MODEL BUILDER

FEBRUARY 1979

volume 9, number 85

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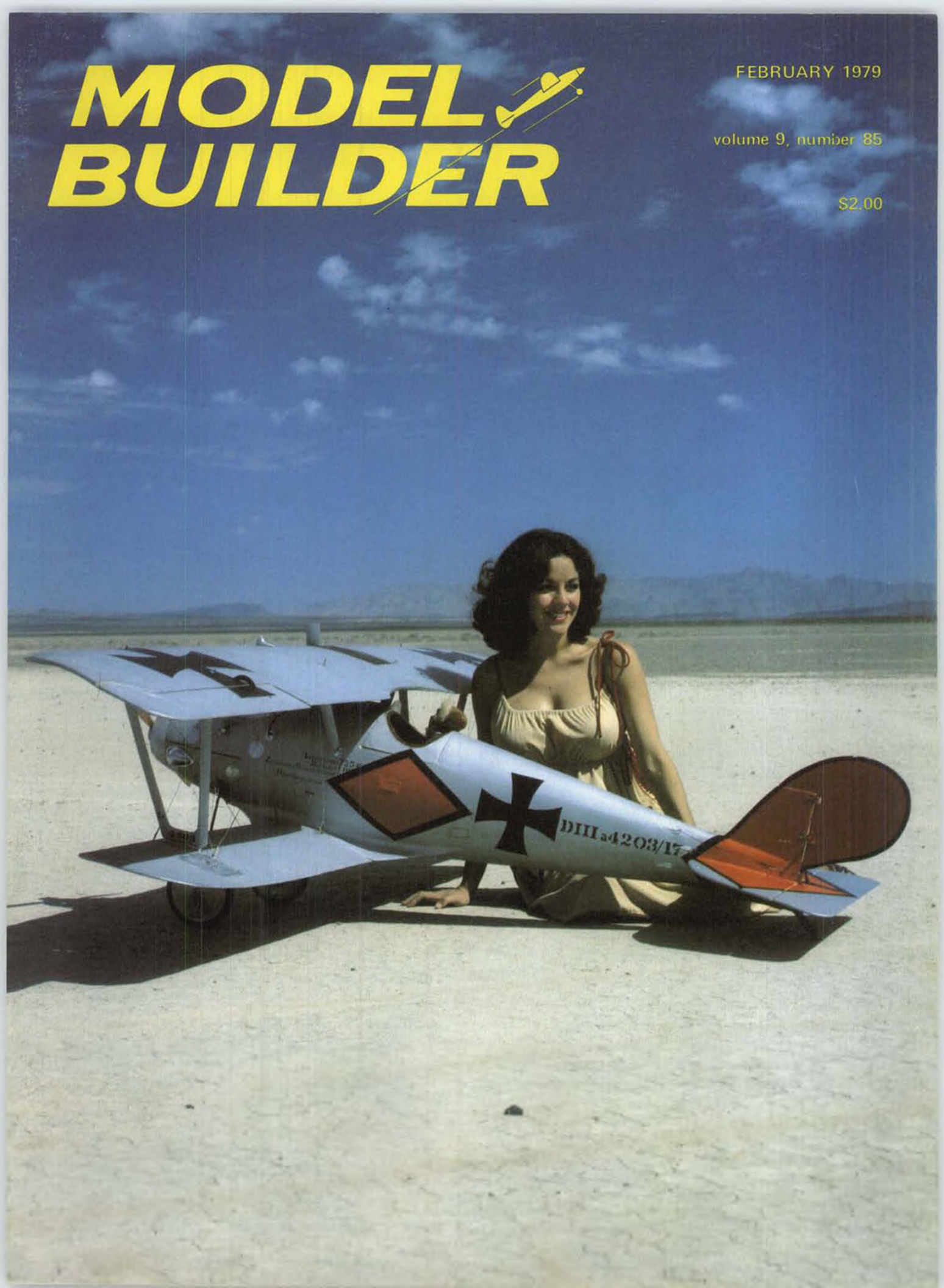

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Piper Cub Testor 049	2GS	R2F	2 S18	Dry	159.95
Z 60 Mabuchi	2GS	R2G	2 S18	Dry	TBA

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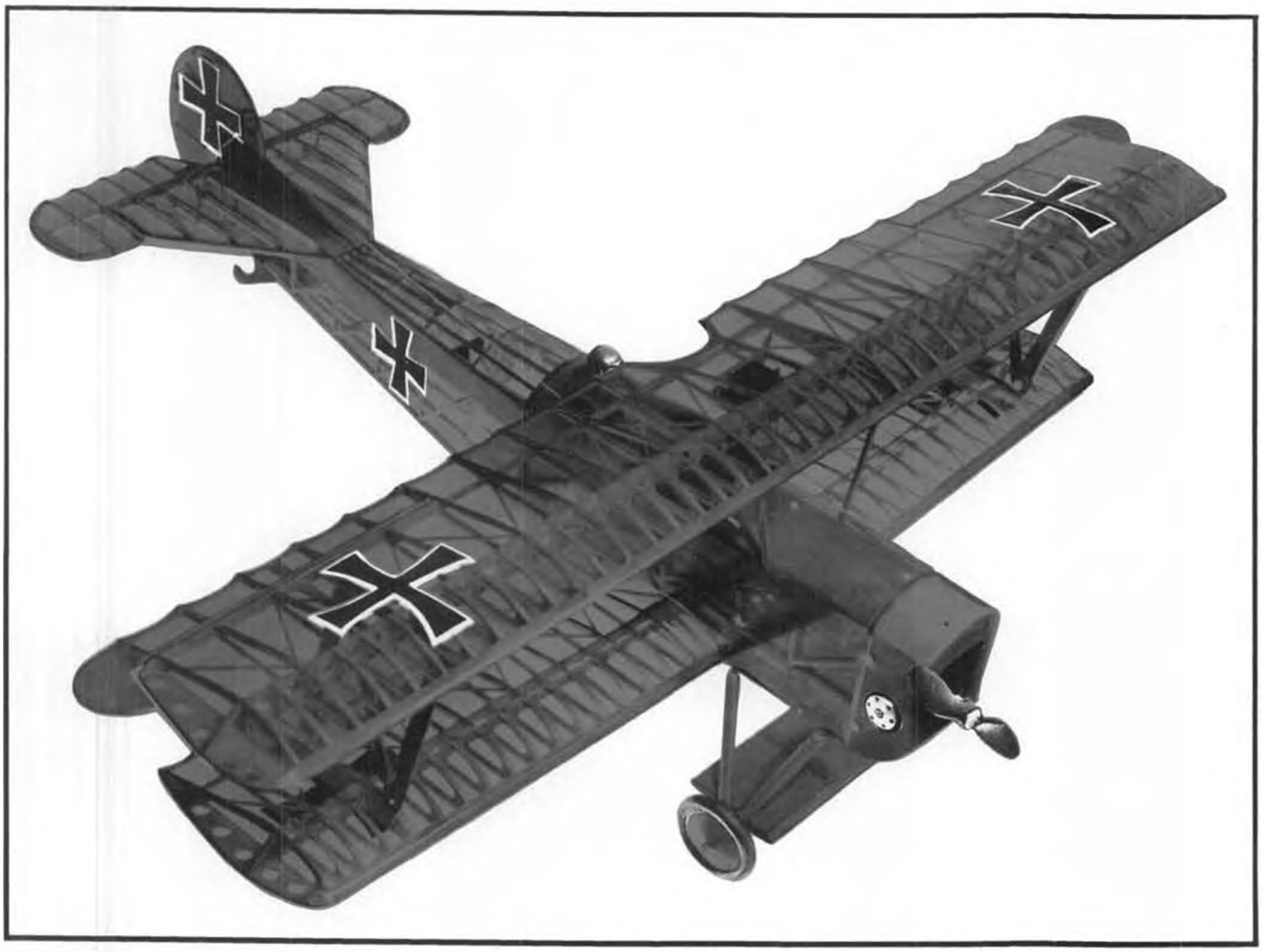

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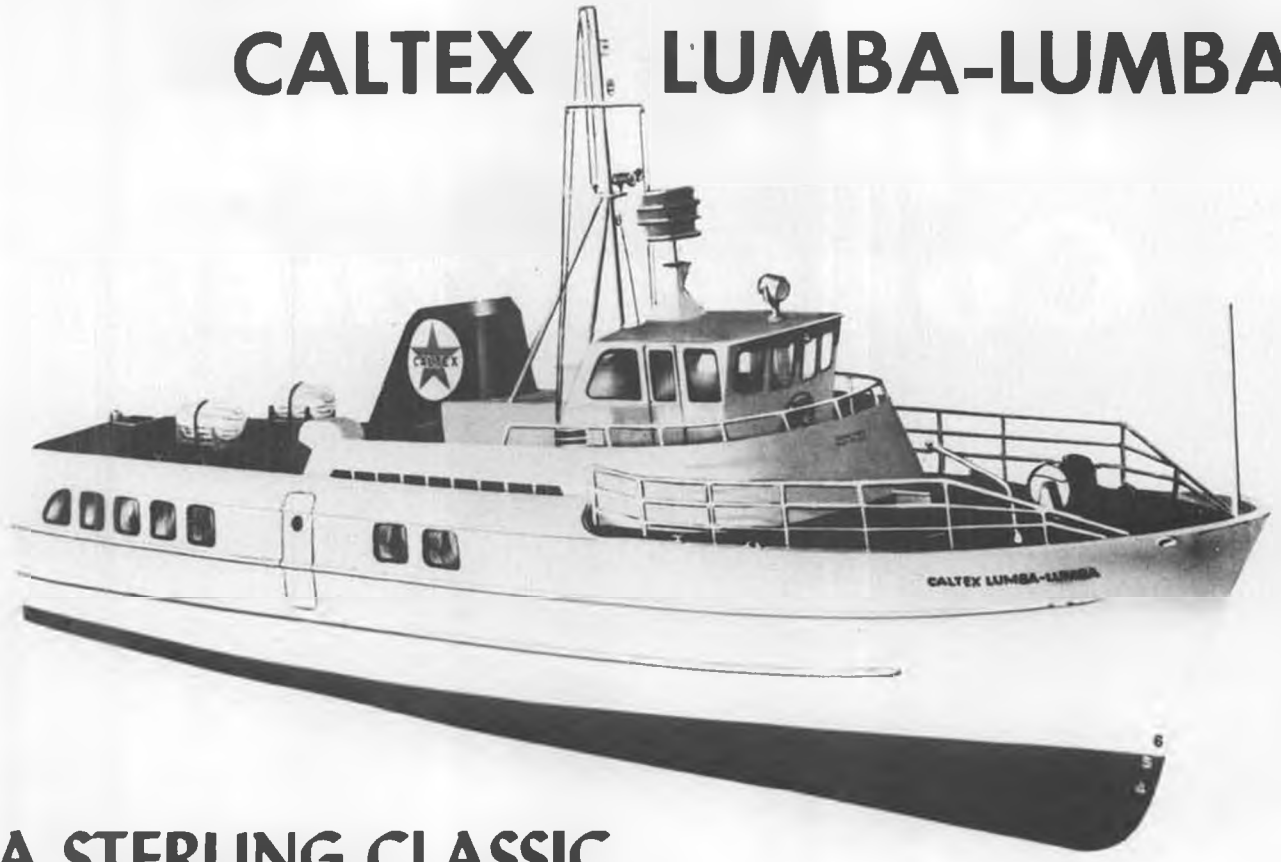

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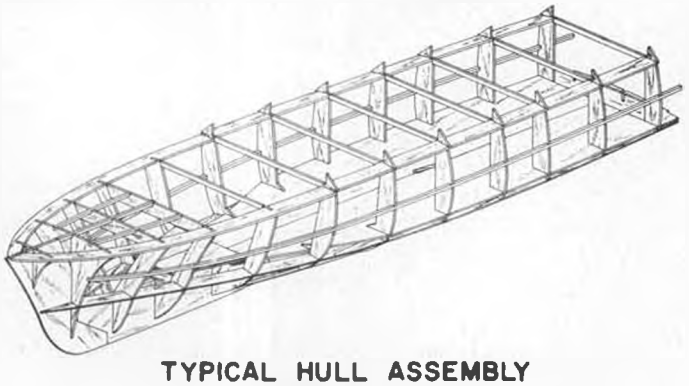

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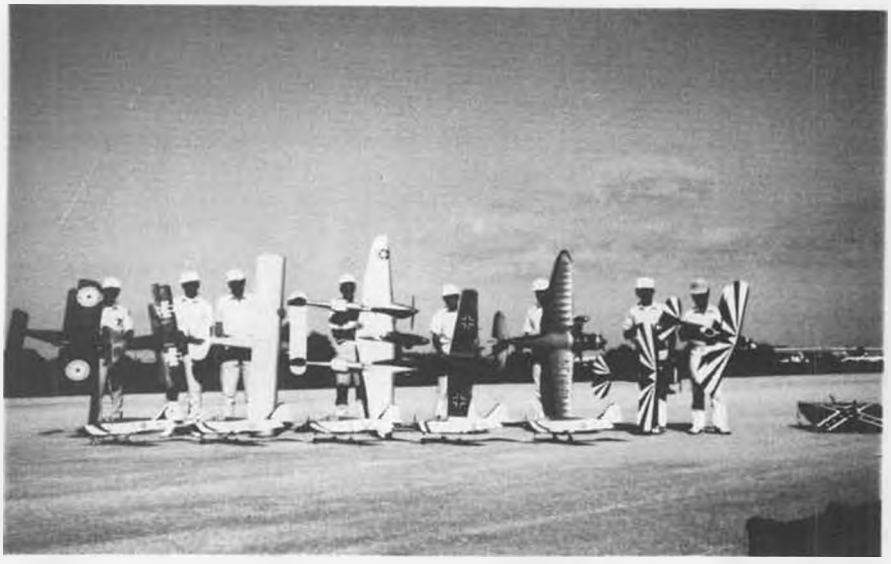
Try Silkspun. At 58¢ per square foot, it is surely one of the most economical coverings available.



Here is the Florida Air Show Team, and here is what Art Johnson, team manager said in his letter: "VK triplane was covered with Super Coverite in 1971. . . and is still holding this bird together after many hundreds of flights and plenty of nose landings. Our team members prefer Super Coverite for the open frame models and Silkspun for covering sheet structures such as the Sig Kougars."

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PERMAGLOSS COVERITE. 100% polyester iron-on covering. Prepainted. 38"x43"/43"x15 feet/5"x36"/ Red, white, blue, yellow, orange, aluminum, olive, dayglow orange, dayglow yellow, black.

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Peanut Fokker D VI.
LSF Tournament story.
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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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SHOCer F/F by Mel Schmidt.
White Trash, famous R/C soarer.
Peanut Ord-Hume.
Chet Lanzo's famous rubber Puss Moth.
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Minnow U/C profile scale racer.
Fokker E-I R/C scale.
Al Vela's O Boy 1/2A
E-Z Bo .A, Al Vela.
Peanu .d Flivver.
Fibe sing over balsa, by Le Gray.
Spoiler, FAI Combat.

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Mar/April 1972

Yankee Gull R/C glider 8' to 12' span.
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Travelair 2000 2" scale R/C, by Editor.
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Shoes R/C QM.
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Slope soaring technique.
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MODEL BUILDER

FEBRUARY

1979

volume 9, number 85

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CONTENTS

FEATURES

SCALE VIEWS

CONSTRUCTION

COVER: This 1/4-scale Pfalz DIIIa was scratch-built from Wylam scale-views by Bob Haight, Las Vegas, Nevada. Construction began in 1962 and was completed in 1969, long before the current Mammoth Scale craze. Covered with Ceconite and finished with Stits silver undercoat, the 92-5/8" span ship weighs 22 lbs., 10 oz., and is powered by a Cox 1.4 engine converted to glow by Millet Eng., turning a Zinger 18 x 6 prop. Kraft radio. Marcellina Ungaro, who is anything but "Pfalz", provides a stunning background for this photo, arranged and taken by Billy Root near Las Vegas.

At the Las Vegas Tournament of Champions banquet, we were mighty proud to meet and rub elbows with Al Unser, Indianapolis winner, and first ever to win the Triple Crown 500's at Indianapolis, Ontaria, and Pocono, 1978. The main topic of our conversation had to do with the ways and means of controlling horsepower, a situation encountered in both of our sports. Photo by Dick Penrod.

from Bill Northrop's workbench . . .

FLASH!!

The FAI has just confirmed that the 1981 R/C Aerobatic World Championships will be held in Mexico.

The February 1979 issue of M.A.N. contains the unedited reproduction of an open letter to the AMA Executive Council from David L. Peltz, Chatsworth, California, regarding the latest dues increase. The letter will be found in Walt Schroder's Man At Work column.

One reason that the letter appears in M.A.N. is that AMA refused to have it published in *Model Aviation*. Now obviously, M.A.N., or any other private enterprise model publication magazine, is not going to pick up and reproduce every letter that AMA turns down, but this one deserves the attention of AMA's membership, and it is hoped that all members will take this opportunity to read it.

As you read the letter, you will begin to note that its main thrust is against *Model Aviation*, AMA's model magazine. For those of you who are relatively new AMA members and/or have only comè into the hobby in recent years, a little background on this matter may be in order.

". . . and thank you, Lord, for helping me to win the election for AMA President, and for giving me the strength to listen to one more Texas joke . . . " This absolutely classic photo was taken by Don Tremain, and first appeared in the Lincoln (Nebraska) Sky Knights newsletter, edited by Majewski. Club will host the 1979 AMA Nationals.

Up until 1966, AMA published a newsletter in various formats, much like its parent organization, the NAA (National Aeronautic Association), has been publishing for many years. News to the membership is a requirement of AMA's constitution and by-laws, to keep in contact with members and inform them of the organization's activities, rules, etc.

In 1966, feeling the need to cut newsletter production costs, yet to expand its contact with the modeling public, AMA made a private deal with American Modeler magazine to publish AMA news in a section of that magazine. Other equally qualified publications were not invited to bid on the job, nor even notified of the deal, until it was announced to the AMA membership and modeling public. Whether this idea for cutting costs was originated by AMA or by American Modeler is not known . . . part of the private deal.

In 1975, American Aircraft Modeler (the change from AM to AAM occurred in 1968) went bankrupt (a management problem, and in spite of the obvious circulation and advertising advantages from being associated with the national organization).

During the period that AMA was without membership communication and deciding its next step, this writer made a proposal. Obviously, making another private agreement with any single publication was out of the question. We proposed that any magazine agreeing to publish the AMA news section on a monthly basis, at no charge to AMA, should be identified as an official AMA publication, and the membership could choose whichever one of these it wished at a special AMA rate. (If only one magazine accepted the offer, at least no other publication could say it hadn't had the opportunity.)

Continued on page 126

OVER THE COUNTER

MODEL BUSINESS

• Not too much in the way of news this month! Traditionally, this month is the time of year when manufacturers start holding back all their new goodies to introduce at the trade shows which will soon be upon us. And they are not as far away as you may think. As a matter of fact, about the time that you are reading this, the first show of the year, the International Modeler Show, will be taking place in Pasadena, the very first weekend of January.

So, having some space available, I can answer some of the comments I receive from time to time. One being, believe it or not, that seldom does a picture of me appear in **MB**! So, in deference to numerous (both) requests, I have decided to open this month's column with a picture of myself. Since I don't smoke, it can't be a portrait type with a cigarette, as often seen. And the talking-on-the-phone photos always remind me of the Petty Girls of years past. I dug around in the archives and came up with one some of you might enjoy.

That's me! In the back seat of the Cavalier Mustang, as remanufactured by Cavalier Aircraft of Sarasota, Florida, for the "Fuerza Aerea Salvadorena", the Air Force of El Salvador, with which I spent three enjoyable years as a USAF advisor.

So it won't be a complete loss of space, I'll tell you scale builders about the bird. The modifications included an 11-inch addition to the fin, "hard points" under the wing for bombs and rockets, the wing-mounted, non-droppable tanks as seen in the photo, two seats, and a longer canopy. Unseen mods included a spar reinforcement, modern instruments and radios, and a zero-time Rolls Royce up front. Beautiful!!!

For those of you who've been wondering what MB's Eloy Marez looks like, now you know. That's him in the rear seat of a two-place Cavalier Mustang. See text for more info.

The bird shown was set up with one pilot and an observer in the rear. We had a TF-51D model, with complete dual controls and instruments. The finish of these birds was camouflage in the shades used by the USAF during the last years of Viet Nam, only in a higher gloss.

And for those of you who slept through your world geography classes, El Salvador is in Central America, between Guatemala and Nicaragua, on the Pacific coast. It is kinda small . . . in fact, it is so small that the Mustang had to be kept in a slight bank all the time, otherwise you'd fly out of the country!

* * *

And speaking of friends who comment, write, or call, I have news of a couple. Without any more pictures of myself. . .

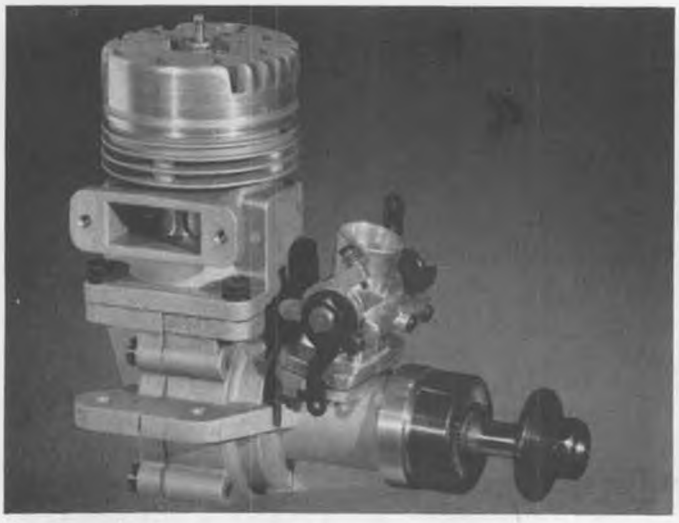
One is Bill's Miniature Engines, in Memphis. Well, it is no longer around!

But wait a minute. Don't run out and sell all your Rossis. It has merely changed names, and is now known as Rossi Sales of America. The address is the same as before: 1325 Carol Dr., Memphis, TN 38116.

And Bill McGraw is still the man there, with phone number (901) 396-7485.

The other is Windspiel Models, which used to be in Idaho. Well, it is now in California, at 1844 W. Glenoaks Blvd., Glendale, 91201. The number there is (213) 241-5361.

When you call, be sure to tell them where you got this good news . . . unless



New .60 engine from Fox, the Eagle II.

Quarter scalers will like this one: the 1.2 cu. in. Fox Twin.

New Fox fuel tank, designed especially for Slow Combat.

you forgot the time difference between you and them and you get someone out of bed at three in the morning!

* * *

Need BIG diameter piano wire for landing gear or wing struts on that new Mammoth Scaler? How about some 5.56 mm? Or maybe some .2187-inch stuff?

Would you rather have some 7/32? Something like this is certainly a necessity for those bigger and heavier models now so popular. Well, it is now available from Sig Manufacturing Co., which increases to 12, the number of sizes of highly-quality music wire available. The range is from .015, at 5¢ each, to the new 7/32 at 98¢ each, all in 36-inch lengths.

At your dealers or direct. Sig Mfg. Co., Inc., Montezuma, IA 50171.

* * *

An interesting thing I'd like to know, but don't: how many engines has Fox Manufacturing Co. produced in its lifetime? My first one that I can remember definitely was in a "Stunt Stuka" from Air Trails magazine, that I used to fly at Tachikawa Airbase in Japan, between C-54 missions to Korea, in 1952.

One thing is certain: there have been a lot of Fox engines produced since then, and Duke's crew in Fort Smith must surely have learned a lot about our means of propulsion. The latest announcements from there tell us about a new Eagle II, which should be of interest to pattern fliers, due to its unusually high power output and durability. It features an unusually large connecting rod and rod bearing, and is available in both side and rear exhaust models. Weight is 17 ounces, with a bore of .906 and a stroke of .937. The Eagle II is to be priced at $125, and deliveries will start in January, 1979.

Also to be available at the same time is Duke's new twin, of 1.2 cubic inch displacement. It is big, sturdy, and powerful, features a one-piece crank, steel connecting rods, 3 ball bearings, dual carbs, Schneurle porting, and removable prop stud.

The Fox Twin will be supplied with a firewall-type mount, and every engine will be test run and adjusted before delivery. A rear exhaust model will also be available. The weight is 2-1/2 pounds, and it is rated at 3 horsepower. The smoothness of operation is claimed to be far superior to any single of similar power output. The price is $250.

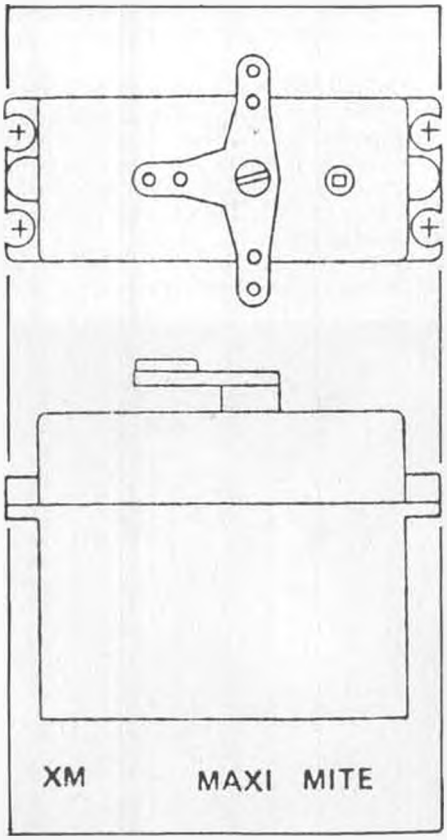
Nor have you controlliners been ignored. Fox Manufacturing Company has developed a new tank especially designed for Slow Combat competition, but equally efficient for larger sport profile and stunt models.

The secret of its superior performance is two baffles, so positioned that fuel is held at the pickup point under both acceleration and deceleration. The inboard baffle is flanged in such a way that fuel is retained at the pickup point for several seconds, even in tight overhead maneuvers.

A 2-1/2-inch size will run your .36 engine for over 5 minutes . . . at $9.95.

The tank is now at or on the way to your dealer. Also check with him about the engines, or write direct to Fox Manufacturing Company, 5305 Towson Ave., Fort Smith, AR 72901. Tell them where you read about these new products.

* * *

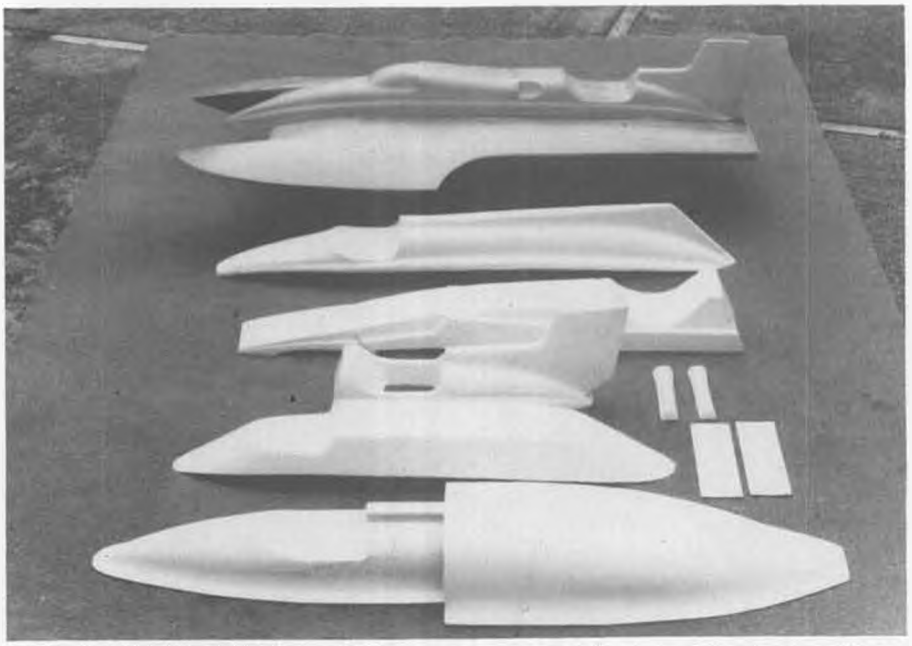


E.K. Logictrol's extra-powerful "XM" servo.

Bavarian Precision Products' new HB .21 PDP.

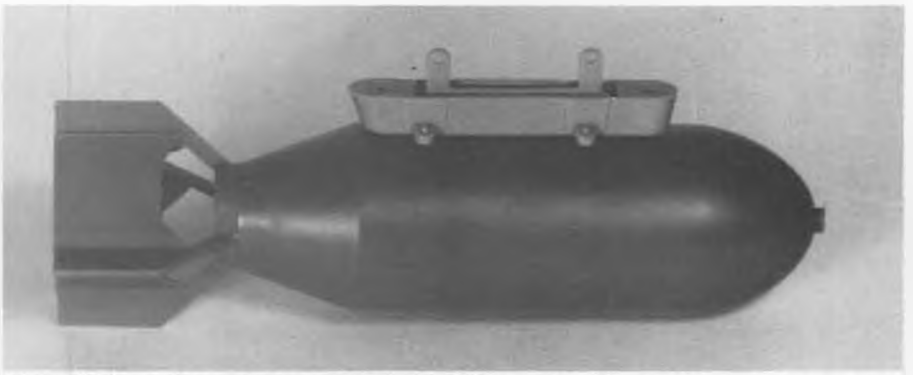
The latest in its series of HB engines has recently been introduced by Bavarian Precision Products Co., P.O. Box 6, New Canaan, CT 06840. It is a .21 PDP (Perry Directional Porting) model designed especially for airplane use.

The PDP system, developed by John Perry of Perry Carburetor fame, is a system incorporating additional inlet



New from Stewart Scale Models, a fiberglass basic scale unlimited hydro hull and the different cowlings that can be adapted to it.

Improved servo-actuated towhook, from E.K. Logictrol.



Vortac Mfg's bomb or tank drop mechanism and fall-apart bomb.

ports in the cylinder sleeve and a special channel in the crankcase, the result of which is greatly increased fuel efficiency. Fresh fuel mixture is introduced in front of the piston baffle at the proper time, which accelerates the expulsion of exhaust gases, increases power and rpm, and saves fuel.

This is one of the features of the new HB .21; others are double ball bearings, Perry carb, and a crankcase with both beam and radial mounts. A muffler, wrench, needle valve extension, and instruction manual are included.

Look for this new engine at your favorite hobby shop, or write for further information, being sure to mention **MB** when you do.

As a side note, Bavarian Precision Products is now making Award Certificates available to all model groups sponsoring competitive events. This is part of its efforts to support and encourage our hobby, and will permit the winner of a certificate to purchase his or her choice of an HB engine at a 40% discount off the current price. Contest Directors may make their requests for these certificates directly to Bavarian Precision Products, address as above.

* * *

Logictrol International Corp., better known to most of us as E.K. Logictrol, has a new addition to its list of R/C-related accessories. It is an improved version of its original servo-actuated glider towhook. This is a must for the competition flier who can't afford a premature unhooking, and who must release at the most opportune time to catch the best air.

The new hook, designated as the THR-2, is fail-safe and adjustable from outside the glider. It is now available and is priced at $4.98.

A new husky servo has also been announced, big brother to the Logictrol SM, to be called the XM. It offers six

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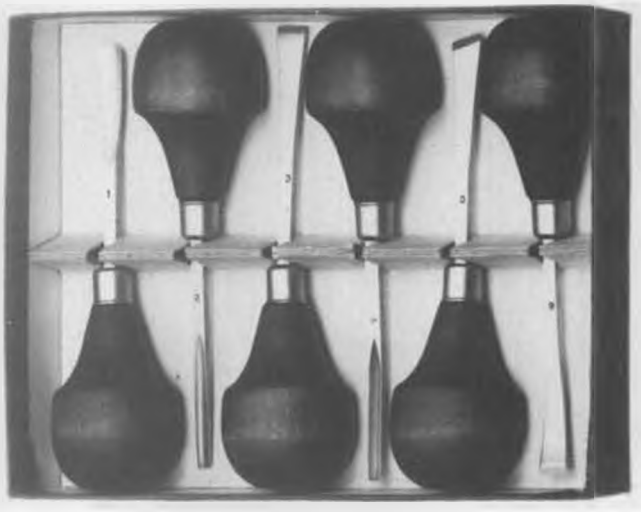
If looking out the window doesn't tell you enough about the weather, get one of these computerized weather stations from Heath Co. Does everything but whistle Dixie.

For contest awards, Bavarian Precision Products is making available these certificates, good for 40% off on HB engines.



Nicely made carving tools from Harmen Company.

R/C WORLD

The famed father-and-son team of Hans and Hanno Prettner, from Klagenfurt, Austria, with their huge Dalotel DM-165, made a clean sweep of the 5th Annual Las Vegas Tournament of Champions, scoring well above all competitors in every qualifying and final round. See Las Vegas story

Flight INSTRUCTOR

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

• This last month has been a hectic one around the Brown household, with the frantic preparations for the Vegas Championships, but as this is being written, the airplanes have been shipped by motor home (*motor home???*) and we are packed to fly out in the morning. Come to think of it, I'll probably end up finishing the column on the airplane. I hope Bill Northrop doesn't read this too closely, as this means it's being written on the fourth and was due the first!!! This month only brought two letters, one of which would require a book to answer, but I did have one individual call (sorry, I can't remember his name) with the suggestion that I do a column on props and their effects on airplane performance, so I'll give it a try.

Most manufacturers of propellers and/or engines supply a recommended prop size chart which will generally give you a good starting point. The sizes recommended are for general purpose use with common sport engines, but what if you have an oversize airplane, or a little one, or a heavy one, or whatever? A little understood fact that few people realize is that, for any given size engine, the most powerful ones usually require smaller props than your average sport engine! The reason for this is that the peak of the horsepower curve is at the higher rpm, and it is necessary to allow the engine to turn up faster in order to take advantage of this horsepower increase. A perfect example of this is the fact that in the early '70's, the most common prop used in pattern was the 11x8, with a good engine turning it at 11,000 rpm; in the mid '70's the most common propeller became the 11x7-1/2, with the engines turning at 12,000-12,500 rpm; and in the last two years, we have seen the 11x7 or 11x7-1/4 become more popular, with the engines turning at 14,000-15,000 rpm with a pipe.

The first question we must discuss is what the propeller size designations mean. What is a 10x6 propeller, for example. A 10x6 prop is one with a diameter of 10 inches and a pitch angle which would pull the propeller forward 6 inches per revolution if it was used in a non-compressible substance, like butter. Most propellers have what is called helical pitch, meaning that the pitch angle becomes continually less as you progress from root to tip to compensate for the different distances traveled by the root and tip.

Enough theory (WHEW! . . . typist-wife), now let's get to the practical side of things. Keeping in mind that the prop charts are generally set up for sport type engines and that basically, diameter determines thrust and pitch determines speed, let's try a few hypothetical cases.

If you have a sport .40 engine in a typical sport .40 size airplane, the chart calls for a 10x6 prop, and this is probably your best bet. The same airplane with a Schnuerle .40 engine would probably fly best on a 10x5, giving you about the same speed but increased vertical performance and quicker acceleration. The same engine in a smaller airplane would probably fly better on a 9x6 or 9x7, which would increase the flying speed. Putting this same high-performance .40 into a large airplane such as a Senior Falcon or a high-drag scale airplane which is intended to fly fairly slowly, you might try an 11x4.

This brings up the next point, which is very important. The tip speed of the propeller must be kept below 900 feet per second, or a very dangerous condition will exist: the tip speed approaches the sonic range, causing serious vibrations and flutters which in turn lead to many other problems. Assuming a nominal increase in rpm when the prop is unloaded in flight, the following is a list of maximum rpm on the ground for various prop diameters (in inches):

DIAMETER	RPM
16	11,500
15	12,500
14	13,800
13	15,000
12	16,500
11	18,500
10	20,500
9	23,000
8	26,500
7	30,500

As you can see from this list, the maximum rpm recommendations are, in most cases, well above any attainable speed, but problems can be encountered with this on racing engines or very large engines. The Las Vegas type airplanes have taught many people this lesson, as a good .90 with a pipe will turn a 16x4 at about 12,000 rpm, which puts

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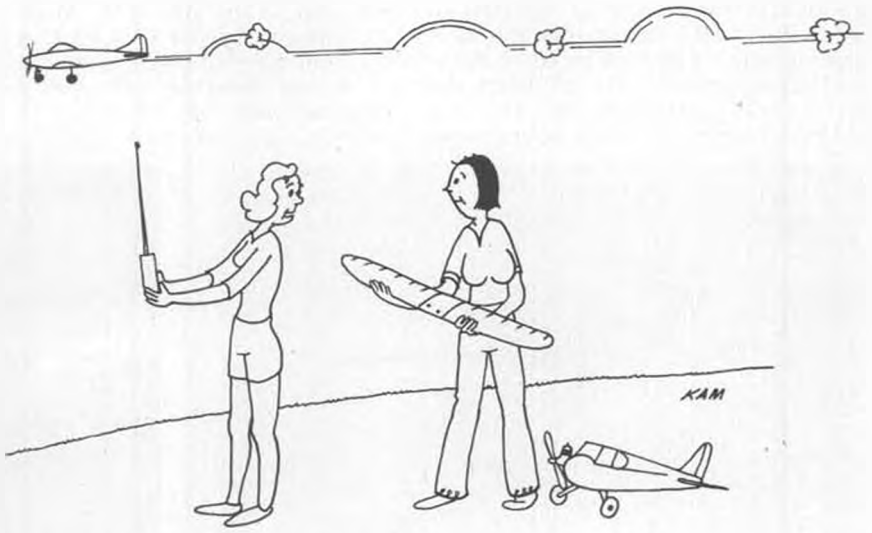


"Will you get me a glass of water, Ruth? I have the hiccups."

This tranquil, winter scene was captured by Neil Whitman, Simsbury, Connecticut, and shows his son Tim's partially finished, electric powered Dumas "Shelly Foss" tugboat, pulling a tow through a skim of ice forming on their pond. Better hurry, Tim!

R/C WORLD

By BILL NORTHROP

WHAT'S A MODEL?

Last month, in our "Workbench" column, we installed a flash regarding a recent move on the part of AMA to counteract the runaway growth in the physical size and weight of models. Reacting to a supposedly serious (or very facetious) question on the part of a member who asked if it was within the general AMA rules to fly a full-size J-3 Cub with radio control, the Executive Council invoked the FAI's description of a model airplane. To repeat, "An Aeromodel is a heavier-than-air craft of limited dimensions, with or without engine, not able to carry a human being."

While this takes care of any individual's attempts to fly a full-size aircraft by radio control within the sanctity of AMA, it certainly does nothing to solve the much more realistic problem that is with us right now. . . The modelers, the insurance companies (particularly AMA's), the manufacturers, and most importantly, the FAA officials, need to have a clearly defined border line between model aircraft and . . . well . . . non-model aircraft. The point is this; as models become larger, whether R/C, F/F, or C/L, but most obviously in R/C, there has to be an established limit beyond which AMA is no longer responsible for the consequences of a serious accident. In other words, if AMA has a 30 pound weight limit, and someone builds a 35 pounder (you think it hasn't already happened?), AMA can say, "Go right ahead and fly it, Sonny, but you better get the FAA's approval, 'cause it's not our baby!"

OK, so how do we "clearly define" or separate models from non-models? And by the way, if "we" don't do it, the FAA will step in the first time there is an incident and do it for us. If the FAA does it, it would probably follow the example of several European countries which have adopted the FAI limits; 11 plus pounds, .61 maximum displacement, etc. This would eliminate even the reasonably large size models which are now so rapidly gaining popularity.

We have discussed this with many leading modelers, and something in the neighborhood of 30 pounds, 35 ounces per square foot, and 2 to 2-1/2 cubic inch total engine displacement usually gets the best reaction. One problem still seems to nag all of these discussions, however . . . the matter of how much horsepower can be developed from 2 to 2-1/2 cubic inches.

Without going into the various estimated possibilities for controlling horsepower, and thus the potential speed and total collision force of aircraft with this power, we'll offer the best power-control suggestion we have heard to date. It was made by Don Lowe, long-time competition flier, past R/C Contest Board member, FAI R/C Team Manager, RPV designer and flier, and currently District III Vice President. Don

The prototype Byron Originals P-51 making a realistic fly-by for spectators at the Las Vegas T.O.C.

Phil Kraft's Super Fli looks just a little over-propped with a Zinger 24x8, installed by Tony Bonetti when Kraft wasn't looking.

suggests that we simply establish a carburetor intake cross-sectional maximum area. Within reasonable limits, it is virtually impossible to extract more than a certain amount of power from a specifically limited volume of fuel and air mixture. By using a simple no-go insert gauge, it would be relatively easy to measure and control this limit. In fact, Don feels that this limiting feature might be enough to take care of the whole model aircraft limitation.

Though we heartily agree with the power limitation idea, we feel that the physical model aircraft size must still be considered, if for no other reason than the instant visual appraisal of the aircraft with respect to its model or non-model identity.

We urgently request your feedback on this question, as time becomes more critical. Before modelers go beyond safe limits, before manufacturers invest too much time and money in products that might become illegal, before the FAA prescribes limits that we could not live with, let's decide what's a model. . .

DRAGONFLY STRIKES AGAIN

Our very popular "Dragonfly", featured in the February, 1976 issue, played a major role at the Dallas R/C Club's Fall Picnic. Using the .15 powered model shown in the photo, 18 wives attempted to fly a loop, followed by a left and right turn, on verbal instructions only before handing over the transmitters to their husbands. Helen Randolph, in the photo taken by her husband Randy, was one of six ladies who succeeded. Photo was taken *after* the contest.

WATCH THAT GASOLINE!

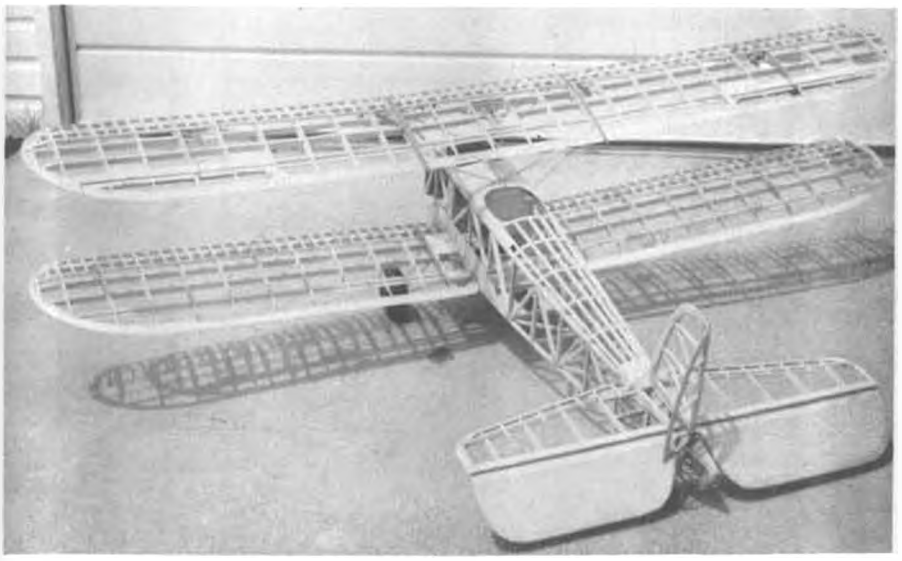
Charlie Reed, editor of the Kansas City Radio Control "Contacts", published a timely reminder in the latest issue. He believes all model publications should stress the problems with gasoline in ignition powered model aircraft. Most of the fliers today (but not all, Charlie!) are not old enough to remember the crash-and-burns . . . yes, real fire . . . associated with the old gasoline engines. With the methanol and nitro of today's glow fuel, it's almost impossible to have problems (try to tell that to Charlie Viosca!). Reed says you can throw a lighted match into an open container of glow fuel and it will either go out or burn with a low blue flame. (Frankly, we're willing to take his word for it, and have no intention of verifying it. We also warn strongly against anyone else trying it!). Do the same thing with gasoline and you're guaranteed an explosion.

NAME FROM THE PAST

The "built-by" caption in one of our photos should cause a double-take among some of our old-timer type readers. We're referring to the Flamingo framework photo. The builder is Bruce Lester, of Toronto, Canada, and if you were reading model mags back in the late 1930's, the name should ring a bell. You'll be reading more about him in a subsequent "Plug Sparks" column, so we won't undermine John Pond's efforts with more information at this point. Once a modeler. . . . ●

The Dragonfly strikes again! Helen Randolph was one of 6 ladies out of 18 who successfully looped, turned left and right, from husband's verbal instructions at Dallas R/C Club Fall Picnic.

A major portion of the scale ships which appeared at Mile Square Park, Fountain Valley, Ca., for the Scale Squadron's 2nd Annual Non-Contest. Many Mammoth Scale aircraft in attendance.



Bruce Lester, Toronto, Ontario, Canada, is building this Udet Flamingo from scratch. Don't worry, since taking the photo, he has added ailerons to the bottom wing. See text.

Beautiful action shot of Kirby Crawford's Curtiss Gulfhawk, recently flown at D.C. meet. Kirby did his own conversion on a Homelite chainsaw engine, does a good job of pulling the 27-pound model through a realistic aerobatic routine. Model is not quite 1/4 scale. Photo by John Preston.

1 TO 1 SCALE

By BOB UNDERWOOD

Tom Stark with his Bird biplane at McDonnell-Douglas meet held in St. Louis.

S. Claus
North Pole, World
00001
Dear Mr. Claus,

I felt it imperative that I write to you concerning the gifts which were left at our house this last Christmas. Please do not misunderstand; I certainly appreciate the generosity exhibited by you, however, there seems to be a rather signifigant communications gap between our house and yours. Please allow me to clarify the requests that were made in the original letter of December 2, 1978.

It would appear that you misunderstood the meaning of the item listed as "Kraft". I think our family will find it very difficult to use up 450 jars of salad dressing, not to mention the 38 lbs. of cheddar.

I realize that the description "mono" means one, and I must admit that my wife is pleased beyond reason with the $16,000 fur coat, however, my request for Monokote referred to an entirely different item.

She was confused, however, to find the older Italian gentleman who was sitting under the tree. If you check carefully, I believe you'll discover that a Rossi 60 is an engine. I am relieved beyond words that I didn't ask for a Super Tigre!

