger, BT-4 Transport, Sandy's Eaglet, and more. Gordon has scaled the plans to 1/4 in. = 1 ft. for those who are interested in reproducing these oldies. He is also producing these designs in 1-inch scale that show "real" airplane construction as well as the rubber model framework. Codding has a library to draw upon for a "state of the art" model suitable for the particular period of time the design came out. Sounds simply great!

NEW ZEALAND FLASHES

Just received a letter from B.R. Dunn, of the Argosy Bookshop in Wellington, New Zealand, who reports the New Zealand Nationals were held at Invercargill (don't ask me, look it up!).

As Bev puts it, this is about as far south

as you can get in this country without falling off. As usual, the weather fouled up the works. Dunn says there was a time when they had good weather at the Nats, but can't remember those dim old days.

Dunn entered the vintage events and suffered total disaster. His rubber job was written off on the first flight because of high winds. He says he has a new version of Murphy's law; "If it works okay on the home field, it will naturally destory itself when taken to a contest. Destruction is at the direct ratio of the distance traveled."

In power, his gas model went so far in the stiff wind it was simply too late to fly again. Replica .020 was again the same story in the wind, but he did manage a second. Stout fellow! (Side note: Of course, the weather cleared up immediately at the close of the Nats.)

THE WRAP-UP

We haven't told an anecdote for quite some time, but George Armstead of Glastonbury, Connecticut, who was visiting on the West Coast, told us a good story worth repeating.

It seems that Ed Novak had one of Henry Struck's rubber designs (think it was his Contest Champ, but not sure) at one of the SAM 7 club meets that feature contests for just Henry Struck designs. Anyway, Ed wound the model up several times with the net results that it would wind in to the right.

Henry noted this and volunteered to help Ed. "First thing," said Hank, "is that this model flies to the left." With that, Struck made some small adjustments designed to change the turn pattern. Nothing to do but wind up the model and let her go. The model promptly wound in the right.

A little concerned, Henry picked the model up, carefully sighted all surfaces for warps, checked rudder for turn, looked over the wing and tail alignment, and finally checked the thrust line. Henry then made some further adjustments to ensure a left turn.

Wind up the model again carefully launch for left turn. The law of organic perversity asserted itself again, as the model again spiraled in to the right. Struck looked at the model, handed it back to Ed, and said, "I guess it flies to the right." •

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

are strong enough to stand abuse and will be useful in developing additional learning experiences.

The model in the photo was patterned after the Cessna Cardinal and has a span of 16-1/2 inches and a length of 12-1/4 inches. There are a total of 5 parts, plus a prop (included). The only tools required are a hammer and screwdriver. Really now, what could be easier? These models look to be an ideal introduction for any youngster to the joys of model creativity.

For more information, interested fathers should contact Hobby Hideaway, RR 2, Box 19, Delavan, IL 61734.

* * *

Chuck Blackburn and I recently had to stay late at the **R/C MB** office, waiting for some printing to show up, and so to pass the time we took a good look at the stand-off scale Cessna 150/152 kit that had just arrived from the Champion Model Aeroplane Co. . . . and were impressed. Ours was a top-quality kit in all respects. All the wood was good and the die-cutting was some of the best we've seen in a long time.

Unlike the full-size 150 or 152, the model is not intended to be a trainer. Instead, it is designed for the Sunday flier who can handle a 4-channel airplane and who likes a fully-aerobatic scale-like model. Probably the neatest thing about this model is that it features optional operating flaps, which are said to have the same effect on the model as they do on the full-size bird . . . very steep approaches without building up excessive airspeed. Needless to say, the flaps make landings on small fields a cinch.

The model features conventional construction throughout. The fuselage is just a balsa box, and the tail surfaces are pre-cut 1/4-inch sheet balsa. The wing is a regular D-tube structure with spruce spars, and should be strong enough to withstand just about any maneuver you'd care to name. The main gear is of the cross-over torsion bar type and is pre-bent, of course, as is the steerable nose gear. All hardware, including the plastic molded wheel pants, is furnished. They've thought of everything in this kit!

Champion's Cessna 150/152 spans 50 inches, takes a .19 to .35 size engine, weighs 3-1/2 to 4 lbs. ready to go, and takes 4 or 5 channels of R/C, depending on whether or not you decide to use the flaps. The only thing we're not sure of is the price, but according to the UPS slip that was inside the box the kit was shipped in, the declared value was $45, which sounds about right for a kit of this quality.

From the Champion Model Aeroplane Co., P.O. Box 45, Keyport, NJ 07735.