Perhaps you could pick up a few of the items that could be used elsewhere. I'm just finishing up two scale models and needed a couple of items, however, even though they're darling, I just can't use those little sets of trousers. I had something else in mind when I asked for pants for a Chipmunk and a Minnow. Also, I'm certain a Tibetan monk would make more use of the cowl you brought.

Once again, thank you for your generosity and I'll try to be more specific next year when I send my "Dear Santa" letter.
Sincerely,
Joe Modeler

BIG ONES REVISITED

In one of the first efforts produced for this column, some comments were made concerning "Big Ones"; the large and super-large models. In the almost one year since then, there has been a tremendous movement in their direction. There has been a like amount of "press", both positive and negative, with claims and concerns from both points of view. The main thrust of many

John Preston took this photo of the flight line at D.C. meet. Didn't say whether photo was taken from a model or full-size plane.

Bud Atkinson at McDonnell-Douglas meet with his Savoia Marchetti SM 79. Friends say he painted it by exploding a jar of mustard nearby.

of the discussions has been aimed toward the concept of safety. My first article spoke to this point and this is the consideration here.

While the "big" movement is not limited to scale by any means, much of the activity is addressed to this. In light of this, I feel we must consider the many ramifications from a scale point of view. In addition, we must distinguish between "big" models and quarter-scale. A quarter-scale model is not necessarily large. A Pitts, a Volksplane, and myriad others do not turn out "big" if prepared quarter-scale.

What, then, is "big"? Before we address ourselves to this problem, let's consider the credit and debit columns that have developed from various sources.

Good God! This sort-of-scale Avro Lancaster was demonstrated at the Scale World Champs at Woodvale, England. See text for Bob's comments on ultra-large models.

CREDIT:

Bigger models fly better and more realistically.

A generally accepted point that this writer would agree to share. An early Bonzo flew like a lead Zeppelin at 2-1/2 inches to the foot, while at 3 inches (quarter-scale) it flew like a pussycat. The reason, of course, was due to several factors. The wing loading dropped dramatically when the wing area jumped from about 600 sq. in. to almost 900 sq. in., while the weight went from about 9-3/4 to 10-3/4 lbs.

While they weigh more, then fly slower; hence, they have no more destructive force than smaller models at higher speeds.

Not having the scientific knowledge to field this, we'll simply comment that there appears to be logic in that statement.

They use less expensive materials and fuels.

Seems to be true, considering the ability to use something besides balsa and glow fuel. Other than making big models more attractive to build, there is not much to consider about safety here.

They are easier to detail.

Would seem to be true. No safety feature other than that they can stand detailing better without accumulating unrealistic wing loadings.

They are more impressive and satisfying.

No safety feature, and is simply a matter of opinion. One of the most impressive things I've seen is an indoor CO_2-powered R/C model.

While there are other "credits" that may exist, let's look at some "debits".

DEBIT;

The model may not hit harder in a crash, but it covers a larger area.

Would seem to be true, especially if you're considering an attentive audience at a big event. I can't help but wonder if they are more resistant to breaking up due to the firmer stock used.

Big models are "outflying" the available equipment such as servos, etc.

The industry has been very quickly reacting to the needs of big ones, and equipment such as servos keyed to the special needs are becoming available. It is questionable to consider using older,

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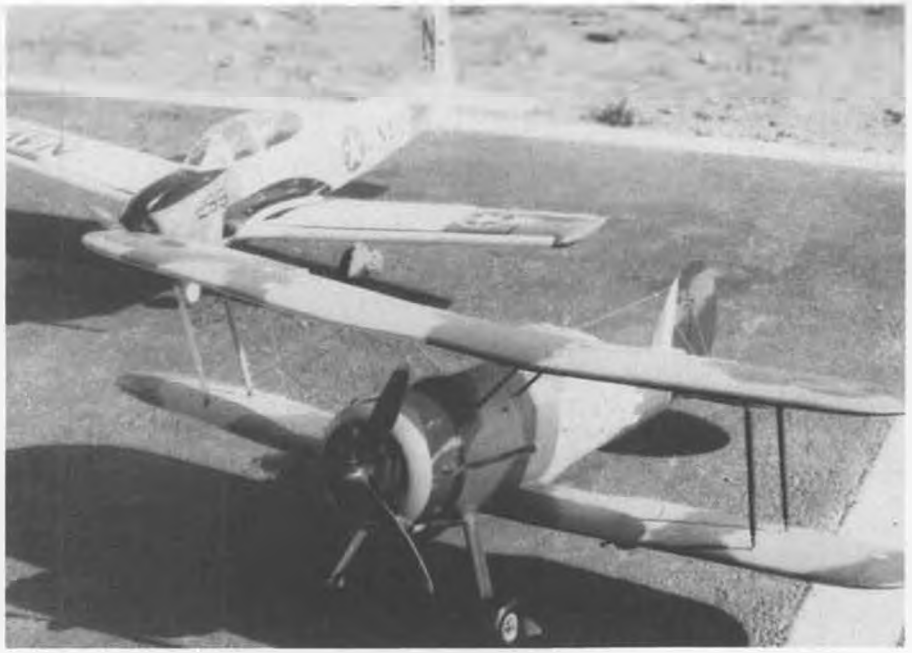


At the Texas Flying Scale Championships, held at Abilene, Texas, Robin McGeorge's Platt T-28 placed 1st, and Buddy Irwin's scratch-built Gloster Gladiator took 2nd. Jerry Farr photo.

Fred Hulen with his old, *old* scratch-built T-28 at McDonnell-Douglas meet.

Good in-flight shot of Robin McGeorge's T-28, 1st in Sport Scale at Texas Scale Champs. A beautiful model, but where the hell are the pilots? Photo by Jerry Farr.

Gross Vogel II

By CHARLES CLEMANS . . . An improved version of the author's original design powered flying wing, the Gross Vogel is a real attention-getter. Article includes tips on how to lighten the model for power soaring.

• Gross Vogel II is without doubt a strange sort of aircraft. How many nine-pound, .60-powered, tail-dragging, non-swept flying wings have you seen lately?

Its unusual appearance and flight characteristics have made GV II a popular attraction at model airshow activities in the Seattle area for several years. Its flight envelope includes such outrages as STOL and hovering flight in moderate wind, barrel and snap rolls, and hands-off flight at cruise altitude.

With the engine idling, the aircraft exhibits a very low sink rate, allowing one to cruise for long periods searching for thermals while using little fuel. The muffled engine makes little noise when idling, and GV II has shared a thermal with a hawk on several occasions even though the engine was still ticking over.

The bottom of the wings and fuselage are black for maximum visibility from below. When circling in a thermal, the aircraft is easily mistaken for a buzzard or a hawk. Until, as Tom Richards put it, "I remembered that buzzards don't have square-tipped wings."

DESIGN SUMMARY

Function: Novelty sport and powered soaring.

Configuration: Flying wing with zero sweep and constant chord (PLANK planform).

Area: 1774 square inches.

Span: 101-3/8 inches.

Weight: 9 pounds with Kraft 3-channel.

Power: .45 to .60, an ancient Enya .60 was used on the prototype.

Controls: Rudder, elevator, and throttle.

Airfoil: CJ-1.

FLIGHT CHARACTERISTICS

Any aircraft design is a compromise, and the Gross Vogel is no exception. The taildragger configuration, which reduces drag and gives a distinctive appearance, requires care during ground handling. The dihedral, which permits hovering flight and hands-off cruise, makes crosswind takeoff or landing difficult.

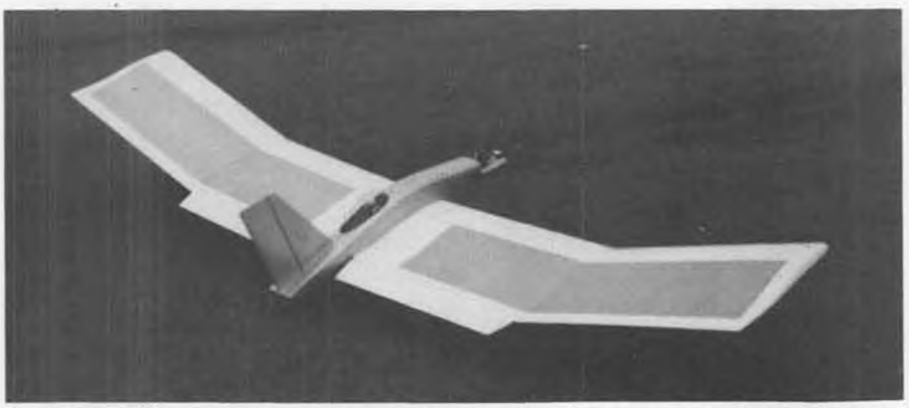
On initial flights, care should be taken to line up directly into the wind. The rudder is quite effective, due to the propeller slipstream, and a rudder-induced skid with the corrective roll induced by the dihedral can result in a ground loop if one wing touches the ground.

On a pattern ship, ground tracking during rollout is accomplished with rudder and nose or tail wheel which, due to near-zero dihedral, results in yaw only. With the Gross Vogel, the corrective rudder required for a crosswind takeoff will invariably result in a skid and steep bank when the aircraft breaks ground.

Prior to the first flight, check the center of gravity. It should be 3-1/4 inches back from the leading edge of the wing, plus or minus 1/4 inch. An accurate method of accomplishing this is to balance the model on the eraser end of two new pencils, one on either side of the fuselage. The pencils should be mounted in holes in a board or clamped in a vise. The fuel tank should be empty during this operation.

The neutral position of the elevator should be set as indicated on the plans; it continues the reflex or upsweep of the airfoil.

As stated earlier, make your initial takeoffs and landings into the wind. On about half throttle, takeoff is about the same as with a conventional aircraft, requiring from fifty to one hundred feet.



Gross Vogel before the lettering and trim had been applied. Model is very stable in the air, requires careful ground handling when wind is blowing to avoid ground looping.

After a run of thirty to forty feet, the tail will lift and the aircraft will accelerate and eventually lift off in a gentle climb.

DESIGN EVOLUTION

The basic configuration of the Gross Vogel originated with German designs of the late 1930's, which featured a constant chord wing with no sweepback and a so-called self-stabilizing airfoil. The CJ-1 airfoil was evolved from one used on the Struijkplank (ironing board), a Dutch design circa 1950.

Prior to the development of the plank configuration, longitudinal stability in flying wings had been achieved by means of sweptback wings and washout (as much as 18 degrees) at the tip. The swept configuration, while aesthetically pleasing, has structural disadvantages.

Pitch stability in the flying plank is achieved by the forward location of the center of gravity, 18% to 23% of the Mean Aerodynamic Chord (MAC), as compared to 30% to 50% on conventional configurations, and by reflexing the trailing edge of the airfoil. Those interested in a more detailed treatment of the subject of plank stability and airfoil development are directed to Jim Marske's excellent book on the subject.

In 1968, I visited the Los Angeles area, where Dave Jones was flying a small slope glider utilizing the plank configuration which he called the Wing Thing. I was intrigued by Wing Thing because of its unusual appearance and flight characteristics. It could turn on a dime, and when the wind was steady, be made to hover just above the edge of the slope.

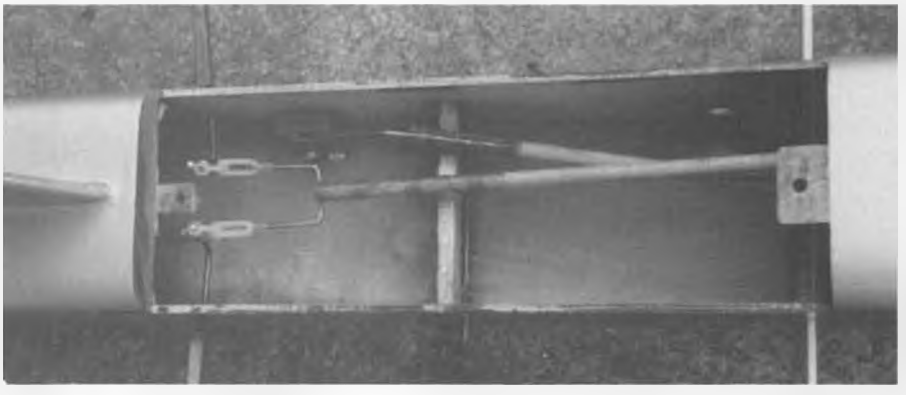
Since that time, Dave and I have collaborated on several flying wing designs, including the Little Plank and Standard Plank, which were published. Anyone wishing flying wing design data, airfoils, etc., or plans for state-of-the-art flying wing sailplane designs such as the RAVEN, should drop Dave a line at Western Plan Service

Upon returning to Seattle, I began designing what was to be the first Gross Vogel. Slope soaring had yet to be discovered in the northwest at that time, and the aircraft was configured as a powered sailplane, to be hand launched. The original GV was powered by a Cox .09 pusher and required nearly a pound of ballast to achieve a proper center of gravity. Needless to say, the Gross Vogel did not remain a pusher for long.

Like many designs one reads about, Gross Vogel flew right off the board, but barely. The hand-carved pusher prop did not turn well and the Gross Vogel made one very low turn around the field before running out of air. It may very well hold the record for continuous flight in ground effect by an aircraft with higher aspirations. While the first flight was not impressive, it had demonstrated that the design was extremely stable, even at very low speed with a minimum of power.

During the next five years, the aircraft was flown with a variety of engines: Cox 15, McCoy 19, S.T. 35, and finally an Enya 45. A landing gear was added, and the aircraft weight grew from 4 pounds to 6.5 pounds. Most of the time, Gross Vogel was flown on one-fourth to one-half throttle. The increase in power was dictated by the desire to carry increasingly larger payloads (camera, streamers, etc.), to perform short-field takeoffs, and climb swiftly to thermal country.

Good closeup shot of the engine and radio installation. Most of the top of the fuselage is removable for access to the tank, radio, and control linkages.



Control linkage details. Square brass tubes provide positive drive to elevators. Rudder pushrod exits the fuselage via a bellcrank, connects to tailwheel strut which drives the rudder.

Prototype Gross Vogel uses an Enya .60, which is more than enough power. Engine is angled to one side to provide clearance for muffler.

The original Gross Vogel won first prize for novelty aircraft at the 1971 RAMS symposium. It brought many hours of pleasure until its demise in 1974. It had survived a major crash due to radio failure and two attempts at free flight (failure to switch on the radio), but finally succumbed to a case of battery pack ejection brought on by faulty hatch design.

Externally, there is little difference between Gross Vogel II and the original, but internally this is not the case. Wing construction has been simplified and ruggedized through extensive use of 3/32 sheet. The fuselage, formerly of balsa, was changed to plywood to withstand the weight and vibration of the larger engine and occasional bad landings.

At full throttle and full up trim, Gross Vogel will leap into the air in anywhere from five to twenty feet, depending on the wind. After the aircraft has gained twenty to thirty feet of altitude, reduce the up elevator and/or reduce throttle to achieve the desired climb angle. Due to the effect of the propeller slipstream on the elevator, some down elevator will be required to maintain level flight at full power.

Landings pose no special problem. As with takeoffs, landings should be made into the wind. With no wind, there is a tendency to fly right off the far end of the runway. Beautiful three-point land-

ings are possible if flair is begun at an altitude of about two feet, ending with full up at touchdown. Touch-and-go landings can be made with engine at low idle, but are difficult due to ground effect holding the aircraft off.

SPECIAL MANEUVERS

The propeller slipstream passing over the control surfaces provides good control response, even at very low airspeeds. In light wind (6 to 10 kts.), near-vertical ascent and descent and even hovering flight is possible. This flight mode is typified by high engine rpm, with angles of attack usually in excess of thirty degrees, and low relative airspeed. Head into the wind and gradually increase up elevator and engine rpm until the desired relative groundspeed is achieved. Stability is maintained using rudder, elevator, *and* throttle.

Vertical landings are possible if the wind is steady, but are not recommended due to the turbulence usually found near the ground. The whole operation is a bit like balancing on a ball.

With the aircraft trimmed properly, it will fly for extended periods without operator control. As noted earlier, the radio must be left turned on for this stunt. With the engine on idle, full up trim, and rudder set for lazy circles, set the transmitter on the ground and let the Gross Vogel hunt for thermals. This is not recommended at low altitude or at high engine rpm. Remember, transmitter range is reduced greatly when the transmitter is not hand-held!

Extremely small inside loops are possible. Begin from level flight with full power and full up elevator, then cut power at the top of the loop to avoid excessive speed buildup. Remember, with Gross Vogel the throttle is an active control element. Go fast and turn left is for the pylon types. Go to an airshow sometime and listen to the way the engine is used to accomplish the various maneuvers while keeping airspeed and g-loads within bounds. Power-off loops require only a shallow dive to build up airspeed. A power-off loop can be entered with the speed built up doing a power-on loop.

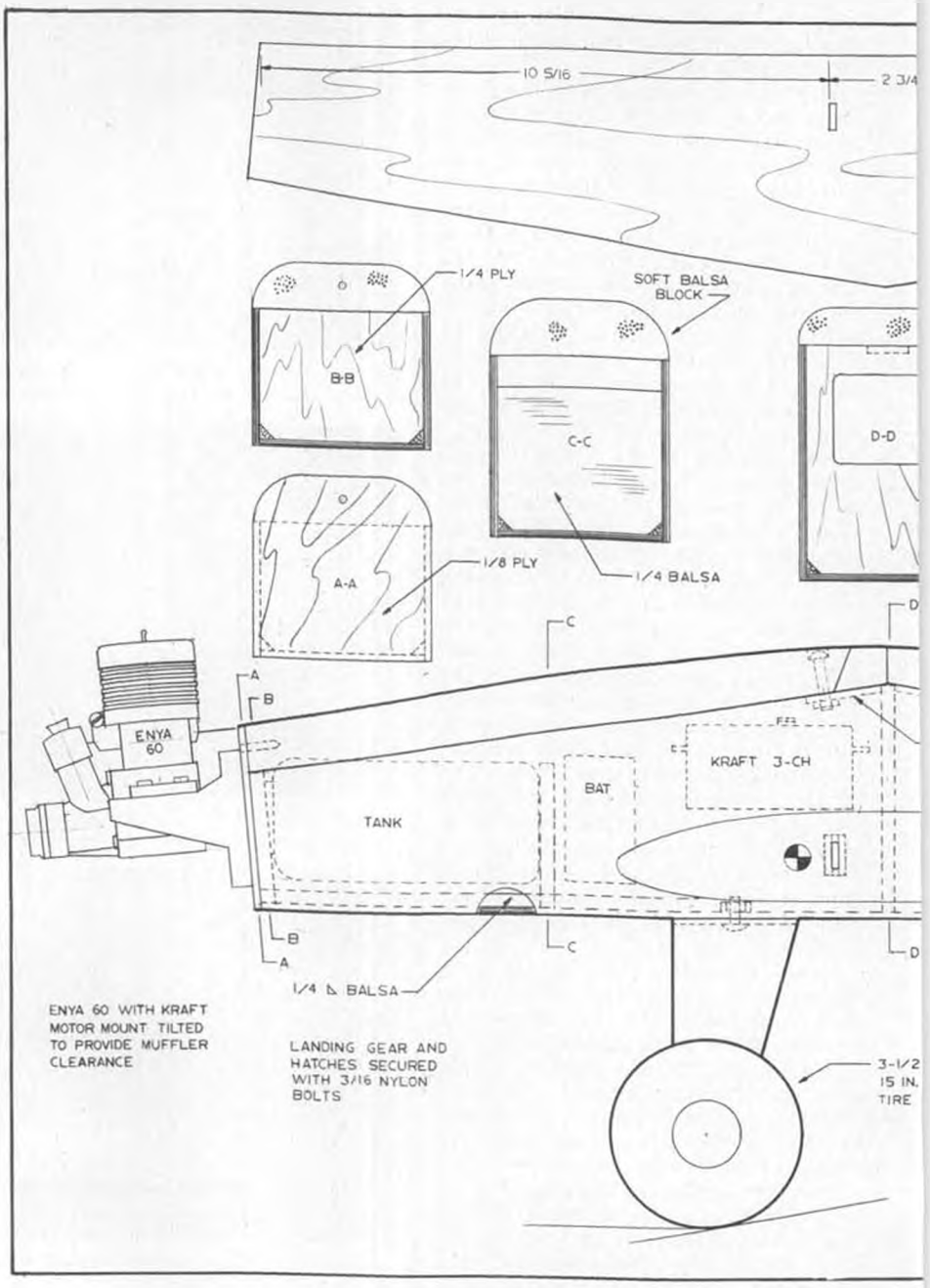
While axial rolls are not possible with the Gross Vogel, some really astounding barrel rolls and snap rolls can be performed. Inverted flight is possible but difficult, due to the reflexed flat-bottom airfoil.

CONSTRUCTION

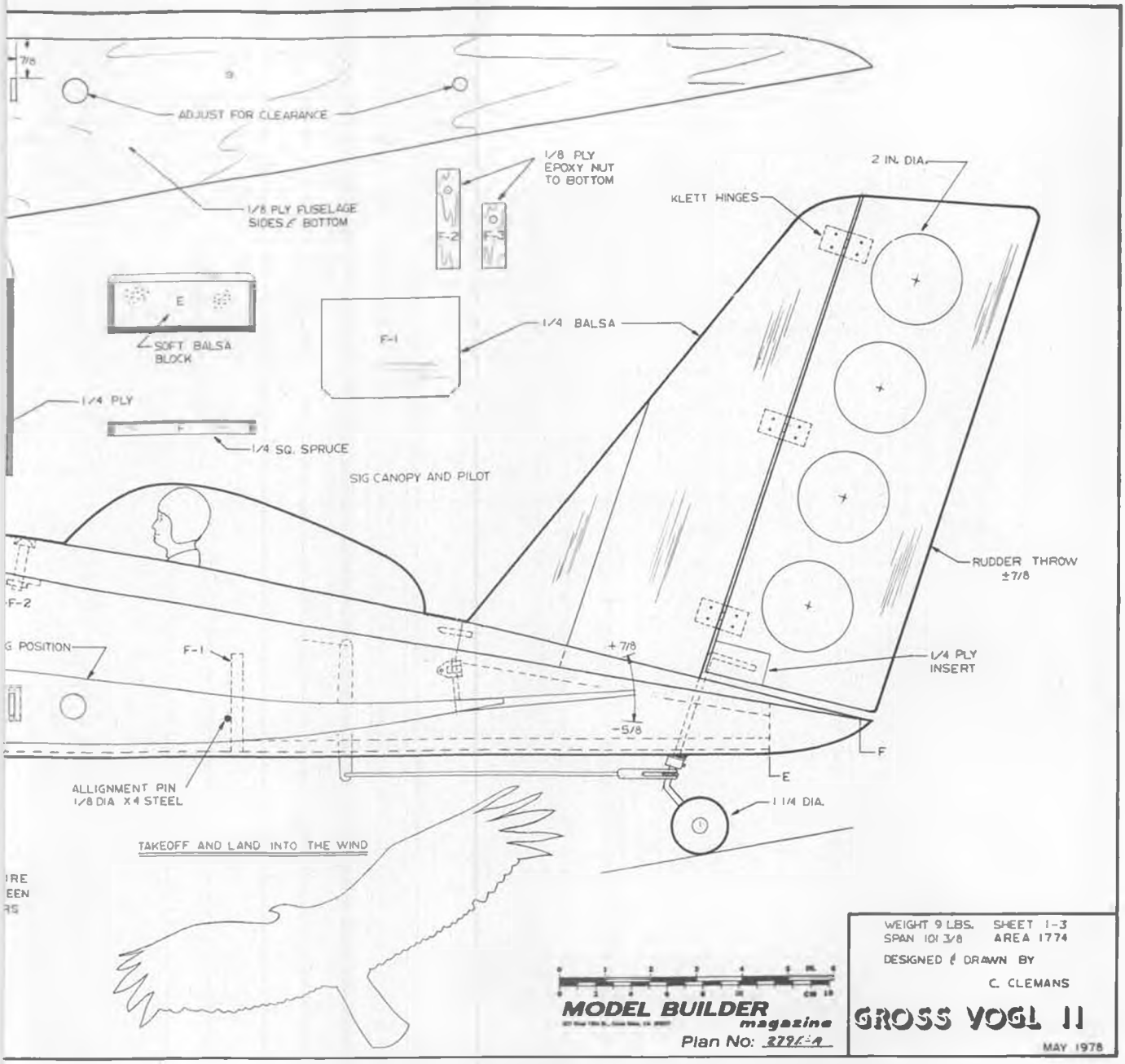
The construction depicted by the plans is quite rugged, having been designed to withstand the rigors of sport flying and occasional bad landings. If your primary goal is powered soaring, one or more of the following changes can be made for a weight reduction of from 30% to 50%:

A) Use 1/16 sheet balsa in place of the 3/32 specified for wing planking.

B) Build the fuselage sides from 1/4-inch balsa instead of plywood. Use 1/16 ply doublers where the wing spars enter the fuselage and in the forward equipment bay. Another alternative is 1/8 ply mahogany door skins available from



If Gross Vogel doesn't result in a rash of UFO reports in your area, nothing will!



FULL SIZE PLANS AVAILABLE – SEE PAGE 128

your local lumber yard. Try Sig Lite Ply.

C) Eliminate the landing gear and tail wheel. Add a balsa lower cowling and skid. Exit the rudder pushrod from the top of the fuselage. Raise the wing sufficiently to permit a good grip on the fuselage for hand launch.

D) Power with a .19 to .45 displacement engine, depending on the rate of climb desired. Reduce fuel tank size and move equipment forward to balance. Lengthen nose from one to two inches for smaller engines.

RUDDER/FIN

Construct the rudder and fin from soft balsa to control weight aft of the center of gravity. Cover with a paintable material of your choice, such as silkspan or Coverite, and set aside. Hinges may be fitted at this time if they are of the removable pin type, such as Klett, to permit insertion of the rudder tiller during final assembly.

FUSELAGE

Cut the fuselage components using the patterns provided on the plans. Construct the basic fuselage box using a good grade of glue, such as Titebond, adjusting bulkhead locations to suit your equipment. Install the triangular reinforcing where specified. These are required because of the small gluing surface provided by the edge of the plywood fuselage sides. Cut the upper deck and hatch blocks to profile and install, using glue and nylon bolts where appropriate.

Carve and sand the fuselage to shape. Remove the hatch blocks and hollow to suit. Fit the canopy at this time. One of the early Gross Vogel variations was an open cockpit, reminiscent of World War I fighter aircraft.

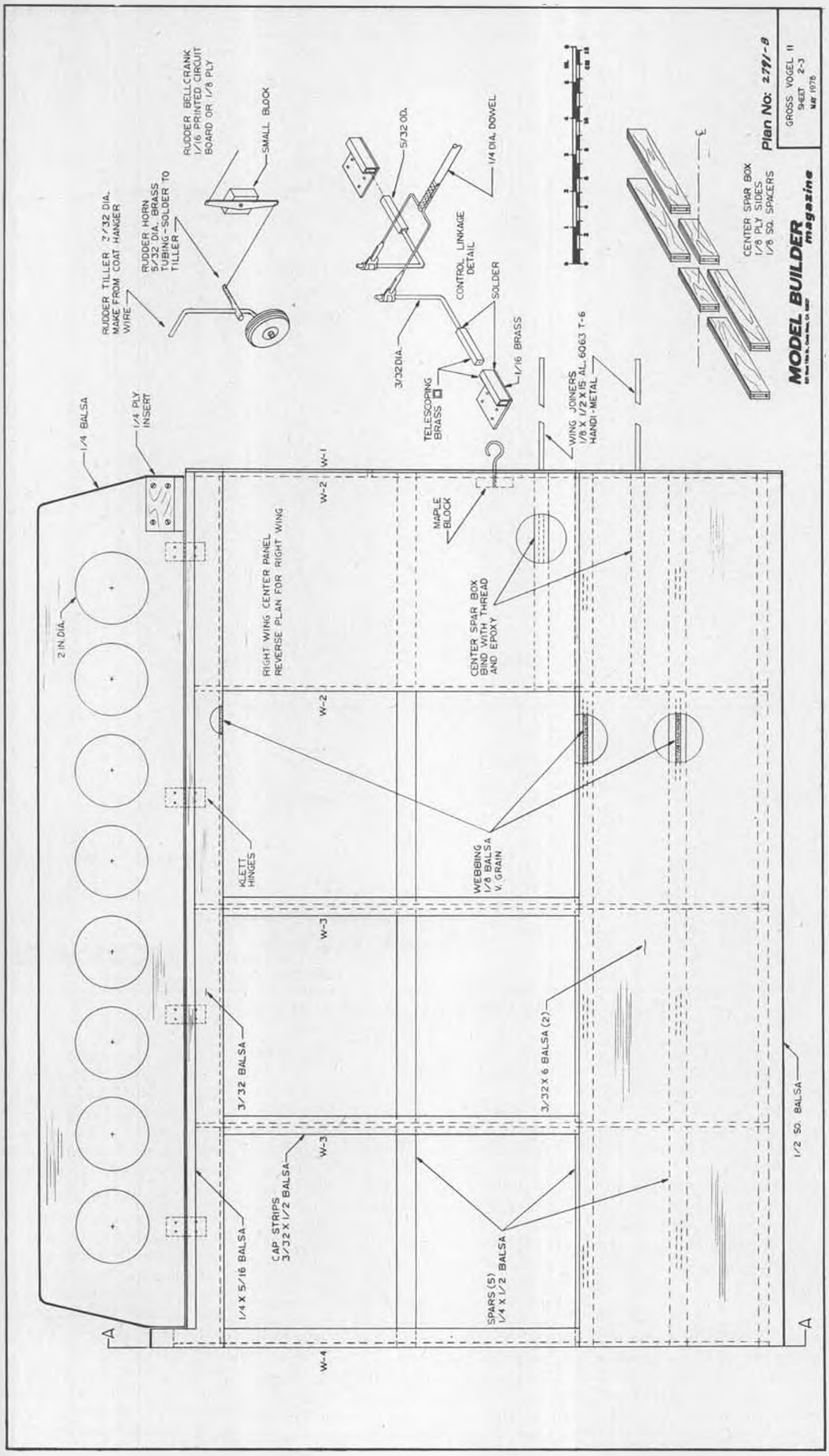
Mount the fin in a slot on the fuselage top, or butt glue using 1/8-inch diameter dowels to reinforce the glue joint. Drill the 3/32-inch diameter hole through the fuselage just aft of the fin for the tail wheel and rudder tiller assembly.

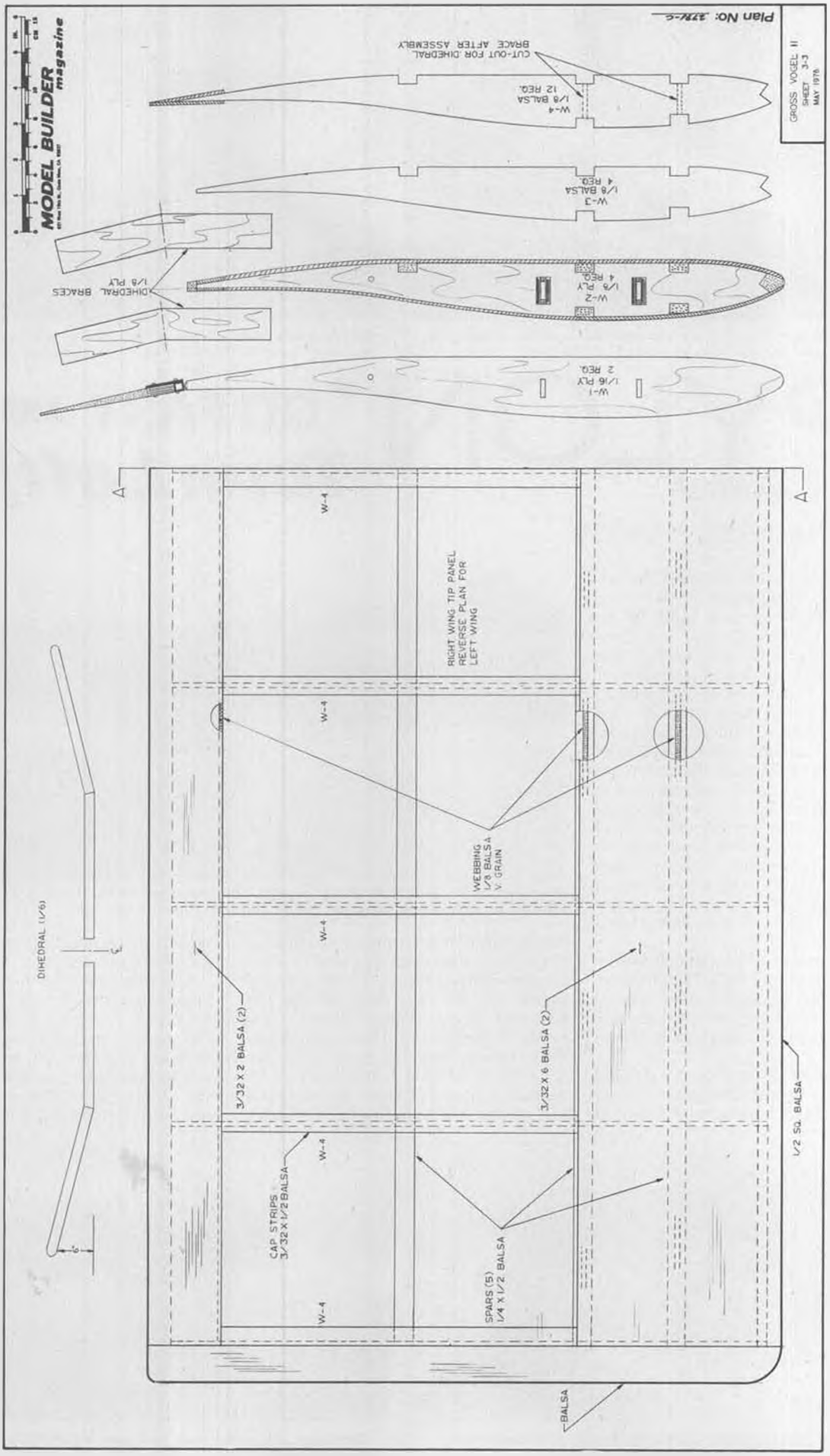
CENTER SPAR BOX

Construct the center spar boxes from 1/8 square spruce and 1/8 birch plywood. Cut the components to length and glue and wrap with silk thread, using a length of aluminum spar as a male jig. I find it faster to build one long box and cut it to length after the glue has cured. Use a slow-drying epoxy, as 5-minute epoxy will not provide sufficient strength. Slide the spar out of the box before the glue sets up!

If suitable aluminum (6063-T6 or

Continued on page 97


MODEL BUILDER magazine
Plan No: 2771-8
GROSS VOGEL II
SHEET 2-3
MAY 1978
RUDDER TILLER 2/32 DIA. MAKE FROM COAT HANGER WIRE
RUDDER HORN 5/32 DIA. BRASS TUBING - SOLDER TO TILLER
RUDDER BELLCRANK 1/16 PRINTED CIRCUIT BOARD OR 1/8 PLY
SMALL BLOCK
5/32 OD.
1/4 DIA. DOWEL
CONTROL LINKAGE DETAIL
SOLDER
1/16 BRASS
3/32 DIA.
TELESCOPING BRASS
WING JOINERS 1/8 X 1/2 X 15 AL. 6063 T-6 HANDI-METAL
CENTER SPAR BOX 1/8 PLY SIDES 1/8 SQ. SPACERS
1/4 BALSA
1/4 PLY INSERT
2 IN. DIA.
W-1
W-2
W-3
W-4
RIGHT WING CENTER PANEL REVERSE PLAN FOR RIGHT WING
MAPLE BLOCK
CENTER SPAR BOX BIND WITH THREAD AND EPOXY
KLETT HINGES
WEBBING 1/8 BALSA V. GRAIN
3/32 BALSA
3/32 X 6 BALSA (2)
1/2 SQ. BALSA
1/4 X 5/16 BALSA
CAP STRIPS 3/32 X 1/2 BALSA
SPARS (5) 1/4 X 1/2 BALSA
A
A



FULL SIZE PLANS AVAILABLE — SEE PAGE 128

At '78 NMPRA Q-M Nats, 1st place winner Gail Jacobson (right) and caller Dave Latsha show off the goodies and Gail's Prather Toni.

Gail Jacobson reveals the secret to winning: when things start to get out of hand in the middle of a heat, just close your eyes!

PYLON "GO FAST AND *Turn Left!*"

By JIM GAGER

PHOTOS BY AUTHOR UNLESS NOTED

• "Disqualification: Exclusion. Contestants may be disqualified or excluded from any or all events if guilty of an infraction of contest rules, unsportsmanlike or discourteous conduct, infraction of good safety practice or procedure, or conduct detrimental to the well being of model aviation. If, after entry in an event, a contestant is found ineligible to compete in that event, all of the contestant's flights in that event are to be cancelled and any awards won in that event returned. If judged guilty of willful misconduct, the contestant shall lose all claim to awards, and shall be liable to expulsion from the contest site. *Repeated or particularly vicious acts of willful misconduct may result in suspension or revocation of the model flyer's sporting license. . .*"

Taken from the AMA Official Model Aircraft Regulations 1978/79 rulebook, page 4, section 17. Rather than take up more space with the rest of the rule, look it up. The most important part has been shown here.

Our October issue column dealing with contestant misbehavior and treatment of officials conducting a contest has brought the strongest reaction of any subject this writer has ever touched on. Newsletters have picked up on the theme; phone calls from people who have experienced similar situations, and personal contacts while at contests lead me to believe that most pylon racers feel it's time to bring a halt to such detrimental temper tantrums and outpourings of obscene verbal abuse, the likes of which prompted the writing of that October column.

Good start in 3rd heat elimination round in Doolittle races. All for nothing, though. Bob Reuther crashed and Ron Bressler and Al Grove both got double cuts.

Quoting QM-NMPRA President Gail Jacobson in the October NMPRA newsletter: ". . . .I think it is time that the CD's warn the contestants at the pilots' meeting and eject . . . anyone with any unsportsmanlike conduct; any trace is sufficient! About the time a couple of the super-hots get kicked out, the

Before starting the first round, starter Ed Tasman made sure every flier and caller understood the rules and procedures.

Good start. All callers must have been watching the starter . . . for a change!

Last picture ever taken of Bob Reuther's Cosmic Wind. See text for sad story.

Gail Jacobson (foreground) and Doug Brueshaber ready for fly-off to determine the NMPRA Q-M champ. Gail flew a Cox-powered Toni, Doug flew a Shark, also powered by Cox.

And they're off! Start of fly-off race between Jacobson and Brueshaber. Jacobson's plane on right.

situation will correct itself."

I'm personally in full agreement with Gail and all the others who feel the same way. I, as a CD, fully intend to enforce sportsmanlike conduct at any contest I direct, and further, to back up fully any other CD at any contest I attend. The AMA (ourselves) has given us the tool to bring about the dignity which racing deserves, and now we must strengthen our backbones to enforce said rules. If you're not a CD, the problem still concerns you as a contestant, contest worker, or club member, as the first time someone enforces this rule, the CD is going to need all the moral and possibly physical support he can muster. Let's all try to make the '79 racing season free of such incidents.

TIP OF THE MONTH

We were introduced to this little trick while at the '78 Rough River Races and can attest to its usefulness. We didn't think to put it in this column until we recently saw it printed in the Ohio Pylon Racing Assoc. newsletter, edited by Art Arro.

"Cyanoacrylate glues (Hot Stuff, Zap, etc.) used as a finish sealer on props. After your F-I and Q-M props are finish sanded and balanced, just apply a coat of cyanoacrylate, smoothing it out with a sacrificial finger. I generally use an adhesive near the end of its shelf-life and don't trust it for building anymore. After the cyanoacrylate cooks off, sand the props with 400 to 600 grit (sandpaper), followed by 0000 steel wool for a super finish. You can also wax the props, and rubbing them with a kitchen variety waxpaper works fine!"

Gail Jacobson (right) leads Doug Brueshaber around course for 1st place.

1978 NMPRA Q-M NATIONALS, ROUGH RIVER, KENTUCKY, Sept. 9 & 10

Outdrawing the AMA Nats held in Louisiana this year by better than a 2-1 margin, forty-nine contestants came from 12 states, some as far away as New York and Oklahoma, to see who was the best. They came not only to race, but to enjoy the easygoing hospitality that has become legendary in just a few years, and to enjoy the superb vacationing facilities this park offers. If one arrives early enough, or stays over after the racing, he can enjoy some fine fishing, boating, swimming, or water skiing on the 4,860-acre Rough River Lake. Horseback riding, golf, and hiking trails are other diversions to help one get "up" for the coming races or unwind from the chores of winning. Food, service, and the traditional warmth of the South all serve to make this one of the finest contests you could possibly attend.

The association of clubs that sponsors Rough River have invested heavily in equipment from what little profits a race makes to allow this annual contest to become one of the better-run ones. The 1978 race was better than ever, with few hassles and a smoothly-run two days. If I sound redundant, it's because it's so nice to be impressed.

This championship race is actually two

Identification of planes for Doolittle final heat. Left to right: Doug Brueshaber (Shark), LeRoy Webb (Toni), and Bobby Blouch (P-51). Blouch was the eventual winner.

Bobby Blouch (background) leads Doug Brueshaber around course. Webb dropped out.

From l to r, Lynn Stevens, 1977 Doolittle winner, helps Shorty Holsclaw present new trophy to 1978 winner Bobby Blouch.

NMPRA Q-M champs, l to r: Gail Jacobson, 1st; Doug Brueshaber, 2nd; Bob Reuther, 3rd; LeRoy Webb, 4th.

Beautiful new Doolittle perpetual trophy. Well worth the effort to win.

races in one. The regular rounds of racing determine who wins by totaling points, just as in most every other pylon race, the winners taking home beautiful silverware trophies and cash for 1st through 5th places. Meanwhile, the twelve fastest fliers qualify for the Jimmy Doolittle fly-off, the winning of which will get your name on a very beautiful perpetual trophy and a $100.00 cash prize. The excitement and tension created by turning a low time and making the magic twelve, and then watching every heat and waiting to see if your time got bumped by one slightly lower, is almost unbearable.

Early morning fog prevented racing from starting until 10 a.m. on Saturday, but then things flowed well and three-and-one-half rounds were flown. The high humidity and temperature caused all fliers problems in searching for that elusive needle setting, most fliers claiming to be down 1000-1500 rpm from normal expectations. After the racing was over on Sunday, Bobby Blouch, who turned the fastest time of the two days, was overheard to say he had to go all the way up to a .024-inch head clearance to get his Cox to turn up properly. At the end of racing on Saturday, it was too early to pick an eventual winner, as there was a five-way tie in perfect points for first and a four-way tie with fliers only one point down. Qualifying times for the Doolittle race cut-off were up around 1:38.

Sunday was a carbon copy weather-wise, but the contestants had done their homework and times dropped slightly. Gradually, through Sunday, the competitive racing took its toll of the contestants tied for first, with it finally boiling down to a tie in points between Gail Jacobson, from Georgia, and Doug Brueshaber, of Minnesota.

The final fly-off heat to determine the NMPRA Q-M Champ was somewhat anti-climactic, with Jacobson pulling away to a comfortable lead and holding it for the ten laps, to be crowned champion.

Meanwhile, cut-off times for the Doolittle Trophy dash had dropped to 1:35 with five fliers tied with that time,

Some of the sponsors who helped make the Rough River meet as good as it was.

making a total of thirteen qualifiers. In order to run even-matrix three-plane heats, it was necessary to have a fly-off to eliminate one qualifier.

First elimination race was yours truly, Wayne Yeager, and Al Schwartz. Schwartz came in last with a time of 1:47, Gager and Yeager both being in the mid 1:30's. Then LeRoy Webb and Ron Bressler flew their elimination heat and only needed to beat Schwartz's time to qualify, which they both did.

In the first true elimination heat between Phil Spies, Bobby Blouch and LeRoy Webb, Spies cut out in the early

Continued on page 104

First five place trophies for Q-M championships, plus old perpetual Doolittle loving cup (now retired) in center.

Saturday night banquet at the Park Dept. facility. Great food and short speeches . . . what more could you ask for?

R/C FORUM with

Hal deBolt

P.O. Box 147
Buffalo, N.Y. 14225

Mail in your questions or concerns.

• This month we have some letters which seem interesting to all R/C'ers, with the main subject being batteries. It is realized that the experienced R/C people understand batteries well enough to get along fine, but you would be surprised how little is known by the newcomers, and the problems they get into as a result. Also, from some of the advice handed out by the more experienced, it appears that they may have been misled by some of the more technical info that has been published. Perhaps we can be of some help by offering some very basic information without getting technical about it.

TYPES OF BATTERIES
USED BY MODELERS

Dry batteries are lead-zinc cells, normally associated with flashlights, etc. They are a non-rechargeable type. When they are freshly manufactured, they have their maximum capacity, and this capacity is constantly *diminishing* as they age. The decrease from storage is relatively small for a number of months, then it becomes serious. In usage, every time the battery is tapped, some of the capacity is used and cannot be replaced. When proper engineering is used and a dry battery is called for, the size recommended will be much greater in capacity than would normally be needed. In this way, the diminishing capacity can be allowed for.

The most common use of dry batteries at this time in modeling is with some of the least expensive R/C systems; calling for dry batteries is one way to keep the initial cost down for the equipment. In many cases, equipment delivered for use with dry batteries can be converted to Ni-Cd operation (rechargeable). However, *such a conversion should only be attempted if the manufacturer recommends it;* reason being that while dry batteries create 1-1/2 volts per cell, Ni-Cds have only 1.2 volts per cell. With most of the power supplies containing a number of cells, you can see how this shortage of voltage can accumulate. Usually you add the voltage *per cell* to get the power supply output. Losing over 1/4 volt per cell can make a big difference when a number of cells are involved. So, do be sure that the lower voltage supplied by a Ni-Cd power supply will not affect the performance of the equipment involved.

Lead-Acid cells are another type of battery often used by modelers. Most often, these are used in conjunction with the engine and starting. Most common today is the motorcycle type, a 12-volt battery used to power starters, etc. The lead-acid cell is rechargeable. This type creates 2 volts per cell, thus a 12-volt battery has 6 cells. Sometimes a single lead-acid cell is used for heating the glow plug, however, in this case some means of reducing the voltage has to be incorporated. Most glow plugs are only rated at 1-1/2 volts. So-called "Power Panels" are offered by the industry which use a 12-volt battery as a power source and serve to provide the various voltages (and checks and tests) needed to operate our models.

The major shortcoming of a lead-acid cell is the acid used in its operation. This acid secretes fumes which must be vented form the batteries, and these fumes are corrosive . . . just the thing not needed around model equipment. The other objection is weight; construction being lead and liquid, they are heavy.

Gel-Cells are a recent improvement of the lead-acid battery. The Gel-Cell is said to provide some improved performance, while eliminating the fume problem. The difference between the two, as far as modelers are concerned, is that the Gel-Cell uses a gelatin-like acid which is not liquid, and thus the battery can be sealed and the fume danger removed.

It should be noted that *all* lead-acid type batteries have a discharge characteristic similar to dry batteries. That is, they have their maximum capacity when freshly charged, and this capacity diminishes whether the battery is stored or used. The rate, however, is much less than with the dry type.

Nickel-cadmium batteries can be said to be a development of the space age, where the need for a lightweight and powerful energy supply was most important. That they have fulfilled the need is easily observed; just recall the trips to the moon and the many satellites that are traveling around the earth. Outside of tapping a utility company outlet, the Ni-Cd is probably our most usable and reliable power source. The design criteria used in its development created a supply which fills most any need very well. The Ni-Cd comes in two forms: a so-called dry and sealed type, which is most common, and the "wet cell", which provides a bit better performance while adding the problem of using a liquid. Model equipment generally uses the sealed cell type, as its performance is more than adequate.

Physically, the advantage of a Ni-Cd is its compact size and light weight . . . much more so than any other style battery in general use. Thus, it is great for model use. Electronically, it has even greater advantages. While the voltage created is only 1.2 volts, this battery will hold this voltage over practically the entire range of its capacity; the other types will not. This voltage stability adds greatly to the reliability of any equipment powered by Ni-Cds. The only detriment would be that it is a mechanical device which contains some connections, etc., which are difficult to manufacture and maintain in usage. On a rare occasion, a Ni-Cd can fail for no apparent reason. While we might not like the result of such a failure, we should not get too excited about it, considering all the advantages that the battery gives us.

Ni-Cd batteries vary a bit in construction, due to the widespread use of them for purposes where performance is not critical. This change in construction and/or manufacture is reflected in cost. The most reliable types do cost a bit more. With our models, the characteristics most needed are reliability and vibration immunity. Most of our R/C manufacturers provide the more costly Ni-Cd, which fills these needs in the best possible manner. In other words, R/C Ni-Cds are *different* from the types generally offered by the discount houses.

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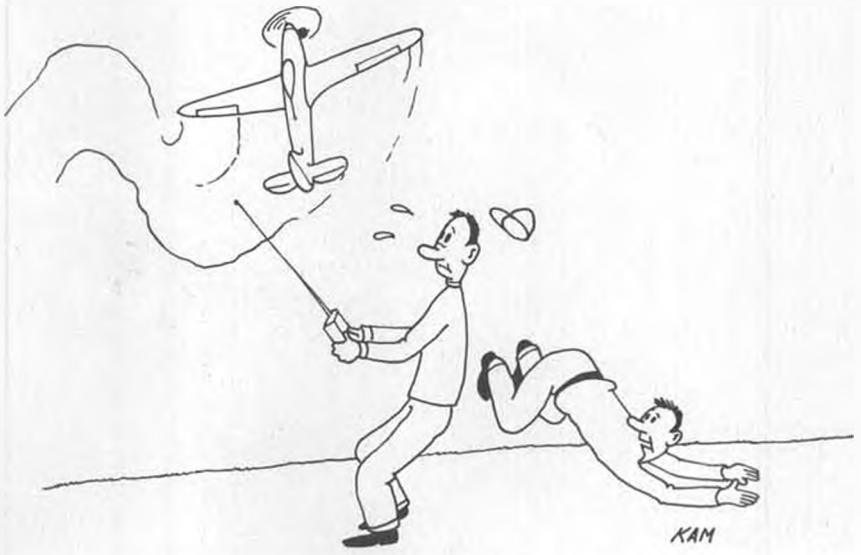


"Who's having the memory problems, Joe, the batteries or you!"

The first step (after reading the instructions through) in reversing servo rotation is to disassemble the case. Shown above are three miscellaneous servos showing the screws to remove. From left to right, MRC, Ace Bantam, and Kraft KPS-14.

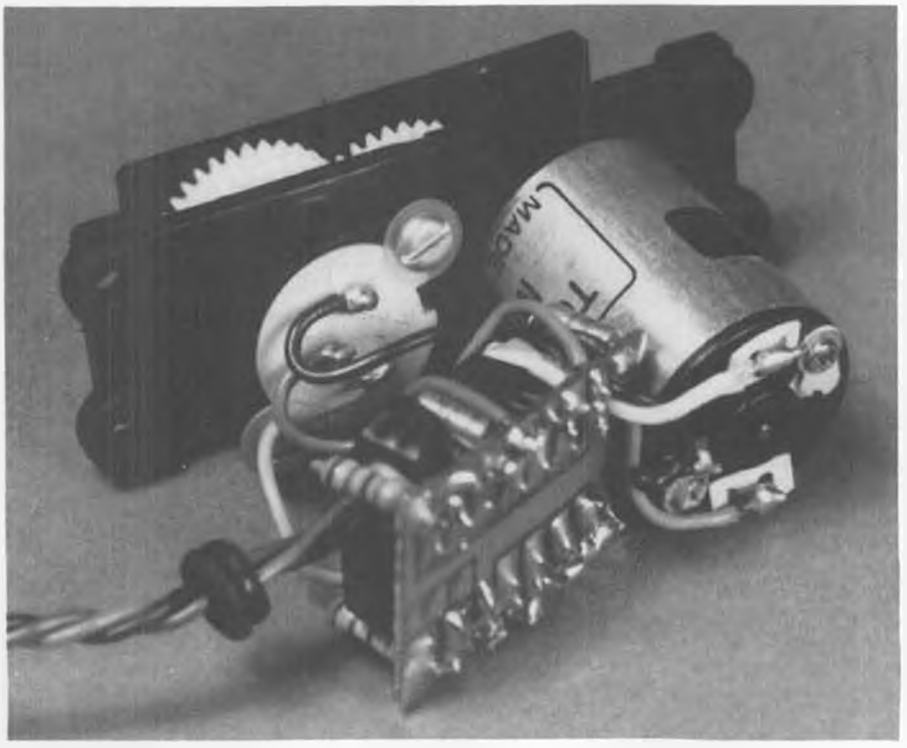
Changing Servo Rotation

By ELOY MAREZ . . . Have you ever wished, while installing a radio, that one or more of your servos worked in the opposite diection? If so, this article is for you. It's easier than you might think.

• Backwards is best! No, this is not a sequel to Stu Richmond's October 1976 article in *Radio Control Modeler* about the advantages of Mode One flying. I happen to agree with him, but that has nothing to do with this writing. I am referring to the fact that now and then, the installation of an R/C system and its related linkages would be so much easier, and better, if servo rotation was backwards, or opposite to what it is. Described here are simple instructions on how to reverse servo rotation.

This is not going to endear me to the service managers of the radio companies, who prefer that the untrained stay out of the systems which the company is responsible to maintain. And rightly so; I too have seen some of the horrible examples of what people can do to their R/C systems with crowbars and blowtorches. Worse, sometimes it was done by a well-meaning friend whose total electronic experience consists of checking TV tubes down at the corner drugstore.

To compound the problem, quite often these butcher jobs will come with a letter saying, "It was this way when I bought it," and insisting that it be fixed under a warranty that expired last year. You aren't fooling anyone. Remember that most R/C systems are assembled by people who have made that type of work their career. A solder connection made by a person who has done the same thing thousands of times is as different from inexperienced work as an airplane built by a modeler of ten years' experience is different from a first attempt. The trained eye can tell immediately if amateurish work has been attempted.



Ace Bantam servo, less case, showing standard set-up. Gear train at the top, amplifier and motor at the bottom, and feedback pot between gear train and amplifier.

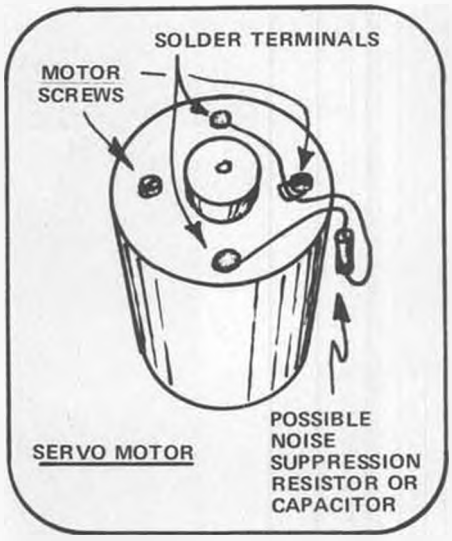
Thus, if you work on your radio, be prepared to assume the responsibility if something goes wrong because of your work. If the system is still under warranty, remember that most manufacturer's warranties are voided if anyone other than themselves or their service centers work on their systems.

So much for the not-quite-honest, and the not-too-skillful. On the other hand, it must be recognized that there are thousands of modelers in the world who are quite skilled, can and will follow instructions, and who can solder as well as any of the assembly pros. This is intended for you . . . for those times when, for one reason or another, you wish to reverse the direction in which one or more of your servos will operate.

It is extremely simple, and one time around will make you an expert. Wish we could say the same for pylon racing!

You will have to disassemble the case enough to reveal the motor and feedback pot assembly, change four solder connections, and re-center. That is all there is to it!

The disassembly procedure will depend on the exact type of servo. Some, like the D&R Bantam, are held together



with four small screws through the side and come apart in two vertical halves. Others have screws on the top or bottom, and can be partially taken apart to expose the electronics in the bottom while keeping the top gear section intact. In any event, keep the gear train together; it is not necessary to break it down for this rotation change. With most servos, the gear train is somewhat separate from the case exterior and is designed to remain as a unit without the exterior of the servo being fully assembled.

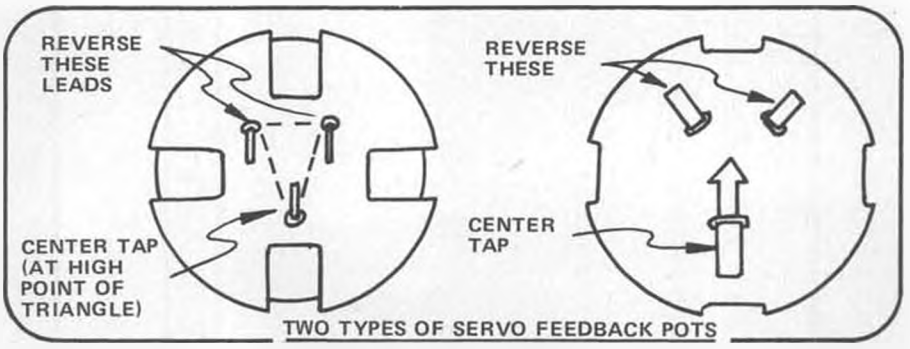
Once you have the electronics exposed, you will note three separate parts. There is the motor, easily identifiable; the amplifier, which is the printed circuit board with all the components mounted on it; and the feedback pot, which is the round element usually submounted in a molded cavity in the plastic gear train base. The wiper, which changes the effective resistance of the pot, is mounted on the output gear shaft and turns with the output gear. It is not visible until the pot element is removed.

Note that the motor will have two, and sometimes three wires connected to it. If present, the third wire will go to the motor case, and will remain where it is. There may also be a resistor or capacitor soldered across the motor terminals. It is there to suppress electrical motor noise, and will also remain as is. The two other wires, also going to the motor input, are the drive voltage connections, and they will be removed and reversed from one connection to the other.

Now, look at the feedback pot. It will also have three connections. One is the center tap, and is identified by an arrow, or is placed at the high point of a triangle. This connection remains in place. The other two wires going to the outside terminals will be reversed.

Before you start unsoldering, there are a couple of things we need to do. One is to put away that radiator-fixing soldering iron and obtain a small one of not more than 30 watts, with a small tip.

If you don't have this type of iron and are looking for one to purchase, I would recommend a look in the Ace R/C catalog. It lists an Ungar handle (32K776), a heating element (32K535), tip adapter (32K100), and a .054 Micro Spade tip (32KPL340) that is ideal for this type of work. The total cost is only $10.90, and you can order other tips or heating elements for heavier work.



TWO TYPES OF SERVO FEEDBACK POTS

I would also recommend you get a roll of Ungar Super Wick, (32K5004), at $2.40. This is a resin-impregnated metal desoldering braid which is held against the soldered joint as the iron is applied. When the solder melts, it will be wicked off into the braid, leaving the parts clean, tinned, and ready for a new solder joint.

The other thing to check now is the method we will use to re-center the servo once the direction of travel has been reversed, as it will be off a considerable amount. Looking at the pot element, you will see that is has some indentations in two or four places along its perimeter. It is held in place with two screws along the outside edge, which can be loosened half a turn or so, allowing the element to rotate in its holder. By inserting the tip ends of a pair of small needlenose pliers into the indentations along the edge of the pot, it can be easily rotated.

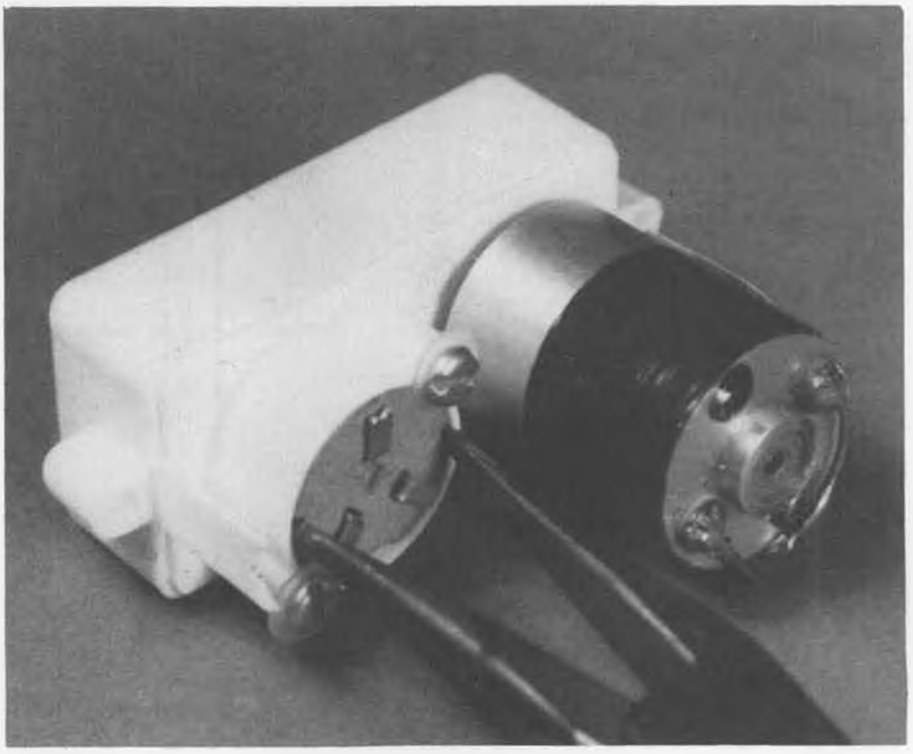
With the system power turned on, both receiver and transmitter, note the direction of servo travel versus stick travel. For example, does left stick make the servo rotate clockwise, or counter clockwise?

Now, with the pot screws loosened as described, and with the system still live, rotate the pot element with the needlenose pliers. Note the direction of output arm rotation versus pot rotation; i.e., does the output arm travel with the pot, or opposite to the pot? Remember this, as it determines which way you will turn the pot to obtain servo re-centering after the reversal of rotation. After the changes to be described are made, this movement will work in reverse.

At all times, when the system is live, and you are working with the servo open, be extremely careful that you do not allow the amplifier to come in contact with either the motor or the needlenose pliers. To do so may cause a short circuit which may damage the amp beyond repair.

During this operation, servo action can best be observed if the longest arm furnished is installed parallel with the servo sides. A wheel or triangular device

Continued on page 110



After the four wires have been reversed, the servo will have to be re-centered. Needlenose pliers are used to rotate the feedback pot until the servo output arm is centered.

First official flight of the first day, and some said, "He has it sewed up already!" And they were right. The winner, Austria's Hanno Prettner.

At practically the same spot as photo at left. Bill Bennett, winner Hanno, Sue Kepler, "Miss T.O.C. 1978," and Walt Schroder.

Las Vegas T.O.C.

by BILL NORTHROP

• Way back in the December 1967 issue of M.A.N., the radio control news editor (guess who . . . the initials were W.C.N.), who continuously, to the point of boredom, pushed the use of look-like-real model aircraft in competition of all types, was quoted as saying . . . "Strangely enough, it has taken a completely new event, NMPRA/AMA Goodyear (*Formula I*) racing, to successfully boost an aspect of competitive R/C flying that we've been trying, without results, to push (*like we said*) for years. We're referring to the use of scale in competition, not for the primary consideration as in the Scale event, but as a bonus stimulation in stunt pattern that has enough teeth in it to make the effort worthwhile. . .

"Speaking of the Scale event itself, the complicated regulations on proof of scale, the myriad variations of bonus points for operating knick-knacks, the many special specifications for ground handling of differnet types . . . discour-

The top five (l to r): Wolfgang Matt, Liechtenstein, 5th; Dean Koger, USA, 4th; Ivan Kristensen, Canada, 3rd; Dave Brown, USA, 2nd; and Hanno Prettner, Austria, 1st.

Dave Brown, own Zlin 50-L, O.S. .90 FSR, Top Flite 14x6, Monokote, W.E. Expert.

Ivan Kristensen, own CAP 10b, Webra .91, Perry Pump, MD 14x6, Solarfilm, Pro Line.

Dean Koger checks aileron in Laser 200, Webra .91, Master Climb drive, Kolbo 16x13.

Gunter Hoppe, Germany, holds for Matt. Zlin Z 50-L, Webra .91, Perry Pump, Webra 14x6.

Jeff Tracy, Australia, own CAP 20 L, Quadra, Zinger 18x8, K&B, acrylic, Kraft Signature.

Phil Kraft, Marty Barry holds. Super Fli, Webra .91, Perry pump, TopFlite 14x6/5.

Giichi Naruke, Japan, own Chipmunk, YS 1.2, MS 14x6-1/2, dope finish, Futaba FP-8-TN.

Mark Radcliff, George Radcliff's Super Fli, Webra .91, Top Flite 14x6, K&B Super Poxy.

Rich Brand, Rhodesia, own Zlin Z-526, Webra .91, Top Flite 12x8, Rhom Air, Kraft.

ages more participation in what could and should be the most spectacular event. . .

"The problem is that right now, there is no category for a non-superdetailed but otherwise scale aircraft, the type more modelers would be willing to build and fly. (*Obviously, this was before the coming of Sport Scale.*) Since the scale aspect has done so much to make the Goodyear event more attractive, why wouldn't it also make pattern flying more challenging to the modeler, more interesting and understandable to the non-modeling spectator, and also do more to eliminate the objectionable public image that we're playing with 'toys'."

Well, at long last, eleven years later, our wish has come true. Granted Sport Scale did come along, but it is still bogged down with picky-picky scale requirements. The nearest thing to our ideal has been the Sport Biplane event, but it has never come near to replacing our regular pattern event as the leading competition category. But now, the Fifth Annual Las Vegas Tournament of Champions has proven the scale-in-pattern concept, and may have convinced the entire modeling public that using scale aircraft in other than Scale competition is the greatest challenge in the aircraft modeling sport.

It is very possible that most of the credit for bringing this dream to a reality belongs to one person. Do you know who founded and developed the original multiple-plane Goodyear/Formula I pylon racing concept? Jerry Nelson. Do you know who was the founding father of the scale biplane aerobatic concept, now the basis for the IMAC (International Model Aerobatic Club)? Jerry Nelson. And do you know who has been heavily involved in the Las Vegas Tournament of Champions series as Contest Director? Jerry Nelson.

Obviously, it takes more than ideas and dreams to turn a new concept into a reality. To put it bluntly, you need organization, publicity, and money! These ingredients have been provided by Walt Schroder, President of Model Airplane News, and Bill Bennett, President of the Circus Circus Hotel/Casino.

One other ingredient is needed to make a new-concept sporting event an instant success . . . top competitiors. As in all four of the previous Tournament of Champions contests, the list of competitors for this year's event represented many of the worlds best, including current and recent world and national champions.

The following commentary on this

Ron Chidgey, Ed Keck Spinks Akro, Webra .91, Perry pump, MD 14x6, Futaba/Pro Line.

Fred Kugel, Ed Keck Spinks Akro, Webra .91, Top Flite 14x6, Futaba/Pro Line Tx.

Denny Donohue, own Stephens Acro, Webra .91, Top Flite 14x6, Best in Scale, Kraft.

Don Weitz, Keck Spinks Akro, Webra .91, Perry Pump, Top Flite 12x8, Super Poxy.

Isao Matsui, Japan, Leo O'Reilly, Australia helping. Zlin 50-L, O.S. .90, MS 15-1/2x5-1/2.

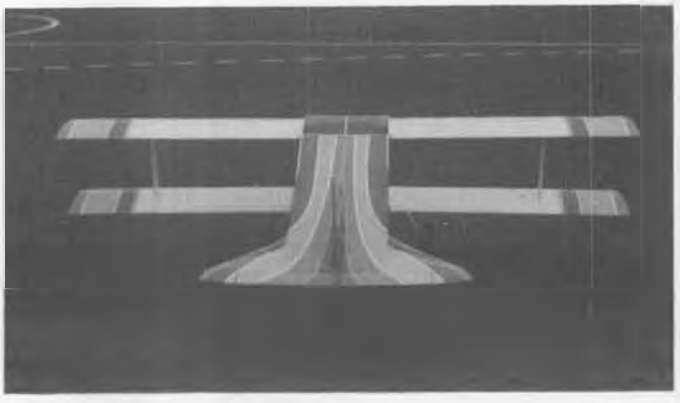
Bruno Giezendanner, Switzerland, Zlin-50-L, Webra .91, Top Flite 14x6, Monokote, Pro Line.

Benito Bertolani, Italy, own Zlin 526-AFS, OPS .90, Mantua 13-1/2x6, Mantua retracts.

Harald Neckar, own Zlin 50-L, Webra .91, Top Flite 14x6, Graupner Vari Prop.

John Lockwood, own Sportmaster 150, Webra .91, Top Flite 14x6, Futaba Competition.

Norm Cassella fires up Webra .91 with O.S. .61 carb in his own kit Steen Skybolt. 15x5 prop, Kraft radio. Donohue holds.



Not the best angle on a Hiperbipe! Ralph Brooke's, with Quadra, Zinger 18x8, Monokote, Kraft. Ralph's design, 17 pounds.

year's contest pretty well sums up the results of the efforts to initiate the new concept. It was written by Bob Upton, our successor as president of the United States Pattern Judges Association, a long-time pattern judge at the Nats and Masters Tournaments, and judge at every Las Vegas Tournament of Champions.

"This year's tournament was successful beyond words. The introduction of the Count Aresti system to model R/C aerobatic competition, in my opinion, was the 'shot in the arm' pattern has needed for years. For too many years now, pattern competition has suffered from lack of interest to all but those competitors in the event. Even those competing showed little interest in the flying up to the round that separated the top few places in the contest.

Two photos of Hanno Prettner's power system. Geared prop (2 to 1) driven counterclockwise by two clockwise-running Webra 61's. Worked faultlessly for all practice and official flights. Further description in text. Interesting arrangement!

Sneaky stall strip blended into tip leading edge of CAP 20 L by Jeff Tracy, Australia. Maintained scale outline of aircraft, and legal.

Hanno's only mechanical failure! Nut holding hatch hold-down bolt came loose. Re-epoxied after one flight with rubber band hood strap!

Impressive P-51 with belt-reduction driven 4-blade prop, .61 power. A prototype for Byron Originals kit. Smooth flier.

Is that "Walt Schroder" in the cockpit of Denny Donohue's Best in Scale Stephens Akro entry?

'Where the h . . . did it go?" TV cameraperson discovers advantage of shooting from shoulder.

Aeromodeller/R.C.M.&E's busy reporter, Ron Moulton, wasn't seated very often.

Dean Copeland taxis Byron Originals kit Pitts after crowd-pleasing demonstration flight.

"Flying a model in an imaginary 'box' and scoring each and every maneuver, including the turn arounds, proved to be a challenge to both the competitors and the judge. If a pilot 'blew' a maneuver, he was very likely to blow the next couple of maneuvers due to fact that one maneuver flows into the next. Consequently, the Aresti type of pattern requires a lot of practice. There is no time to 'fall back and regroup' between maneuvers. The pilot no longer has the luxury of horizon-to-horizon turn arounds before the next maneuver, as is afforded by the present AMA and FAI pattern.

"Judging of the Aresti pattern is different to say the least. The judge no longer has the time to look down from the sky to record a number on a sheet of paper. A recorder is necessary to record scores since an almost instantaneous decision from the judge is a must. We could not use flash card holders this year because of the fast pace of the event. As far as the decision-making process is concerned, it was made easier by going to half-points system, thanks to Art Scholl. As an example, last year's finals of the Tournament of Champions was extremely difficult to judge. In fact, it was the most difficult contest I've ever had to judge because of the superb flying of the top five finalists. We were using a system that ranged from 7 to 10, and this is not enough of a spread to decide a contest. A half-point system would have been welcomed.

"I mentioned Art Scholl, who was one of five aerobatic pilots invited to judge the Tournament of Champions. Art needs no further introduction. Jerry Zimmerman, United Airlines captian and International FAI Aerobatic judge; LaMar Steen, pilot and designer of the Steen Skybolt; Gordon Price, Canadian aerobatic champion and airline pilot for Air Canada; and Jim Roberts, American Airlines pilot, aerobatic pilot and builder of the 'Laser' (an identical aircraft to Leo Loudenslager's 'Laser') made up the full size component of judges. Bill Johnson, Downers Grove, Illinios; Masahiro Kato, Japan; Dennis

Bill Bennett and Eddie Morgan take in some between-round demonstration flying. Dig those crazy slacks!

Behind every hot shot pilot there's a coolie . . . wiping, wiping, wiping. NSRCA's Sally Brown look's after Dave's Zlin.

Phil Kraft receives AMA Hall of Fame award from Walt Schroder.

Leon Shulman receives AMA Hall of Fame award from now president Earl Witt.

Ed Packard, "Mr. Cleveland Models", receives AMA Hall of Fame award from John Worth.

Johnny receives AMA Meritorious Service Award for 8-year pesidency, from John Worth.

Twin tuned pipes in bottom of Prettner's Dalotel DM-165. Tubes lead to prop bearings.

Denny Donohue received George Johnson Memorial Award for best scale entry from Louis DeFrancesco.

Bill Bennett passes on famed Walt Billett trophy to Phil Kraft. It will now be retired.

Hunt, South Africa; Geoff Franklin, England; Warren Hitchcox, Canada; Dave Lane, Hawthorne, California; and I, were the modeller type judges. As previously mentioned, during the judge's practice round prior to the start of the qualifying rounds, it was suggested by Art Scholl that we use half-points. It didn't take Doc Edwards, chief judge, long to get an affirmative decision from Jerry Nelson, Contest Director, to go to the half-point system. This made it easier, believe it or not, for the judges to score each maneuver because you could say to yourself . . . 'it's not quite an 8 . . . 7-1/2 is the score. . .' and so on. With the old scoring system, the flyer probably would have received a 7, for the same maneuver; consequently, the judge would lean toward an 8 for the next consecutive maneuver when it really only deserved a 7 or a 7-1/2.

"The Aresti pattern resulted in generally lower overall scores for the competitors due to the difficulty of some of the maneuvers. To my mind, this is good, because the challenge is there for pilot improvement. The fliers have something to shoot for. The elimination of the take-off and landing maneuvers is a decided inprovement since it tremendously speeds up the pace of the contest.

"As far as judging is concerned between the full size pilots and the modellers, each set of judges learned from the other. The full size pilots were very

The carpeted (!) pit area was a tremendous help in keeping the planes and engines free from dirt. A real luxury!

Wrong way, dummy! Rich Brand holds while Tony Bonetti demonstrates how not to flip 24x8 Zinger prop on Phil Kraft's Super Fli.

Judges and officials (l to r standing): Walt Schroder, Jim Roberts, Geoff Franklin, Dennis Hunt, Bill Johnson, Bob Upton, LaMar Steen, Jim Edwards, Art Scholl, Bill Bennett. (L to r kneeling): Warren Hitchcox, Dave Lane, M. Kato, Gordon Price, Gerry Zimmerman, Jerry Nelson.

"Stay close, don't go away!" Art Scholl gets flying lesson from Dave Brown, as LaMar Steen (left) and Doc Edwards watch.

Jerry Puleo prepares his Quadra powered Waco for a demonstration flight. Permagloss Coverite in cream with red trim.

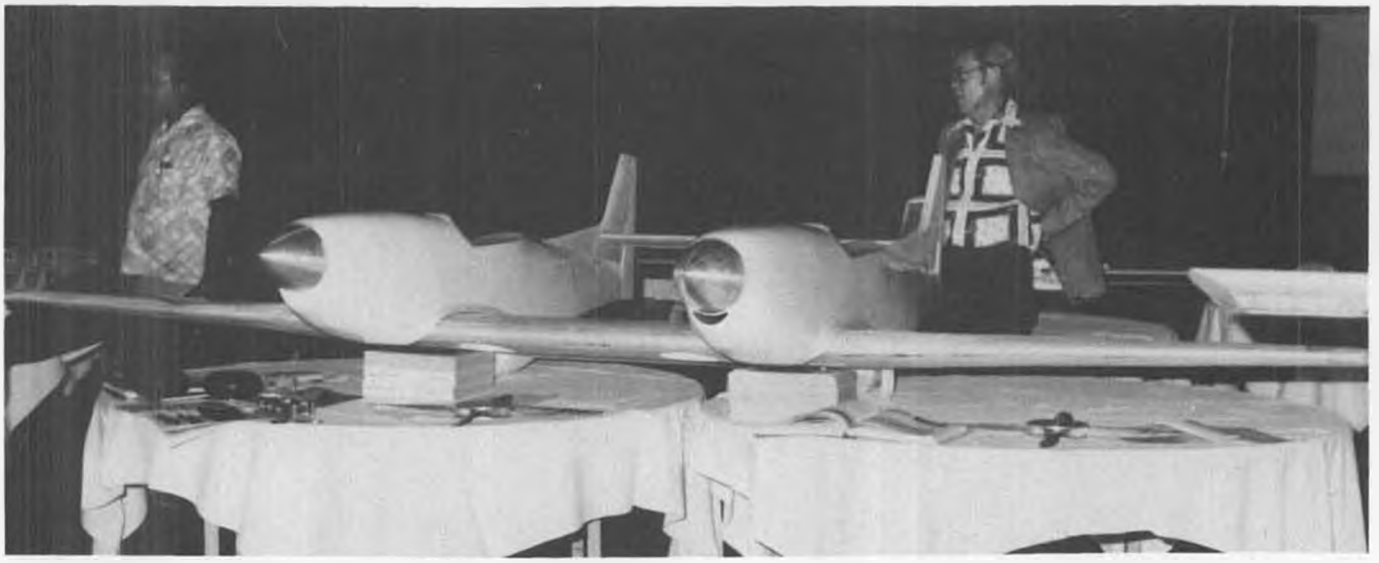
critical of heading changes while the modellers were generally more critical of positioning. The scoring, however, was remarkedly consistent. I think Doc Edwards will confirm this. Incidentally, we agreed on zeros and we modeller types learned that they do the same thing in full size aerobatic contests. It was gratifying to learn from the full size pilots that the judging at the Tournament of Champions was better and more consistent than the judging at the past Aerobatic Nationals held near Sherman, Texas, where Leo Loudenslager earned his fourth national aerobatic championship. Jim Roberts and Gordon Price indicated to me that the judging is exactly the same for full size aircraft as it is for models.

"In my 14 or so years of judging pattern, I have never had more fun nor been more challenged than I have while judging the Aresti system. I strongly urge NSRCA to encourage and promote the Aresti-continuous pattern type of competition. I feel that if pattern flying remains in the same rut it's been in for the past several years, it will lose support from all but a few pattern diehards. The Aresti system, where semi-scale aircraft are used is very interesting to watch. Several thousand spectators can attest to this who were witness to the Vegas meet. I heard *not one* negative comment by either spectators or modellers relative to the pattern flown. Phil Kraft was actually enthused about the Aresti system and for the first time in years, he enjoyed practicing for a contest.

"As a judge, it was challenging and fun to participate, and I only wish that all of you could have an opportunity to judge this type of meet. Hopefully, a precedent has been set this year in Las Vegas that will be followed in short order. I

Continued on page 118

Another look at the winner (l to r): Bill Bennett, Hans and Hanno Prettner, Sue Kepler, Walt Schroder, and Al Unser. The finish of a superbly managed show!



What *not* to build for 1/4-scale. This 12'10", 55-lb. F-82 Twin Mustang, being built by John Simone and Frank Johnson, is a good example of what the 1/4-scale movement could lead to unless some upper limits are placed on engine size, wing loading, and total weight.

MAMMOTH SCALE

By RON SHETTLER

• This month's article was intended to be written on the site of what was, in many peoples' minds, the Mecca for Mammoth Scale, Quarter Scale, etc., namely the 2nd Annual Las Vegas Fun Fly. However, it's being done at home afterwards because there was just too much to do and see and many people to meet who had previously been only a voice on the other end of the line or some wiggles or series of characters on modern version birch bark.

Our hosts, the R/C Quarter Scale Association of America, knocked themselves out to make the event really something. I'm sure that if they had applied equal effort to the daily chore of making a living, they would either all be millionaires or dead from exhaustion. Larry Vance told me as he was leaving the site late on Saturday evening that the only thing that had gone according to plan was the garbage collection detail, and from the job that crew did, the plan must have been beautiful.

If anything took away from the enjoyment they intended for us, it was that the hosts weren't able to join us as fully as they should have in the activities. Some were not even able to make a single flight because their aircraft lay uncompleted in order that they could dedicate more time to the meet. I strongly feel that in any fun fly, *everyone* should be able to participate, and that in the future, host areas should only be responsible for providing the site and facilities that can't easily be brought in. Events, entertainment, frequency control, and the other thousands of little items (little until you forget them) could be shared by the incoming groups, provided there is enough back-up to take care of any no-shows.

Barb and I arrived early and were most pleased to be able to help in a small way. I learned long ago that people are more often disappointed in not being offered a job, and the trick is in utilizing the manpower . . . whoops, personpower . . . without spending more time explaining how to do it than the time it takes to do it yourself. In other words, don't be frightened to holler "help". Look at it this way . . . for every helper you recruit, you'll usually have one less person criticizing the area that person works in.

Stinson Voyager by Chris Evans, of Loomis, Ca., was flown at Las Vegas 1/4-scale Fun Fly. Built from Sid Morgan plans, 9' span, 20 lbs., Quadra engine. Low stall speed with flaps down.

At one point in time, there were apparently 115 pre-registrations with indications of many more to come, a registration supposedly indicating an aircraft. After the event, I received copies of the actual registration forms, numbered 1 to 72, but 9 were missing. I know EWH's 3 aircraft were there, but they didn't appear on the sheets. There were a lot of cancellations, and I'm sure it was mainly because of transportation. Many people intended to fly to Las Vegas and may have completed their aircraft in time, but didn't allow enough time to build a suitable box to get the aircraft there in one piece. It's one thing to get a big model to the flying field up to 50 miles away, but entirely another to get one 3 and 4,000 miles distant. Many people drove, and spent more time on the road than they spent at the meet (we were away for 12 days). When you consider the effort involved to get to the meet, it's downright fantastic that so many aircraft and fliers did make it. I spoke of the work done by the Vegas people, but without the modelers who came from far and wide with their aircraft, it would have been a wasted effort.

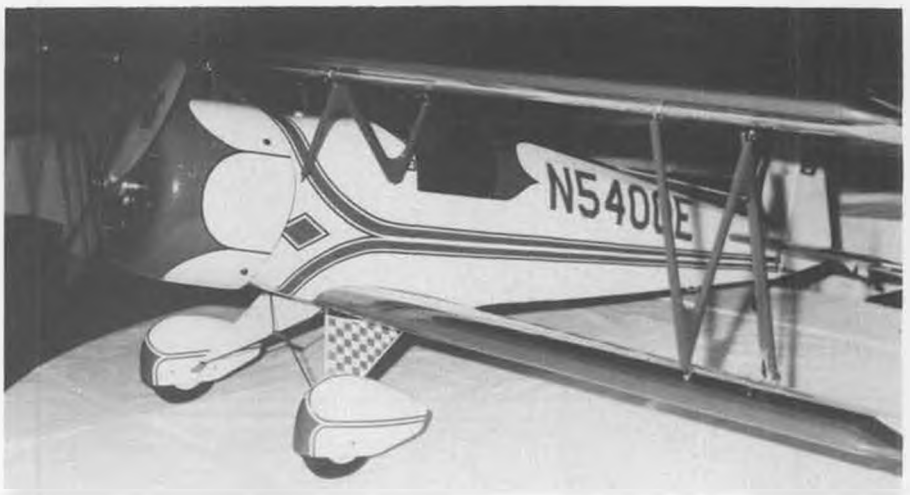
One of the best parts of the meet was the display held at the Stardust Convention Center (to whom we owe a great vote of appreciation for their donation of this valuable facility). It enabled those present to look over someone else's solution to a problem or challenge. When you looked over this huge ex-

panse of floor area filled with white cloth-covered banquet tables, each adorned with a beautiful aircraft, it had to be one of the biggest feasts for the eyes of any modeler anywhere. Those who exhibited their models seldom stuck by it, but were off looking at and enjoying someone else's workmanship, unless they were brought back to their own model by someone wanting more information or a demonstration of his solution to a problem. I'm sure this display was a great lift to all who worked hard to make it a success, organizer and modeler alike.

In a recent publication, someone stated that rather than form their own organization, the QSAA should put their shoulder to the wheel and help the AMA, for example. Heavens, I've been modeling for nearly 40 years in more than one country and I recognized so many people at that meet who have had their shoulder to the wheel for so long that their shoulders have taken on a permanent set! When one has his shoulder to the wheel, it's often difficult to become the wheel itself or have attention directed on anything else. Perhaps it's time to realize that not all modelers are serious contest competitors. There are those who prefer instead to provide their own challenges *within their ability*. Large models have provided this broad challenge. I hope it never gets mastered to the point where it becomes just another commercial enterprise.

There were also criticisms overheard, and we can all learn from these. It should have been entirely a big airplane show, as most people did not come there to be entertained but to learn from others' experience which was so freely offered. (There were no competition secrets here.) Anything which robbed them of this opportunity, especially those who could spend only a few hours there, detracted from the theme of the meet. Much effort went into obtaining those beautiful perpetual trophies and also into making the shipping crates, but they are going to create a lot of work perpetually. The QSAA recruited a lot of members on a non-competition platform, and it's too bad they couldn't keep it that way. A lot of members were unaware of any trophy presentation prior to the meet, and next year it won't be the same. The tropies are there, they're beautiful, and people will try to win them. The theme for the QSAA shouldn't have been "Big is Beautiful" but "Keep it Simple".

Here are some statistics of the meet. There were 282 official flights during scheduled times, 2 crashes, and 1 mid-air. One of the crashes was a twin "legal" pattern ship on exhibition. The mid-air was a takeoff/landing situation which clearly indicates again that frequency control isn't the only requirement. Takeoff/landing and circuit direction should also be indicated, even in no-wind conditions. This was soon rectified and also a buddy system put into operation, where a buddy would warn his flier that another model was in the air, on a



Dick Wetzel's Krier Kraft, built from MB plans (No. 10771, $8.50) but using a fiberglass fuselage. Model has over 25 hrs. flying time on various engines, didn't say what he's using now.

landing path, coming in dead-stick, or any situation just outside the pilot's present flight vision envelope as well as keeping the pilot from flying over people, the pit area, or into obstacles, etc., which is very easy to do if you're flying on a strange field. It works well, especially if the experienced flier uses a learning buddy and the learning flier uses an experienced one. The side benefit is usually a faster, less painful learning process for the beginner and a "practice" judge for the expert who is interested in improving his flying and can ill afford a mid-air, etc.

The heaviest plane at the meet weighed 45 pounds. It was James E. Cline's Robin with McCullough engine, scratch built, 12-foot wingspan, photo aircraft. The heaviest aircraft that flew realistic aerobatics was Jim Folline's PT-19 at 31-3/4 pounds, Quadra powered, 9-feet wingspan, winner of the military category and flown so well by Lee Taylor.

Having watched this armada of aircraft perform in well over 100° temperatures and at fairly high altitudes, which certainly affects the performance of engines and airframes alike, and then going through all the registration forms for weights and power plants, etc., I've come up with some useful information for us rule-of-thumb engineers. One is that if you want to be assured of crisp aerobatic performance, strive for 10 pounds (or less) per properly applied hp; i.e. 20 pounds with a Quadra. If you go higher than that, the aircraft design, trim, and piloting ability will have to make up the difference. In aircraft that are not intended to be pattern performers, but are capable of mild aerobatics, use a 15 pound per hp limit. At 20 pounds per hp, you're going to run into problems getting reliable takeoffs, although once in the air it's going to depend largely on the aircraft and the pilot. There are exceptions, such as the Taylor-flown PT-19 previously mentioned, and wing loading certainly has a

Continued on page 103

See sketches next page. ⟶

Closeup of the nose on Bradford Allen's 1/3-scale Aeronca C-3 Master reveals a two-cylinder Quadra! Not really, the one on the model's right is a dummy. Sure looks real, though!

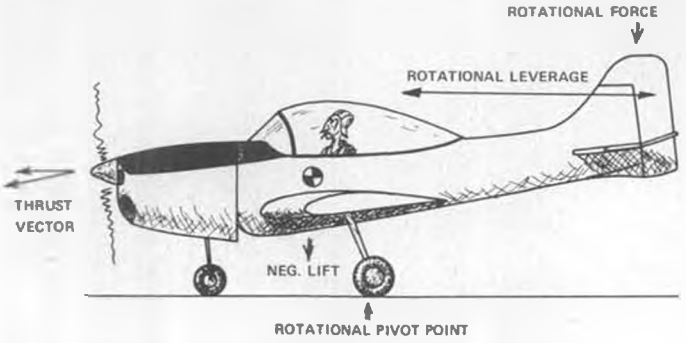
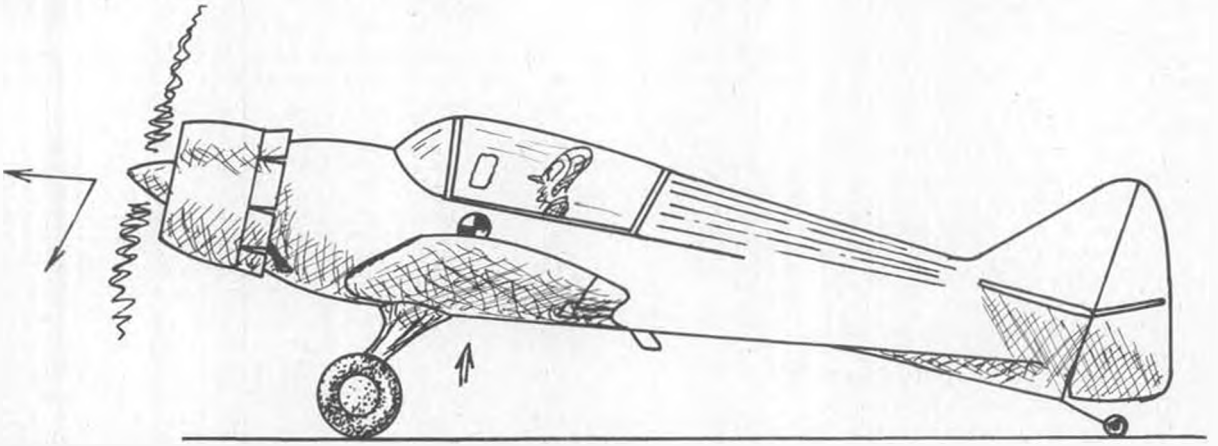


FIG. 1

1) Main gear too far back.
2) Nose down attitude causes wing to provide negative lift, *adding* weight aerodynamically.
3) Thrust line pulls model down, adding further artificial or dynamic weight to gear, directly proportional to drag on wheels due to runway condition, tires, wheel bearings, etc. Rotational effort of elevators causes tremendous aerodynamic drag.

FIG. 2



THRUST ANGLE & UP ELEVATOR & TAILWHEEL DRAG TENDS TO FORCE WHEELS DOWN

HIGH ANGLE OF ATTACK PROVIDES LIFT BUT HIGH DRAG

HIGH DRAG DUE TO HIGH ROLLING RESISTANCE OF A SMALL TAILWHEEL POOR BEARING "CLUTTERER" STEERING MECHANISM

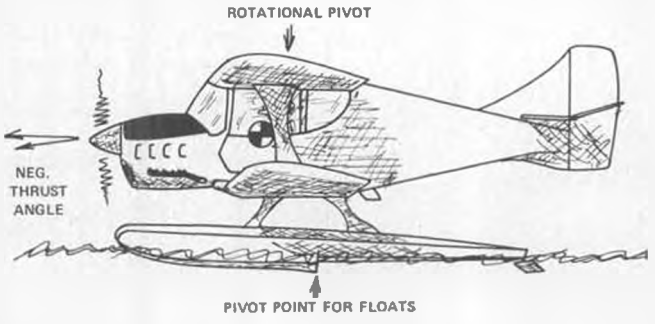
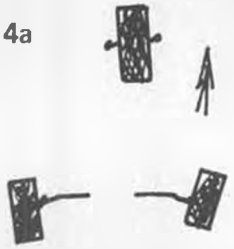


FIG. 3

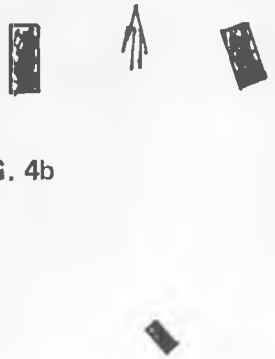
1) Too small or large flotation. Too small: will not come up on step, excessive spray. Too large: unnecessary surface drag.
2) Step too far back. Digs in on rotation, pivots at different points.
3) Negative angle of attack of wings when float is at best planing angle.
4) Step behing CG and CL position, tends to make front of floats dig in. Additional power only makes things worse.
5) Excess elevator required to force rotation. If liftoff is achieved and up elevator is held after floats leave water, aircraft will pitch up abruptly as float drag is suddenly removed. Aircraft is almost certain to stall.
6) Floats not parallel with each other, with the aircraft, or at the same angle of attack. Float alignment is as important as wing alignment.
7) Misaligned water rudders.
8) Float attachment hardware and struts in high speed wash area.