* * *

We usually don't like to write up a new product on the basis of sketchy information, but seeing as 1/4-scale is about the fastest growing facet of this hobby/sport of ours (as anyone who attended the Toledo Show can attest to), we'll make an exception in this case. A company by the name of IKON N'WEST, up in Washington, is producing kits for a 1/4-scale Interstate Cadet and Piper Super Cub. According to the info sheet that was sent to us, both models are rugged enough for the Quadra engine (although both will fly with a decent .60 or .91), both span about 107 inches, both feature hand-cut parts and 48-inch spars, both models are equipped with flaps, weigh about 14 lbs., and have a wing area of around 1700 sq. in. Both should be available as of this writing.

Well, now you know as much as we do. If you're interested, write to IKON N'WEST, Box 566, Auburn, WA 98002.

* * *

Lately it seems that the people at Dumas have been coming out with at least one new boat kit each month. That sleek-looking cruiser in one of the photos is their latest. It's the American Enterprise, a miniature version of the full-size boat designed and built by Halter Marine, Inc. The American Enterprise is a high-speed boat designed especially for transporting work crews to offshore drilling rigs. The Dumas kit builds into a good-size boat, measuring 52 inches in length and 12 inches across the beam. The kit is designed for gas or electric power, but is attractive enough to be used for static display. The kit includes Dumas' usual high-quality die-cut plywood parts and all deck hardware. The American Enterprise is kit No. 1213, and an optional running gear kit for twin propellers, No. 2332, is also available.

For price and availability information, write to Dumas Products, Inc., 909 E. 17th St., Tucson, AZ 85719.

* * *

Gemini Models is coming out with some interesting items for R/C'ers. First off, there is a new type of wing hold-down method that does away with bolts or (worse yet), rubber bands. This system makes use of a spring-loaded 1/4-inch aluminum pin that fits into a turned aluminum holder (see photo) which is mounted at the l.e. of the wing. The t.e. is held in place by the familiar hardwood dowel. To put the wing on, the aluminum pins are inserted into 1/4-inch holes in a piece of plywood mounted in the model, the wing is pushed all the way forward (against the spring tension), the t.e. dowel is lined up with its hole, and the wing is then pushed back by the springs, engaging the t.e. dowel. These steps are reversed to get the wing off. When using this system, you have to allow about 3/8 of an inch of clearance between the l.e. and the fuselage for the wing to slide forward to engage and disengage the rear dowel, which means you've got to make some sort of a fairing to cover this gap, if you want the model to look good. The Snap-On Wing Mounts come two to a package for $8.95.

Also from Gemini is a Scale Wheel Axle. A package contains two axles, two washers, and two nuts. The axles have to be cut to length to suit your particular wheels, then the washer and axle are soldered to your landing gear wire. The wheel is retained on the axle by a 1/4-28 lock nut, which gives a rather scale appearance. Certainly looks more scale-like than a wheel collar, and there's no special wrench required either. The Scale Wheel Axles are available in 3 sizes, to fit 1/8, 5/32, or 3/16-inch wire. Each package sells for $1.49.

Last, but not least, Gemini is introducing a new R/C trainer, the "Super Champ." Unfortunately, we didn't get a photo of the model along with the poop sheet, but we can at least say that it's a high-wing, trike-gear, cabin type model with a 56-inch span, weighs 3-1/2 to 4-1/2 lbs., takes a .20 to .35 size engine and 3-channel R/C rig, and has slightly over 600 sq. in. of wing area. The kit features hand and machine-cut parts, ABS plastic cowl and wing tips, rolled plans, and the new Snap-On Wing Mounts described a couple paragraphs ago. Retail price of the Super Champ is $54.95.

All from Gemini Models, Inc., 311 Lakeview Ave., Clifton, NJ 07011.

* * *

At last! Something designed especially with F/F Rubber fliers in mind! It's a new type of balsa stripper from Gene Dubois, and will strip sheet balsa up to 1/16-inch thick. The main feature of this stripper is that there are no adjustments to make when stripping different sizes of wood. Take a look at the photo. Each of those three grooves is milled to a different depth (1/16, 3/32, and 1/8 of an inch). Those numbered pieces in the middle of the block act as clamps for the cutting blade. Gene was kind enough to send us a sample, and it works great.

This stripper is handmade of laminated hardwood and will save anyone who owns one a lot of money. For instance, if you buy a sheet of 1/16x3 and strip all 1/16 square, you'll have 48 strips for the cost of the sheet of balsa (about 72¢). If you go to the hobby shop and buy 48 pieces of 1/16 square, you'll pay about $4.80, because those little blighters cost 10¢ each! The savings is obvious. As a side note, Gene tells us that a stripper for larger sizes of sheetwood will be available shortly.