FIG. 4a



Worn wheel bearings or bent axles cause main wheels to toe out when moving, aircraft will dart in either direction as soon as nose wheel lifts off. Solution: bend gear around nose wheel so that center of wheel drag is in line with nose gear strut. Adjust toe-in so that when wheels are gently forced outward, wheels are straight or only slightly toed in. Excessive toe-in causes drag as well.

FIG. 4b



Make sure aircraft tracks and rolls straight, not only in 3-point position but in tail up or nose up position as well.

FIG. 4c

Runs straight, but oh the drag!

Kit contents. Foam building jig on the right is very helpful for maintaining alignment of the hull during construction.

Bill Brazzle is very happy with his Klampon Kai. Compare the modified cowling with boat at the bottom of p. 39.

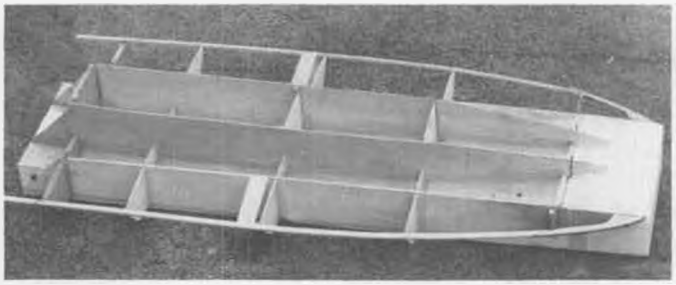
PRODUCT$ IN U$E

PHOTOS BY AUTHOR

MIDWEST PRODUCTS' KLAMPON KAI, by JERRY DUNLAP

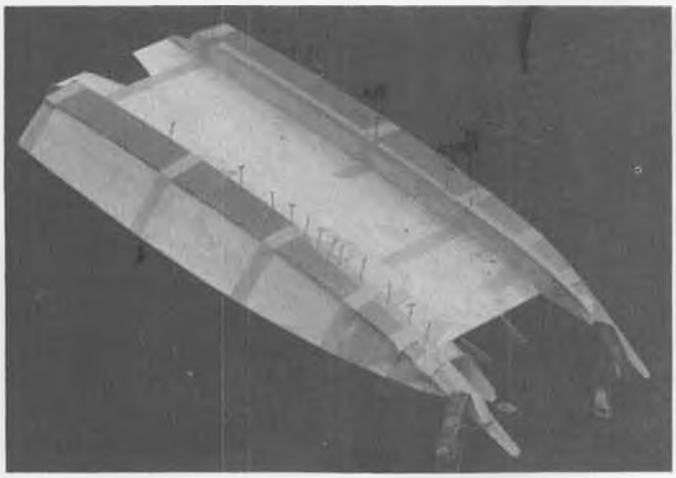
• A relatively new manufacturer on the model boating scene is Midwest Products Co., 400 South Indiana St., Hobart, Indiana 46342. Although a new arrival in model boating, Midwest has been around the R/C airplane scene for many years. One of the first R/C planes I ever saw fly was a Midwest Tri-Squire, and Midwest continues to offer a wide variety of model airplanes for R/C flying enthusiasts. But we've digressed. We're supposed to be telling you about the Midwest Klampon Kai Outboard Tunnel, and not about its line of fine model aircraft. So, what's there to tell you about the Klampon Kai? Well, let's take it from the beginning, since I had a small part in dealing with this model as a plans article.

The Klampon Kai is an outboard tunnel design developed by the gentleman who used to own Marine Specialties, prior to turning that business venture over to K&B Manufacturing. Yes, it was none other than good ol' Charlie Pottol who drew the lines for the Klampon Kai. Actually, the version that is featured as Midwest's kit is something like number 4 or 5 in a progression of tunnel boats that date back to the early 1970's, when Charlie was attempting to develop a boat to take to a big race in Hawaii. At that time, the only outboard available was the Fuji 15. What the Fuji 15 made up for in appearance, it more than gave away in performance. A hot performer it wasn't. After that Hawaiian contest, the Klampon Kai design was sorta put on a back burner, since little (if anything) was cooking in the way of model outboard racing. However, the introduction of the K&B .21 Outboard a couple of years back really started things cooking again, and Charlie was one of the first model boaters to get his hands on the new offering from the folks at Downey. Charlie tried the K&B Outboard on his original tunnel and immediately found that this boat was much too small and narrow to handle a real racing-type model outboard. Charlie redesigned a tunnel during the summer of 1976 in order to have something ready

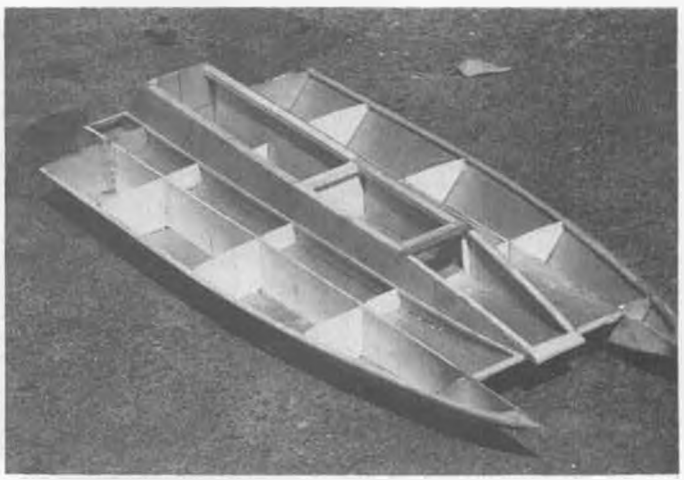


The framework on the foam building jig. Map tacks work well in holding the framework to the jig.

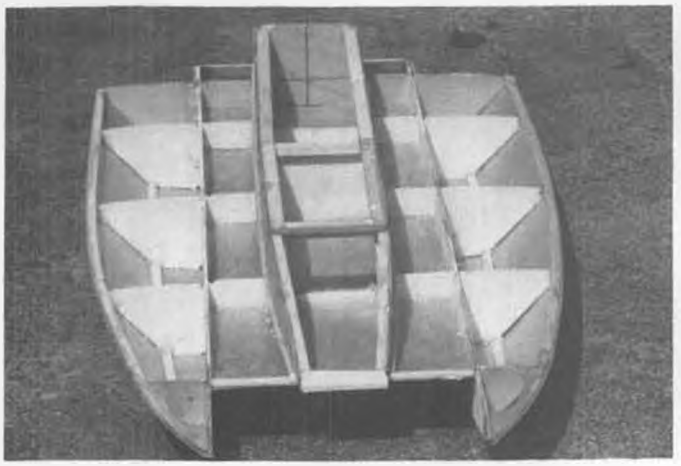
Clamps are used to hold the sponson sides to the basic framework, still on the foam jig.



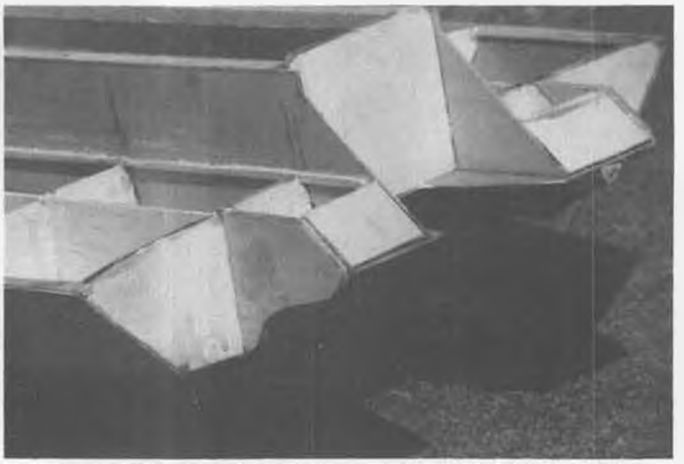
Masking tape, pins, and clamps (what, no staples?) hold the sponson bottoms in place.



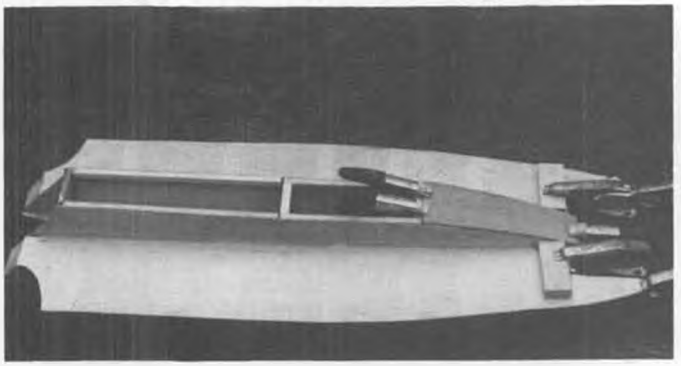
View showing the modifications the author made to the top of the boat to change the looks of the cowling.



Front view of the deck, showing the cockpit and radio compartment.



Closeup of the stern, showing the changes made in the transom area.



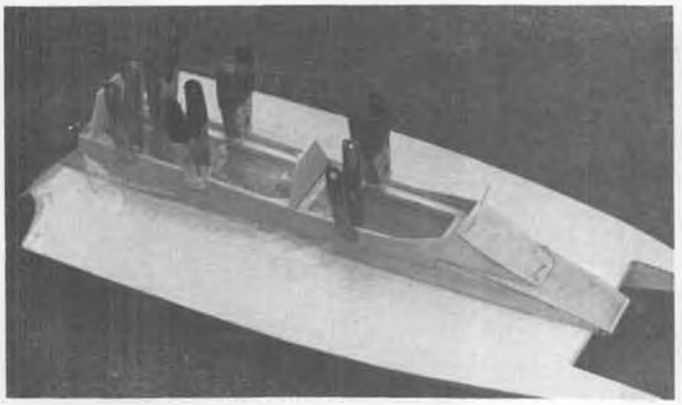
Tape and clamps hold the decking in place until the glue dries.

All kinds of clamps being used to hold the cockpit cowling in position. Remember, this is not the stock cowling.

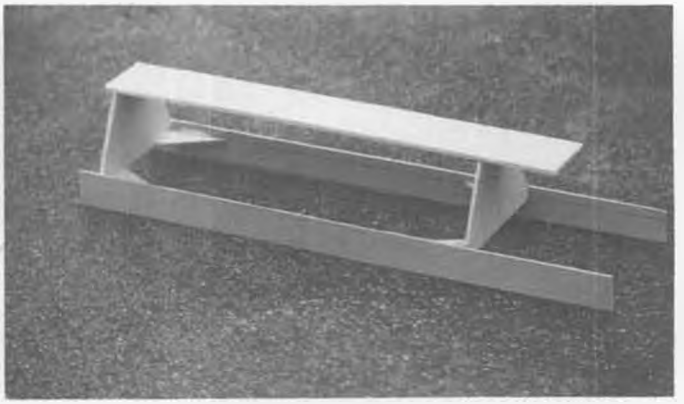
for the First Annual Golden Gate Outboard Regatta, hosted by the San Francisco Model Yacht Club in early November of that year. It is at this point that your author sorta slides into the Klampon Kai picture. Charlie and his wife, Pat, who this writer thinks is one of the really neat ladies in model boating, invited me to attend the race and spend the weekend with them. It was a super weekend. Charlie and I spent most of our time arguing about almost everything, and Pat provided great meals and plenty of beverages. She must have been doing the right things, because she ended up placing second on race day. As usual, Charlie and I didn't resolve any issues, but I did agree to write a construction article on his Klampon Kai. That article appeared in the February 1977 issue of *RC Sportsman*. It was just about one year later that Charlie and the folks at Midwest got together and came out with a kit version of the Klampon Kai.

Since I am also a designer of model tunnel outboards and have my own design available in fiberglass, reviewing other people's tunnel kits is comparable to Henry Ford doing a review in *Car & Driver* on a Corvette. I will attempt to be honest in my opinions, even though I don't always agree with the way certain things were handled in the kit. Since I've already stated there were parts of the kit I didn't like, let's get those out of the way first. They are strictly personal opinions and definitely not criticisms of the materials, construction technique, or plans and operating instructions. The only thing that I didn't like about the Klampon Kai is the manner in which the cowling is designed. I mentioned that I didn't like the cowling design when I wrote the construction article for *RCS*, and the same cowl is employed on the kit. The Klampon Kai cowling design is not scale appearing. It's functional, it gets the job done, but it doesn't satisfy my needs for a scale-appearing cowl. So I changed it.

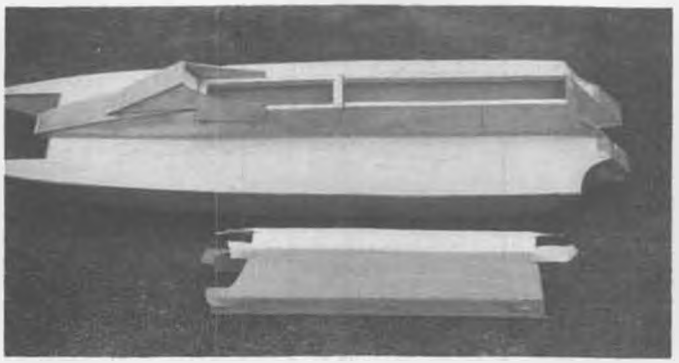
Hopefully, our esteemed editor will see his way clear to use a bunch of the photos of my modifications. I'm not even going to tell you how to make these modifications. If you're building a tunnel for the first time, build it the way the plans show. If you've built wood kit boats before, you can figure out how to make the modifications by looking at my pictures. Did my modifications improve the boat's performance? Not one bit. But I didn't make them in hopes of improving performance. Did I improve



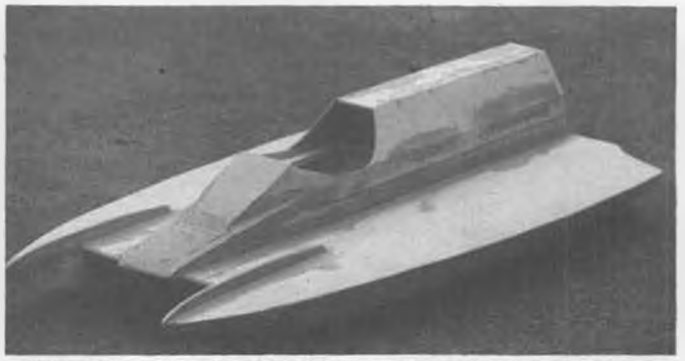
The modified rear cowling is built over the cockpit sides. Saran Wrap prevents unwanted glue joints.



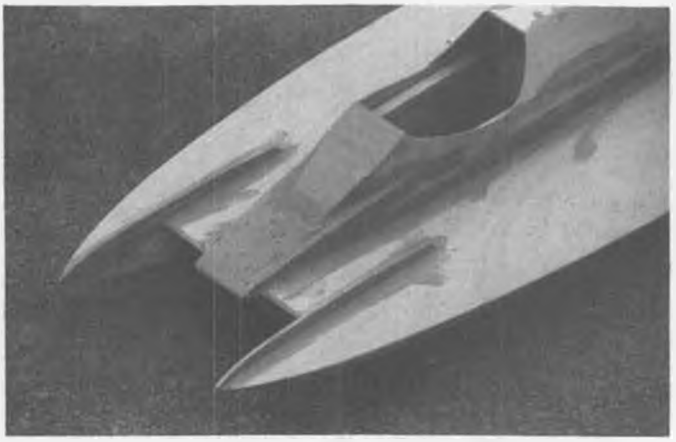
Modified rear cowling after being removed from cockpit. Simple framework is easy, quick to build.



Tape holds side pieces in place on rear cowling. Basic hull structure is complete.



Basic hull with rear cowling in place and body putty in all joints and seams.



Closeup of bow, showing body putty application.

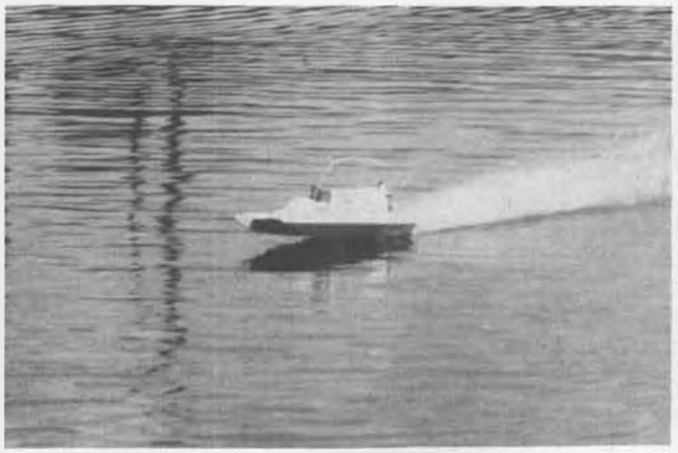
Radio, fuel tank, and engine installation in the Klampon Kai that the author built for Bill Brazzle.

the appearance of the boat? Obviously, that's a matter of opinion. I'll let you decide for yourself. I like the way it looks, and so does Bill Brazzle (he races the boat).

One of the strongest selling points for this kit is the building technique. The Midwest people came up with a super-slick idea when they decided to include a foam building jig for framing the Klampon Kai. Without question, the most important part of building a tunnel hull is true alignment of the framework. The foam building jig helps assure that the framework aligns properly during the initial construction phases. I'm not going to give you a piece-by-piece account of how to build a Klampon Kai. I found the directions and illustrations more than adequate. If you haven't built many wood kits, it's always a good idea to familiarize yourself with the directions and pieces prior to mixing that epoxy. Speaking of the pieces, the material is top grade throughout. No complaints from me in this area.

During the past six months, I have seen at least a half-dozen Klampon Kais built by novice model boaters, and they have all run respectfully. I'll even go farther than that and say that some of them ran well enough to win quite a few of the races we held for model outboard tunnels up here in the Northwest this past year. We do more organized outboard racing up this way than any other section of the country . . . the world, even. One of the new members of our local club, John Moss, has used a Klampon Kai to bring home a whole batch of trophies since last April. I know he's beaten me on a number of occasions. I know for a fact that his Klampon Kai was the kit that won more events than any other commercially available model tunnel. The boat has been a big winner up this way.

In summary, the Midwest Klampon Kai will prove to be a good design for both the beginner and more advanced model tunnel racer. Although I chose to make some cosmetic changes of the cowling, I don't recommend this for a novice builder. In an area that is definitely a "hot bed" for model outboard tunnel racing, the Klampon Kai has proven to be one of the top boats available. If you're considering building a wooden outboard tunnel, you just might want to latch on to a Klampon. ●



The Midwest Klampon Kai really scoots, as this photo shows. This boat can be competitive for beginner or expert alike.

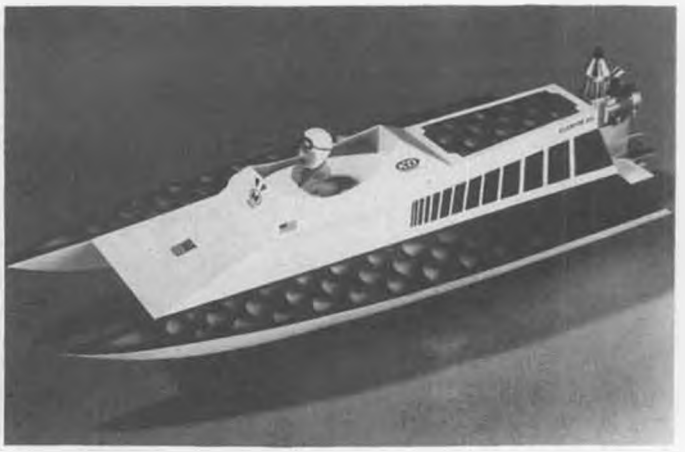


Photo from Midwest of an unmodified Klampon Kai. Author's cowling changes were for looks only, no gain in performance.

Texaco fliers waiting to get their models weighed, l to r: Jack Albrecht, John Pond, Don Bekins, Al Hellman, and Karl Tulp. Photo taken at the 1978 John Pond Commemorative meet held at San Luis Obispo. One of the best flying sites ever, this meet will again be held here in 1979.

PLUG SPARKS

PHOTOS BY AUTHOR

By JOHN POND

• Texaco Double Header! That's just about the best way to introduce the column this month, as we are going to report on two great contests (unfortunately held on the same day!) that were held within a hundred miles of each other.

In deference to the free flight boys, we will report on the SCIF 12th Annual Texaco meet held on October 15, 1978. (Columnist's note: one of the big problems in reporting on free flight is the dearth of news.) This meet enjoyed a nice day with very few thermals. Sure cut down the chasing to the point where Bruce Chandler (the C.D.) could truly claim "expanded R/C coverage".

The Texaco event turnout was down due to the R/C boys flying on the coast, but this didn't prevent Cliff Silva from winning with his Baby Cyclone-powered Michael Roll Berryloid Winner. Cliff has been working on the engine for two years and his efforts were rewarded with better than a 14-minute motor run. No problem to make the total time of 27:08 then!

Bruce Chandler also noted that in addition to the Texaco Event, two other events, Old Ruler and Commercial Rubber, proved to be what the doctor ordered for rounding out the fun.

For those who don't know what the foregoing events are, briefly explained, the Old Ruler contest allows original designs built to conform to the 1940 NAA rules. The Commercial Rubber event is for rubber-powered R.O.G. type cabin models, restricted to 36-inch wingspan. The latter event, pioneered by the SCAMPS, has proven to be extremely popular.

Some of the fun things noted around the field were Gene Wallock's Nimbus (a ten-foot flying lumberyard) seen landing in the foothills of Taft, followed by a tall column of black smoke. Bruce opined the smog controls on Gene's Super Cyclone needed adjustment. How about that? Ken Sykora, the peppery writer of the SCIF Flight Plug Newsletter, was observed producing kits from full-blown models. However, for the rubber event, his Paul Plecan "Paragon" had the boys talking about building the "new" super threat.

Jack Godfrey, who came all the way from Hamilton, New Zealand, to attend this meet also suffered from the two meets being held on the same day. Fortunately, the week before, he was able to visit the San Francisco Bay area and meet most of the fellows who were absent. He brought an Air Trails Sportster powered with a Mills 1.3 cu. in. diesel and a rubber model called the Airsail "Ascender", looking very much like a

Carl Hatrak and his Mickey DeAngelis "Kloud King", at the '67 AMA Nats at Los Alamitos NAS.

Karl Tulp has won many a meet with his Lanzo Record Breaker. Photo taken at 1978 West Coast R/C SAM Champs at Fresno.

Jim McNeill (left) awards the AMA Outstanding Service Plaque to Bryton Barron, a long-time promoter of model flying.

Rare Australian rubber job, the "Sky Rover Senior", to be restored by Max Starich, O.T. columnist for Airborne magazine.

Korda Wakefield. He had more darn fun with his CO_2-powered Pietenpol Air Camper that made simply lovely rise-off-ground (R.O.G.) flights. Now he can say he flew at Taft!

Prizes were just great, as they always are when Jack Jella (the proprietor of Air Trails, Inc.) donates the trophies. The trophies were made up of R/C Cola bottles with large ribbons holding large engraved discs. Of course, the winner opened the Champagne (in this case, Cold Duck) and as Bruce Chandler puts it, it was truly another touch of class with expanded R/C coverage . . . haw! Best part of it all is that the contest made money!

JOHN POND COMMEMORATIVE

Originally called the John Pond Memorial until someone asked when this columnist died, this meet just keeps getting bigger every year. This year was no exception, as competition is getting keener every year. Imagine Don Bekins getting ninth place in Texaco with a 15-minute flight!

This year, John LeSuer took over the Contest Director duties, as Tom Bristol, the annual alternate, fell off a ladder when painting his home, breaking both a leg and an arm! At the time of the meet, Tom was still confined to a wheel chair. Tough break!

Luckily, it was John's turn to run the annual affair, and he promptly relocated the meet to the Cal Poly Campus farm area. As a word of explanation, John LeSuer has been flying RPV (remotely piloted vehicles) for Professor Nicholaides, head of the Aeronautical section at Cal Poly, and it was only natural to take advantage of this lovely field. Only one drawback; no beer allowed on the field, as it was a California school area! As the columnist moaned, it surely made for a long day!

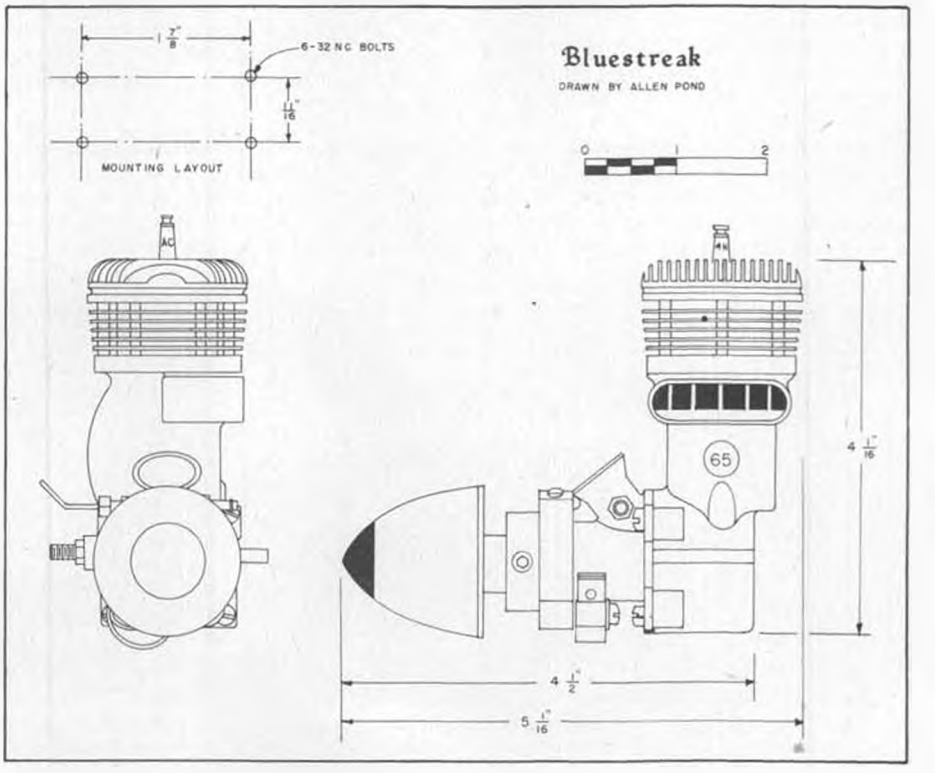
Full credit should be given to John LeSuer and his wife, Helen, for the tremendous job they did in organizing the meet, arranging for motels, housing, etc., staging the most enjoyable Saturday night dinner with trophy awards and, of course, the entertaining after-dinner speaker, Professor Nicholaides, on his "Flying Mattress" type planes and parachutes, together with the RPV progress being carried on at the Campus.

With the Santa Maria boys (sorry, the names escape me) running the meet, you couldn't complain one bit. There were processors everywhere, ready to weigh your model, measure out the required amount of fuel, and of course, timers every place. Matter of fact, the writer was timed so much by Bob Angel, he almost thought he had his own personal timer!

This two-day meet featured all the limited engine run events on Saturday, with Texaco strictly set aside for Sunday. This worked out beautifully, as the Texaco event turned out to be quite demanding on time and timers. After all, there were 25 entries in this event alone!

The columnist had to smile after the Pilots' Meeting when John LeSuer, after carefully spelling out the confines of the landing field (which was huge), promptly missed the field twice himself! Not content with landing on the other side of the barbed wire fence, the next time he landed on someone's automobile!

Jim McNeill and the loot he won at the Jim Kloth Memorial contest.



Ross Thomas and his wife, Maxine, with Ross' 100" Shereshaw "Eaglet". O.S. .60 4-cycle power. Plans scaled up by Bob Sliff (see "Hobby Horn" listing in Classifieds).

Monty Terrel (left), of Mulgrave, Australia, has flown this Denny-plane for eight years. Didn't get other fellow's name.

He finally salvaged a third place despite the first two zero flights.

As a spectator treat for a change, Bob Boucher of Astro Flight sponsored an electric event ably directed by Bob Sliff, with judges John Pond and Jim Adan[illegible]. (Talk about getting the SAM bigwigs to do your work for you!) Three events were scored as a single contest; precision flight, precision-duration, and static display. This most interesting event ended up being won by Bob Sliff, with Don Bekins and Ross Thomas being close second and third places. Those interested can write to Bob Sliff, 8044 Legion Place #6, Midway City, CA 92655 for complete rules and information on how to put on this new fun event.

Well, we couldn't go much further in this column without telling you that Lawrence Bekins again beat out Dad Don Bekins for first place in Class A/B Limited Engine Run. As noted more than once, the younger Bekins is simply uncanny for his "feel" of thermals, as he is yet to touch down in less than five minutes.

In looking over the winners, the new rule giving ignition motors a 40-second engine run, as compared to the glow version of 20 seconds, didn't catch the boys looking, as ignition-powered models took four of six places, and the Antique event was dominated by ignition across the board. No question about it, when you get a good running ignition engine you can be competitive!

Bob VonKonsky with his 14'8" Boehle "Giant", at the '78 Pond Commemorative. The 11-lb. mammoth is now powered by an O.S. 4-cycle. That's a *one piece* wing!

One interesting facet of this meet turned up in that in order to speed flights up, if you had an engine over-run, you were simply credited with a 20-second flight! Man! That made some of the boys (including this columnist) sit up and pay attention! This was made all the rougher with only three official flights (six attempts with anything over 40 seconds being an official. Try getting down from an over-run in less than 40 seconds!).

The gang at **Model Builder** had a right to swell up their chests when Phil Bernhardt came in first with his Super Cyclone-powered Ehling Contest Winner. Not content with winning the Antique event, Phil also pulled a second in Class C. It's gonna be rough around the office for awhile!

Probably the most popular win was the last-minute flight by Hal Cullen, one of the perennial also-rans who never quits trying. Hal hit the darndest "boomer" you would ever want to see after a frustrating day for most, who simply couldn't develop much lift. After a half hour, Cullen was told to bring the model down, as he was the winner and it was getting time to close the contest.

As usual, the trophies were awarded by the namesake of the contest, John Pond. Other big winners were Bob Sliff, Ross Thomas, Karl Tulp, and John LeSuer. Sweepstakes winner this year

Don Bekins has been doing extremely well in Electric O.T. events with this Cabin Playboy. Astro 10 with belt reduction.

Even the CD gets to fly! Mike Poorman flew his Ohlsson .60-powered Comet Clipper while CD'ing meet in Bowie, Maryland.

From Donald Saunders, of Addison, Michigan, comes this photo of his reconditioned Super Buccaneer, which he originally built in 1945. Now flying with radio.

was Don Bekins. At the close of the meet, LeSuer announced that the Fifth Annual John Pond Commemorative would again be held at the Cal Poly Airport on October 13 & 14, 1979. Paste that in your hat!

ENGINE OF THE MONTH

This month's engine is a follow-on to the Hassad Sky Devil we wrote up several months ago.

Actually, the Hassad Bluestreak came about when the Engineering Development Co. (EDCO) got into financial trouble and had to declare bankruptcy. Among the main creditors were the Tyce Brothers of Chula Vista (a town south of San Diego), known as the International Tool Company (Aircraft Engineering Service), who found themselves the owners of a large supply of Sky Devil parts.

In an attempt to salvage some of their investment, the company hired Ira Hassad to come up with an engine that would use the parts on hand. Race cars had run their course and it now being 1947, there was a tremendous demand for a large, hot controlline and free flight aircraft motor.

By early 1948, Hassad had come up with a new design. To show his versatility, he made up the dies for the permanent mold castings. This included crankcase, cover, and extension. The rest of the motor was made up from the Edco parts. A slight difference in machining for the pistons and heads was evolved to allow for a left-hand exhaust.

As far as can be verified, about 1500 to 2000 engines were produced. Surprisingly, there were a few left to be sold by Ted Tyce as late as 1972. By April of 1973, the firm announced that all parts to make any engines had been sold.

It was no great surprise that the engine turned out to be a good one, inasmuch as it used all internal parts of the Model 1500 SD Sky Devil. Specifications, of course, remained the same as the Sky Devil, with the exception of the exhaust and bypass ports being rotated 90 degrees.

Although the new engine promptly won the championship stunt event at Santa Anita in 1948, the Hassad engine was unable to hold its own against all the other new racing engines coming on the market. A remarkable similarity to the problems of the Sky Devil arose, as the Bluestreak still did not perform as well as the original Hassad Custom. No question about it, that extra finishing touch Ira gave to his reworked engines made a definite difference.

Ohlsson .60-powered Rambler by Bob Bissett, flown at Bowie, Maryland contest.

Interviewed by Bill Thompson, of San Diego (to whom we are indebted for this information), Hassad stated that the Bluestreak was his last engine. I always felt bad that the engine did not become popular. It just didn't have what was needed to pull controlline speed planes. Until this day, I can't tell you why.

By this time, Ira Hassad finally had enough money and equipment to start his own machine shop to specialize in work on full-size hot rods and racers. This may come as a surprise to many, but Ira had always wanted to work with full-sized machines. Actually, working with models had ceased to be fun, and here was the chance to launch a new business into the automobile racing business. A quote from Ira might be in order: "I don't know if I was getting tired of models, or the others were getting better."

To this day, Ira and his wife run a large machine shop in El Cajon (a town east of San Diego). The business is known as Lomar Machine Works (Lomar from his wife's name, Lois Marie). As noted by Bill Thompson, Ira said the secret of his success was "Dare to be different".

30 YEARS AGO, I WAS. . .

The columnist is delighted to receive a letter from Dick Johnson of Dallas, Texas, as forwarded by Bill Hannan. Dick goes on to say:

"Your photo of the Scientific Mercury and story in the March/April issue of **Model Builder** really cause the memory muscles to twitch. Going back to the late thirties and early forties is a real long trip.

"At the ripe old age of 14, already a stick-and-tissue veteran of three or four years, I dreamed over the GHQ ads and watched the "big boys" fly gas models. An older friend, Andy Campbell, of Oklahoma City, had a big red Scientific Mercury. It had, of all things, a Bunch

Continued on page 120

Ed Rangus tunes the Forster .29 in his Ranger for an official in Class B Pylon at the '78 SAM Champs.

Look at all the stuff hung on the nose of an otherwise nicely streamlined Shereshaw "Polly". Danny Sheelds built it.

Single Stick Pusher

OLD TIMER Model of the Month

Designed by: Harry Edsall

Drawn by: Al Patterson

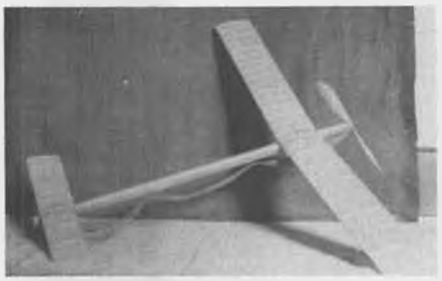
Text by: Phil Bernhardt

How many pushers, single or twin, have you seen at the last few Old Timer rubber contests you've been to? I thought so. Except for pusher-only events, such as the one recently held by the SCAMPS (see the Dec. '78 "Plug Sparks" column), these types of models are rarely flown in competition. The general feeling seems to be that pushers just can't hack it when pitted against the tractor type ships.

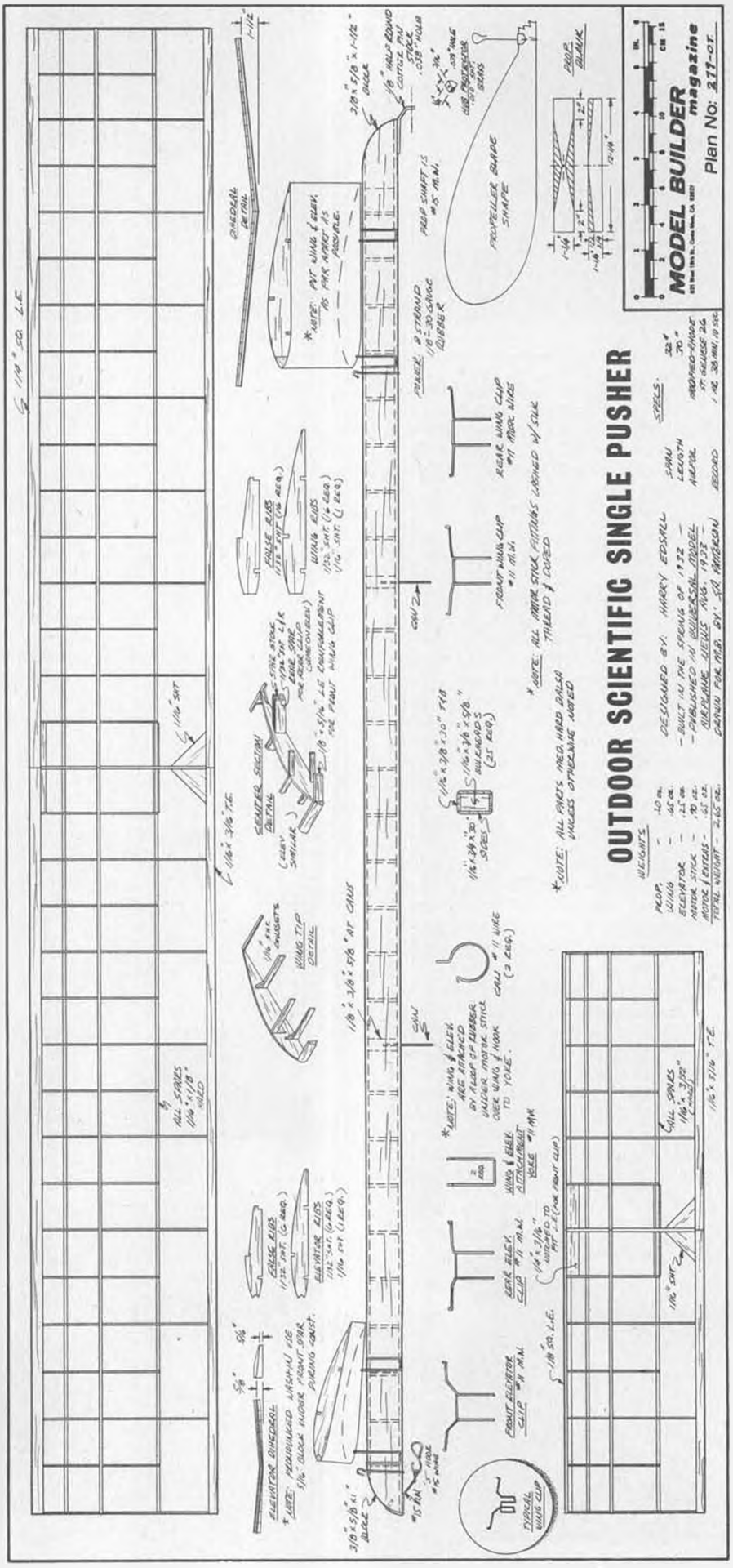
Which is just so much foof, as far as I'm concerned. My first O.T. rubber ship, built about 10 years ago, was a twin pusher from plans published in some obscure 1929 model airplane book. It was the type of model that would bring tears to the eyes of any hard-core O.T. purist . . . non-free-wheeling props, single-surface wing, bamboo ribs and wing tips, and exposed motors. The thing flew exceptionally well, and had I been able to keep one long enough, I probably would have done well in competition. But the models (I built a total of five) had a habit of flying away; at least three are lying in the badlands of Taft, slowly bio-degrading into nothing.

Single pushers are excellent performers also. The one we are presenting this month was designed by Harry Edsall, of Springfield, Ohio, and was published in the August 1933 issue of *Universal*

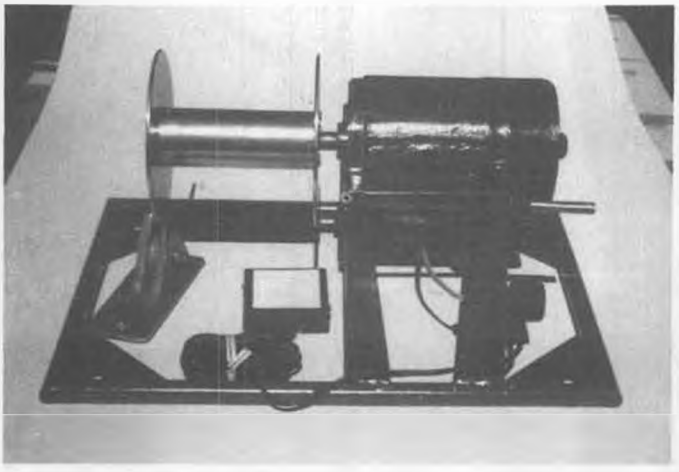
Continued on page 114

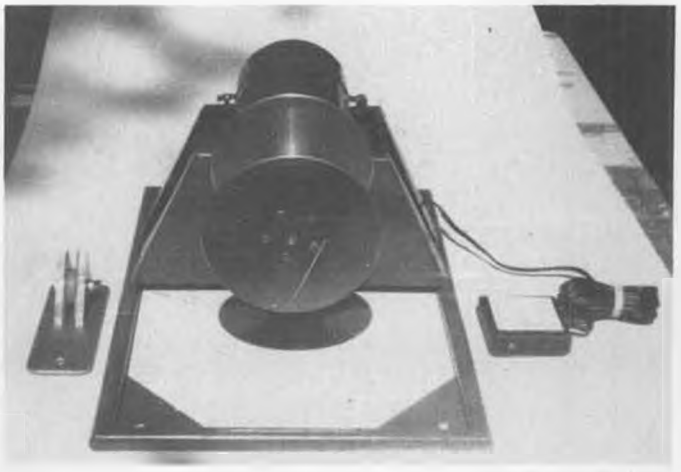


These are the same photos that appeared in the original 1932 article in M.A.N.



FULL SIZE PLANS AVAILABLE — SEE PAGE 128





Simple electric glider winch available from Don Daly, of Denver, Colorado. Price of $135 includes everything but the 12-volt battery and cables. See text for more info on this and three other currently available winches.

R/C SOARING

by Dr. LARRY FOGEL

PHOTOS BY AUTHOR

• There's no doubt that a strong arm is the cheapest way to launch a sailplane. But from the altitude that method provides, it takes a lot of skill and luck to find a thermal. I'm glad there are other ways to launch off flat land. There's hand tow, hi-start, use of an R/C tow plane, and of course, the powered winch . . . now standard for contests and when you really want to "get it up there". Let me call your attention to four winches currently on the market.

First, there's the electric winch offered by Don Daly (3035 West 63rd Ave., Denver, CO 80221). This winch is 18 by 12 by 9 inches, with a carrying handle built into the design. It weighs 24 pounds without the line and battery required to complete this launching system. Don recommends the use of a standard 12-volt battery to drive the starter motor, which turns an aluminum drum. He also provides a turn-around (an aluminum pulley on ball bearings), and an electric foot switch, all for $135 plus the shipping charges. This price does not include the battery and cables. Don assures me that this winch will easily tow heavy models "out of sight." He'd be pleased to provide you with such a winch if you send him a $50 deposit, the balance being paid C.O.D.

Bill Amour (20326 Madison Street, Torrance, CA 90503) offers an electric winch which operates on either 6 or 12 volts. The 6-volt operation is for small sailplanes, while 12 volts provides the added "get up and go" required for the big birds. A 12-volt starter motor is mounted on an aluminum welded and anodized base. Bill provides all required battery cables, a reel, push-button run-down switch, on-off switch, the foot pedal for actuating the unit, and a turn-around, all for $185 F.O.B. Torrance, CA (excluding the battery and nylon launch line). He offers a similar winch, but restricted to 6-volt operation, for $169.

You can order this winch reel separately for $30. It's made of heat-treated aluminum. The side plates and spacer hub are machined for trueness in assembly and operation. The reel is light and thus reduces "flywheel" overspin. It's machined to fit a 5/8-inch diameter shaft starter motor. A turn-around is also available separately for $25. It includes a base, line tracking guides, and a two-way swivel unit. I've seen this winch in operation. It's a dependable asset.

Hi-Flight Model Products (43225 Whittier Avenue, Hemet, CA 92343) offers the Hi-Flight 12 winch (for $179) which is powered by a conventional automotive battery (not included in the purchase price). This winch is unique in the fact that a single foot control allows the flier to choose slow, medium, or high winch speed. The speed may be varied continuously during the launch as dictated by the size of the sailplane and the prevailing wind conditions. You want to use low speed for line tensioning and launching light aircraft under windy conditions. Medium speed is appropriate for standard class sailplanes in dead air or unlimited ships under breezy conditions. The high speed launch will take care of the heaviest unlimited class sailplanes with

Another simple electric winch, the Hi-Flight 12, from Hi-Flight Model Products, Hemet, California. Ultra-simple foot switch allows slow, medium, or fast winch speed. Comes in kit form, too.

Hi-Flight's Bill Mueller is testing a line retrieval system for the Hi-Flight winch.

Sturdy, well-built electric winch by Bill Amour, of Torrance, California, will operate on either 6 or 12 volts. Cost is $185, excluding the battery and nylon towline.

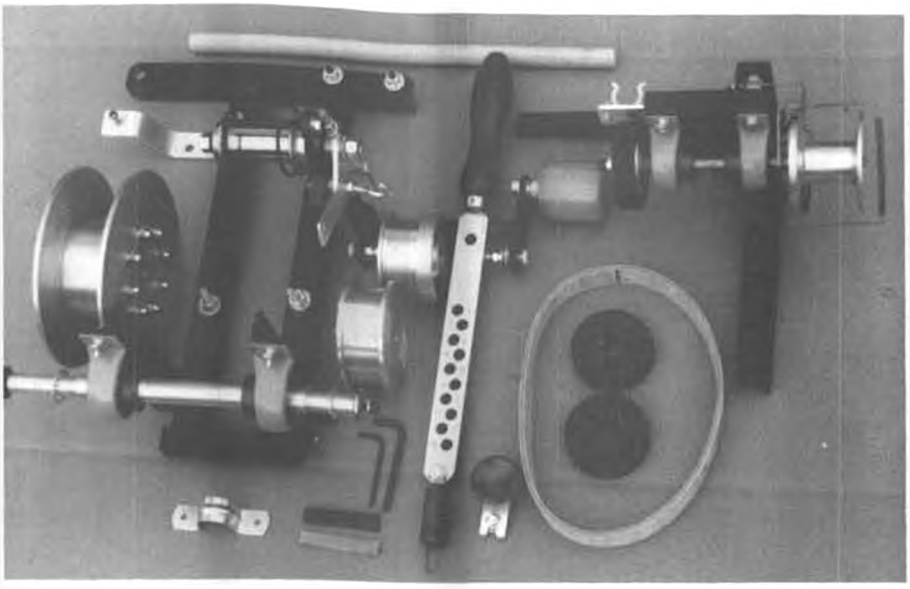
John Lupperger's original design "Ridge Runt" was inspired by the "Beaver", a Pilot kit.

ease. An isolation switch is provided to eliminate high speed take-up if the pilot desires this safety feature. Bill Mueller designed this winch to relieve the pilot of pulsing (with the attendant unevenness in the launch). The foot pedal uses open contacts . . . surely reliable because of the simplicity.