The balsa stripper sells for $10 and is available direct from Gene Dubois, 14 Budano Dr., Acushnet, MA 02743.

* * *

It seems like quite a while since we've seen something new from Gee Bee Products, but now there are two new goodies. First, there's a new kit for the famous DeHavilland Tiger Moth. This good-looking model spans 45 inches, takes a .25 to .35 size engine, and is designed for 4 channels of R/C. The kit is

all balsa and requires no special jigs to put together. All hardware, including pre-bent cabane struts, is included in the kit.

Wish we could tell you more, but that's all we know about the model ourselves. Going price on the Tiger Moth is $52.50, and it should be at your hobby dealer soon.

The other new item from Gee Bee is a set of wheel pants. The pants themselves are pre-molded from plastic and are ready to paint, and come with all the hardware necessary to mount them to your gear, including 2 axles, 2 washers, 2 "Pant-Loks," 2 lock washers, and 2 nuts. The Pant-Loks are the special feature of this set; they provide a secure mounting of the wheel pants to the landing gear. The pants are rugged and light and will take 2-3/4 to 3-1/4 inch wheels. Directions on how to mount the pants to a wire landing gear are also included.

The Gee Bee wheel pants sell for $9.95 a pair. From Gee Bee Products, P.O. Box 18, East Longmeadow, MA 01028. •

R/C World . . . *Continued from page 15*

model, along with several other winners, were in the "average size" scale category. Jim Funduk, Holly Ridge, North Carolina, whose aluminum foil covered P-38L won Military Scale and Best of Show, ironically placed only 3rd in the WRAM's show in New York just 6 weeks earlier.

Quite a few manufacturers were also getting into the Mammoth swing, with various large ignition engines, geared and belt-driven reduction systems, big props, heavy-duty retracts, large wheels, beefed up servos, cable control systems, and various miscellaneous items aimed at the big ones. Surprisingly, there weren't any new construction materials on display. In such big aircraft, balsa not only becomes prohibitive in price, it is also not capable of handling many of the new stresses not previously evident. Perhaps they're all waiting for you, Sig, so they'll have something to copy!

On the other end of the scale, Bill and Charlie Cannon were showing their new Super-Mini servo which is under a half-inch wide, under an inch long, and an inch-and-a-sixteenth high, not counting lugs and output wheel! In this direction, small, high-capacity batteries are the bottleneck in preventing Peanut Scale R/C from becoming a reality.

In our own area of endeavor, it was a bit comical to find that the previously unidentified booth next to us, separated only by a passageway, was to be occupied by *Model Airplane News*. At this early stage in Walt Schroder's changeover from M.A.N. to **MB** . . . er, **RCMB**, the situation confused quite a few spectators. When Al Novotnik or Don Typond were asked, "Where's Walt?", they would point to our booth and say, "Over there." We're sure that some left after talking with Walt, thinking that he was only visiting our booth and was still associated with M.A.N.! We'll get even with Weak Signals Co-Chairmen Bob Belote and Don Hisey somehow!

With around 150 manufacturers exhibiting their products, it would be impossible to adequately describe everything on display at the Toledo show. What follows are some of the items that stuck in our mind.

The Concept Models Fleet is still one of the most impressive Mammoth Scale kits. Ply box spars also double as wing joiners for the 4 demountable panels. Romey Bukolt is trying to come up with 3-inch scale molded cylinders as an accessory item that really make this model complete.

Bud Barkley's Tiger Moth was one of the hits of the show. We'll be doing a complete product review on this 1/4-scaler in the future.

Other biplane biggies included M.E.N.'s staggerwing Beech and Aero Composites' Krier Kraft. The latter has a glass fuselage and foam flying surfaces. Original plans were by Ray Nugen and published as a completely built-up construction project in our October '77 issue.

The Byron Originals MIG-15 features a ready-installed ducted fan unit and is designed for Schneurle 60 power with regular low-nitro fuel. The fuselage is glass, while the flying surfaces are injection molded polystyrene. See Byron's ad in this issue.

Bob Smith R/C Aircraft showed its Sea Breeze, a just-under-100-inch slope and thermal glider that may do what the Hobie Hawk didn't do . . . fly well for the beginner. It is all ready to fly, less radio installation, and features epoxy fiberglass fuselage with pushrods installed and painted white. Wings and stabs are *also* of molded epoxy 'glass in a choice of six colors, and are tough!