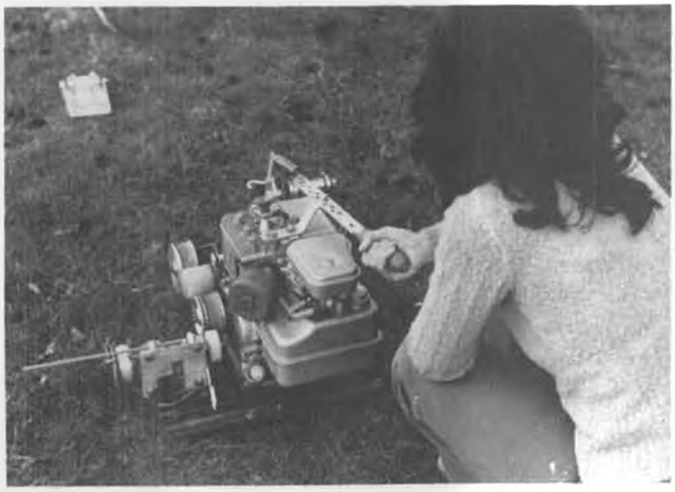
I've used this winch, and it worked well for me. Hi-Flight also offers this winch in kit form including everything needed, with the exception of the motor and winch drum ($98). Machined and welded aluminum alloy winch drums are available in two sizes: two-inch core for 12-volt operation, or four-inch core for 6-volt operation, at $29.95 each.

Winch motors and flight line (120 pound test) are also available from Hi-Flight. By the way, Bill is now experimenting with a line retrieval system . . . one that will not increase the weight of the launch line towing the plane to altitude. I look forward to seeing this in operation.

You may remember Ralph Learmont



Beautifully-made gasoline-powered winch by Ralph Learmont, of Melbourne, Australia. Uses a Briggs & Stratton engine, not included. No word on price, but you can bet it won't be cheap!



Setting the line tension. The pull can be adjusted for anything between 0 and 20 pounds. Line tension remains constant.

Ralph Learmont and his Launch Master winch. Also included is a line retrieval system that brings the towhook back to the winch.



Sequence of photos of John Lupperger's Ridge Runt making a close pass at Torrey Pines. Model has a 49-inch wing with a 10% flat bottom airfoil. Really moves out at 9 oz./sq. ft.

(31 Queens Parade, Burwood 3125, Melbourne, Australia), designer of the quarter-scale Kestrel 17. Ralph now offers another example of his ingenuity . . . the Launch Master fully automatic self-regulating winch. Here you can adjust the winch to pull with the desired tension, so as to achieve a constant gentle pull for your "floater", or the kind of force needed to launch the heaviest of models. Line tension is controlled by negative feedback. The tension control arm indicates the wide range of possible towline pull. You can select anything from a featherlight "nudge" up to a steady 20 pounds of tension. Automatic braking of the drum prevents backlash and snarled lines.

According to Ralph, "Self-launching is easy. You just concentrate on the flying while the winch drives itself." He prefers to use a regular Briggs & Stratton gasoline engine as his power source. "Just start the motor, pre-select your line tension, hook on the line, and you're ready to go. All you feel is a smooth, constant pull. Take your line, walk back if you like, the pull stays the same all the time. When you're ready, just launch in the usual manner. The launch and climb that follows is unbelievably smooth and steady. Much more so than pulsing an electric winch or the vertical pull provided by a hi-start."

Ralph goes on to remind us that his winch provides a constant tension, even under gusty wind conditions (or no wind at all). You select the desired tension based on the size of your model and the desired rate of climb. "The wind factor need *not* be considered. The motor rpm does not have to be adjusted. It even pays out line if the wind is strong or if you are heavy on 'up-elevator'. It will never break wings as a high-start or hand throw does. It's really extremely safe."

This Launch Master winch is produced by Ralph Learmont's company, Southern Sailplanes. It weighs 37 pounds, "which alone is lighter than a car battery." He also provides a retrieve unit (which weighs an additional four pounds). This unit grabs the released line in the sky and tows it right back to the launch point. That's a neat trick! You have to see it to believe it.

When you're finished for the day, this winch "winds itself up. It's virtually maintenance free in that there are no batteries to charge up, no acid to spill, and never a need for a new battery. One tank of petrol provides at least 200 launches. You can operate the system by itself, but if the retrieve system is in use, a second person is needed." This beautiful design is more costly than conventional winches, and there's the sound of the engine to deal with. Ralph guarantees the winch for six months and claims that "this system should more than pay for itself very quickly by charging, say, 10¢ per launch with a launch rate of one per minute using the rapid retrieve system."

While on the subject of launching sailplanes, I've noted some costly common mistakes. Some pilots have a tendency to throw a "curve" instead of launching the plane along a straight line. The correct launch feels uncomfortable, but it's worth practicing while you watch your hand carry the plane along the first part of its straight-line flight path. It's

Continued on page 101

Talk about different! John Veale, of Manhattan Beach, California, converted this all-foam free flight 747 into an R/C slope glider. Uses Kraft radio with KPS-18 servos, weighs less than 10 oz.

Closeup of the radio installation in John's 747. Ailerons are driven by torque rods set into the top surface of the wing.

John's 747 gets a launch. Model looks quite realistic in the air, causes hang glider pilots at Torrey Pines to do a double take.

Herb Semmelmeyer's beautiful "Elliptical" multi-task FAI design, featured as a 3-view on page 50. The model shown here was built by Harry Menke, of Santa Rosa, and was flown in the 1976 LSF Tournament held there. Model has a 117-inch span, 1046 sq. in. area.

DESIGNING YOUR OWN SAILPLANE

By DAVE THORNBURG . . . Part Two of a series, Dave discusses the pros and cons of "penetrators" and "floaters", and sets down some design parameters for a hypothetical minimum-sink sailplane.

Last month, amid a flurry of name-dropping and plugs for just about everybody's book but my own (it hasn't found a publisher yet), we discussed airfoils and made a few infuriating generalizations, to wit:

1) Fatter airfoils (10-12% and up) are easier to build and easier to fly than skinny (9% and under) airfoils.

2) Skinny airfoils are generally faster and more efficient than fat ones.

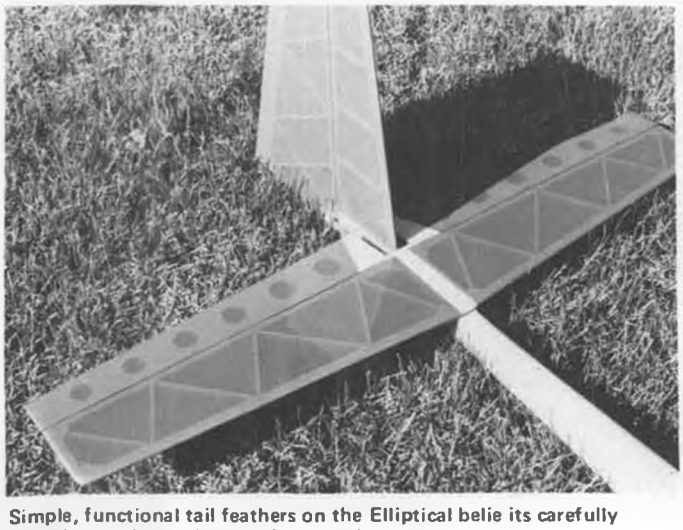
3) Airfoil IS design. The shape of the airfoil (in conjunction with the wing loading) determines the performance range of the sailplane. Everything else is largely cosmetics.

Before we start our actual doodling on paper, let's look at some of the implications of these three points. They can help us make some basic decisions about what we want from our Dream Soarer. After all, we're here to *design* a new sailplane, not merely to draw one. You design for performance, you draw for looks. Right? (Let's hear a little more enthusiasm out there. And turn down that TV, will you?)

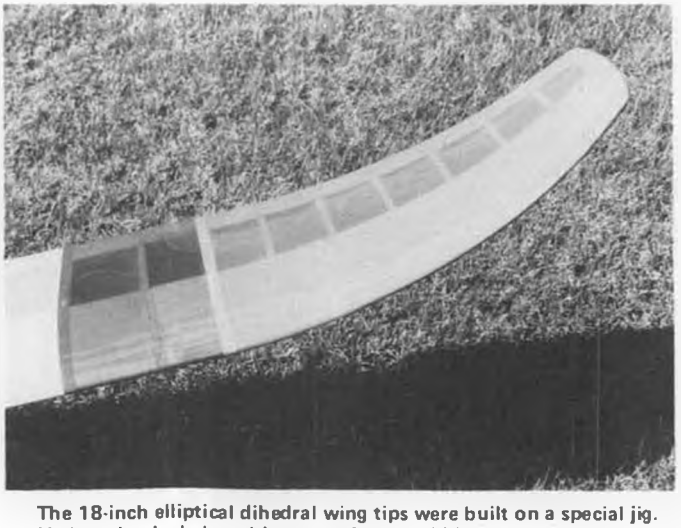
So ask yourself this, for starters: do you want to design a floater or a penetrator? Do you like the slow, gentle, forgiving performance of the Olympic II, or do you prefer the fast, smooth, powerful feel of the Astro Flight ASW-17? This is the basic choice you jave to make, the choice between minimum sink and maximum go. You can't optimize both in a single airplane, because they're at opposite ends of a broad performance spectrum. Only my hero Muhammed Ali can float like a butterfly AND sting like a bee . . . a sailplane has got to settle for doing one or the other.

So which will it be, minimum sink or maximum go?

Minimum sink means the ability to ride very light lift, to stay aloft a little longer in poor conditions, to make a slow and gentle landing after a slow and gentle flight. Minimum sink designs are relaxing and forgiving to fly, and as a consequence they're very popular with beginners and "Sunday fliers" and (surprise!) contest winners as well. (An airplane that's slow and easy to land is a natural for spot-landing accuracy, and since 90% of all American contests are won or lost *on the ground*. . .) It's probably safe to say that "minimum sink" designs represent 70-80% of all kit sales in the U.S. at the present . . . take a poll of at least three flying sites before you disagree . . . so if you opt for minimum sink, you certainly won't be



Simple, functional tail feathers on the Elliptical belie its carefully thought-out design, balanced proportions.



The 18-inch elliptical dihedral wing tips were built on a special jig. Herb soaks the balsa with ammonia to mold it.

alone.

But "maximum go" sailplanes have an appeal all their own. Just ten years ago this winter I got hold of my first one, a Fliteglas Phoebus, and it taught me more about soaring in six months than my four previous years of flying minimum-sink ships had done. Since then, I've owned three Hobie (now Midwest) Hawks, one overweight (34 oz.) Windfree, and two Graupner Cumuluses (Cumuli? Cumulese? Cumulae? Oh, hell . . I owned a Graupner Cumulus, and then another one just like it!). Also a Soarcraft Libelle. All these ships had one thing in common: the liked to move around the sky pretty quickly. Put the nose down and they were *gone*, no questions asked. Slow them up too much in a tight thermal, close to the ground, and you were through flying for the day.

They were like rack-and-pinion racing cars, after years of driving sluggish family sedans. They gave me a sense of power, precision, command, with a little shot of danger thrown in. These ships weren't at the mercy of every gust and bubble . . . they didn't hop and bounce all over the sky like windblown Kleenex, registering every nuance of turbulence, every roll and toss of the restless air. Instead, they went planing about in smooth and graceful arcs, riding invisible rails. They had, as the wine connoisseurs put it, *authority*.

So you see, a case can be made for the ships at either end of the spectrum, and the choice is still yours. I've designed and flown both types in the past, and will probably continue to design and fly both types in the future. Floaters and penetrators each have their own virtues.

Now I hear what you're grumbling about, out there: *why can't we compromise*, you're saying. Why can't we have both minimum sink *and* maximum go in the same airplane? Why does this Thornburg fellow keep talking about floaters and penetrators as if they were in two separate worlds?

Because that's the easiest way to think about them, when you're designing. Obviously, what you finally come up with *will* be a compromise of some sort: either a floater with (hopefully) some ability to penetrate, or a maximum-go machine that will slow down to at least Mach 1 when you gotta ride light lift. Your Dream Soarer will fall somewhere on the broad spectrum between the "floater" and "penetrator" extremes.

All I'm suggesting is that you be aware of the extremes, and *make a conscious choice to design toward maximizing one of them*. If you try to develop the perfect compromise, the halfway machine, the true floater-penetrator, what you're likely to wind up with is a plane that does everything *adequately* and does nothing *well*. There are plenty of those in kit form at your local hobby shop; why design your own?

GETTING DOWN TO FIGURES

Let's suppose you opt for a floater, and you already have a wingspan in mind . . . say 90 inches. Why 90 inches? Well, why not? I'm a little tired of 72 inches, 100 inches, 120 inches, and other sizes that are dictated either by rules or by rulers. Ninety inches is a nice number. Besides, I had a lovely little Schweizer 1-29 with a 90-inch span, once. Flew great until I wore out the wing, and replaced it with one that had a laminar-flow airfoil, like the full-scale 1-29 has. What a bag of worms! Had to double the wing loading to get a decent glide, and then it flew fine again . . . at about 30 mph! (That's a scale speed of almost 200 mph!)

Dave Thornburg launching the Schweizer 1-29 mentioned in the article, out on the New Mexico flatlands, about 1970. No need for frequency flags when you fly alone!

Standard class floaters usually run about 4 or 5 ounces per linear foot of wingspan, so our 90-inch ship will probably weigh between 30 and 37 ounces. See . . . just by multiplying seven-and-a-half feet by 4, and again by 5, we've got some *nice solid figures* on paper already! Ain't Science wonderful?

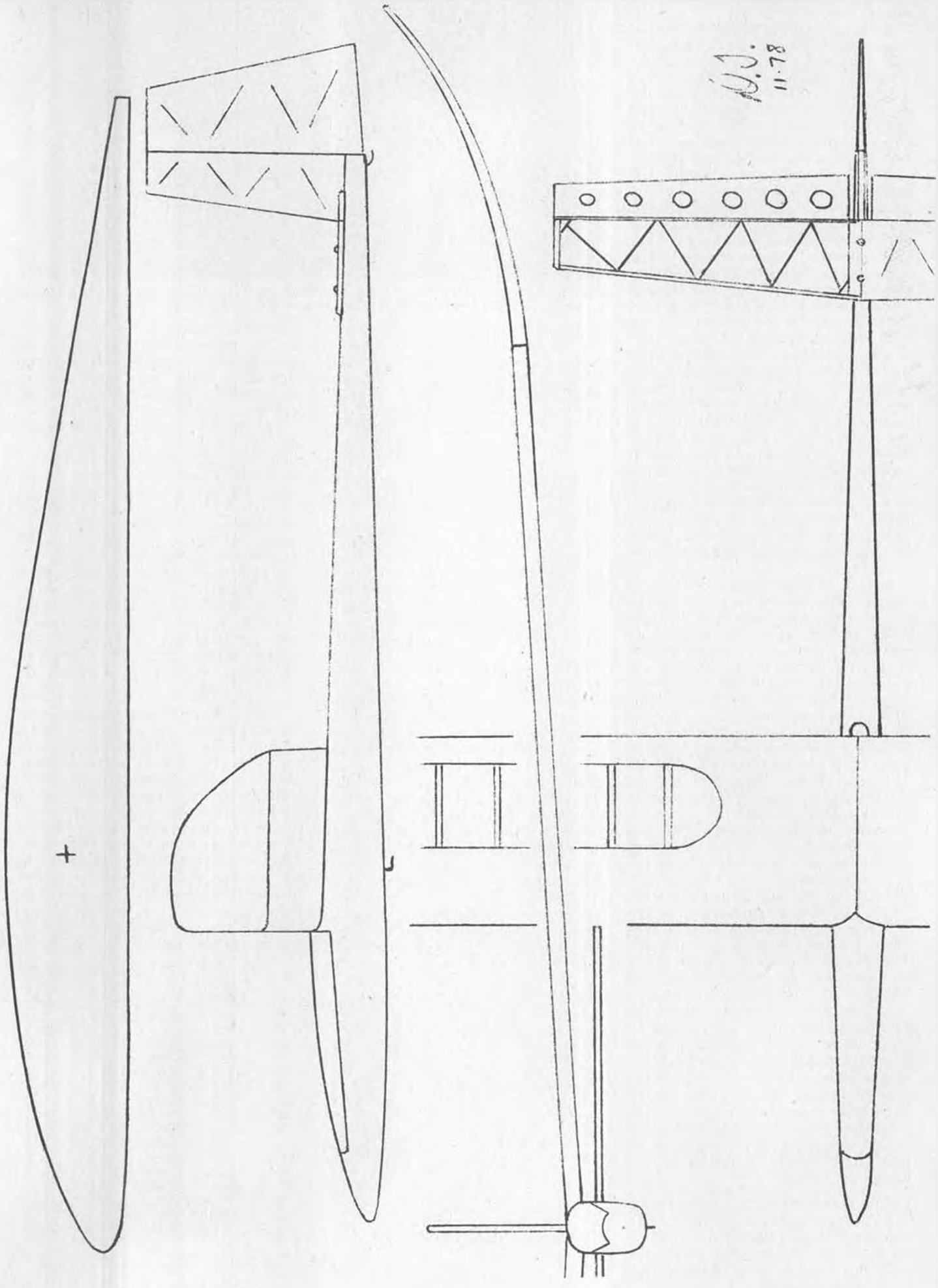
Of course, what we're really interested in is *wing loading* . . . the number of ounces that each square foot of wing has to carry. Wing loading is the traditional "yardstick" for comparing different airplanes within a similar size range. You have to be careful how you apply the wing-loading yardstick across *different* size ranges, however, because something very magic takes place as a sailplane grows larger. A certain 600-square-inch plane might be considered a penetrator at 8 ounces per square foot, but when the same airfoil is scaled up to, say, 1400 square inches, it becomes a real floater at that wing loading. To get it back into the penetrator class it may need a wing loading of closer to 11 or 12 ounces per square foot. Engineers dismiss this phenomenon as "scale effect" or "Reynolds number effect", but what it is, basically, is magic. Big airplanes simply fly better than small ones. It doesn't please me to admit this, because I *prefer* smaller airplanes. But it's true.

So what kind of wing loading should our 90-inch floater have? Let's take a quick look at the wing loading chart for some of the popular kits on the market today. The Oly II comes in at 5.9 ounces a foot, the Windrifter at 6.8 . . . and that about brackets it. A figure of six to six-and-a-half also happens to agree pretty closely with my personal prejudices. I feel that the advantages of being much under 6 oz/ft are usually outweighed by the disadvantages, at least for sport flying: superlight structures often prove too fragile to take the knocks, and superlight ships can be at the mercy of unexpected turbulence, especially on landing pattern.

Awright. Now we have a weight range (30-37 ounces) and a wing loading (around 6 to 6.5 ounces per foot) to shoot for. This tells us we're thinking about a 5 or 6 square foot airplane, right? If we decide on 5 square feet, however, we'll need to build it light to hit our 6.5 ounce maximum wing loading . . . 6.5 times 5 is only 32.5 ounces flying weight. Can we expect to build a plane with the wing area of a Cumulus and the weight of a Windfree? Hmmm. . . On the other hand, if we try 6 square feet in our formula, then we have 6.5 times 6, or 39 ounces, to play with. Now *that* sounds

Continued on page 105

PLANE	SPAN	AREA	WT.	OZ/FT²	AR
Aquila	99	810	40-44	7.5	12.1
ASW-17	132	950	58-62	9.0	18.3
Bird of Time	118	1070	42-44	5.8	13.0
Californian	115	915	40-44	6.6	14.5
Centurion II	99	618	28-32	7.0	15.9
Cumulus 2800	110	753	54-58	10.7	16.0
Grand Esprit	134	1100	64-66	8.5	16.3
Javelin II	134	1005	51-53	7.5	17.9
Legionaire 140	140	1325	65-74	7.5	14.8
Midwest Hawk	99	590	38-40	9.5	16.6
Maestro Mk III	132	990	54-56	8.0	17.6
Olympic II	99	928	37-39	5.9	10.6
Paragon	118	1080	44-46	6.0	12.9
Sailaire	150	1643	120	10.5	13.7
Viking	118	1200	53-55	6.5	11.6
Wanderer 72	72	563	22-24	5.9	9.2
Windfree	99	555	30-32	8.0	17.7
Windrifter/SD-100	99	902	40-45	6.8	10.9



The Cliffhanger is just the thing for a simple, inexpensive slope glider. The model had been flown quite a bit when this photo was taken, hence the dings. Guess you could say the model has really been through the Renger . . . er, *ringer* (hope you're in the mood for bad jokes!).

CLIFFHANGER

By LARRY RENGER . . . Yes, our "Half-A Scene" columnist also flies gliders! The Cliffhanger is a quick-building aerobatic flying wing that uses Ace foam wing panels. Right at home in 40 mph winds.

• Once upon a time in the happy little kingdom of **Model Builder**, there lived a couple of lovely young flying wings. Also in this kingdom there was a young (more or less, I'm told) lad who saw them and fell madly in love. Sad to say, he was under a dark spell by the wicked witch called "Lazy", and was unable to reach his desire.

One bright day while sitting at his building board, our hero (?!) came across the fixings needed to overcome the dreaded "Lazy" spell. Chanting "ACEEXPANDEDBEADFOAMMOLDED-WINGS" under his breath, he mixed a grisly potion of Parts A & B of a magic 5-minute elixer bought at great cost from the land of Hobbypoxy. At it hammer and tongs, wrapping with cloths of bright plastic and adding mysterious electronic black boxes, he had his creation finished in a nonce.

This particular nonce happened to be in the middle of a dark and gloomy night, but the wings shown with a luster, the pinstriping was in place, even a name was proudly emblazoned on one wing! Lo and Behold! It was the "Cliff-hanger", all ready to fly. Now our lazy lout had a sexy flying wing all his very own.

There was one hang-up, a nagging fear that the new model would just flop helplessly end for end when it was thrown over the edge of the local cliff. Fortunately, there is an old trick for checking model stability developed by, of all people, the model rocketeers. A thirty-foot piece of 1/2A dacron control line was tied around the fuselage and run through a small hole drilled 1-1/2 inches from the leading edge in one wing tip fin.

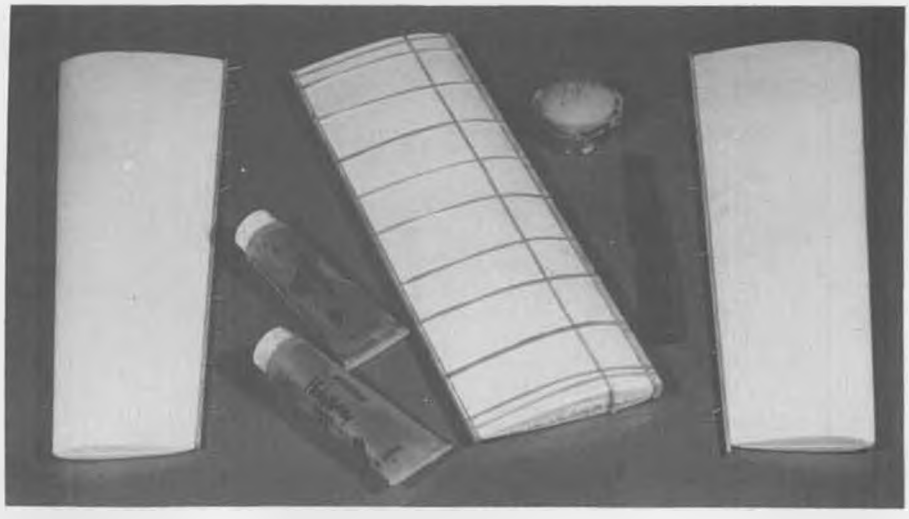
Thus it came to pass that around the witching hour last July 4th, I sneaked out into the middle of the street in front of my house and did a "swing test" to check balance and control settings on the prototype Cliffhanger. Sure enough, there were trim adjustments required, but due to the safe control possible with a tether, there wasn't a scratch on the model even though I was flying it over asphalt. It's just a good thing that the neighbors are understanding about that weirdo on the block playing with his model airplanes in the dead of night.

First flights were not quite so smooth as I hoped, but not disastrous. I had trimmed for a very flat, fast glide on the tether. Experience now indicates that a bit more "float" is in order. More on this later.

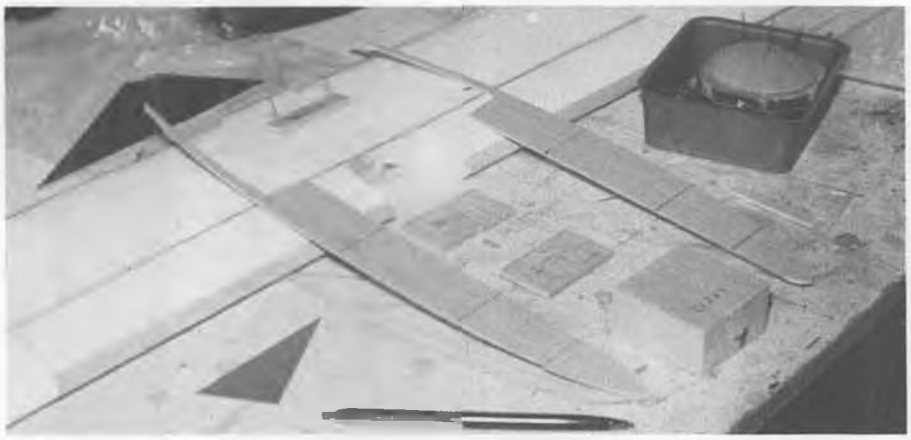
About the time I was getting Cliff-hanger flying right, it folded in the middle during a tight turn. OOPS! Back to the drawing board for design of a completely new center section. Tip fins were also enlarged in the process. New construction was quick, as I grafted the new parts onto the old tips . . . "Lazy" strikes again! This time there were no special flight problems. The changes worked just fine and Cliffhanger is now a good flying model.

So what is the end result? Well, Cliffhanger won't thermal, that's for sure; it's purely a slope machine. But it is fast and smooth, turns on a dime, handles high winds with ease, and is nice and compact. For sport aerobatics, or speed on the slope, Cliffhanger is a hot trip. The highest wind yet tried with Cliffhanger was a steady 40 mph. This was over a sheer 300-foot cliff, so lift was no problem. I finally had to fly straight into a bush to get down. Loops and rolls were duck soup that day.

The separate ailerons and elevator and this particular mode of construction yield a really easy-to-build airplane. It's both rugged and repairable. The materials are simple and inexpensive. In the air, this model looks clean and purposeful. Longitudinal trim is smooth, due to the almost symmetrical wing section. As you might expect, it does require careful CG placement, but since that is already



Gluing the leading edges, trailing edges, and spar to the foam wing panels. Note that only the center section gets a spar and leading edge; the tips get trailing edges only.



Wing and nose block pinned to building board, ready to start fuselage assembly. Cut-out in wing is for aileron servo. Foam aft of spar is cut out later for elevator servo.

established, you should have no problem with your own Cliffhanger.

Cliffhanger has successfully been flown under power. A simple flat panel of 1/8 plywood was epoxied upright to the rear face of the nose block, and a Tee Dee .020 was fastened to it by a couple of No. 2 sheet metal screws. All-up weight was 17 ounces, but it flew well and could even be looped! It would be better to make a socket into which the engine mount could slide for easy removal and installation, if you want this alternative.

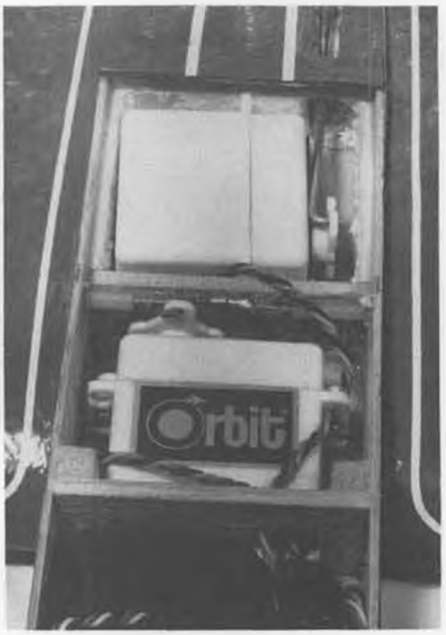
CONSTRUCTION

After gathering the required materials, cut the straight Ace wing section at the spar line, then at the leading and trailing edges. Make a single cut for the spar, and take up the 1/8-inch excess chord by extra trimming at the trailing edge cut. Epoxy the spruce strips to the spar core, then epoxy the five center panel pieces together. Both tip panels only get trailing edges epoxied on. Carve the center section leading edge to shape.

Next, sand both ends of each wing panel as shown on the plans. Note that the 2° for the tip fins is equal to a 5/8-inch forward sweep over the 18-inch wing tip panels when setting up for sanding. Sand all panels inverted, then epoxy them together, still inverted, so that the top of the wing will be straight. If you wish, a bit of dihedral could be added to each tip panel, say, up to 1/2 inch each. My prototypes flew well even with a droopy wing after repairs.

Make the fuselage cutout in the center panel, then pin the panel right side up over the plans with the trailing edge blocked up 1/4 inch. Pin the nose block over the plans, then epoxy the fuselage sides to the wing and nose block. Epoxy the formers, spacers, and hatch retainer strips in place. When the epoxy has set, unpin the model and epoxy the fuselage bottom on. The panel runs from nose to trailing edge. Note that you should not yet have cut out foam aft of the spar! Carve the nose block to shape.

Now you can cut in the pocket for your elevator servo aft of the spar, set the servo in and cut a channel for your



Servos are mounted with servo tape. Plywood radio hatch snaps in place.

pushrod underneath the spacer and hatch retainer strip. Inset the cable guide tubes into the top surface. Then add glass fiber package strapping tape to top and bottom wing surfaces from fuselage to tip at the spar location. Epoxy the tip fins in place. Cut the 6-inch strips of 1/4 x 1-inch trailing edge stock to fit, and epoxy in place against trailing edge and tip fin. The rear edge should be up about 3/16 inch from a line drawn from the bottom rear surface of the airfoil.

Cut the ailerons and elevator from 1/4 x 1 trailing edge stock. Cut and fit the hatch panel and epoxy the balsa tabs under each end. Sand all wood parts such as the nose block, vertical fins, and control surfaces, and also eliminate any mismatch in the foam panels. Sand the panels gently with 400 grit sandpaper wrapped over a long piece of wood to remove the little molding bumps.

Hinge the control surfaces in place with full-length Econokote hinges. Cover and decorate your airplane.

Install the radio. Check your CG position and move whatever you must for balance, or add small amounts of ballast as required. Set up your control surfaces with about 1/8-inch up and down throw.

The bottom aileron surface should have a slight break upwards, and the elevator should be parallel to the bottom surface of the wing.

How about that; ready to fly already! If you are the nervous type, try swing testing your model. Tie the line on around the nose, then run it through a small hole in one wing tip. Neutralize your transmitter controls, turn everything on, then turn the receiver off and transmitter off so that your servos are locked in their neutral position. Swing your model around to see how it flies. Little by little, on successive tests, adjust the three control surfaces until your

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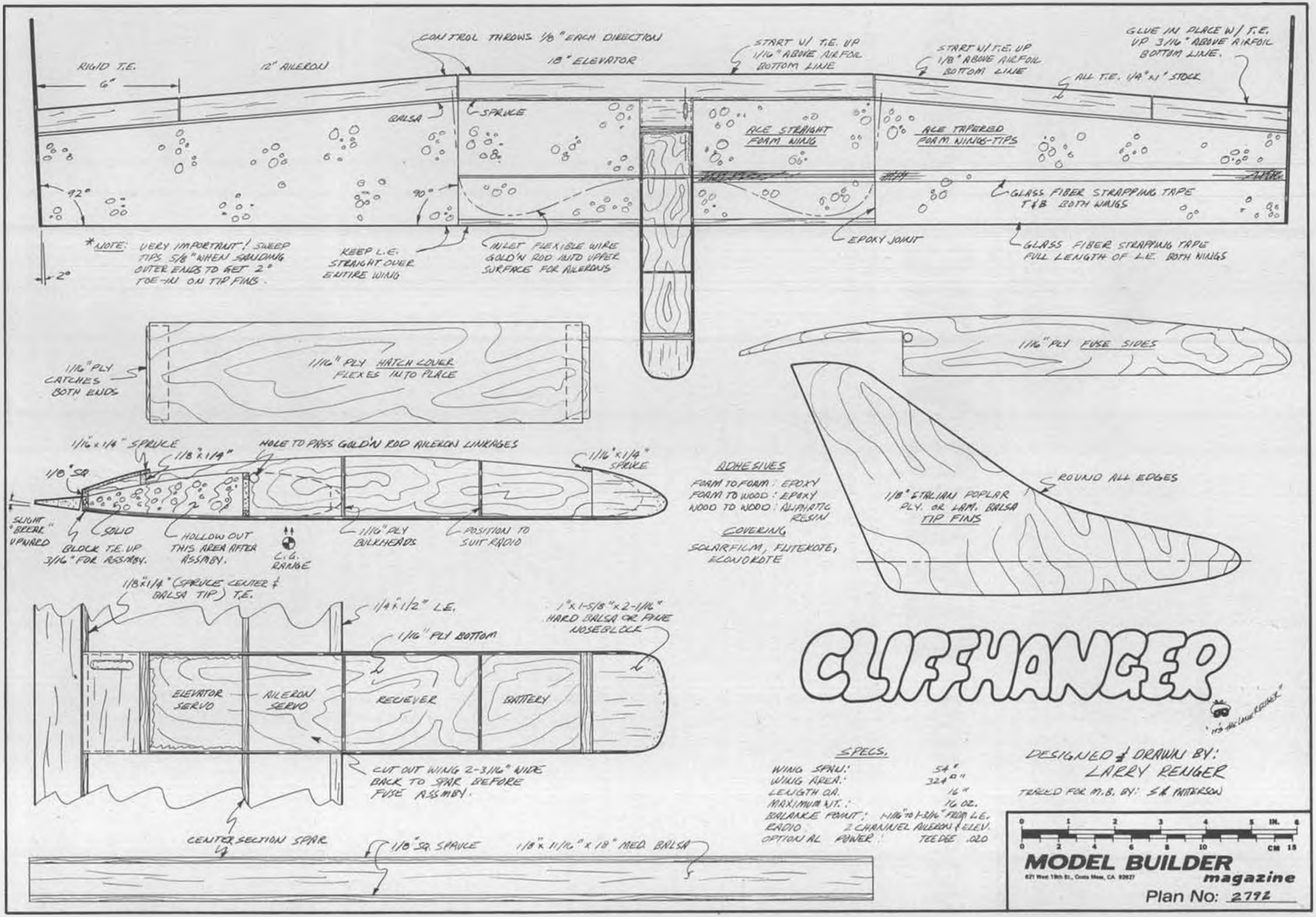
Dr. Jekyll and Mr. Hyde . . . whoops, no, it's just the two personalities of Larry Renger, Cliffhanger designer and MB "Half-A Scene" columnist. Didn't know he could get so violent, huh?



CLIFFHANGER

"It's the Latest Rage!"

SPECS.

WING SPAN:	54"
WING AREA:	324 sq. in.
LENGTH O.A.	16"
MAXIMUM W.T.:	16 oz.
BALANCE POINT:	4 1/16" to 4-3/16" FROM L.E.
RADIO:	2 CHANNEL AILERON & ELEV.
OPTIONAL POWER:	TEE DEE .020

DESIGNED & DRAWN BY:
LARRY RENGER

TIMED FOR M.B. BY: S.K. PATTERSON

MODEL BUILDER magazine
821 West 19th St., Costa Mesa, CA 92627
Plan No: 2772

FULL SIZE PLANS AVAILABLE — SEE PAGE 128

Wayne Sakamoto placed 2nd in R/C Power with his Evans "540" design. Uses .40 size engine with tuned pipe. Fast!

Bob Martz and his original design delta, 4-1/2 lbs., O.S. .40, about 500 sq. in., 4 channels. Looked kind of squirrelly in the turns.

NORTHROP FLYING WING CONTEST

By ELOY MAREZ . . . Featuring events for both F/F and R/C models, this contest has earned a reputation for being one of the most interesting meets of the year. The '78 contest was no exception.

• Orange County, California, stretching from just south of Los Angeles almost all the way to San Diego, is well-known for its aviation activity. It is dotted with numerous small airfields, and is also the home of El Toro Marine Corps Air Station . . . the old Navy blimp base at Santa Ana that is now a Marine helicopter base . . . and Camp Pendleton, another Marine base very busy with many types of aircraft. Sitting square in the middle of Orange County is Orange County Airport, the second busiest in the nation, and home of such interesting things as Talmantz Aviation and its most interesting museum. Douglas, Northrop, and Rockwell have facilities nearby. On the outskirts, we find Long Beach Airport and Los Alamitos NAS, known for its Nats contests in years past. We have Norton and March Air Force Bases nearby, and the Navy has Pt. Mugu, Miramar, and North Island Air Stations in the area. The homebuilders are represented in great numbers at Corona, Flabob, and Chino airports. The latter is also the home of a terrific new airshow initiated in 1978, the "Gathering of Eagles", which will be repeated in 1979 and which we unreservedly recommend. And while on the subject of air shows, Mojave Airport, with its Reno-type annual air race, is also next door, airwise.

And of course, Orange County is the home of **Model Builder** Magazine, and famed Mile Square Model Flying Field. This is a nice place for air nuts . . . both big and little airplanes. And as you might expect, the skies of Orange County are not strangers to flying objects, unidentified or otherwise.

In the late 40's, Northrop Aircraft Corporation gave birth to what was probably the largest flying wing ever built, the YB-49. This was a rather successful aircraft for its day, being jet powered at a time when jet engines were in their infancy, and it set some impressive records. It never became an operational aircraft, possibly for some technical reasons, and maybe because it appeared at the wrong time. Those were the years right after World War Two, and there were not going to be any more wars. Not even "police actions", as they later came to be called. It was thought that we would no longer need a large Air

Well-known flying wing sailplane designer, Dave Jones, with his R-2, a version of his Raven.

Bill Evans, designer of the very successful "540" on the right, with a slightly larger "720", left. Lots of Evans' designs at the meet.

Shades of Star Wars! Another unusual Bill Evans design, the "Astron". Two channels, .15 engine. Not flown at the contest.

Tony Nacarato won 1st in R/C Power with his old "Altair 1", 4 channels, K&B .40.

"Scimitar", by Bill Evans. Powered by two K&B .19's with individual throttles, uses five channels of radio, one for nose wheel only.

Only small engine entry, Dave Meyers' Lil' Plank, with Cox .051. Had engine problems.

Winner of R/C Sailplane was Rick Norwood. Fuselage comes from an AS-W 15.

Force, or new bombers, and thus, the YB-49 faded away.

But not its memory. In commemoration, once a year, some lucky Southern California model flying field is host to a Northrop Flying Wing Contest. This year, the place was Mile Square, and the date was November 5. This is not a contest for models of the Northrop design, but for any and all tailless designs, with the exception of rogallos. The latter dominated the rubber-powered event for a while, and for one year had a separate category all to themselves. This was dropped a couple of years ago in favor of the more conventional (?) flying wing designs.

Hildie Boehme, 9, shows excellent form as she launches Stringless Wonder. Placed 4th.

Officials for this event, the 12th of its kind, were Carl Hatrak as Chief CD, Bill Stroman as F/F Chief Timer, Dave Jones for R/C sailplane, and Harry Apoian for R/C power.

Entries were a little lighter that I have seen at previous contests, possibly due to the fact that the day dawned cold, gray, and ominous. However, it improved considerably by midday, and some excellent flying was enjoyed by both contestants and spectators alike. The free-flight area is separated from the R/C field, and flying there went on continuously. The R/C power and sailplane sites were next to each other, and took turns flying their rounds to prevent any possible frequency mix-ups. A good idea, which worked well!

What would impress a flier whose only model competition is R/C Quarter Midget racing? The variety of the designs in free-flight, that's what. Not much variety in R/C. The power class was dominated by Bill Evans' "540" (500

Continued on page 100

Denise Comley, with brother Chris' "540" model. Denise wants to learn to fly, but can't get Chris to teach her. Any volunteers?

Antique Grand Champion of the 1966 Antique Aircraft Association fly-in was N263H, a Fledgling restored by Joe Erales. Restoration is authentic down to the Challenger engine and forged Curtiss-Reed prop. Airplane is now in a museum in Rio De Janiero. Warren Shipp photo.

CURTISS N2C-1 "FLEDGLING"

by PETER WESTBURG

• PART ONE •

• "If it has two wings, it's got to be good!" . . . William Northrop, Jr.

Few airplanes had two larger wings than the Curtiss Fledgling, which automatically makes it a better than good airplane. By all accounts it was a good airplane; those who flew it said it was a pleasure to fly and ideal for seeing the countryside, because it was stable and reliable.

The Fledgling owed its existence to a 1927 Navy specification and a design competition for an aircraft capable of primary and advanced flight training, training in both fixed and flexible gunnery, radio spotting, and bombing. No less than fourteen companies vied for the contract, most with modifications of civil aircraft. Curtiss won with a trainer it called the "Guardsman". Three XN2C-1 prototypes were tested and Curtiss was given a contract for 31 trainers to be equipped with the 9-cylinder Wright Whirlwind J-5 of 225 hp,

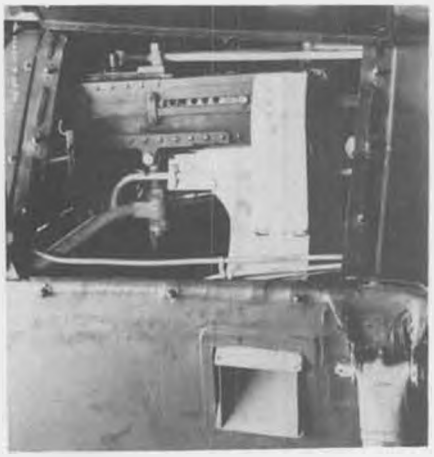
Both XN2C-1's and N2C-1's were powered by the 9-cylinder Wright Whirlwind J-5. Bomb sight and bomb rack fittings have been installed on the all-yellow trainer, but the tail stripes and serial number are missing. Pete Bowers photo.

In an effort to improve high speed and rate of climb, Curtiss engineers designed the Fledgling Jr. with 7-1/2 feet chopped off the wings. The Navy also tested the Jr., but performance was no better than the long-wing version. Pete Bowers photo.

the same engine that powered the Spirit of St. Louis.

The boom in flying following Lindbergh's epic flight led Curtiss to expand its flying school program. Having a contract to produce the Guardsman, the logical choice for a training airplane was a civil version of the N2C-1. One hundred Fledglings, as they were called, were manufactured for the Curtiss Flying Service. A handful of Fledglings went to sportsman pilots.

The J-5 Whirlwind, excellent though it was, went out of production to make way for an improved Whirlwind. The J-5 cylinders had a bore of 4-1/2 inches and a stroke of 5-1/2, and a displacement of 790 cubic inches. The new Whirlwind had a displacement of 760 cubic inches, but delivered the same hp with 7 cylinders having bores of 5 inches and strokes of 5-1/2. The J-6 cylinder became standard for all 5, 7, and 9-cylinder Whirlwinds.



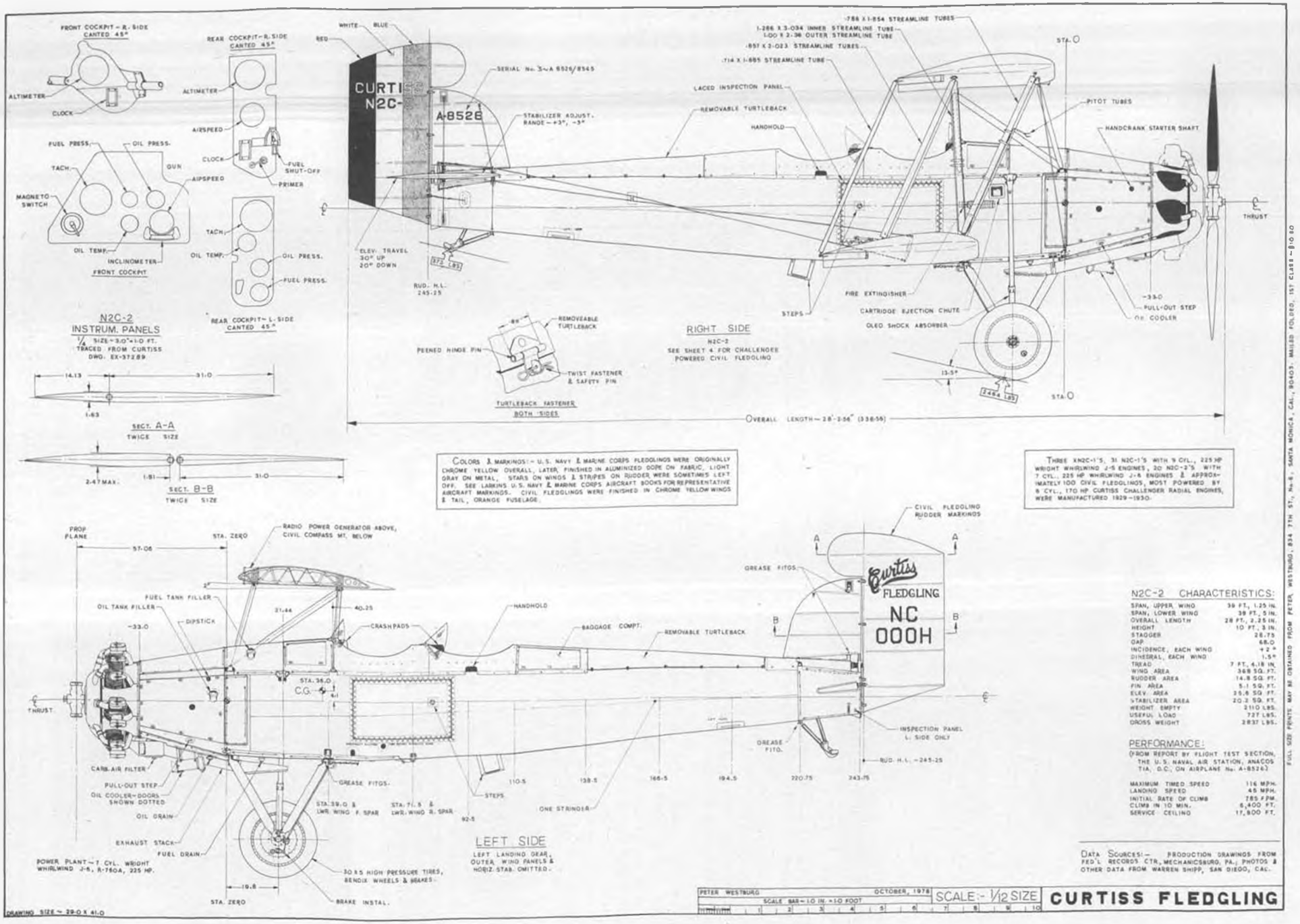
On military Fledglings, a single fixed .30 caliber Browning was installed on the right side ahead of pilot. A Lewis gun on a Scarff ring was also carried for gunnery training.

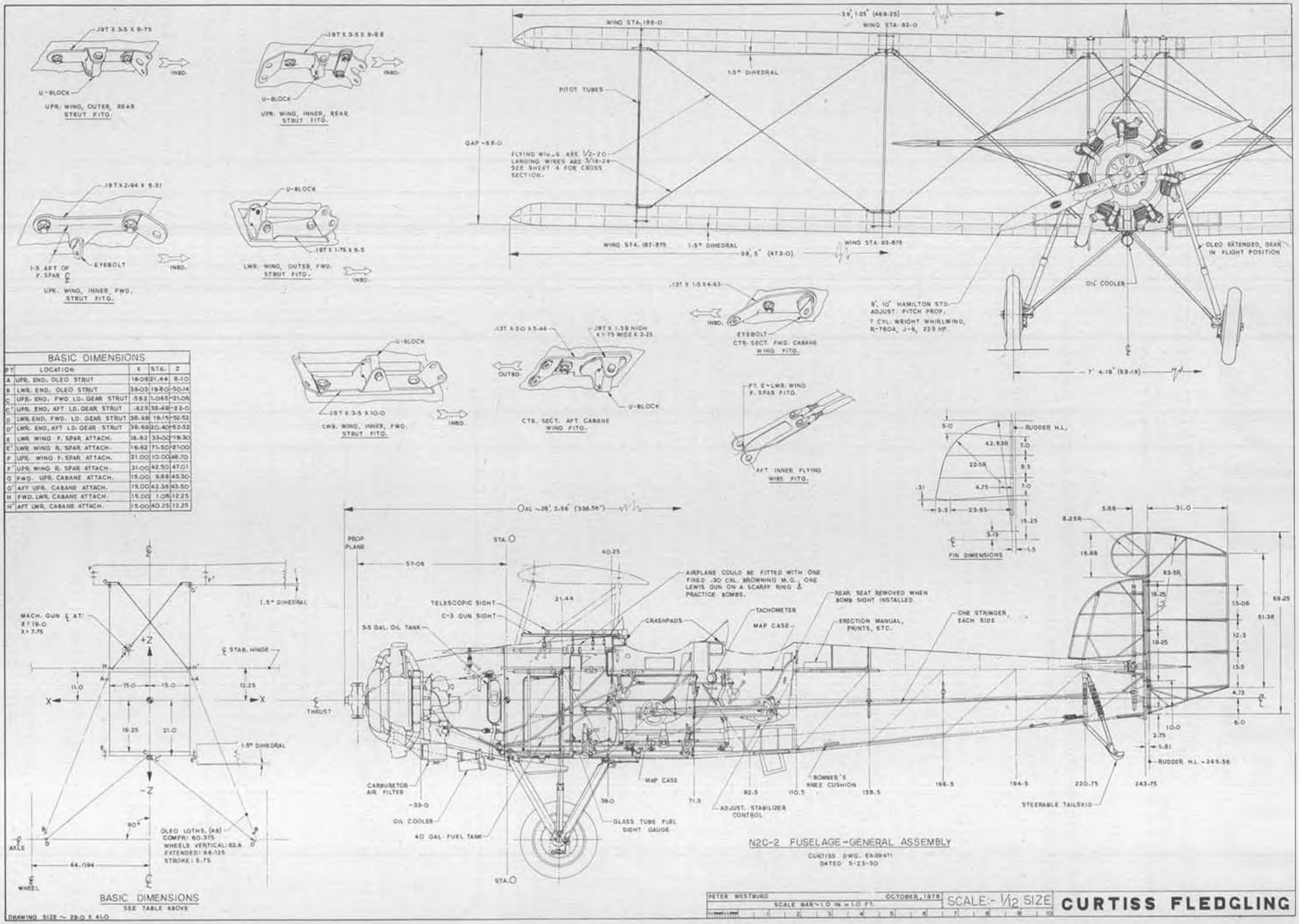
The J-5 Whirlwind went out of production at about the end of production of the N2C-1. A follow-on contract for 20 Fledglings called for the N2C-2's to be equipped with the 7-cylinder J-6 Whirlwind. The merger of Curtiss and Wright had not yet occurred; Curtiss chose to develop its own aircooled engine, and installed it on the civil Fledglings. The 6-cylinder Challenger put out 170 hp and pulled the Fledgling along at a top of 107 mph and a lazy cruise of 87.

The Fledgling, like its namesake, was an ungainly looking bird, but it became so well known that both the civil and Navy versions were called Fledglings. Though it appeared overgrown and awkward, it was not. Navy test reports gave it good marks in all categories of maneuvers, except in slow or double rolls, chandelles, and falling leafs . . . maneuvers normally performed only by fighting aircraft. And, when fitted with floats, the Fledgling could not easily recover from a spin; it was therefore not recommended for training pilots to fly seaplanes.

To be continued.

Good detail for modelers in this photo of Joe Erale's Fledgling restoration. Most of the metal parts are from the original NC-263H flown by Assem Joradnoff. Shipp photo.


FRONT COCKPIT – R. SIDE CANTED 45°
ALTIMETER
CLOCK
REAR COCKPIT – R. SIDE CANTED 45°
ALTIMETER
AIRSPEED
CLOCK
FUEL SHUT-OFF
PRIMER
FUEL PRESS.
OIL PRESS.
TACH.
GUN
AIRSPEED
MAGNETO SWITCH
OIL TEMP.
INCLINOMETER
FRONT COCKPIT
TACH.
OIL TEMP.
OIL PRESS.
FUEL PRESS.
REAR COCKPIT – L. SIDE CANTED 45°
N2C-2
INSTRUM. PANELS
1/4 SIZE – 3.0" = 1.0 FT.
TRACED FROM CURTISS DWG. EX-37289
14.13
31.0
1.63
SECT. A-A
TWICE SIZE
2.47 MAX.
1.81
31.0
SECT. B-B
TWICE SIZE
WHITE
BLUE
RED
CURTISS
N2C-2
A-8526
SERIAL No. 3-A 8526/8545
STABILIZER ADJUST. RANGE – +3°, -3°
ELEV. TRAVEL 30° UP 20° DOWN
RUD. H.L. 245.25
REMOVEABLE TURTLEBACK
PEENED HINGE PIN
TWIST FASTENER & SAFETY PIN
TURTLEBACK FASTENER BOTH SIDES
RIGHT SIDE
N2C-2
SEE SHEET 4 FOR CHALLENGER POWERED CIVIL FLEDGLING
.756 X 1.854 STREAMLINE TUBES
1.286 X 3.034 INNER STREAMLINE TUBE
1.00 X 2.36 OUTER STREAMLINE TUBE
.857 X 2.023 STREAMLINE TUBES
.714 X 1.685 STREAMLINE TUBE
LACED INSPECTION PANEL
REMOVABLE TURTLEBACK
HANDHOLD
STA. 0
PITOT TUBES
HANDCRANK STARTER SHAFT
THRUST
FIRE EXTINGUISHER
CARTRIDGE EJECTION CHUTE
OLEO SHOCK ABSORBER
STEPS
13.5°
STA. 0
-33.0
PULL-OUT STEP
OIL COOLER
OVERALL LENGTH – 28'-2.56" (338.56)
COLORS & MARKINGS:– U.S. NAVY & MARINE CORPS FLEDGLINGS WERE ORIGINALLY CHROME YELLOW OVERALL, LATER, FINISHED IN ALUMINIZED DOPE ON FABRIC, LIGHT GRAY ON METAL, STARS ON WINGS & STRIPES ON RUDDER WERE SOMETIMES LEFT OFF. SEE LARKINS U.S. NAVY & MARINE CORPS AIRCRAFT BOOKS FOR REPRESENTATIVE AIRCRAFT MARKINGS. CIVIL FLEDGLINGS WERE FINISHED IN CHROME YELLOW WINGS & TAIL, ORANGE FUSELAGE.
THREE XN2C-1'S, 31 N2C-1'S WITH 9 CYL., 225 HP WRIGHT WHIRLWIND J-5 ENGINES, 20 NDC-2'S WITH 7 CYL., 225 HP WHIRLWIND J-5 ENGINES & APPROXIMATELY 100 CIVIL FLEDGLINGS, MOST POWERED BY 9 CYL., 170 HP CURTISS CHALLENGER RADIAL ENGINES, WERE MANUFACTURED 1929–1930.
PROP PLANE
57-06
STA. ZERO
RADIO POWER GENERATOR ABOVE, CIVIL COMPASS MT. BELOW
FUEL TANK FILLER
OIL TANK FILLER
DIPSTICK
-33.0
21.44
40.25
CRASH PADS
HANDHOLD
BAGGAGE COMPT.
REMOVABLE TURTLEBACK
STA. 36.0 C.G.
4.1
THRUST
CARB. AIR FILTER
PULL-OUT STEP
OIL COOLER-DOORS SHOWN DOTTED
OIL DRAIN
EXHAUST STACK
FUEL DRAIN
POWER PLANT – 7 CYL. WRIGHT WHIRLWIND J-6, R-760A, 225 HP.
GREASE FITGS.
STA. 39.0 & LWR. WING F. SPAR
STA. 71.5 & LWR. WING R. SPAR
92.5
110.5
138.5
166.5
194.5
220.75
243.75
STEPS
ONE STRINGER
30 X 5 HIGH PRESSURE TIRES, BENDIX WHEELS & BRAKES
BRAKE INSTAL.
19.8
STA. ZERO
LEFT SIDE
LEFT LANDING GEAR, OUTER WING PANELS & HORIZ. STAB. OMITTED.
CIVIL FLEDGLING RUDDER MARKINGS
A
A
B
B
GREASE FITGS.
Curtiss
FLEDGLING
NC
000H
INSPECTION PANEL L. SIDE ONLY
GREASE FITG.
RUD. H.L. – 245.25
N2C-2 CHARACTERISTICS:
SPAN, UPPER WING 39 FT., 1.25 IN.
SPAN, LOWER WING 39 FT., 5 IN.
OVERALL LENGTH 28 FT., 2.25 IN.
HEIGHT 10 FT., 3 IN.
STAGGER 28.75
GAP 68.0
INCIDENCE, EACH WING +2°
DIHEDRAL, EACH WING 1.5°
TREAD 7 FT., 6.18 IN.
WING AREA 368 SQ. FT.
RUDDER AREA 14.8 SQ. FT.
FIN AREA 5.1 SQ. FT.
ELEV. AREA 35.8 SQ. FT.
STABILIZER AREA 20.2 SQ. FT.
WEIGHT EMPTY 2110 LBS.
USEFUL LOAD 727 LBS.
GROSS WEIGHT 2837 LBS.
PERFORMANCE:
(FROM REPORT BY FLIGHT TEST SECTION, THE U.S. NAVAL AIR STATION, ANACOS TIA, D.C., ON AIRPLANE No. A-8526)
MAXIMUM TIMED SPEED 116 MPH.
LANDING SPEED 45 MPH.
INITIAL RATE OF CLIMB 785 F.P.M.
CLIMB IN 10 MIN. 6,400 FT.
SERVICE CEILING 17,800 FT.
DATA SOURCES:– PRODUCTION DRAWINGS FROM FED'L RECORDS CTR., MECHANICSBURG, PA.; PHOTOS & OTHER DATA FROM WARREN SHIPP, SAN DIEGO, CAL.
PETER WESTBURG
OCTOBER, 1978
SCALE BAR – 1.0 IN. = 1.0 FOOT
SCALE:– 1/12 SIZE
CURTISS FLEDGLING
DRAWING SIZE – 29.0 X 41.0
FULL SIZE PRINTS MAY BE OBTAINED FROM PETER WESTBURG, 834 7TH ST., No. 6, SANTA MONICA, CAL., 90403; MAILED FOLDED, 1ST CLASS – $10.00



BASIC DIMENSIONS				
PT	LOCATION	X	STA.	Z
A	UPR. END, OLEO STRUT	18-09	21.44	8-10
B	LWR. END, OLEO STRUT	38-03	19-80	-50.14
C	UPR. END, FWD LD. GEAR STRUT	.562	1.065	-21.06
C'	UPR. END, AFT LD. GEAR STRUT	.625	38-49	-22-0
D	LWR. END, FWD. LD. GEAR STRUT	38.69	19.15	-52.52
D'	LWR. END, AFT LD. GEAR STRUT	38.69	20.40	-52.52
E	LWR. WING F. SPAR ATTACH.	16.62	33-00	-19.30
E'	LWR. WING R. SPAR ATTACH.	16.62	71-50	-21.00
F	UPR. WING F. SPAR ATTACH.	21.00	10.00	48.70
F'	UPR. WING R. SPAR ATTACH.	21.00	42.50	47.01
G	FWD. UPR. CABANE ATTACH.	15.00	9.88	45.30
G'	AFT UPR. CABANE ATTACH.	15.00	42.38	43.50
H	FWD. LWR. CABANE ATTACH.	15.00	1.08	12.25
H'	AFT LWR. CABANE ATTACH.	15.00	40.25	12.25

FUEL LINES

GEORGE ALDRICH
P.O. Box 1426
Mission, TX 78572

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

OTTO BERNHARDT
17119 S. Harvard
Gardena, CA 90247

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

ALDRICH

• Today, most of the C/L Stunt boys are looking for a .40 that puts out the power of a .46 with no increase in weight, in order to avoid flying on the heavier lines required. It occurred to us that what they are looking for in an engine is low end power, and this applies to many phases of modeling, such as scale, or any event where swinging a big prop is desirable. I've heard from several stunt fliers who are using 12-in. dia. props on an O.S. 40 FSR. As it comes out of the box, this engine (and many others) are simply not meant to swing this much wood.

Many of today's engines are timed on the "high" side. What this means is that the exhaust timing is in the 140° to 165° area; from the time the exhaust opens until it closes through bottom dead center. If you subtract 165° from 360°, you get 195° of rotation from the time the exhaust closes until it opens, through top dead center. One half of this rotation is on the up stroke. The other one half is the down or power stroke. It follows that, the longer the exhaust stays open, the less power stroke there is. Also, if you have a high timed engine, it will develop its maximum power at a higher rpm range than one that is timed lower.

There are two things that can be done to improve an engine's low end range:

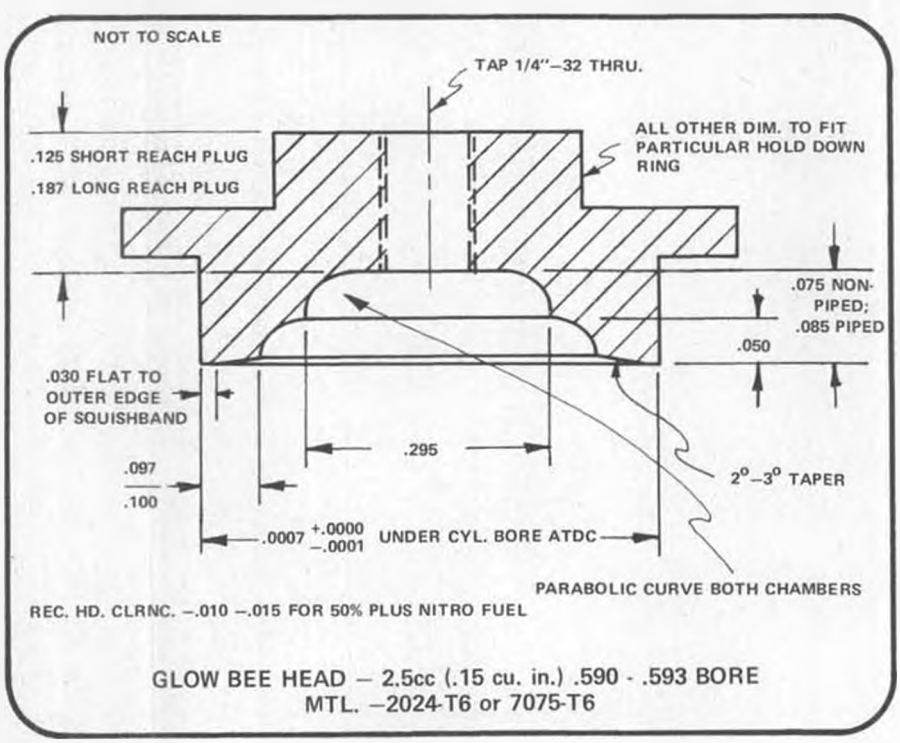
1) Lower or drop the cylinder in the crankcase. This operation is best performed by machining material from the top of the crankcase (.0025 to .003 = 1° of exhaust timing). Example: Your engine has 145° of exhaust timing, and you want to lower it to 135°. Turn a mandrel in a lathe that is a push fit to the bore in the crankcase, and face .025 inch (10° x .0025 = .025) off the top surface of the crankcase.

2) Raise the intake timing of the cylinder. Some engines have a long "blow down" period. (The difference between when the exhaust and the intake ports open is the "blow down" period.) A long blow period tends to make an engine "peaky" and resist holding a good 4-cycle setting or low idle. This last operation should only be performed if, after lowering the exhaust timing, the engine will not hold a good steady 4-cycle without going lean during maneuvers.

These two operations can be considered as a preferable alternative to the lowering of the piston baffle we talked about a few months ago, in reference to the K & B .40, #8011. Also, as a thought to experimentation, a combination of both could give the desired results.

It's well to remember that engines timed for C/L Stunt, i.e. good strong 4-cycle, low-end power, etc., also produce excellent idling and handling characteristics for R/C scale and sport flying.

While we continually state that we no longer do *any* engine rework, we still continually get requests for various custom services. Recently, a surge of this happened when Bill Lee won C/L Scale Racing at the big Winston Salem meet. Shortly after, the phone rang for several days with the ensuing requests for Rossi 15 rework or "that Glow Bee button head of yours". To abate the requests and to assist those of you who want it, herewith is the head design we worked out for the Glow Bee plug a few years ago. Here are a couple of names and addresses of those who are fully capable of performing custom engine work: Henry Nelson, 729 Valemont Dr., Verona, PA 15147, and Vic Garner, Box 573, Livermore, CA 94550. If there are any others out there who are soliciting this kind of work, let us hear from you. •



KLAUSE

• At a recent control-line contest, which featured Mouse Racing, someone asked, "Where's the best place to put the fuel tank?" My response was, "In the middle of the carburetor." I honestly was not trying to be facetious. That really would be the best place. Unfortunately, it's physically not very feasible, besides being impractical from the aspect of tank capacity. As a consequence, in C/L, we have to find other ways to overcome or diminish the effects of varying fuel pressure due to the changing head of fuel and centrifugal force. If you've flown C/L, then you've most likely experienced the frustrations of the typical rich-to-lean change in mixture. In large tank capacity events, it's more of a problem than with the 1/2A events, but even there it can cause problems.

Let's see what can be done in the way of a simple but effective tank for Class II Mouse and 1/2A Scale Racing . . . currently, perhaps the two fastest growing C/L events. Certainly, they are relatively inexpensive events, and they can provide a lot of enjoyment. If what follows seems unnecessarily basic, just remember that fuel tanks have been *the* major headache in C/L ever since the glow plug took over from the ignition engine.

The most basic tank has a fuel pick-up and two other lines for fueling and normal venting to the atmosphere. Such tanks are available at hobby shops; however, they usually have a horizontal (centrifugal) fuel head of an inch or more. This causes too much of a change in pressure to permit a nice consistent engine run throughout the full tank of fuel. If you want to use this type tank, don't exceed 1/2 inch horizontal fuel

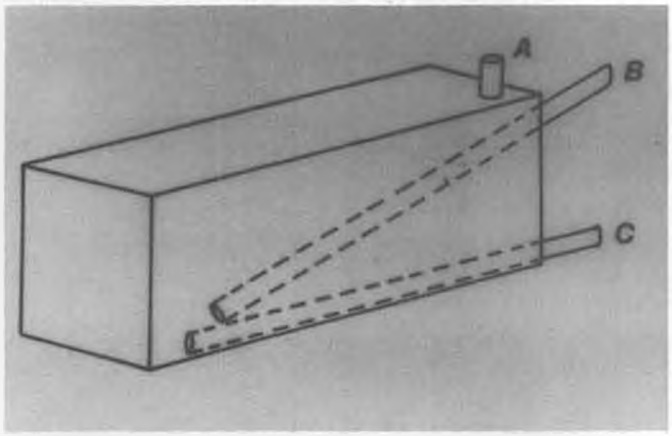
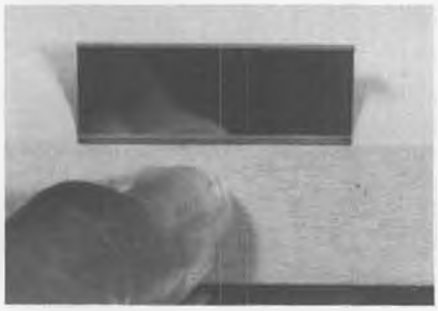
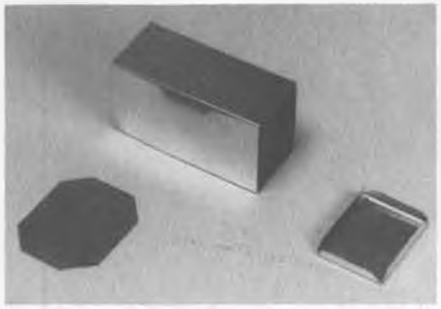


Diagram of a typical uni-flow tank. Note that the fuel pick-up and air bleed lines are on the outboard wall of the tank.

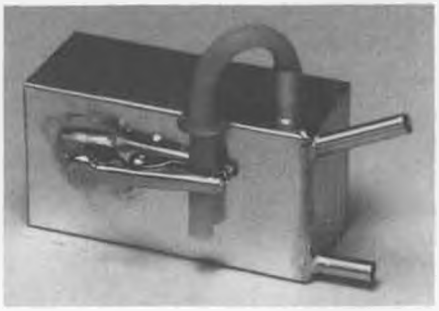
Expensive tools aren't needed to make your own tank. Just use what's available, together with a little imagination.



Use a piece of 1/8 plywood and the edge of the kitchen counter to make the bends.



Partially completed tank. One end piece is finished, the other is ready to be bent.



Completed tank. Squeezing the alligator clip opens the vent. Let it go, and it's sealed.

head, and try to keep the fuel pick-up in line with the carburetor. A good tank capacity for Class II 1/2A racing events is 3/4 of an ounce. Due to practical tank installation reasons, we're just about limited to a one-inch vertical tank height in these events. Thus, a 3/4-ounce tank would be a 1/2 inch wide, one inch high, and 2.7 inches long. (Note: 1.8 cubic inches equals one fluid ounce.) Such a tank will work very satisfactorily. The only problem sometimes encountered is during restarts, due to the long fuel draw. A tank like that is not available commercially. So, that means you'll have to make your own. Now, don't throw in the jock by saying, "I can't build a tank." It's really quite easy to build your own tank. Why not give it a try? We'll give a few tips, or so-called secrets, that should help.

Since you're going to build your own tank, let's make a couple of minor changes to the basic tank that will enable us to shorten it to overcome any fuel draw problems. This will mean increasing the width, but the associated horizontal head pressure problems can be offset by building a uni-flow tank. The drawing represents a typical uni-flow tank. "A" is an overflow which must be sealed after fueling. "B" is a vent which should be directed into the slipstream, and "C" is the tank-to-carburetor line. In operation, since the overflow, vent "A", is sealed, air coming into line "B" bleeds into the tank, about a 1/4 inch from the fuel pick-up point, as fuel is drawn from the tank. The carburetor senses the difference between the bleed and pick-up points rather than a changing head of horizontal pressure. It is especially important to note that this system will only work satisfactorily if: 1) the overflow line is sealed during operation; 2) the tank is airtight; and 3) the air bleed and pick-up lines are in vertical alignment. Keep them about 1/4 inch apart longitudinally.

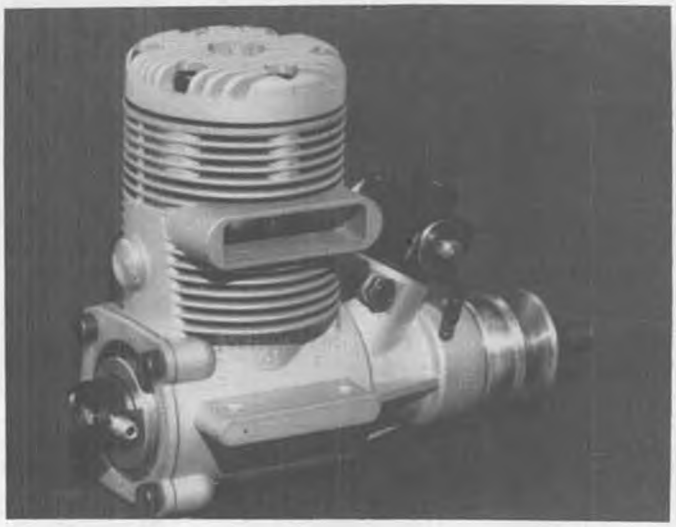
OK, let's begin by assembling what we'll need to build the tank. As you can see from the accompanying photograph, only very basic tools are necessary. The pieces of wood are scrap 1/8-inch plywood, and are used to bend and form the tank. A good material for the tank is K&S tin, which is usually available at hobby shops. You'll also find the 1/8-inch brass tubing in the K&S display rack. The small alligator clip, which will be used as an automatic vent shut-off, is readily available from Radio Shack or a similar store.

Otto Bernhardt's 3rd homebuilt engine, built about 1937. Inspired by the Baby Cyclone, it features a sand cast alunimum crankcase and bypass cover held in place with copper wire.

After deciding upon your tank dimensions, the first construction step is to scribe and cut the main body of the tank. The tank in the accompanying photographs is 3/4 inch wide, one inch high, and 1-13/16 inches long. Thus, the tin should be cut to 1-13/16 x 3-5/8 inches. (Four sides totalling 3-1/2 plus an extra 1/8-inch wrap-around tab for soldering it together.) Scribe the bending points and then simply bend the tank body as shown in the photographs. At this point, you'll be ready for the first soldering operation. This sometimes causes problems for modelers. Here are a few suggestions for successful soldering: Use an iron that generates sufficient heat . . . 40 or 50 watts. Be sure the tip is clean . . . file or sandpaper it to expose bright, clean copper. Most importantly, be absolutely sure that the metals to be soldered are *chemically* clean. You can clean them of any oxidation by using very fine sandpaper, and then applying some rosin-base soldering paste. Do not use acid soldering flux or acid-core solder. Be sure the iron is hot, and then apply the tip and the solder simultaneously to the metal joint.

Once the body is complete, stand it on end on another piece of tin and scribe a line around it. This will be the size of an end cap. Add an 1/8 of an inch all around for tabs, and then cut and bend it

Continued on page 111



PUMPING the WEBRA .91

By ELOY MAREZ . . . If you've been having fuel draw problems with your big engine, consider fitting it with a pump. This article deals with the Webra .91, but the technique could be applied to other engines also.

The superiority of the fuel pump-equipped engines is now pretty well established, in spite of the minor disadvantages of adjusting them, and that they tend to use a bit more fuel. They are currently probably used in the largest numbers in pattern and scale airplanes, where the reliability and extra power is considered to offset the extra cost.

So far, pumper-equipped engines of displacement larger than .61's have not appeared on the market. Neither the older O.S. .80 or Fox .78, or the newer Webra .91 have integral pumps. The few pictures I have seen of the O.S. .90 don't show it to be pumper equipped either. Possibly the designers have discovered that these larger engines have enough fuel draw capabilities to be more forgiving of tank placement and changing fuel levels.

But there is always the 10% that NEVER get the word! In this case, it was a Webra .91 that we were trying to fly on a 34-ounce tank . . . please don't ask why. It would not hold a setting for the entire flight, wanting to lean out during nose-up maneuvers after a few minutes in the air. There wasn't much to be done about tank placement, due to space restrictions, and it was not something else wrong with the engine or installation. A smaller size tank would be sucked completely dry without any problems at all.

Thus, a pump seemed to be in order, and I started looking around for a quick and easy installation that we could try. As I have a K&B Perry pump-equipped .61 in one of my birds, I pulled it out for a quick look-see. It immediately became obvious that there wasn't much difference between the outside diameter of the K&B pump-equipped backplate and the inside diameter of the .91 backplate. Thus, the K&B part could be turned down slightly, the Webra backplate opened up slightly, and a press fit could be achieved. The Perry carburetor is a little smaller than the Webra throat, and could be bushed in.

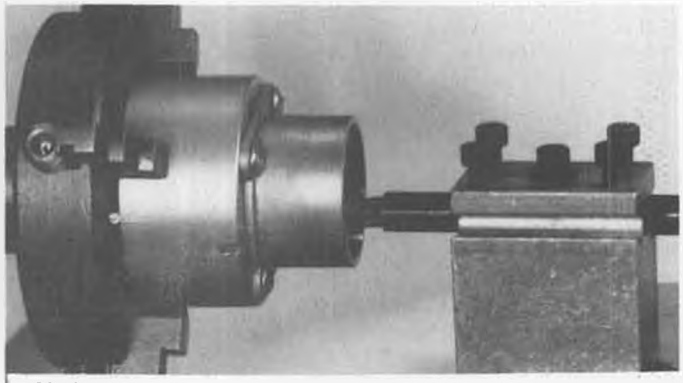
Now if you are thinking that this is a job for a real machinist, you're wrong, because six munz ago I cudn't evn spel it . . . It does require a lathe, and of course, the more experienced the operator, the easier the job will be for him. It didn't look all that difficult, so the decision was made to try it.

Agreed, it was all blind flying, as I had no way of knowing the difference in crankcase pressures of the two engines, the fuel requirements of the Webra, or the exact capabilities of the pump. If vastly different, I really didn't know if the pump would adjust to the required amount. Then of course, changing the carburetor could bring about all sorts of problems of its own.

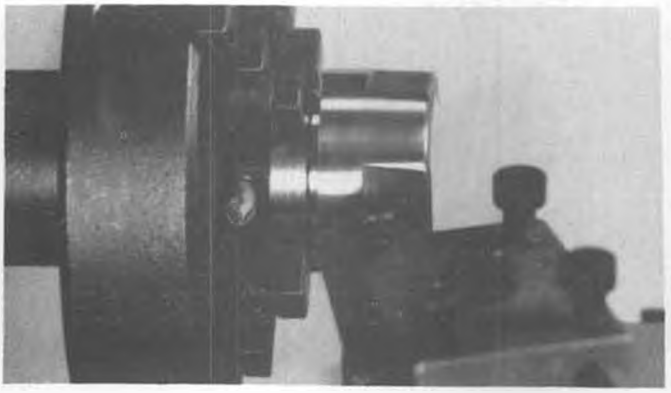
Armed with that complete lack of data, and with the thought that if it did work, I still wouldn't know all the why's and wherefore's, I proceeded to cut up perfectly good backplates from a K&B .61 pumper and Webra .91. I would know what my tach told me. That, and what the engine did in the air, would be proof enough.

Upon close examination, you will see that both backplates taper in very conveniently; the Webra on its inside surface, the K&B externally. As it turned out, when the outside taper of the K&B backplate and the inside taper of the Webra backplate have been machined off, you are almost to the dimensions required for a press fit of the two. But more about that later; let us now proceed with some instructions for the quasi-machinist. The professional

Jigs required. The piece on the left is a press-in adapter, the other is used to hold the Webra backplate during machining.



Machining the Webra backplate. The solid inside cover and taper are removed.

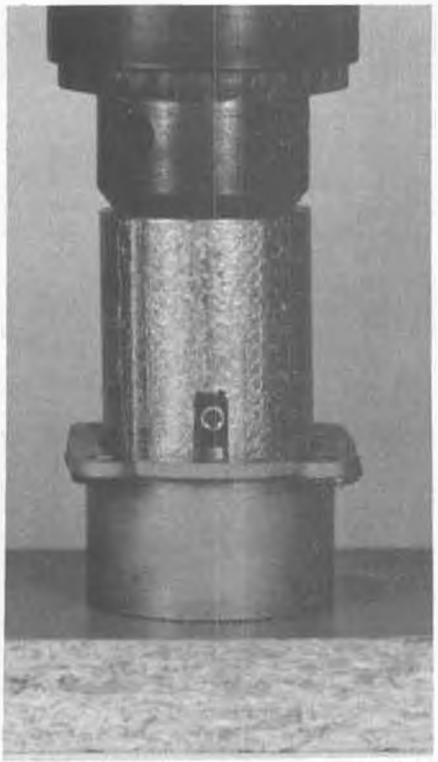


Machining the K&B .61 pump-equipped backplate. The mounting ears and taper are removed.

Machined backplate components ready to be pressed together. Procedure is explained in text.

shouldn't need any and can probably improve on the operation.

My first step, probably because it was the least expensive part to ruin if things went bad, was to bore out the Webra backplate. This boring has to be done all the way through, from front to back. With the rather limited capacity of my lathe chuck, this required a jig, itself counterbored, to be made. I was able to adapt a piece of scrap from the junk box; a short piece of round stock in which holes were drilled and tapped and to which the backplate was attached. Now, being sure that it is perfectly true, cut out the solid front part of the backplate, and remove the inside taper.



Pressing the pump-equipped backplate into the Webra backplate. Drill press is being used as a press. Note pressboard block between backplates and drill press table.

Next, we'll tackle the K&B backplate, which can be mounted in the lathe chuck. Note that the chuck jaws bear on the pump body itself, not on the plastic or on the backplate itself. Obviously, this will not stand foot-tons of pressure, so chuck it lightly, and take fine cuts so as not to upset the alignment. Disregard the flats on two sides of the backplate; they are there to provide piston clearance in the K&B, and do not have any bearing on this conversion.

In this case, machine off the mounting flange, and then the taper. Go carefully, keeping in mind that if you go too far, there is no way to put metal back on. Actually, you are on your own here, as it is a matter of feel. Using the bored-out Webra backplate as a guide, you reduce the diameter of the K&B backplate until it feels about right for a press fit. Again, the pro will take this in stride, but if you are going more on guts than experience, like I was, I can only suggest that maybe a couple of "Our Fathers" or your favorite equivalent might help. Anyway, I took off metal until the Webra backplate would not quite slip on, but felt like it would with pressure.

Then, it is jig time again. In pressing the pump-equipped part in, it is necessary to press only on the outer circumference of what used to be the K&B backplate, and on none of the pump components themselves. In this case, I made a push fitting from a piece of threaded water pipe coupling of one inch I.D. It is necessary to increase the inside diameter by the thickness of the threads, and to cut a couple of slots in the sides to clear the fuel line fittings on the pump.

Most of us have worked with engines enough to know about press fits, and the use of heat for such purposes. But the pump is partly plastic, so using heat was out. Therefore, I went the opposite way . . . I put the part with the pump in the freezer overnight, and left the Webra piece at room temperature.

The next evening came the moment of truth. I should have kept the camera set-up handy to record the smile of satisfaction as the K&B and the Webra parts mated perfectly.

Since I don't own an arbor press, I used my drill press for the purpose. The place to stop is when the two inner surfaces are flush. Originally, I had thought that if the fit felt too loose after starting, I would use a bit of permanent-type metal sealant, such as the Loctite "Stud 'N Bearing Mount" available from Ace R/C. As it turned out, this fit was so good I decided the sealant wasn't needed, but it is something to remember in case of a looser fit.

In case you are not already familiar

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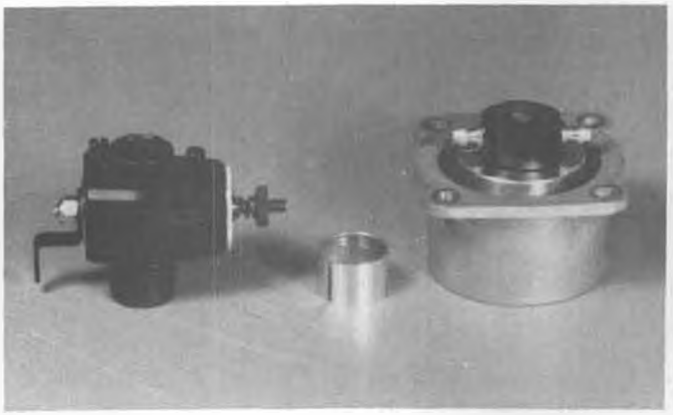
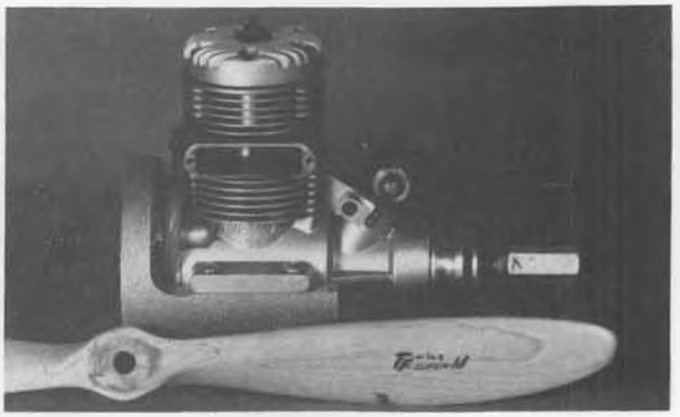


All the new components ready to be installed. Sleeve is required to install the .61 carb into the .91 case.



Pump-equipped .91 installed in CB Enterprises' new CB .90 engine mount. Engine runs better than ever.

The Flight Dynamics A-26 Invader mentioned in the text. Unfortunately, just before going to press, we learned that Flight Dynamics has folded and will not be producing this model. We left the photo and text in so that scratch builders might be inspired to build something similar.

The 1/2-A SCENE

By LARRY RENGER

• Last month, I suggested a 1/2A carrier event using the "Blip Throttle" concept designed into Cox's P-51 ready-to-fly model. The concept has a few advantages; you can take any of the 1/2A throttled engines and work up a two-position throttle system driven by the bellcrank. The throttle can be kicked both up and down. Small variations in model speed come by forward or reverse whipping.

The system is simple, and if you look at the sketch, here is how it works:

A) First, we have a bellcrank (1) with standard 2-wire flying lines (2).

B) On the usual side of the bellcrank, at a typical distance from the pivot (4), is the normal wire (3) to the elevator.

C) The other side of the bellcrank has a curved slot (5) (constant radius from the pivot).

D) A second bellcrank wire (6) extends forward from the curved slot to the engine's (8) throttle sleeve.

E) A bend in the wire and a detent plate (7) allow the throttle wire to stay in only one of two positions.

The way the system functions is that the throttle will set in only the high or low throttle positions. When you give a very fast, hard up control, the end of the slot hits the throttle wire and kicks it over the rib into the next detent. A hard, fast kick of down control will give you low throttle position. The wire is not driven at all in intermediate control positions. The result is a model which flies normally with only two control lines, but can be kicked to high or low throttle, too.

I think that a profile fuselage, sheet wing carrier event using, say, Cox Golden Bee R/C engines and no flaps, automatic hooker, etc., would be fun. The hook could be free-pivoting, with a small drag tab to hold it up in high speed, but letting it fall in low. I'd use sand-filled socks, string, and chalk to set up a blacktop flattop. (The USS MacAdam?)

For ease of construction, you can use a 3/32 plywood bellcrank, or get sheet nylon or styrene if metalwork is a bugaboo to you. I think that weight and wing area should be the free choice of the designer. Why limit the event until some experimentation has been done by a variety of people?

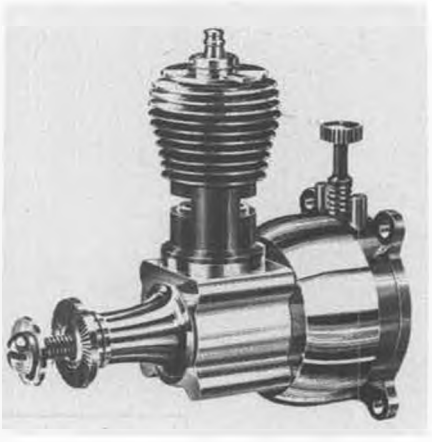
This event would have the same advantages as Mouse Racing: cost is low, time required is relatively small, most parking lots are sufficient flying space, and the younger modelers can handle the models.

Naturally, I suggest that the acceptable subjects be limited to scale profile versions of actual carrier aircraft. That's half the fun. I think that whipping the model is unacceptable during the high-speed run, but should be allowed in low speed, since the throttle is not trimable.

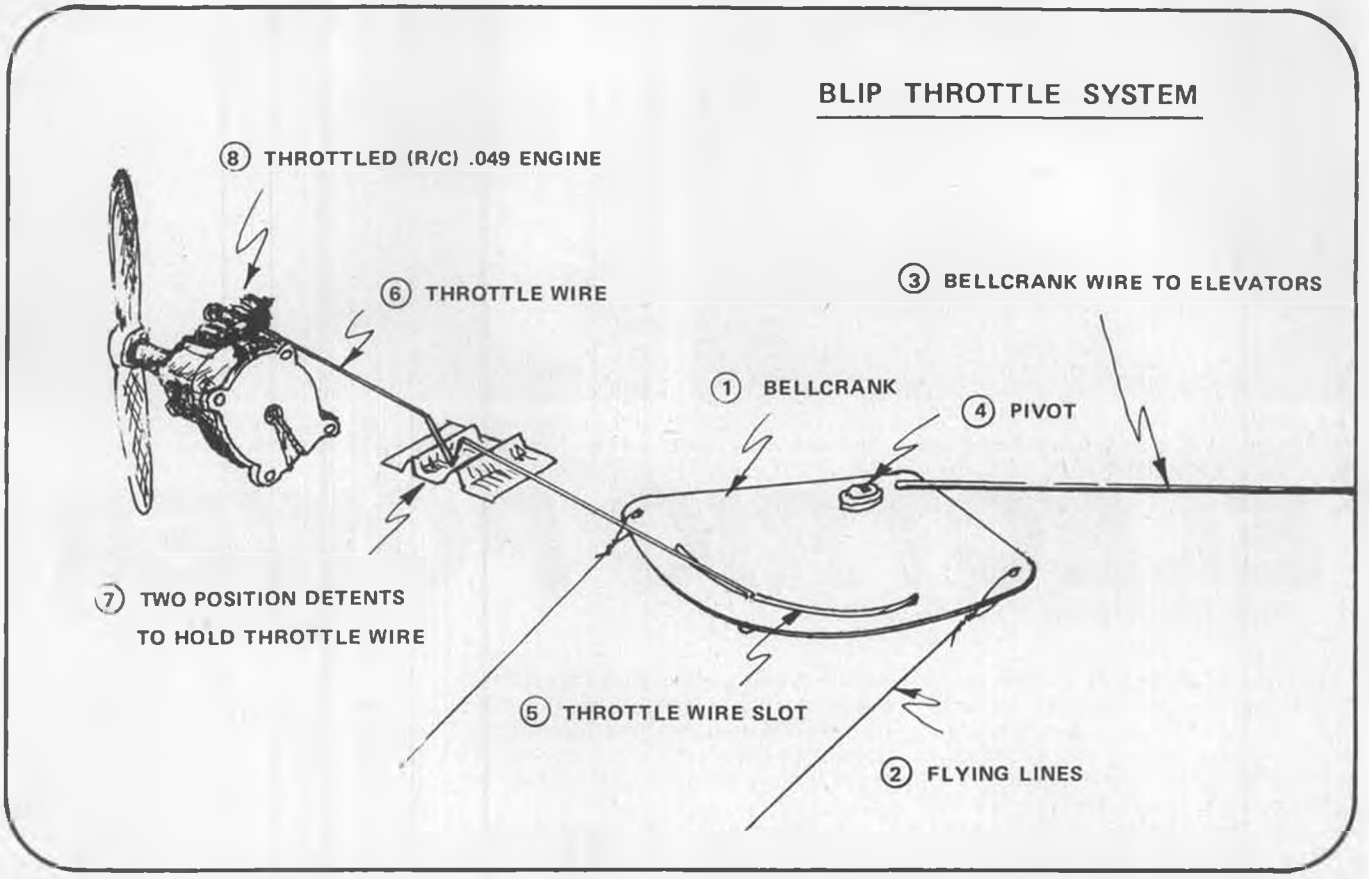
We sure had fun developing the blip-throttle Mustang, and the model was a real crowd pleaser when we did demonstrations at the Nats and MACS Show. Two throttled planes in the same circle is really fun . . . you can play leapfrog!

By the way, Ace has a new throttle for Babe Bee/Golden Bee/Black Widow/

Frank Scott's .020 "Cardcorde" really captures the spirit of sport free flight.



Beautiful etching of the Cox Babe Bee .049, one of the oldest engines still in production.



QRC series engines which works well. It uses a tapered pin which slides into the venturi. I think this should be a legal alternative to the throttle sleeve. Both are readily available systems so no "experts only" stigma need be hung on the new system.