R/C Dune Buggies are starting to make the scene, and in our opinion, it's about time car manufacturers began to realize what aircraft model manufacturers have known for some time . . . sport R/C'ers outnumber competition R/C'ers 10-to-1. The buggies can be driven almost anywhere, and if you use electric motors, almost any time of day. They're fun, and you don't have to race to enjoy them. We'll be product reviewing a Japanese version imported by Spital U.S.A. Corp., Carson, California.

M.E.N. has a new automatic charger for transmitters and airborne packs. You just plug 'em in and leave 'em until you're ready to go flying. The charger monitors itself and shuts off automatically when the batteries are peaked. No meters, no clocks or timers, no exploded batteries, no uncharged systems when a sudden opportunity comes to fly (send us three!).

Midwest Products Co. has now added the 20-size engine to its ducted fan series. The RK-20 contains all molded components; no more sanding and misfitting. Static thrust is said to be 4 pounds with a K&B 3.5cc on 25% nitro

CLASSIFIED ADS

Non-commercial (personal items): Rate is 25 cents per word, with a minimum of $3.00. Commercial: Rate is 40 cents per word, with a minimum of $5.00. No mail-order discount house ads knowingly accepted. No advertising agency discounts allowed. All ads are payable with order, and may be for any consecutive insertion period specified. Name and address free, phone number counts as two words. Send ad and payment to MODEL BUILDER Magazine, Classified Ads, 621 West 19th St., Costa Mesa, CA 92627.

MODEL AIRPLANE MAGAZINES — From the mid-40's up. Excellent condition, M.A.N., F.M., AT, low prices. Call 617/963-1501. R.A. Wilcox, Jr., 43 Roel St. Randolph, MA 02368.

WANTED: Ohlsson, O.K., or Dennymite .60 size ignition engine in good running condition. Laurence Perry, 111 N. 78 St., Milwaukee, WI 53213.

Old Megow Kits, ships, and planes, Verville Air Coach Jumbo rubber plans, 1916 to 1946 model airplane catalog reprints, kit collectors directory. S.A.S.E. for list. Ira J. Keeler, 572 Deodara St., Vacaville, CA 95688.

WANTED: Old ignition model engines. Prefer complete engines in good condition. Paying top dollar. Bill Simpson, 7413 Via Lorado, Rancho Palos Verdes, CA 90274; 213/377-3532.

STARTER CORDSET, glowplug to battery, 30" tangleproof, insulated clips — $1.89. Razor blades, single edge industrial quality — 100/$3.75; 200/$6.75; 300/$9.75. COBBIE'S GIFTS, Box 2, Deal, New Jersey 07723.

WANTED: Old model airplane engines and miniature gas powered race cars and all related items from 1935-55. Arthur G. Suhr, W218 N5866 Maclynn Ct., Menomonee Falls, WI 53051.

MODEL YACHTSMEN: Proportional conversion of any sail control unit . . . "R.C." spinnaker control . . . "R.C." genoa . . . Plans $2 each, all $5. Rainbow, Box 796-MB, Westbury, NY 11590.

WANTED: Old-Time spark-ignition model airplane motors, magazines and gas powered race cars of the 1930's and 1940's. Russell Stokes, Rt. 1, Box 73J, Keller, TX 76248.

PEANUT/GRAPENUT Catalog. Send stamp. Fokker E-1, Gee-Bee R-1, Geep, SBD Dauntless, Davis DA-2, Fike E $1.00 ea. Aero Era, 11333 N. Lake Shore Dr., Mequon, WI 53092.

GLASS CLOTH: 0.6 oz., 38" wide, continuous length. 5 yds. $11.75, 10 yds. $21.50. Add $.75 postage, handling. R/C Consultants, 11809 Fulmer N.E., Albuquerque, NM 87111.

MOVING? SEND NOTIFICATION FIRST!

OLD ADDRESS (Please Print)	Attach old label here / Attach old label here	
	NAME	
	ADDRESS	
	CITY	STATE ZIP
	Attach old label here / Attach old label here	
NEW ADDRESS (Please Print)	NAME	
	ADDRESS	
	CITY	STATE ZIP

Change of address notices must be received one month before date of issue that new address takes effect. For prompt service, old label MUST be attached. Post office will not forward copies unless you pay extra postage. Duplicate issues cannot be sent.

MODEL BUILDER, 621 West Nineteenth St., Costa Mesa, Ca. 92627

and 22,700 rpm.

Fliteglas Models offers a simple in-line restricter for pneumatic retracts that adds realism and subtracts the typical air-driven snap-jerk of most air-driven systems. Inexpensive too . . . set of 6 restrictors for $5.95.

Du-Bro has a new Dzus-type cowl, etc. fastener that is one step better . . . flush with the surface. Called a 1/4-turn latch, it's said to be easy to install and line up. Spring loaded. Paint to match surface and you can hardly see it.

We have some of Royal's Thermalon to try out. It is a pre-painted, iron-on fabric, which Royal claims will pull very tight with heat shrinking and has equal grain pull. This should allow it to be used lengthwise on open framed long wings without showing extreme sag between ribs. Small rolls are 38 by 44 inches ($10.75) and large rolls are 44 inches by 15 feet ($47.95).

Finally, though we've seen it before, the flexibility of Southern R/C's Cord-Less Starter Battery Pack has to be experienced to be appreciated. The $39.95 unit, less starter and charger, will bump-start hundreds of times without needing a recharge.

In future R/C World columns, we'll try to describe additional items seen at Toledo, as well as the MACS and Dallas shows, provided they have not already been discussed previously. See you next month. •

ADVERTISERS INDEX

MODEL BUILDER

Workbench . . . *Continued from page 6*

"For whatever it's worth, I would like to pass on, for the benefit of others, a recent experience in the use of TOLUOL, XYLOL, N. PROPYL ACETATE, METHYL ISOBUTYL KETONE, better known as epoxy-based paint."

As it can be seen, if in fact the anonymous author did experience any health problem it was definitely not from the epoxy resin in our product, but, rather, the solvent system which is common to so very many paint products we have all been exposed to so many times in our lives. There is nothing esoteric about these products. They can be obtained from all distributors of commercial solvents, and are used in various combinations in everything from nail polish and household alkyd paints to the many lacquers, dopes and acrylics sold through the hobby and other paint supply stores.

We replied to the inquiries regarding the use of epoxy paints by indicating that epoxies have been and are approved by the Food and Drug Administration as linings or coatings for the insides of beverage cans and other food containers. They are used extensively, also, as protective coatings on the walls and other interior surfaces of hospitals and food processing plants. As a matter of interest, this resin, even in its uncured state, is classified as being relatively harmless, non-irritating, and non-sensitizing. American National Standard Institute has assigned this epoxy resin as Class 1 Type, which is the safest classification.

A completely erroneous statement made by the author was that the dust resulting from dry sanding of epoxy film is just as dangerous as the original wet spray. The cured Hobbypoxy enamel is, in fact, essentially totally inert and so is the dust resulting from the sanding of the cured film.

It would be presumptuous to comment on the medical problem experienced by the anonymous author of the newsletter. However, if it was in fact the result of spray application of an epoxy coating, the solvents, and not the epoxy resin, most likely were the major cause of his problems.

In the more than 20 years that we have been marketing epoxy paints, to the very best of our knowledge, neither we, nor the largest suppliers of epoxy resins in this country, have had access to any data supporting the deductions made by

the author. Certainly, when spraying epoxy paints, in just the same manner as spraying other types of paint products, the solvents, in particular should be treated with respect, and they should only be used with adequate ventilation.

In short, we feel that the author was very much overly dramatic, and we feel that where he actually compared epoxies with cyanide and snake bites has done no justice to the hobby industry as a whole. We feel that the best justice and the best service to him would have been realized had he brought this matter directly to our attention, or to the real experts in this field, i.e., the manufacturers, themselves, of the epoxy resins.

Most cordially, Pettit Paint Company, Inc., Robert A. Pettit, President.

Naturally, we apologize for any public relations problems created by this article that may have affected the three sources of epoxy paints in the model building field. The fact that epoxy paint was the type mentioned in the article, was not the reason for our quoting it. It was our concern then, when the newsletter article was published in **R/C Model Builder**, as it is now, that too many modelers, and other do-it-yourselfers, for the matter, paint without proper ventilation, particularly when spray painting. The most important factor is that no matter what type or brand of paint product is being sprayed, the area immediately surrounding the person spraying is heavily contaminated with toxic materials, whether they come from the paint product itself, or from the various solvent additives used to make the product sprayable. The important thing, obviously, is to get rid of the stuff before it's inhaled.