Moving onto a new subject, I received a letter from Bob Kress, who, along with Nick Ziroli, developed the AXIFLO fans. The information is very interesting, so here is the entire text:

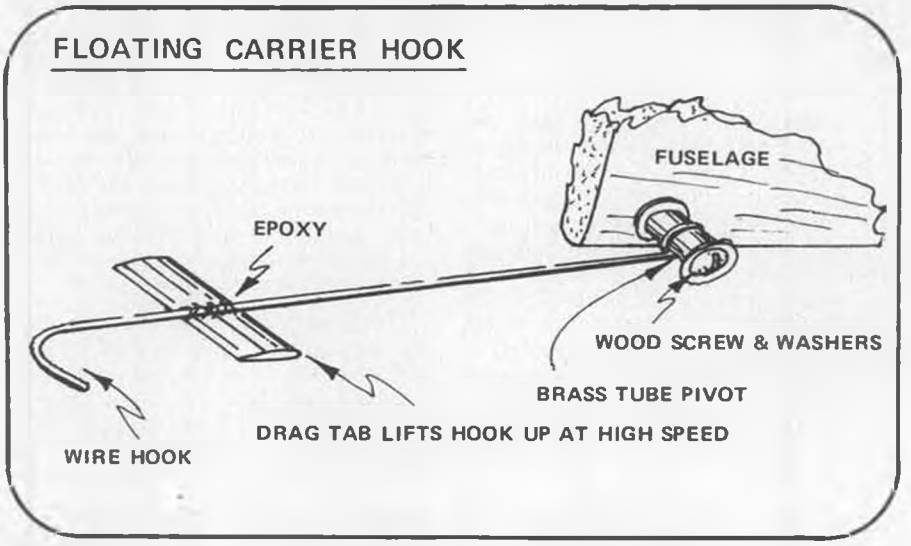
Dear Larry,

My company, Kress Technology, Inc., designs and manufactures the Midwest AXIFLO series ducted fans. I have some clarifying comments regarding your October '78 "1/2A Scene" article in **Model Builder.**

First of all, the RK-049 with a TD .049 and a good pod-type inlet puts out 15-1/2 oz. of static thrust at 20,400 rpm on Cox Red Can 30% nitro. The 16 oz. /20,000/ 25% quoted by Midwest was slightly off. The TD used for the tests had one cylinder washer, no inlet screen, and no pressure.

The same TD was tested with a 6-3 prop, everything else constant, and put out 18 oz. of static thrust. A variety of 1/2A racing props put out from 14 to 16 oz. of static thrust when similarly tested. Of course, installed inside the plane, the jet loses an ounce of thrust (even with a good inlet/exhaust system).

More nitro will up the static thrust, but I have been concentrating on getting good performance for the benefit of the average modeler on mild fuel, so have not tested it. The fan has been tested to 30,000 rpm, so don't worry about blade stress.



We recently ran some very interesting flight tests on two Midwest A-4D's, one with the RK-049 and one with a nose-mounted prop engine. The prop job was ballasted to the same weight as the jet and still had the side air inlets and tailpipe, which caused some unnecessary drag. Both models weighed 31 oz. The results were as follows:

1) With racing props, the prop job would just barely fly. We never got it clear of the brush at the edge of the field.

2) With 6-3 and 5-1/2-4 props, the aircraft would accelerate to takeoff faster than the jet, had an initial climb-out at about the same angle as the jet, but was much slower in flight and could not be looped or rolled without serious altitude loss, whereas the jet could.

The prop job was pulling around some unnecessary ballast and inlet drag, which degraded its performance. I have calculated the inlet/tailpipe drag effect to be roughly 35 to 50 ft./min. degradation in rate of climb out of 375 ft./min. obtainable with the jet A4D. Thus, the effect is not large. The jet, while slow on takeoff and initial climb-out at equal weights, thoroughly outclassed the prop at the higher speeds.

The new RK-20 fan will be of all injection molded nylon to get away from the complicated construction of the early RK-049 and RK-40 fans. Only six self-tapping screws are needed to put it together.

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Two views of Mitch Poling's "Astro Dandy", designed and built especially for the Indoor R/C Record Trials to be held at the IMS Show. Sandra Smith Poling, M.D., is the better looking model in the photo. Astro Dandy has 4 sq. ft. wing area, weighs 16 oz. without motor on-off servo.

ELECTRIC POWER

By MITCH POLING

PHOTOS BY AUTHOR

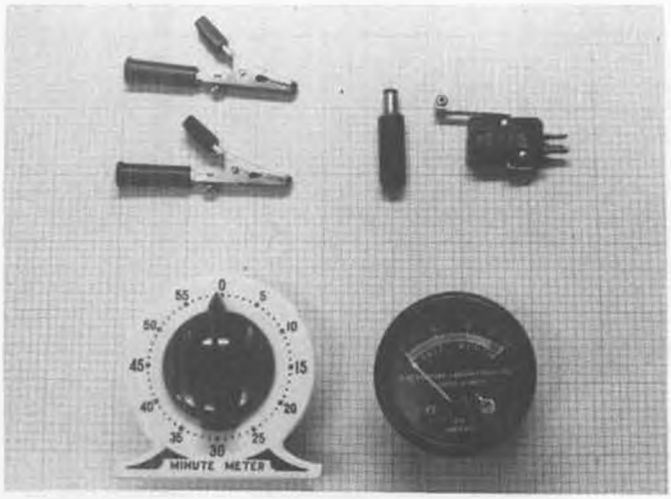
• Let's take a further look at some of the ins and outs of rapid charging the Astro Flight way, and continue from last month. Take a look at the wiring diagram for a field charger. Simple, isn't it? But remember, this diagram is for the Astro charge method, which uses 1.5 volts per Ni-CD cell for charging. This means six volts to charge four cells (Astro 020), twelve volts for eight cells (Astro 05), eighteen volts for twelve cells (Astro 10), and twenty-four volts for eighteen cells (Astro 15 and Astro 25).

Check the figures and make sure you understand this, because it is the heart and core of this type of charging method. Use these numbers and the cells will charge smoothly in fifteen minutes, starting from a current that is six to eight times the capacity of the cell if it is nearly discharged (that is, about 4 amperes for a .500 Ah cell), to a current that is about equal to the rated capacity of the cell in fifteen minutes (again, about .5 ampere for a .500 Ah cell). When I said a smooth charge, that's exactly what happens; all the cells get evened up, even though some may have been lower than others initially. We'll go into this a little later; it is another bonus when using the Astro method. Do note that this is assuming, as usual, that these cells are connected in series (if they are in parallel, all bets are off!).

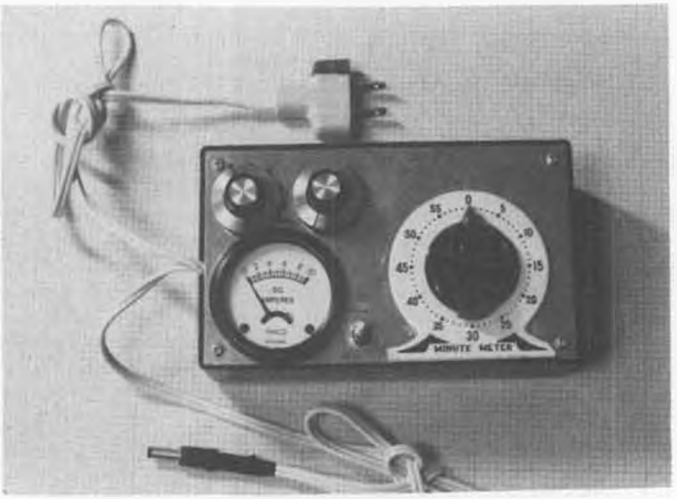
What happens if a charging voltage of less that 1.5 volts per cell is used? The charge current is too low, and the cell will not charge in fifteen minutes. If the charging voltage is less than 1.25 volts per cell, the cells will, in fact, go into discharge instead of being charged. I know, I prove it now and then because I have taps at 3.6 volts, 6 volts, and 12 volts on my charging battery, and every once in awhile I goof and plug the charger into the wrong tap. The ammeter needle kicks backwards and tries to register below the zero peg when I try to charge the Astro 05 from 6 volts!

On the other hand, what happens if a charging voltage of more than 1.5 volts per cell is used? The current skyrockets; at 2.0 volts per cell, it is up to 8 amperes on a discharged Astro cell (.550 Ah). Worse yet, this current does not taper down, and stays above six amperes even when the cell is 100% charged. Such a charge rate would charge the cell in four minutes, which is OK, but once it is 100% charged, like a pitcher filled to the brim, something has to spill. The battery gets hot, then the seals around the top of the cell give up. This would happen, I guesstimate, for the example I just gave, in about six to eight minutes after the charge was started. The result is a cell that has a top that leaks like mad, or the top popped off entirely like a pop top can. I have done this, to my regret, but that does seem to be the limit . . . the batteries don't blow up, they just pop their top.

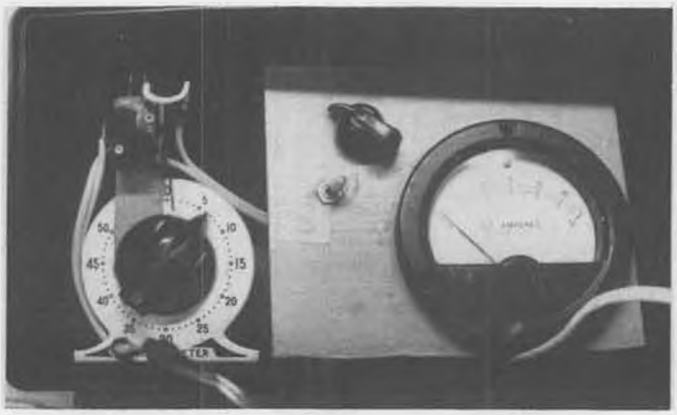
Remember, this is all based on the Astro technique, which uses no resistors in the charge line. If a resistor is used in the charge line, the situation is completely different, and this will be talked about later. So, the Astro method is smooth, easy, requires a minimum of experience and equipment, and last but not at all least, absolutely requires a charging voltage of 1.5 volts per cell, no more, no less. That is not a hard requirement to meet, and all the advantages



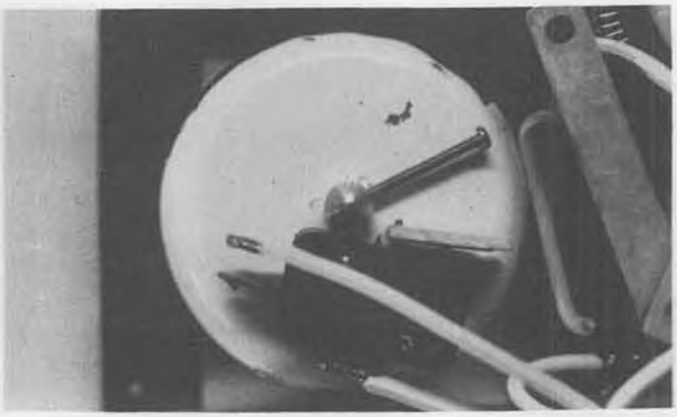
All the parts required for the do-it-yourselfer who wants to make his own battery charger: timer, ammeter, plug, clips, switch.



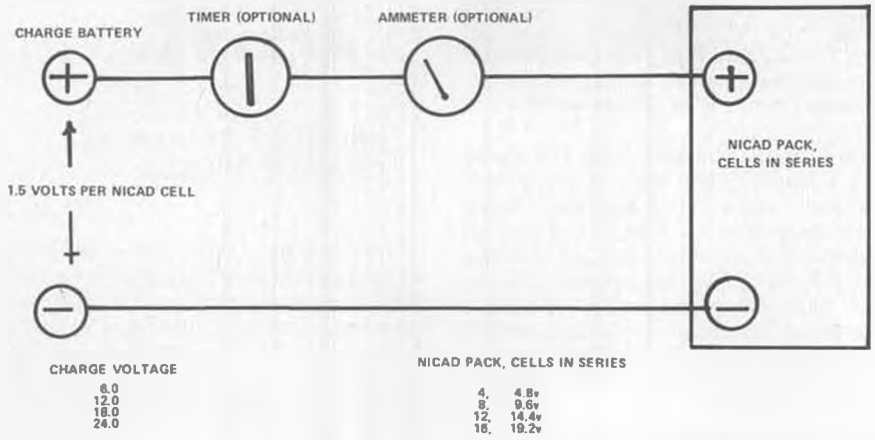
Portable charger from parts in photo at left. Uses regular 115 V plug, color coded with tape for positive and negative leads.



Homebuilt field charger described in text. Note how timer pointer will engage switch lever. Also has rheostat for resistor charger.



Closeup of back of timer in photo at bottom of p. 66. Note how long bolt in wheel collar on timer shaft will activate switch lever.



make this one requirement more than acceptable.

There is a postscript to add to all this, since what applies to electric flight can also apply to the radio equipment batteries. If the cells used in the R/C gear are General Electric, as mentioned in the previous column, there is no problem at all, and the R/C batteries can be charged on the field up to nearly 100% capacity in fifteen minutes. Six volts would be right for the four-cell receiver packs, and twelve volts would be right for those transmitters that use eight cells. If the cells are not General Electric, they have more internal resistance and will charge much more slowly. How long it would take for a 100% charge would only be a guess on my part, since I only use GE batteries in my radios, nor do I know how other brands would tolerate such a rate of charge. If anyone has had some experience in this, let me know and I will be happy to pass it on. I do field-charge all my radio equipment, both the receiver and transmitter packs, and have done so for four years with no problems. In fact, I haven't used a trickle charger (wall charger) for my radios for four years!

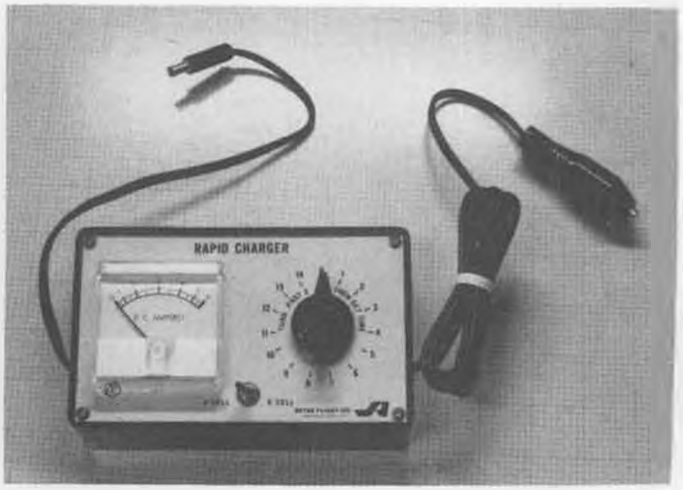
Astro Flight (13377 Beach Avenue, Venice, CA 90291) has a good four-page catalog of accessories which is worth sending for. The auto charge cord or the alligator clip charge cord are all you need for charging (No. 4001 and No. 4002, list $7.95), but for most of us, the rapid charger (No. 4005, list $29.95) is best because it has a timer and an ammeter, so the charging can be watched and cut off automatically.

If you want to make your own charger, the parts are shown in the photos along with two homemade chargers of mine. One is in a lunch box field box, the other is in a Radio Shack plastic box for portable use. The photos show two ways of shutting off the current with a timer. The simplest way is to servo tape the switch on the front of the timer so that the pointer on the timer hits the switch lever and turns it off. If you wish a hidden switch set-up, servo tape the switch to the back of the timer and use a wheel collar with a long bolt to shut off the switch. The long bolt serves as the pointer and is easy to adjust for the right lineup on the off position. The short stub shaft sticking out the back of the timer is just barely long enough to hold the wheel collar, but so far my set-up has held together just fine.

My Astro Dandy indoor R/C plane hasn't flown indoors yet, but it has had a lot of flights outdoors. It flies very well indeed, at about 15 to 20-foot altitude for about five to six minutes. This isn't

Continued on page 105

Astro Flight charge cord that connects in auto cigarette lighter. Doesn't have timer, so don't forget to unplug after 15 minutes!



Astro Flight's Rapid Charger. Lighter plug shown, also available with alligator clips for Gel Cell or motorcycle battery use.

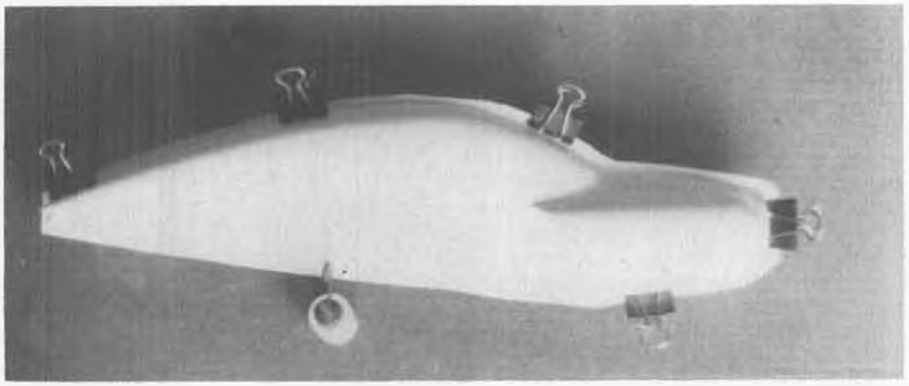
Lovely Denise Viosca with Charlie's Plane Jane. Kit is highly prefabricated, comes with pre-built and sheeted wings, pre-built fuselage and tail surfaces. Takes a .15 to .25 size engine.

PLANE JANE

PRODUCT REVIEW, by CHARLIE VIOSCA

• Model Merchant, P.O. Box 3792, Irving, Texas, is a kit manufacturer with quite a variety of fine kits on the market. There is something for most everyone. Racing enthusiasts can go from a 1/2A Rickey Rat to two Quarter Midget racers to the Super Quick 500 Racer to a Formula One Midget Mustang. These are only some of Model Merchant's kits, and you will be able to read about them in coming product reviews.

This review will deal with the Plane Jane Trainer, kit No. MM121. Plane Jane is a sport trainer with a high wing. It is a gentle lady with a .15 or a real powerhouse with a .25. Wing span is 51 inches, with a total of 500 square inches. Complete with a 3-channel radio and a .15, it should weigh about 3-1/2 lbs.; with 4 channels and a .25, it should approach 4 lbs. Of course, how you build will vary the weight some.



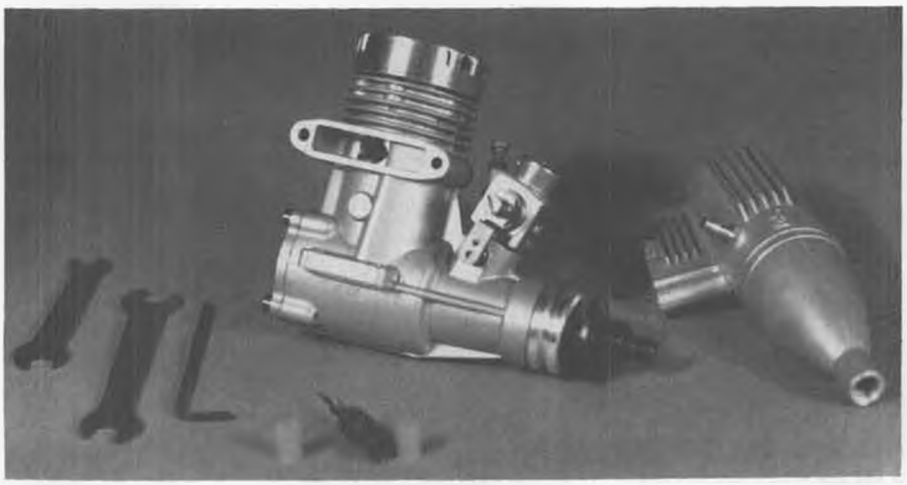
Gluing the plastic cowl halves together. Cutouts for wing and fuselage are made later. Use of spring clips from stationary store is a clever way to hold pieces while the glue dries.

The kit is most complete, with a fine set of instructions and diagrams. You will need the usual items, such as glue and covering material. Building is a simple thing, even for the beginner, as the fuselage is already built, wings covered, and tail cut. Following the instructions will produce a fine sport trainer. The instructions include how to build the kit with ailerons. Should you choose to make it 4 channels, ailerons add just the right touch for the sport flier and everyday flying pleasure.

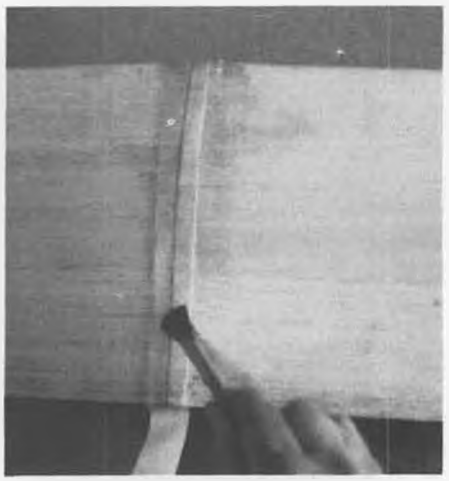
Let us briefly go through the building steps. Join the wing halves by adding the plywood dihedral brace and gluing the wing halves together. Glass tape the center section. Except for painting or plastic covering, you are through with the wing.

The fuselage is most complete. Bolting on the main landing gear, nose gear bearings and wing hold-down dowels is all that is necessary (besides covering).

Attaching the tail is very simple; mark it as shown in the diagrams and epoxy it



The O.S. .25 Schnuerle used on Charlie's model. When it comes to workmanship and appearance, O.S. engines are unexcelled. Muffler and wrenches are included with the engine.



After wings are glued together, the joint is reinforced with fiberglass and epoxy.

into place. Add triangular vertical fin bracing and you are complete here.

Cut the cowl from the plastic parts sheet and follow the instructions for gluing it together. The tail surfaces are cut, shaped and sanded. Mark them as per the instructions, and glue into place on the fuselage.

After painting or covering, you are ready to attach the rudder, elevator, and ailerons (if used).

I have built and flown both the 3 and 4-channel models. An EK LRB was used and proved to be just the ticket. One of the accompanying photos shows the radio installation. The brick was used for rudder and elevator, while the ailerons and throttle were controlled by separate servos. The brick is small, light, and powerful enough to control any size model. The SM servos are small, fast and very responsive. All of my EK radios are equipped with the Ni-Cd battery packs, both in the transmitter and receiver. I find the Ni-Cd batteries much more convenient to operate, and while they cost more initially, they are cheaper in the long run. I have had only one radio with dry cells in the transmitter, and quickly converted it after crashing an airplane due to battery run-down. With Ni-Cds and EK ESV, you can tell exactly the condition of the batteries. With the dry cells, you are just guessing. I depend on the ESV to tell me how my batteries are, and so far, it has not let me down. I think all R/C modelers should have one.

Power for the Plane Jane comes from a Super Tigre .15 R/C. This small, reliable powerhouse really does the job. I installed an O.S. Schneurle .25 in the 4-channel Plane Jane, and it handles more like a pattern ship, very responsive with enough power to haul it almost straight up. The Super Tigre .15 is more than enough engine for training and sport flying, but there is always the flier

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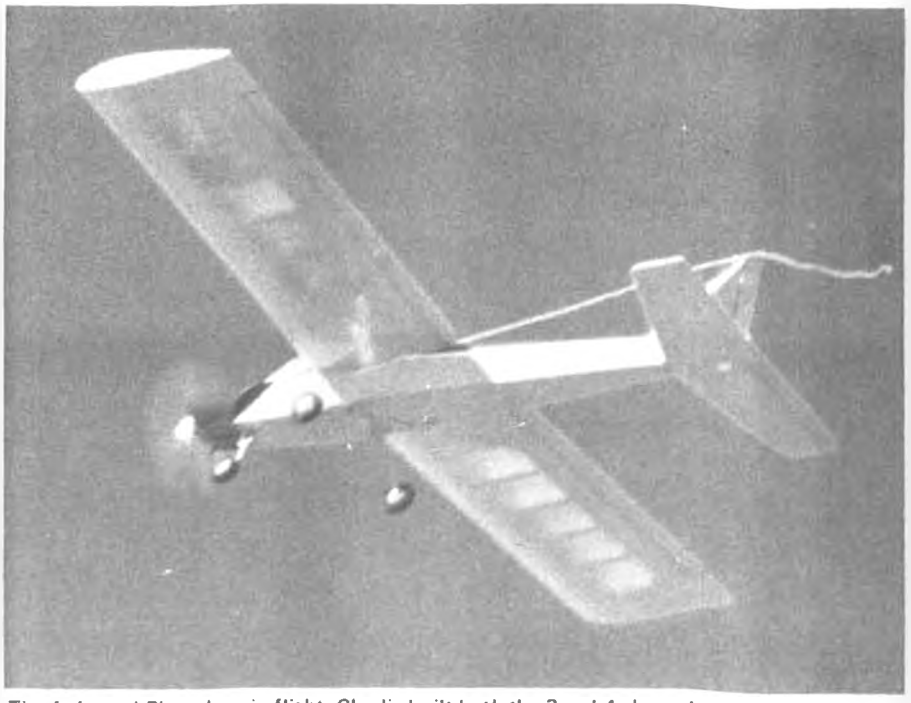
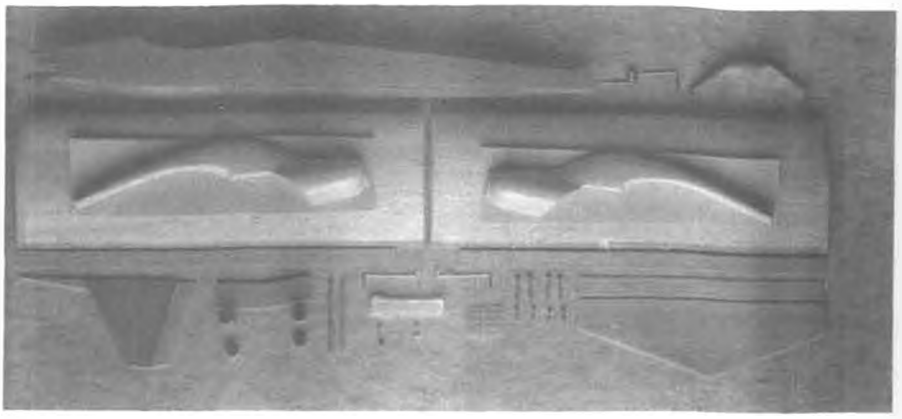
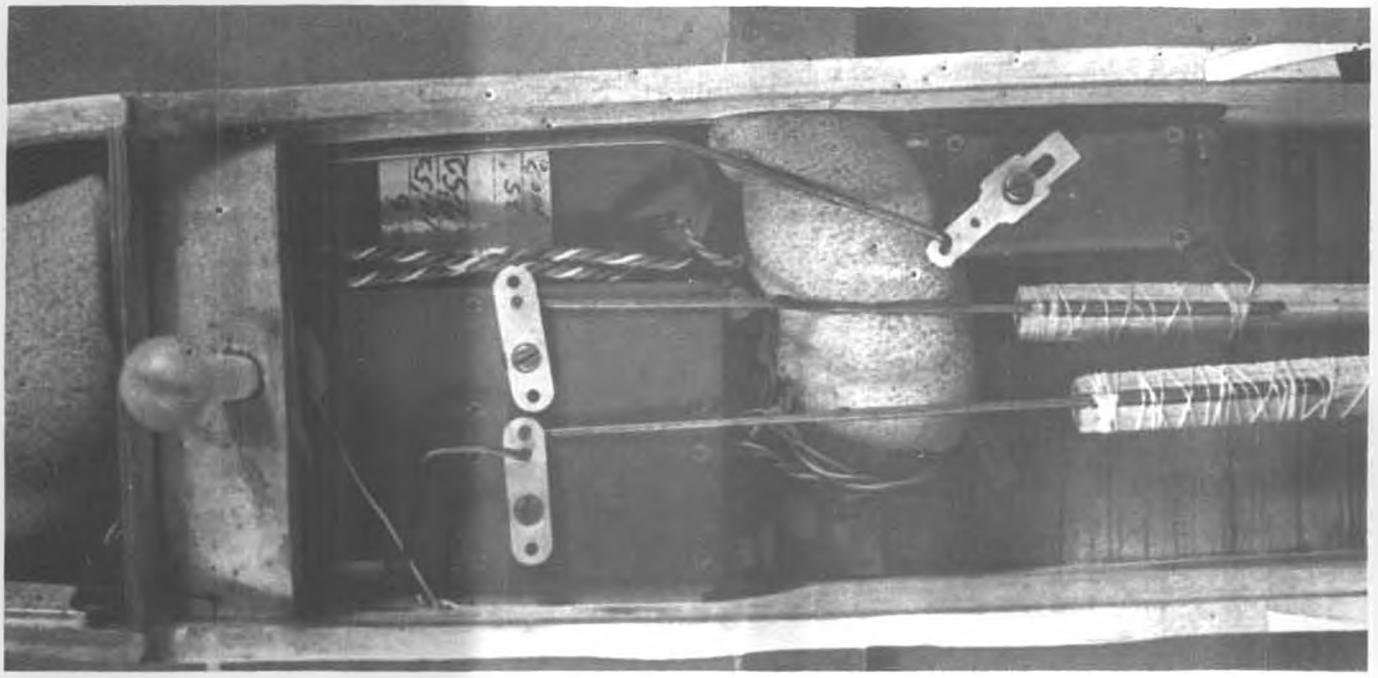


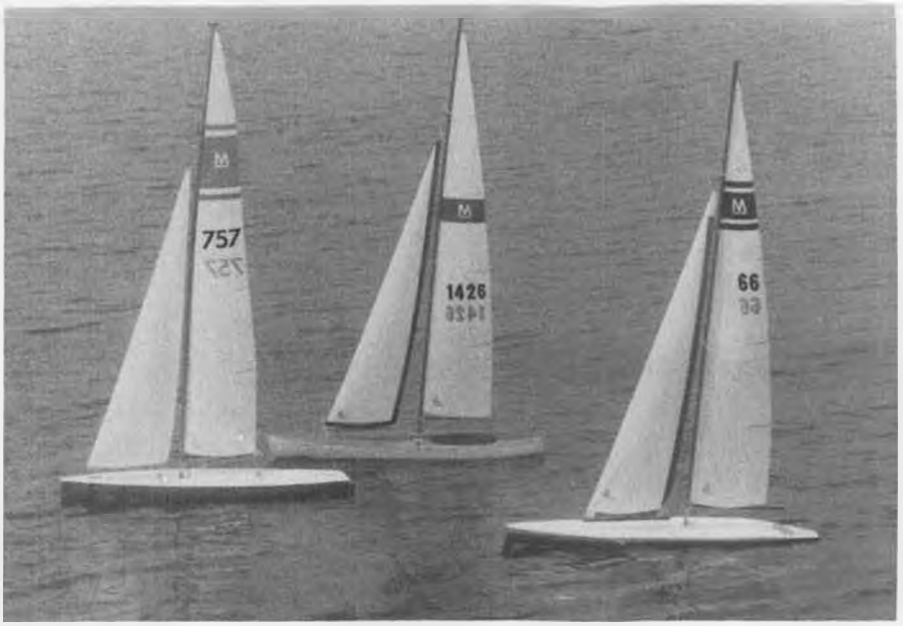
The 4-channel Plane Jane in flight. Charlie built both the 3 and 4-channel versions, powered by S.T. .15 and O.S. .25 engines, respectively. Both models were flown with an E.K. LRB radio.



Plane Jane kit contents. Charlie's models had wings sheeted with balsa, but current kits have 1/64 plywood sheeted wings. Most of the required hardware is included in the kit.



Radio installation details. The E.K. "Little Red Brick" has performed flawlessly in both of Charlie's Plane Janes. The brick handles the elevator, rudder, and nose wheel. Separate servo is for throttle, aileron servo is in wing. Ni-Cd battery is squeezed in beside brick.



From left to right, the BINGO, EPIC, and new BONE design discussed in text. Note how the free foredeck area is increasing as the rig moves aft.

BONE on a reach. Note the excessive amount of twist in the jib.

STRICTLY SAIL

By ROD CARR

• Continuing our look at recent developments in the 50/800 class, we get our first glimpse of the BONE design. In the lead picture we see the parents and their unlikely offspring. No. 757 is the original production BINGO which won the Class Championship in 1975. Notice how near the bow the forestay comes. The BINGO was named B-ONE, as that is the first square on a bingo game card. Behind B-ONE is a stock EPIC, No. 1426, belonging to Bob Harris. Last in the trio is the new design, named BONE in honor of her forebearer, No. 757.

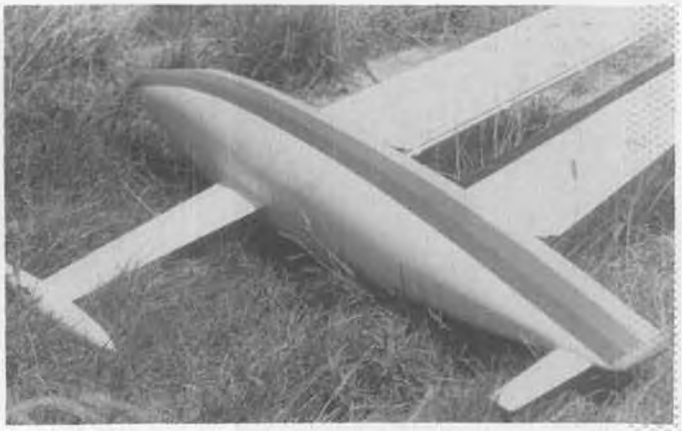
The BONE design is a result of a collaboration between Bob Harris, myself, and a design team from Hydronautics, Inc., of Laurel, Maryland, headed up by Karl Kirkman. The Hydronautics folks wanted to apply presently available technology to the 50/800 class and produce a boat designed from scientific principles, rather than by cutting and fitting bits and pieces from boats seen at the lake.

The original BONE (there is a BONE II already) utilized a rig identical to the EPIC, in order that improved performance be ascribed to hull and stability progress. At the time the pictures were taken, the rig was still untuned, yet the BONE easily kept pace with the two other boats in the light air encountered. This is surprising, since one of the major decisions made when building BONE was to eliminate as much weight as possible. She tips the scale at only slightly over 14 pounds. Light air and light boats have been a deadly combination in past designs. The BOOMERANG and YANKEE are two examples, which were apparently bothered by relatively large wetted surfaces, and hence large drag in light air from skin friction. When the light displacement decision was made for BONE, a corollary was minimum wetted surface. While the hull sections on BONE are not actually semicircles, they are more nearly that than V or U-shaped. The light displacement decision also led to above-water drag reduction quests. The freeboard at the transom is only 1/8-inch in still water, yet the boat is so stiff that by the time her leeward rail is awash, it is time to shorten sail for survival.

The most obvious change from tradition is the installation of the rudder under the bow. The reasons were: first, to place the center of buoyancy, the center of lateral resistance, and the sailplan as far aft on the hull as possible for improved downwind performance by preventing nosediving; secondly, by working in undisturbed water, the rudder would be more effective and could be made smaller, hence less wetted surface; thirdly, certain tactical advantages can be realized by a boat whose bow steers rather than having its stern slide out and around. (Make a couple of mental mark roundings with other boats close by and you'll see what I

Continued on page 120

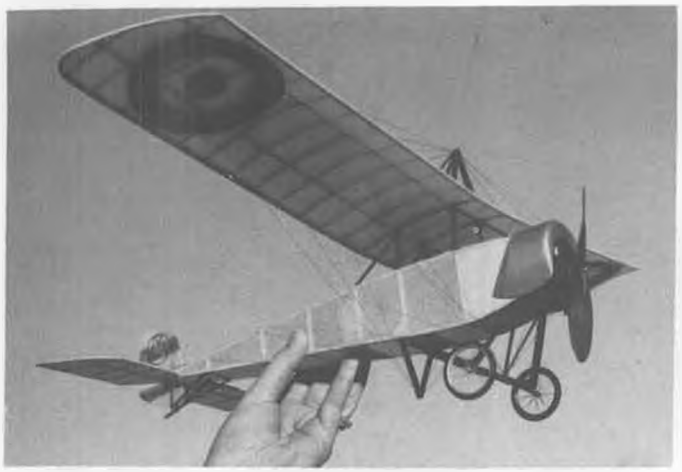
Transom of BONE is only 1-1/2" deep. Center of Gravity of the whole system is 6" below waterline. Hey! Where's the rudder?



There's the rudder, mounted at the bow! See text for logical reasoning behind this radical departure from tradition.

FREE FLIGHT AND CONTROL LINE

The excellent construction and photo work by Bill Noonan, San Diego, California, almost needs no caption. This World War I Sopwith Dolphin is in 3/4-inch scale, and recently was second in the WW-I category at a Flightmasters contest.



Larry Kruse's pretty little Morane Saulnier is powered by a Telco CO_2 motor. Looks like he's using Fulton Hungerford's wheels.

Another cutie from Larry Kruse is this rubber-powered Monoprep, which flew to 4th place in Rubber Scale at the Nats.

FREE FLIGHT SCALE

By FERNANDO RAMOS

• The Flightmasters held its 29th Annual Scale Contest. This year it was limited to only F/F Scale models, with C/L and R/C being dropped. Since the Flightmasters club has been known for F/F Scale, it was felt that the other two classes should be eliminated. The turnout for this event was disappointing to say the least. Even though we had 53 models entered, it was the lowest number we have had, to my knowledge, for this one-of-a-kind event here on the West Coast. So rather than give a blow-by-blow account of the contest, I will let the pictures speak for themselves. However, I would like to give my viewpoint as to why the turnout was not what it should have been.

First off, let me preface by saying that there were many exceptional models, and in general, the overall quality was much higher than in previous years. There were five separate events that could be entered, which included gas, rubber, Peanut, CO_2, and electric. Unfortunately, it seems as though gas is becoming the least desirable, with only five enteries. On the other hand, Peanut was tops, with a total of 23 enteries. Surprisingly, in electric there were only two entries, which was a bit of a "shocker", but I won't voice an opinion as to why that was the case. Rubber and CO_2 had ten and nine enteries respectively.

Some of you may think that having 53 models entered is a pretty fair number, especially for a speciality event like F/F Scale. But those of us who have competed in this contest for over 15 years realize that this is about half of what it should be. My personal feeling is that the Flightmasters for years has had quite a reputation for being the most active F/F Scale organization anywhere, as well as having top-rate modelers. It is my opinion that there are a whole lot of sport type scale modelers who are intimidated by this reputation. They feel that their chances of winning are nonexistent, so why enter? I don't know how prevalent this attitude is, but I do know that it does exist!

We have tried extremely hard to make every contest one that everyone can enjoy . . . one with the lowest key in competitiveness. Fun has been the essence of this scale event. With this attitude, we are hopeful that those just spectating would want to join in the fun. Sure, we have gathered many more contestants this way, but there are still too many who are on the outside looking in. There is always a percentage of modelers who attend meetings regularly, and attend every contest, but without a model! To these modelers I

Bill Hannan fiddles with his CO_2 Farman Moustique. Same model got 4th at World Champs.

Joe Tchirgi, well-known scale modeler, readies his .020-powered Ponnier at the '78 Flightmasters Annual at Mile Square.

Joe's Ponnier on takeoff run. Joe drew his own plans for the model, flies well. Use of gas engines in scale seems to be declining.

Mike Mulligan and his Chambermaid. Good model for Thompson Trophy events.

Like most Thompson racers, Mike's Chambermaid is a fast, smooth, stable flier.

Neat Curtiss XP-37 by Dick Seifried was flown at the Flightmasters Annual. Good flier.

ask the question, why? The excuse of being too busy is not enough. The club needs your support.

Another thought has entered my mind while writting this and that is, how many modelers don't compete because they have to have AMA membership? It is quite difficult to convince rubber and Peanut modelers that they will have to spend $25.00 (I understand that the dues have increased $5.00!) just to fly their Peanuts in a contest. Add to this that AMA insurance is secondary insurance . . . that is, it will cover you only after your homeowners insurance, and with a $50 deductible! Naturally, all of our flying sites require AMA membership. I know that the Flightmasters are not the only ones confronted with this particular problem.

I feel that even though there are many modelers who do not favor the strict judging required by AMA for scale models (check the number of entries in R/C Precision Scale as compared with Sport Scale at the Nats), there is a place for this type of model even in the F/F sector. For one thing, if we are to have our portion of the Scale World Championships, then we need the more precise type of judging. So, as far as I'm concerned, I don't want to see that ruled out of our Annual Contest. From those modelers who still enjoy the building and flying of more accurate and detailed

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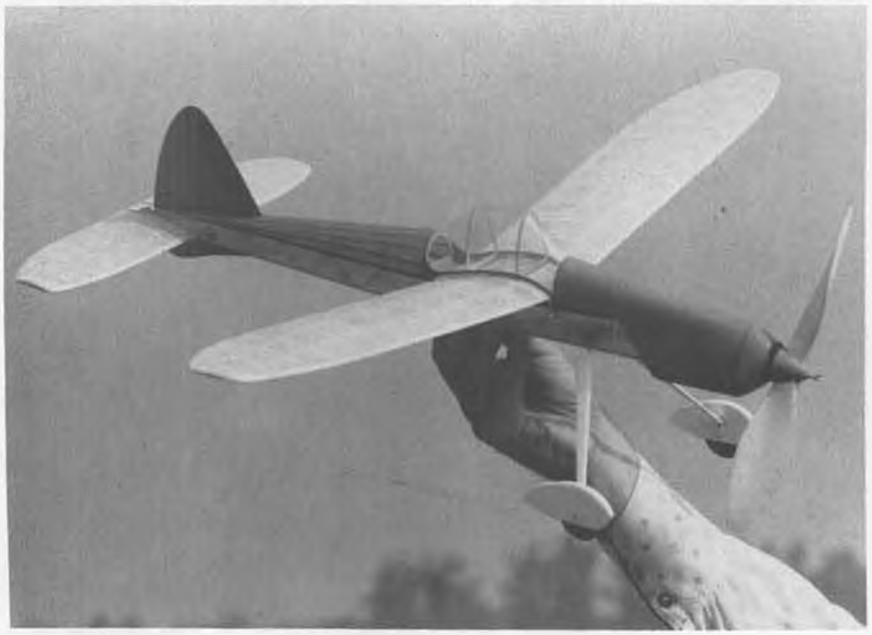
Bill Warner's Annular Wing not only flies, it flies well. Took 1st in electric at Flightmasters.

Bill Noonan's big rubber-powered Messerschmitt 20B spans 52 inches, is bigger than it looks in this photo. Bill hand carved all 10 of the model's occupants.

Cliff McBaine launching his rubber-powered 1928 Cessna AW at Flightmasters Annual. Model was published in MB. Spans 48 inches.

Cliff's Cessna AW in flight. Model was designed when the minimum span for Jumbo Scale was 48", since reduced to 36".



"Stormhawk" is one of the most realistic looking sport rubber models we've seen in quite a while. Wheel pants, unusual cowl, and eye-catching canopy are trademarks of the design.

John Morrill and his Stormhawk. John has an eye for designing really good-looking models.

The 'STORMHAWK'

By JOHN MORRILL . . . The Stormhawk is proof positive that a sport rubber job can have both good looks and good performance. If your flying field is known for its thermals, better put a DT on this one!

• A green field, a blue sky, warm buoyant air, 800 turns and Stormhawk is away for a beautiful two-minute flight. High above your head, now and then a glint of sun off the canopy. This is sport flying at its best. A throwback to those good old days . . . what the old timer movement is all about.

I didn't want to build an old airplane, but I did want to see what I could design that would have a 1938 flavor; see if I could rediscover the magic of the Golden Era.

Stormhawk is performance limited. It has fixed landing gear, a free-wheeling propeller, a fuselage cross-section, and weight. It follows the 1941 AMA rules quite closely. It was designed to be a good, stable flier, combining good duration model proportions with a full-scale look. Under minimum power, the model makes a fine ball-park flier. Full power turns the model into a high performance airplane.

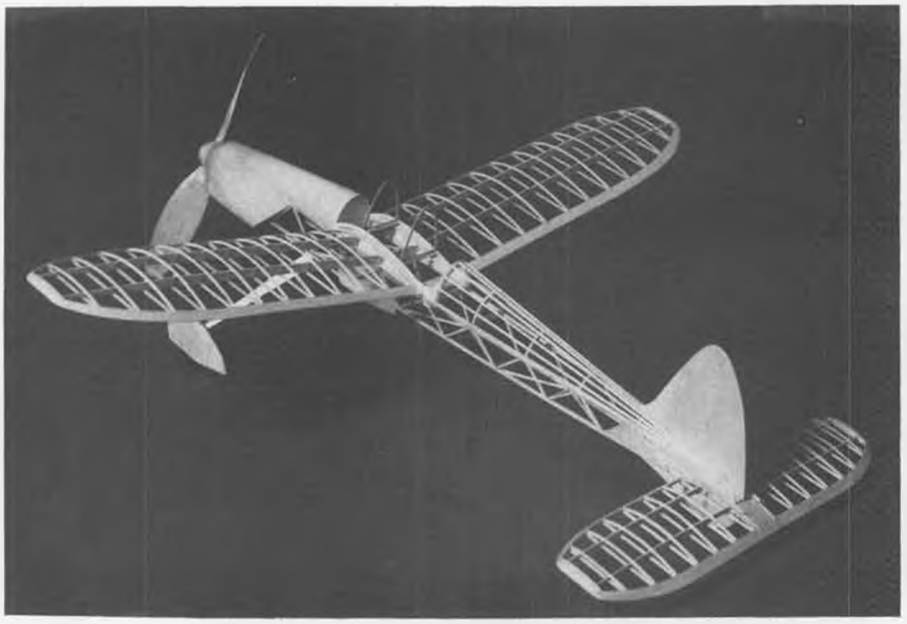
If you are a novice builder or new to stick-and-tissue construction and are saying to yourself, "I would like to build that model, but it is too complicated," take another look at the plan. Stormhawk is intentionally laid out in all staight lines; there are no compound curves. It thus becomes quite easy to sheet the nose, lay out the stringers, and most important, to tissue cover the model. If you feel the sliced rib construction on the wing and stab is too difficult, by all means substitute solid ribs. The canopy and wheel pants are not as difficult as they first appear, and I will cover their construction later on.

CONSTRUCTION

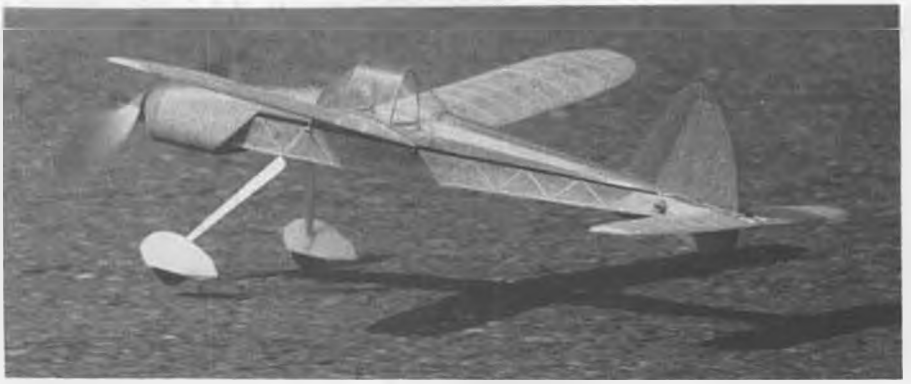
Before we start actual construction, I would like to mention our structural aims. Stormhawk should weigh in at 90 grams, or 3 ounces, ready to fly; any heavier and the glide suffers. My model weighs 68 grams, finished, without the motor. I am using 4 strands of 1/4-inch rubber, braided. The motor weighs 20 grams.