Most everyone is aware that professional painters go to great lengths in force-ventilating spray painting areas. These painters also wear masks to filter the contaminates out of the air that is inhaled while spraying . . . and nobody makes any bones about it . . . it's vitally important. Modelers and do-it-yourselfers, however, are for the most part, non-professional painters (though we've seen some who did better than the pros!), and are not equipped with the safest of painting facilities. Anxious to get a model finished, and limited to the confines of a warm, heated room during the winter months, or the not-so-warm basement hobby area, a modeler will (and don't tell us *you* haven't done it!) brush or spray on "one more coat". It is this action, especially the spraying, that can be highly dangerous, *no matter what the product*, and the one which we feel obligated to warn about from time to time.

HOW FAST DO IT GO?

Every R/C flier gets this question thrown at him sooner or later, by a new spectator or in a conversation with a non-modeler. Strangely enough, most of us don't know, and could care less . . . our main concern being how *well* the model flies, not how fast . . . unless of course, we're into pylon.

Here are some top speeds of several different aircraft types, determined in California recently. Speeds were checked over a 1/10-mile course. A watch was started as each model entered the "gate", and a photo strobe light was flashed at the other gate when the model left the trap, so the timekeeper could stop the watch. Times were the average of runs in each direction, and went like this:

Falcon 56, K&B 40, 74.2 mph; Bridi U.F.O., ST 60, 75.5 mph; Bridi 15-500, HP 40, 96.0 mph; Quickie 500, O.S. 40, 75.5 mph; Cherokee, ST 56, 66.6 mph; VK Navajo, K&B 60, 82.7 mph; and Kaos 40, O.S. 40, 73.4 mph.

HOW TO

Here's a couple of handy hints, one from the Meroke R/C Club, Long Island, New York, newsletter, credited to Rich Hirshman; the other from *Tale Spins* (formerly the *Palm Beach Aeronauts News*) edited by Fred Kom Losy.

Rich says, to cut cockpit coaming from black rubber tubing, insert a slip-fit brass rod into the tubing, and then cradle the combo in a piece of brass channeling. Now slide a sharp knife or razor blade along the tube, using the channel as a guide, and cutting cleanly right down to the brass rod. Install the sliced tubing around the cockpit edge, and instant-glue into place. Neat, huh?

Fred suggests that you can animate the pilot in your favorite scalish model. Cut off the head (yeuch!) of a suitable Williams Bros. pilot bust by severing at the neck (barf!). Mount the head on a short rod that is weighted on the lower end with something like a small chunk of lead. Mount the head back on the body by attaching the rod to the lower neck with a double gimbal arrangement. Movement of the aircraft will put "life" in your pilot. This arrangement is similar to the little dogs and hula dancers that you often see in the back windows of automobiles. •

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Wing area - 600 sq. inches

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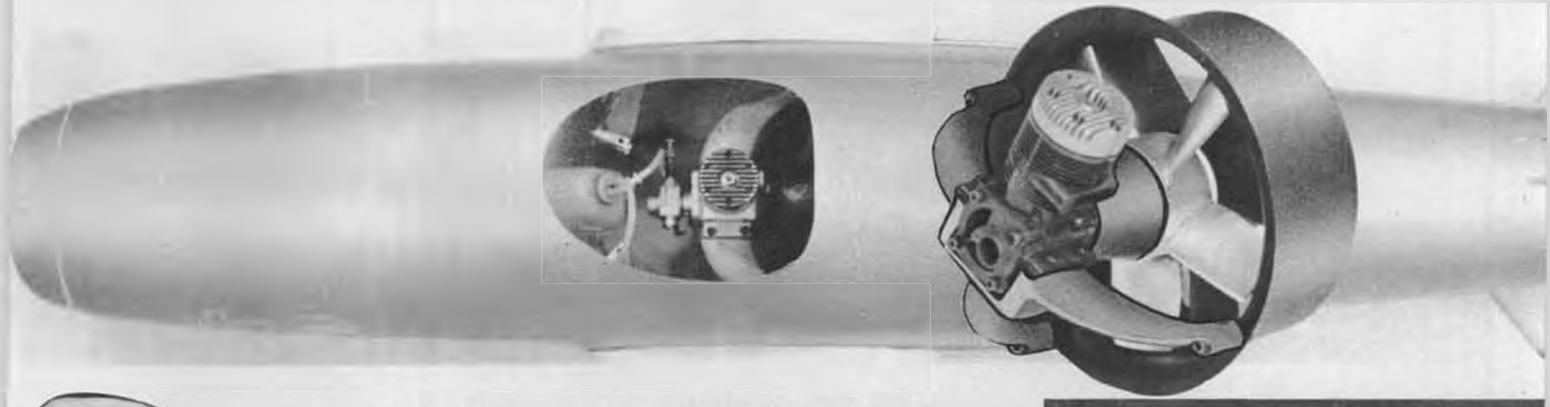

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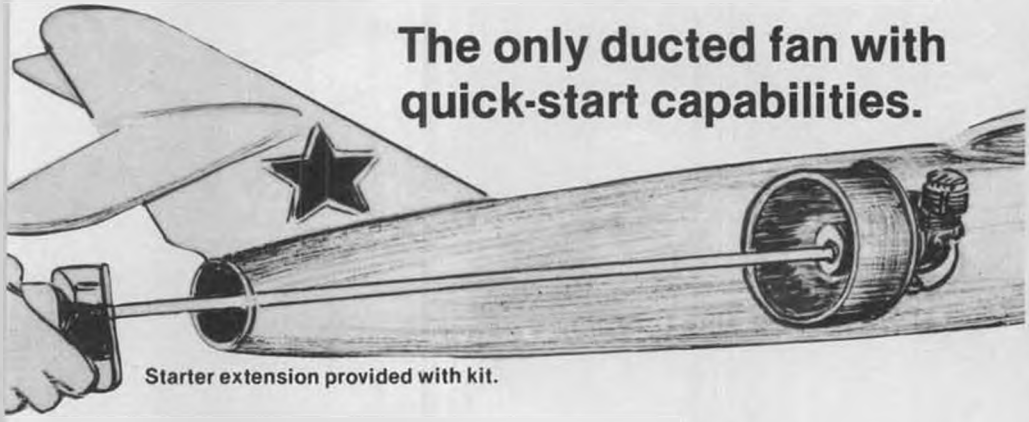

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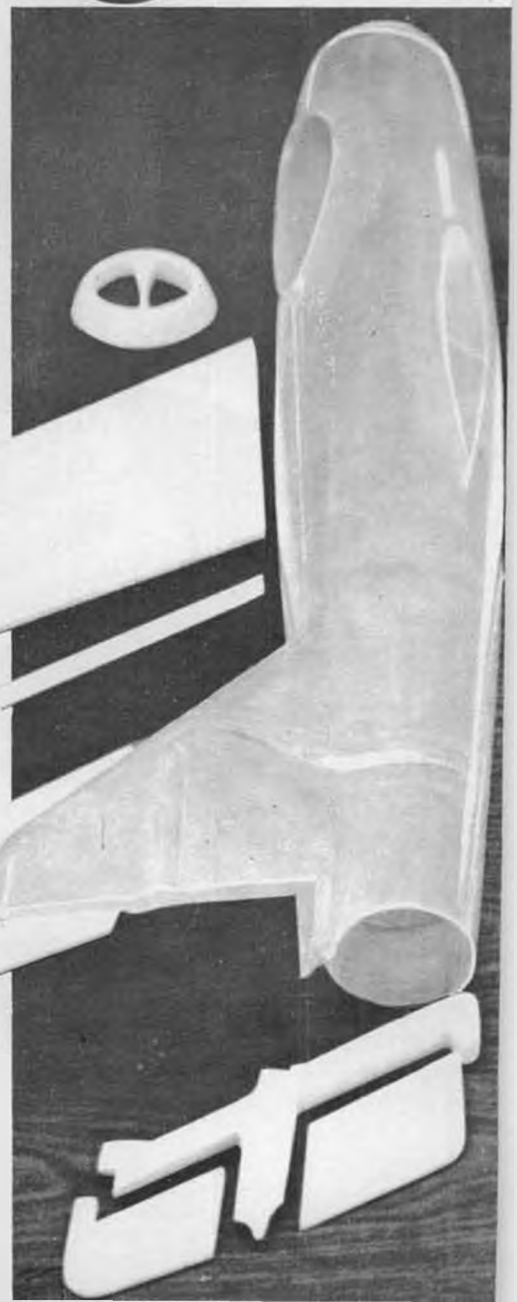

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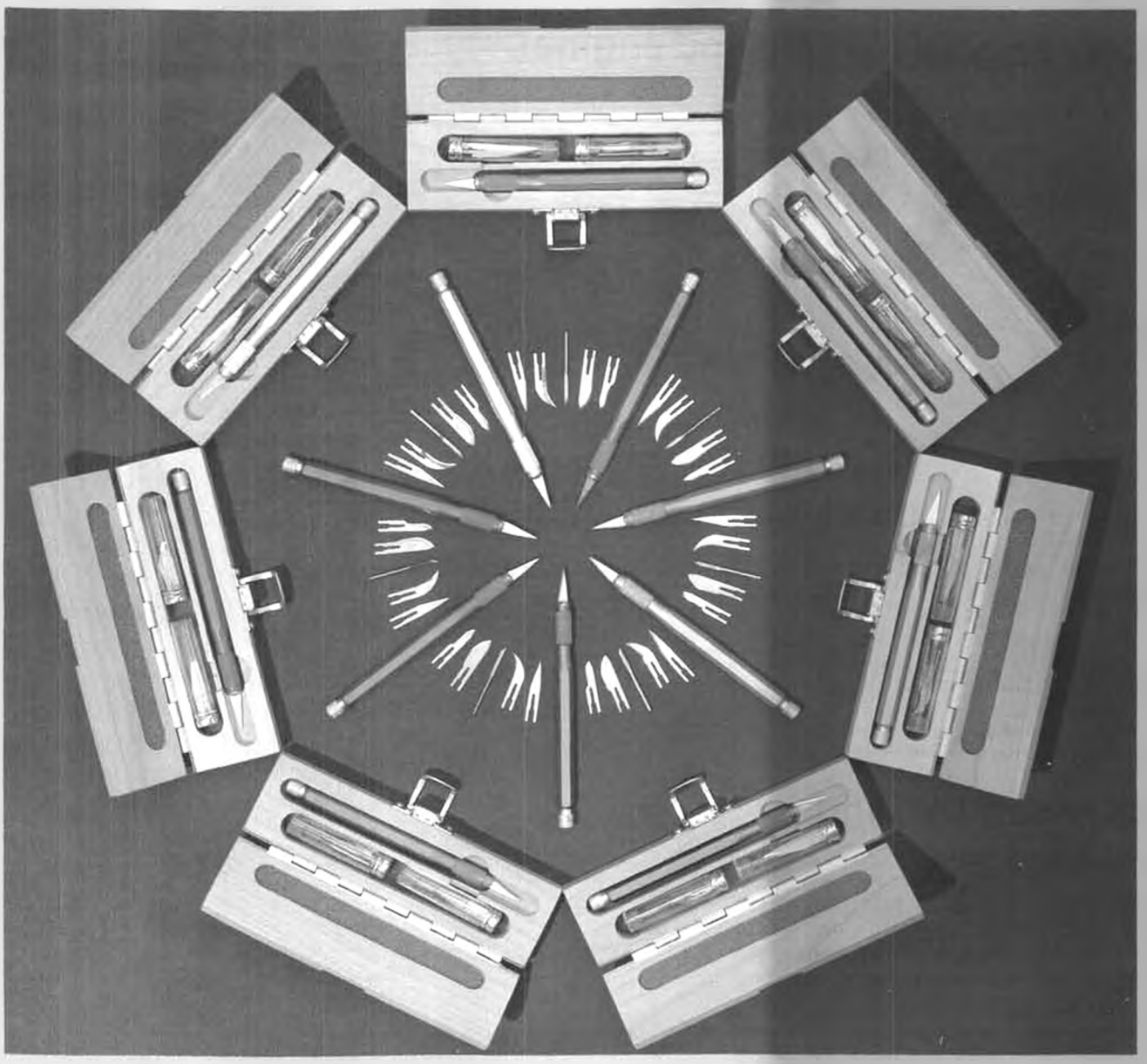

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.09 III TV*	.16	2,500-13,000	.29 B IV	.8	9,000-17,000
.15 IV	.33	8,000-16,000	.29 B IV TV*	.5	2,500-13,000
.15 IV TV*	.28	2,500-14,000	.35 B III	.8	8,000-16,000
.19 VI	.42	8,000-16,000	.35 B III TV*	.6	2,500-13,000

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	Max. HP less muffler	RPM
.19 X TV	.55	2,500-19,000
.40 X TV	1.2	2,500-17,000
.45 X TV	1.3	2,500-17,000
.49 X TV	1.3	2,500-16,000
.49 X TV Helicopter	1.3	2,500-14,000
.60 XF TV	1.7	2,500-16,000

MRC-Enya engines with ballbearing supported shafts

	Max. HP less muffler	RPM
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.19 VI BB TV	.40	2,500-16,000
.29 IV BB	.85	10,000-18,000
.29 IV BB TV*	.55	2,500-13,000
.35 III BB	.85	10,000-17,000
.35 III BB TV*	.65	2,500-13,000
.40	1.1	9,000-16,000
.40 TV*	1.0	2,500-15,000
.45 II	1.15	9,000-15,000
.45 II TV*	1.05	2,500-14,000
.60 B III BB	1.45	9,000-14,000
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