The fuselage main frame is a truss construction for light weight and good torsional strength. Sheet balsa sides could be substituted for ease of construction. If you elect to do that, you will be adding weight and destroying the light, airy look that is the aesthetic hallmark of the tissue-covered model.

I feel that Stormhawk would fly better with a little more wing area. I would therefore suggest the wing span be increased 2 inches (to 28 inches). This is easy enough to do, since the wing ribs are on 1-inch centers. The stab need not be changed; it will work fine as it is. If the model dutch-rolls with the additional wingspan, a slight amount of additional



Stormhawk's structure may look complicated at first glance, but it really isn't. Sheet ribs can be substituted if you just can't bring yourself to make the sliced ribs shown. Note canopy frames.



Stormhawk caught just after release for R.O.G. takeoff. The model fairly jumps off the ground on full winds. Model consistently turns in two-minute flights. Photo by Erik Daarstad.

Coming in for a landing after a nice flight. Right/right flight pattern. Daarstad photo.

rudder area will cure that tendency.

FUSELAGE

The fuselage side frames are built with the second one on top of the first one to assure symmetry. Assemble the basic frame upside down over the top view of the plan. Add the top crosspieces and then the bottom. The bottom is narrower than the top and is indicated by the shading on the plan. A small triangular template will help you get the angle the same on both sides. Diagonals are added between the bottom crosspieces. Formers are next added, being erected perpendicular to the top longerons. The wing saddles, through which the wing must slide freely, are cut from 1/32 plywood. Use a brand new No. 11 Uber Skiver blade. Cut the inside airfoil shape first, then the outside contour. The 1/32 plywood is very easy to cut using a sharp blade. Add the rear stringers; they butt against "J" and lie on top of "K". Place the center stringer first, then the ones on either side. The spacing is shown on former "K". They are again spaced evenly across where they end at the fuselage rear. The lineup on the intermediate formers should be automatic. Finish the rear fuselage with 1/32 sheet, grain running crosswise. The nose sheeting may now be put on. I use white glue for sheeting. As it ages, it doesn't pull the wood down around the formers, adding an unintentional scalloped effect. I use Ambroid for all the rest of the frame construction. I feel it is still the best wood cement for stick construction.

The top sheeting is put on first. Cut the piece extra long by a couple of inches. Butt it along the top longeron of one side. Let the glue dry. Now bend it over the formers. Use rubber bands to hold it in place. The wood will now be at all sorts of cockeyed angles to the other longeron and end formers. Make sure it covers everywhere it needs to. When the glue is dry enough to hold the wood in place, cut it flush with the top of the other longeron and glue it into place.

Trim the overhang from the formers at each end. The cowl pieces are now added. Bevel one edge at an acute angle and cement it on the longeron side. A little effort here will produce a perfect joint to the top sheeting. Use two pieces, one on each side. Wet the wood, bend it around and overlap the two pieces on the bottom. Hold in place with rubber bands until the wood has dried. Make one cut longitudinally along the bottom center with a good sharp blade. This will give you a perfect butt joint. Glue the wood to the formers and hold in place with rubber bands. Trim when dry.

The landing gear wire is bent to the plan. Make a 1/32 ply former that will fit inside the fuselage frame. Lash the wire to the former with thread. Smear the thread with glue, position, and glue the former into place. Small triangular gussets may be fitted on the fuselage bottom to attach tissue where the wire exits the frame.

The wheels are made in a balsa/ply sandwich. Discs of 1/32 ply sheet are cut to the proper diameter. A 1/8 sheet balsa disc is glued to either side. A 3/32-inch hole is drilled for the hub. Get a long (1-1/2 inch) 4-40 bolt and two washers. Put the bolt through the wheel center, a washer on each side, and tighten the nut. Chuck the bolt in a 1/4-inch electric drill. The drill should be held in a horizontal stand . . . an elementary lathe. With sandpaper sticks, true the wheel up and shape the sides. Take the bolt out of the wheel and glue in a 3/32-inch diameter aluminum tube axle bearing. The wheel pant center with the wheel cutout is made from a piece of triangular trailing edge stock, 1-1/4 x 3/8 inch. It is sandwiched between sides made of hard 1/16 sheet, glued to the wire, then wrapped with silk, nylon, or in my case, Coverite. Recesses are gouged out for the wire on the inboard side of the wheel pants.

The canopy is put on after the model is covered. I used the movie film cement technique. The film cement is available from photographic stores and comes in small 1/2-oz. containers.

Cut the canopy frames from 1/32 ply, using a sharp knife. Cement them in place. Using the windshield outlines on the plan, cut heavy paper templates and check to make sure the windshields fit your model. If not, adjust the patterns. Let the celluloid protrude slightly beyond the windshield frames. Next, put several coats of clear dope on all framework where the celluloid will attach. Using small pieces of masking tape, hold the celluloid in position. Do one windshield at a time. With a very fine brush (00000) and finger pressure to hold the celluloid tightly against the

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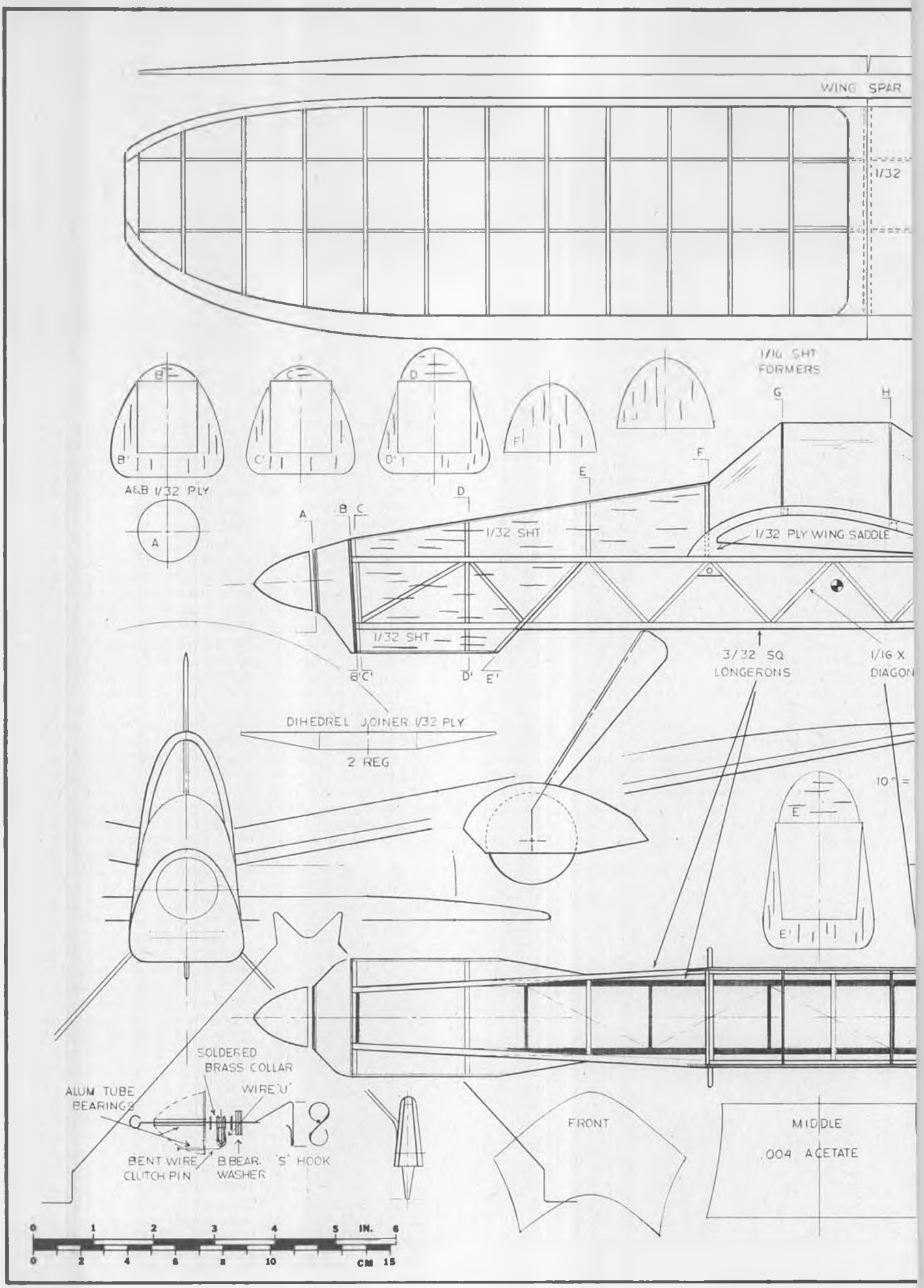
Good action shot of John hand launching his Stormhawk. Model has a pretty steep climb angle for a sport rubber job. Photo by Erik Daarstad was taken at Mile Square Regional Park.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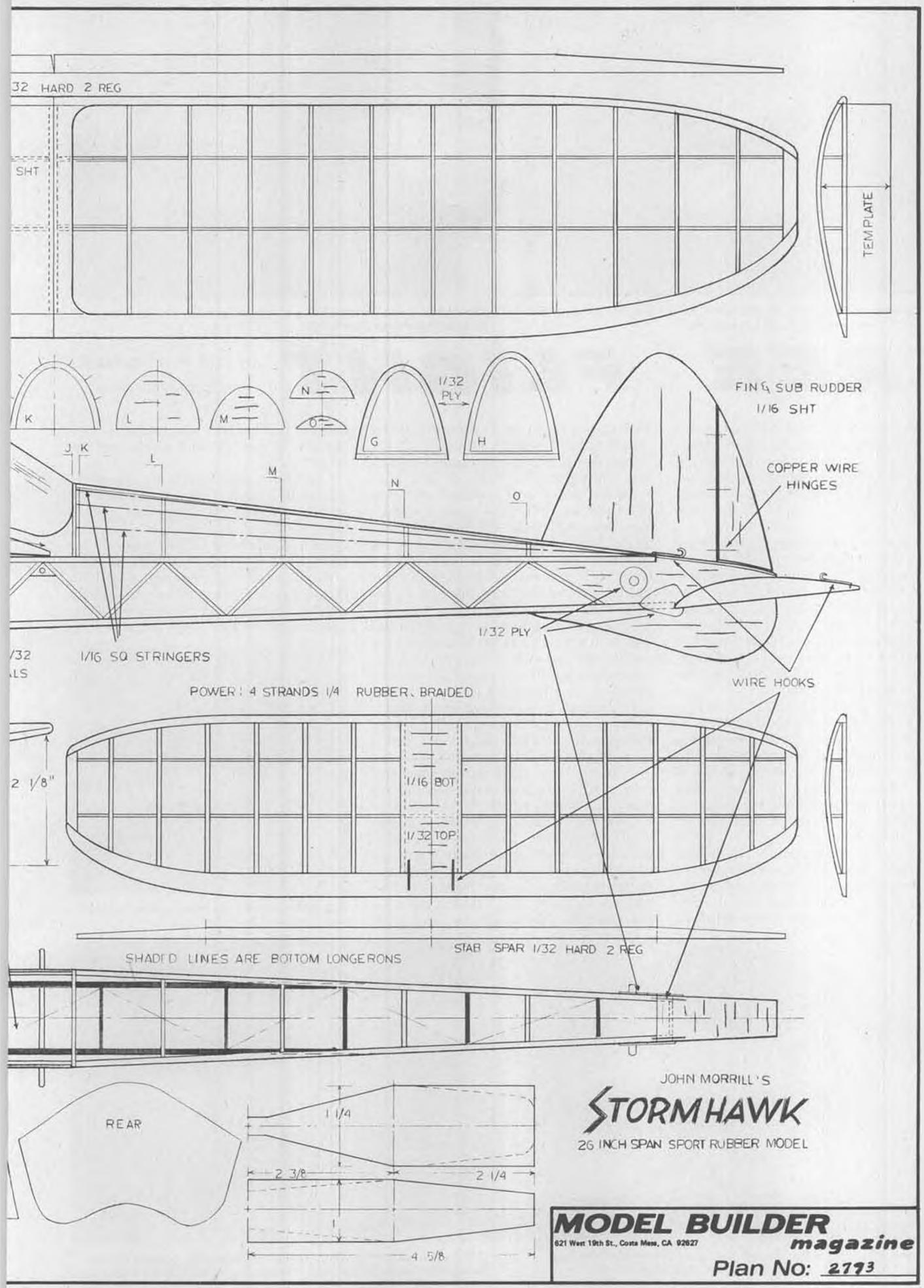
32 HARD 2 REG
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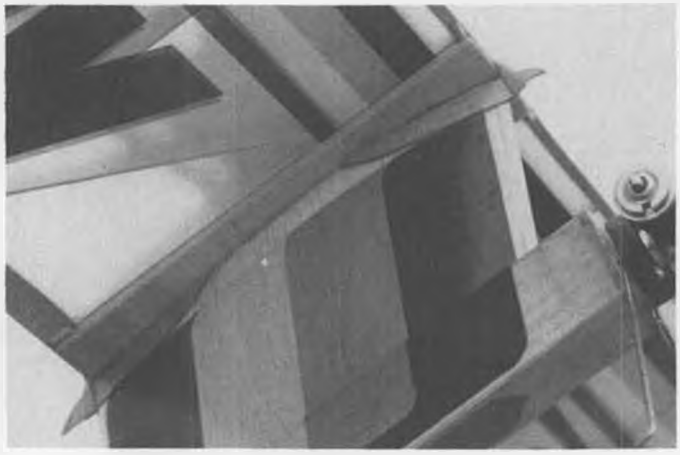
2 1/8"
1/16 BOT
1/32 TOP
STAB SPAR 1/32 HARD 2 REG
SHADED LINES ARE BOTTOM LONGERONS
REAR
1 1/4
2 3/8
2 1/4
4 5/8
JOHN MORRILL'S
STORMHAWK
26 INCH SPAN SPORT RUBBER MODEL
MODEL BUILDER magazine
621 West 19th St., Costa Mesa, CA 92627
Plan No: 2773

Bob deShields displays his 1/2A Maverick, built from RM kit. Bob is a master at trimming models with tissue paper.



Closeup of Bob's Maverick, showing how he made the wing hold-downs. Fully described in text.

FREE FLIGHT

by TOM HUTCHINSON

PHOTOS BY AUTHOR

• Well, the first column's in the hopper and the worst part is over, right? Wrong! You sit here at your typewriter staring at this nice white piece of paper, wondering how you're going to do it again. And how you're going to do it if the piece of paper stays forever blank.

Fortunately, Bob Stalick passed on my address before turning over the column to me, along with a batch of newsletters he's been receiving. Hope those newsletter editors will notice the change and mail them directly to me from now on. This is also a good opportunity for other newsletters to put me on your mailing list, too. My address is 3255 NW Crocker Lane, Albany, OR 97321.

THE GREAT LINECROSSING CONTROVERSY: A DRAMA UNFOLDS

Last month, I described some of the ways the new FAI linecrossing rule affected Nordic flying at the Taft FAI Finals. Now, let Steve Helmick make some comments about one incident that may change the membership of the U.S. Nordic team:

"As a concerned participant in the FAI Free Flight Team Selection Program, I feel compelled to write and express my disapproval of the way in which the FAI Jury gave their blessings to Jim Wilson's 16th round flight in A/2 Nordic at the recent Finals at Taft.

"Jim (a fine fellow and tough competitor) had his model involved in a linecrossing, then land without releasing from the towline. One attempt down. Next try, the model DT'd on tow and again landed without releasing the towline. Two attempts. Next try, he launched for a reasonable flight that put him second on the team, but that makes 3 attempts (for 1 flight).

"It would please me very much if Jim was entitled to 3 attempts, but it is very clearly spelled out in the 78-79 AMA rulebook that these situations are all attempts, and the limit is 2, not 3. The only grounds for a re-fly of an attempt is if the model is involved in a collision, either with another model or with a person, while being launched.

"Clearly, the Jury disregarded the rulebook by which all of our contests are operated, and by which our team was to be selected (according to the contestants' information packet). The results are that all the program participants are cheated, and the honesty and fine sportsmanship in our hobby are in serious jeopardy. Our teams must be selected by the rulebook, and I am getting involved to see that this happens. It is not too late to correct this error."

I happen to agree with Steve that the Jury made an error. Since Labor Day, the Jury has convened again and upheld their original decision to allow Jim Wilson 3 attempts. Their grounds for doing this were that contestants were unfamiliar with the new rule, that linecrossings were being allowed as repeat attempts throughout the contest at the instructions of the event director, that

Bob Sifleet checks his Power model before flight at Taft FAI F/F Finals.

You supply the caption for the expression on Steve Helmick's face. He drove 1000 miles from Seattle to Taft, and it's RAINING!

George Schroedter, of Champion Model Products, poses with the Champion Coupe he's kitting. Kit goes for $13.45. More info in text.

this interpretation was commonly understood and accepted by the contestants and timers, and that they felt that consistent application of this (wrong) interpretation for the entire contest was an overriding consideration in their decision.

Well, folks, I find the Jury's reasons incomprehensible, for these reasons:

1) The linecrossing rule has been in effect since 1976 and has been in the AMA rulebook since then. I read the rulebook before and during the contest, and most of the fliers I know understood what the printed word said. John Lenderman said all teams were briefed on the meaning of the rule at the 1977 World Champs. Jim Wilson had been involved in at least 2 previous linecrossings, and should have known the content of the rule.

2) The event director was familiar with the rule and did *not* universally allow reflights of attempts after linecrossings. I had a linecrossing on the 2nd day, and when I went to get a timer for my next try, the ED (Ross Steckel) specifically told me that this was an attempt and I was now trying for a 2nd attempt. Based on my one experience with a linecrossing incident, it is hard for me to see how the Jury could conclude that attempts being repeated after a linecrossing was a universal occurrence.

3) Even assuming that the contest management was going to allow a deviation from the written rules, they should have notified all contestants that they were going to do this, before the first round of the contest. They did not do this. Apparently, they did not even notify the event director; he was still sticking by the book as late as the last round of the 2nd day.

Jim Wilson flew a very good contest and would make a good team member. It would be a shame to have him eliminated from a high placing because of a mechanical failure. But such failures happened to others, too, and kept them from a place on the team. It would be an even bigger shame to take a place on the team only because of a favorable misinterpetation of the rules by the Jury.

A POSSIBLE SOLUTION

After coming back from Taft, several of the Northwest FAI fliers gathered to discuss how to do better next time. Most of us expressed dissatisfaction with the current linecrossing rule, both because of the controversies over the rule at the Finals and the genuine possibilities for inequity. Jim Thornberry wrote the following analysis of the rule and a possible solution for the inequities:

"Most flyers would agree that the purpose of collision and linecrossing rules should be twofold:

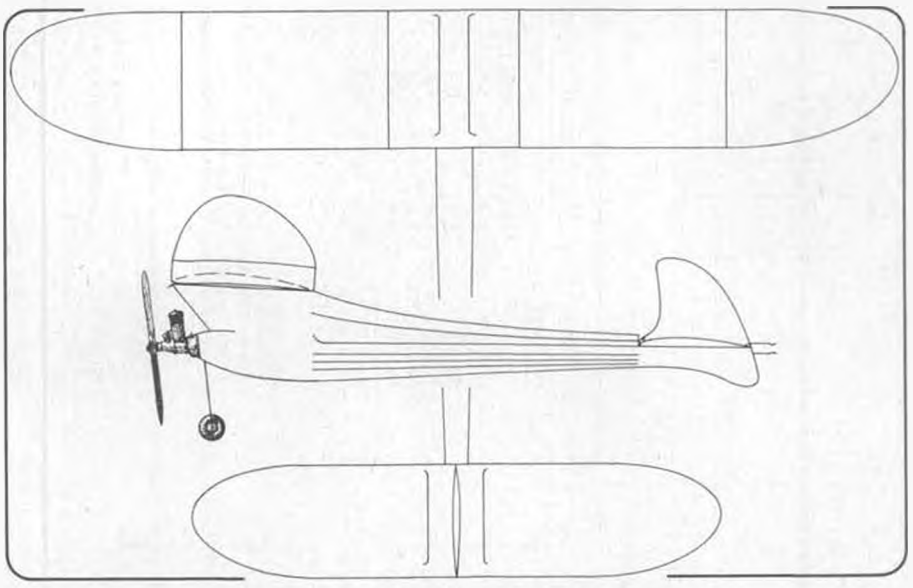
1) A flier, who through no fault of his own, becomes involved in a collision or linecrossing that results in his model being towed into the ground or being released prematurely from the towline should not be excessively penalized.

2) There should be some incentive to avoid collisions and linecrosses; certainly there should be no tactical advantage gained by letting one occur.

"Writing rules that carry out the intent of these 2 statements is not easy. The current rules attempt to satisfy the first statement by allowing a flier involved in a linecross whose model is then released within 60 seconds to accept this flight after it is timed or to use his second attempt in the hope of getting a better flight. The rule offers no recourse to the flier who is the victim of a linecross on his second attempt. If he is towed into the ground by the linecrossing, he receives a zero score.

"The major fault of the current rule is in dealing with linecrosses that result in the model being towed into the ground. When the original rule was written, all towhooks were of the kind which released the glider when the line went slack. Thus, a linecross would result in either a premature release or a normal towing. This is no longer the case with the circle towhooks used by the majority of fliers. These hooks do not release when the towline goes slack; instead, they release at a very high line tension that is not reached during normal towing or a linecrossing. True linecrosses now usually result in the model being towed into the ground or a return to normal towing.

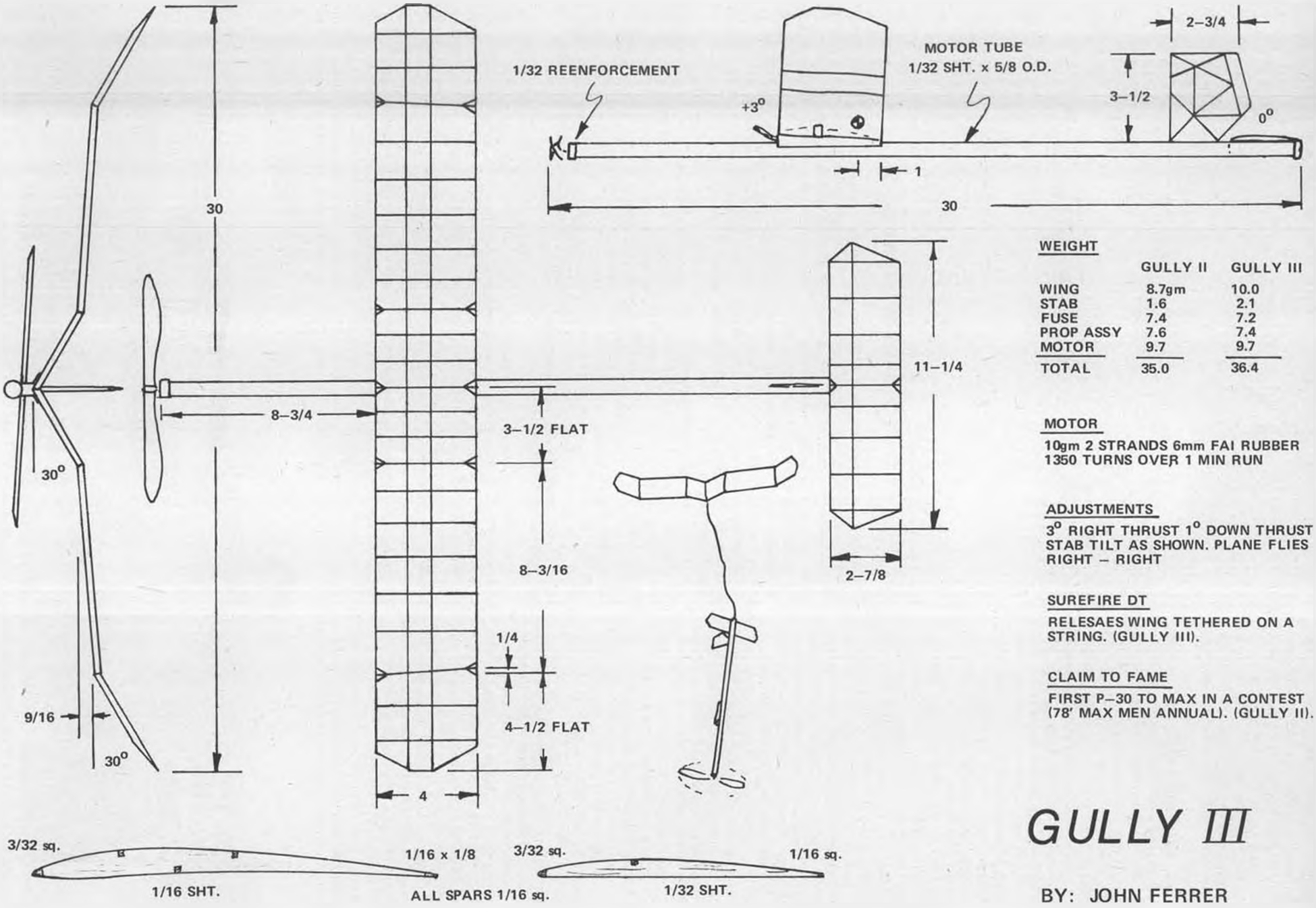
"The current rules regarding collisions do not deal adequately with a collision between a model under tow and a model in flight. The model under tow might be able to repeat its attempt, while the model in flight must take the flight despite the collision! (Only collisions with other models or persons qualify for a re-fly.) Similarly, an in-flight model colliding with a towline must take the flight despite the collision caused by another flier. The current collision rules penalize the in-flight model which



FEBRUARY MYSTERY MODEL

Liz Sanford (center) won P-30 at Dallas Southwesters meet, flanked by Bill Baker (3rd, left) and Roger LaPrelle, 2nd. George Beaver photo.

The 1977 Taft FAI Semi-Finals was the 2nd Semi-Finals in a row that Don Zink posted a perfect score in A/2. Photo by Pam Koontz.



WEIGHT

	GULLY II	GULLY III
WING	8.7gm	10.0
STAB	1.6	2.1
FUSE	7.4	7.2
PROP ASSY	7.6	7.4
MOTOR	9.7	9.7
TOTAL	35.0	36.4

MOTOR

10gm 2 STRANDS 6mm FAI RUBBER
1350 TURNS OVER 1 MIN RUN

ADJUSTMENTS

3° RIGHT THRUST 1° DOWN THRUST
STAB TILT AS SHOWN. PLANE FLIES
RIGHT – RIGHT

SUREFIRE DT

RELESAES WING TETHERED ON A STRING. (GULLY III).

CLAIM TO FAME

FIRST P–30 TO MAX IN A CONTEST (78' MAX MEN ANNUAL). (GULLY II).

GULLY III

BY: JOHN FERRER

George Xenakis, with aid of son Greg, awaits indication of rising air at '77 Semi-Finals. He made it to the Finals. Pam Koontz photo.

Jim Wilson, foreground, awaits start of 8th round at '77 Semi-Finals. Jim qualified for U.S. team at '78 FAI Finals. Koontz photo.

collides with another flier's model under tow or his towline. (The previous rules did not.)

"While it may be impossible to write perfectly fair and concise linecrossing and collision rules, some further improvements seem indicated. These would include the following changes to the rules (changed or added words in italics):

A) change Definition of and Attempt to read: 'e. *during towing the* model or launching cable collides with another *model on tow* or launching cable (linecrossing) and the model is released from the cable within *30 seconds* from the moment of collision or linecrossing.'

B) Change the paragraph beginning, 'An attempt may be repeated . . .' to read 'An attempt may be repeated when the model *in flight* collides with: a. another model in flight *or on tow*, b. *a launching cable*, c. a person while being launched, or *d. the attempt is the second attempt and there is a collision between 2 models on tow or a linecrossing after which the model returns to the ground without release of the cable within 30 seconds or the model is released from the cable within 30 seconds from the moment of collision or linecrossing.*'

"The 2 purposes of linecrossing and collision rules are now better met:

A) No excessive penalty:

1) A flier towed into the ground or prematurely released due to a linecrossing on his second attempt may now repeat the attempt.

2) Collisions between 2 models under tow or between an in-flight model and a towline or model under tow are now specifically covered. The in-flight model may now repeat the attempt while the model under tow may not, thus discouraging towing near an in-flight model.

B) Incentives to avoid linecrossing:

1) A linecross on your first attempt may force you to take your second and possibly last attempt.

2) The shorter timespan (30 rather than 60 seconds) may help prevent tactical linecrosses to 'try out' some air for a max or 'fly down' from full towline length for a repeat second attempt."

Jim has submitted these rules changes to AMA and the FAI Committee for possible inclusion on the CIAM agenda this year.

Irv Aker launches Wake at '77 Semi-Finals, failed to qualify for Finals at Taft.

MODEL OF THE MONTH

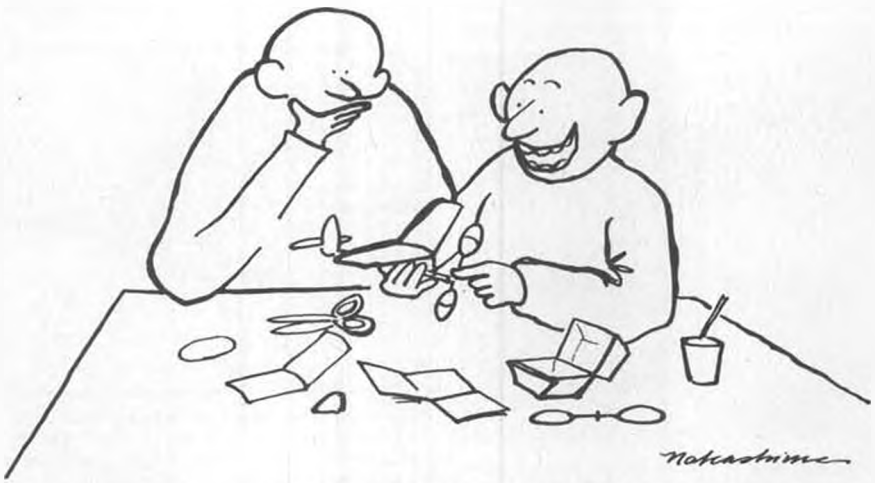
One of the most successful of the new events is the P-30 class. John Ferrer's "Gully III" was the first P-30 to max out in competition. The 3-view and comments by John are taken from the *Bat Sheet*, which took them from *Bugs' Buzz*, voice of the T-Bugs:

"The attached 3-view is of my P-30 design, somewhat unorthodox in that it uses a relatively weak motor and must therefore be built very light. Gully I, which is not shown, has a 3.5-inch wing chord and weighs about 33 grams without the motor; however, it is a good backup ship. Gully II was carried away by the thermal gods and, although retrieved 3 weeks later, it has been retired. Light planes also have their problems coming down . . . so, the new type DT for Gully III. It works great!

"It is my opinion that P-30 will become a difficult event soon unless a weight rule is added. I would like to see the event attract the novice or those afraid of the carved prop, but if expert building techniques are required for light aircraft, then we will lose many a potential flier in this event."

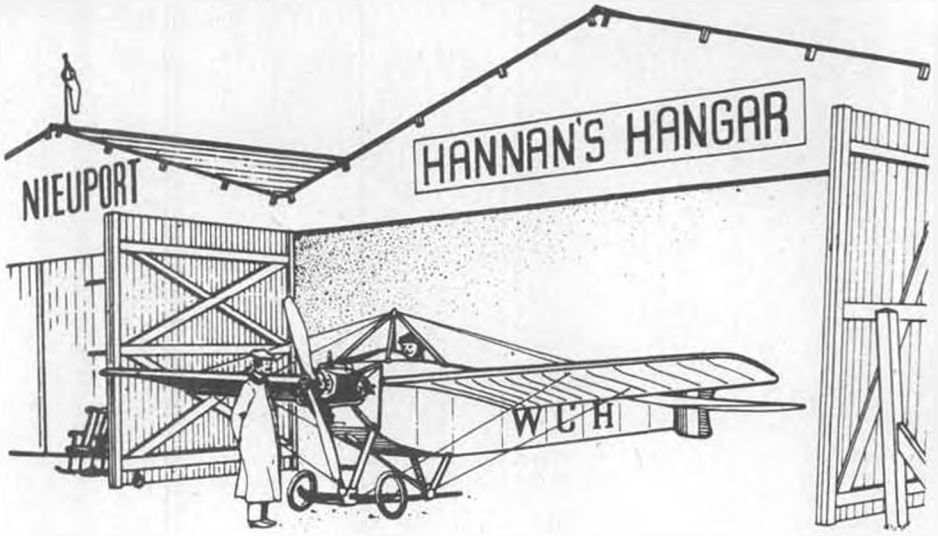
CHAMPION COUPE

You may have seen their ads in the NFFS Digest, but the picture should give you a better idea of what the Champion Coupe looks like. I didn't know who was behind the product until I renewed my acquaintance with George Schroedter at Taft. George was a real active flier with the Max Men in the 60's, and I remember him wiping out the field with both his gas models and this Coupe. Kit costs $13.45 with shipping from Champion



"I used to get my materials from Sig, but now I get them from McDonalds."

Continued on page 102



"The Navy has two airships, but only one set of helium."

• The above quote, by Will Rogers, was almost literally true during 1924, when the remark was made. Abstracted from the article "The Decommissioned U.S.S. Los Angeles", featured in the Summer 1978 American Aviation Historical Society Journal. This prestigious publication is devoted to all phases of U.S. aviation history, and is only one of the benefits available to members. If interested, contact AAHS, P.O. Box 99, Garden Grove, CA 92642.

GEE BEE CELEBRATION

Robert Granville, Henry Haffke, and Tom Nallen were kind enough to fill us in on the Springfield Science Museum gathering, held in honor of the Golden Age of aviation in Massachusetts. Present were many celebrities, including Maude Tait Moriarty, Robert Granville, Howell Miller, and Bob Hall. The keynote lecture was delivered by Walt Boyne, Curator of Aeronautics at the Smithsonian.

Maude Tait, of course, was the winner of the Aerol Trophy at the Cleveland Air Races of 1931. In addition, she held the women's speed record of 214.9 miles per hour, set in a Gee Bee Sportster. Robert Granville, the only surviving member of the brothers, Howell Miller, and Bob Hall were all part of the crew which designed and constructed the early Gee Bees. *(Just before going to press, we received a note from Bill that on November 9, Robert H. "Bob" Granville had passed away. Always a supporter of modeling activities, he had served as caller for Henry Haffke during two major R/C meets. Our heartfelt condolences to his relatives and many close friends. wcn)*

A remarkable array of artifacts was donated to the museum for the ceremony, including Robert Lambert's "Zeta", a number of models, the Lowell R. Bayles Memorial Trophy, the Charles "Speed" Holman Trophy, the Niagara Trophy, and hundreds of photographs. About 150 of the latter were shown as slides by Tom Nallen and Ron Harrison.

Of particular interest to model builders present, were the recollections of Bob Hall, regarding the Springfield "Bulldog". He described it as being very much like some women . . . "it looked fast but wasn't." Russ Thaw flew the aircraft out of Bowles Airport to New York, with little time remaining before the races. At New York, he refueled, including the never-before-filled fuselage tanks alongside the cockpit. Trying to take off, Thaw could not get the tail up to flying attitude, and after several tries, quit. Hall jumped into a plane, flew to New York, drained the racer's fuselage tanks to get the CG forward, and went on to Cleveland, where unfortunately, the ship put in a disappointing performance.

Hall later went on to work for Stinson, where he contributed to the Reliant Taperwing design and some of the trimotors. Then he joined Grumman and was involved as a test pilot on many well-known types such as the "Ducks", Gulfhawks, Skyrockets, Wildcats, Hellcats, and Bearcats. According to Hall, the cockpit layout of the Bearcat was directly based upon that of Kurt Tank's Focke-Wulf 190!

All-in-all, a wonderful tribute to a pioneering group of aviators, and a treat to those able to attend.

AND SPEAKING OF RACERS

Some time ago, we reviewed Tom Foxworth's remarkable book, "The Speed Seekers", a magnificent tome

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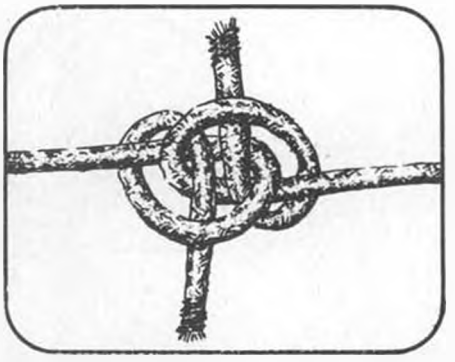
Zona Appleby, of Antique Aero, who constructed the full-size Fokker Triplane in the background, displays her affection for Max Holzem, who was a German fighter pilot during WW-I. Small rubber-powered models were flown for "comic relief" during fly-in at Flabob Airport, near Riverside.

Closeup of Max Holzem's tic tac, several times actual size. Max was a test pilot for Pfalz, and this was the company emblem.

Fernando Ramos shows his dedication to SCALE with his license plate. Strangely, he is holding a non-scale Sig Uncle Sam biplane!



New knot invented by Dr. Edward Hunter, a retired British physician, is just the ticket for those whose rubber motor knots always seem to come undone (usually while winding!). See *Newsweek*, Oct. 30, 1978, p. 105, for more info.

This month's Peanut can be built either as a CO_2 or rubber-powered model. The CO_2 model will consistently do two minutes outdoors, but the rubber model is limited in flight time because of the small prop. Both models had severe flight problems that were solved in a clever way . see text.

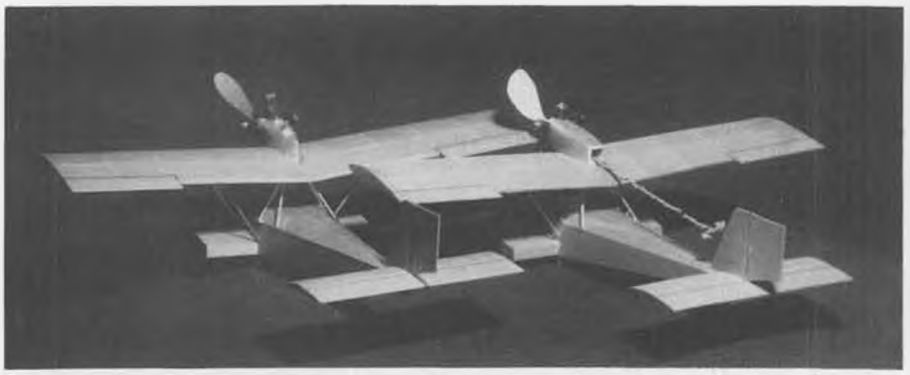
PEANUT SCALE + DORNIER + 'LIBELLE' + PEANUT SCALE

By WALT MOONEY . . . This month the professor presents a two-for-one model; a neat little Dornier flying boat that can be built either for rubber or CO_2. Naturally, both are excellent fliers.

• In the early Twenties, Dornier designed and built a little three-place flying boat. It had simple lines and looked like an excellent design for a small model. This inspired the two models presented here. It can't be said that these models flew right off the drawing board. They didn't. In fact, both of them had identical terrible problems which took a little test flying to solve. Solving the problems became a challenge, and the challenge was met so successfully that the CO_2 model has consistently flown for 80 seconds indoors (we flew it in front of **Model Builder**'s illustrious editor and a batch of other witnesses at the last Peanut Proxy Contest). It will do 120 seconds or more every time outdoors in smooth, stable flight. The rubber-powered model has also been adjusted into a stable flier, but its flight time is fairly short because the propeller diameter is somewhat limited.

Since you have been told there was a flight problem originally, a description of the problem, its cause, and its cure is in order.

The problem: On early test flights, both models spiraled in to the right, very sharply. The radius of the spiral was about three feet. To have a model hit the ground at your right ankle after a two-second flight is somewhat disconcerting. It took about a quarter of an inch of left rudder deflection to overcome the right turn, which obviously wasn't the answer because the gliding flight became as terrible to the left as the powered flight had been to the right.



Three-quarter rear view gives a good idea of the strut arrangement. Vertical stab on rubber model must be strong to withstand the pull of the motor.

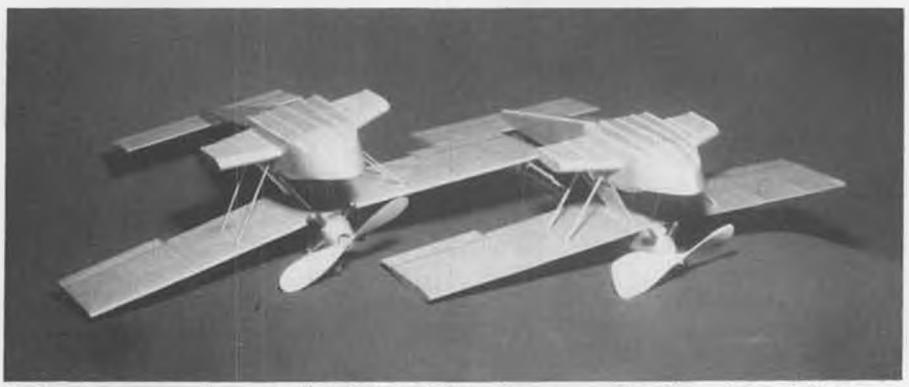
The cause: The propeller slipstream which moves aft in a swirling motion hits the rudder, but only the bottom half of the swirling slipstream hits the rudder; the top half passes above it. Since only part of the propeller blast hits the rudder, there is a sideforce on it that causes a tight right turn under power. Sidethrust adjustments were tried, but even very gross angles weren't successful.

The cure: Straighten out the slipstream below the wing. How? Well, there is no exactly scale way, but there is a way that can be almost invisible and certainly no detriment to the looks of the models. Install a couple of flow straightener vanes below the wing, aft of the propeller. Simply fill in between the forward and second cabane strut on each side with a sheet of thin transparent plastic. These panels keep the flow from going sideways and force it to go nearly straight back over the vertical tail . . . and whaddayaknow, the problem is solved.

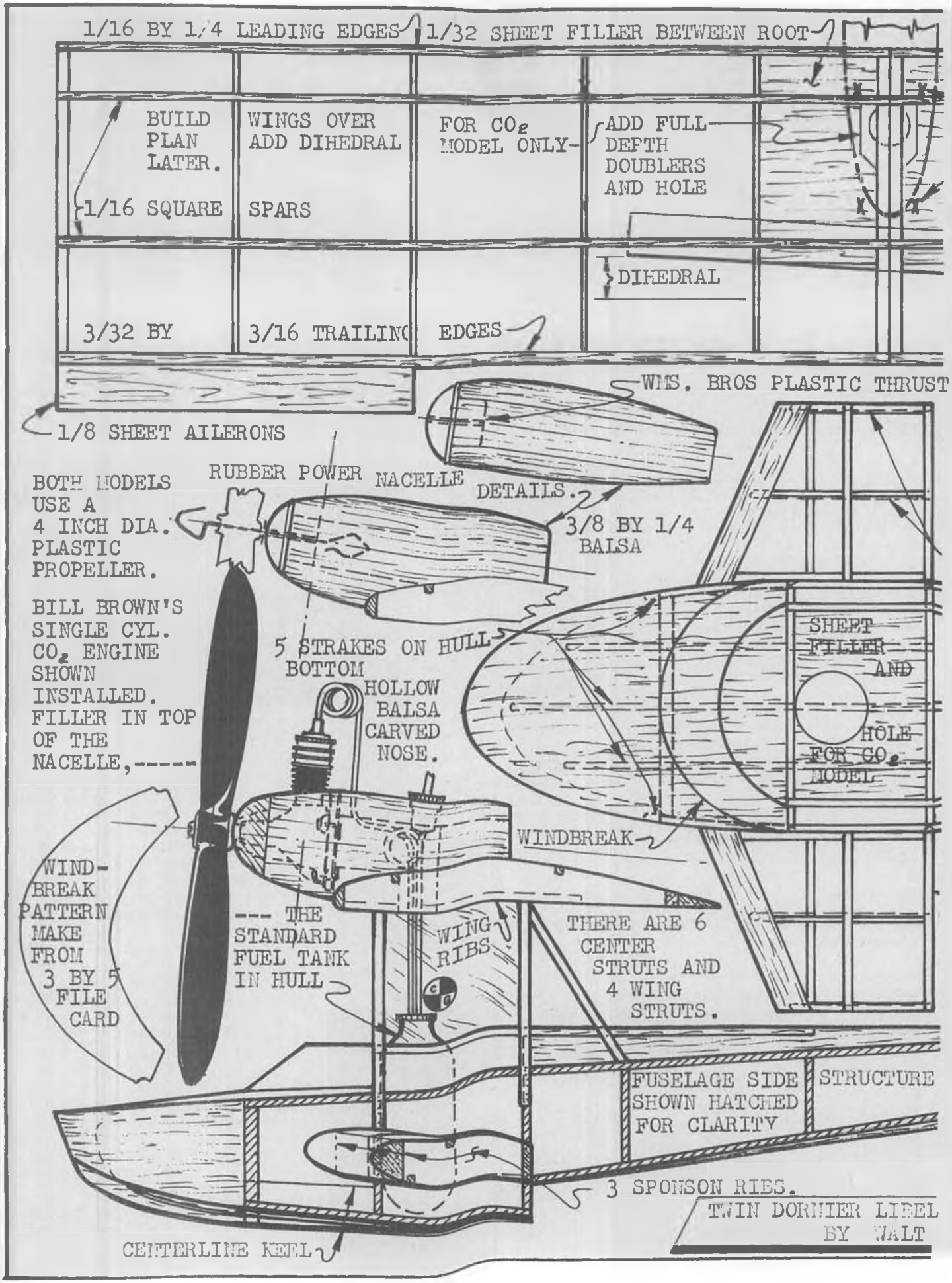
Compared to solving the flight problems, building the models is very simple. Most of the building methods are the old standards. Assemble the parts over the plans, using balsa for all the major structural components. The powerplant installations are the major nonstandard efforts.

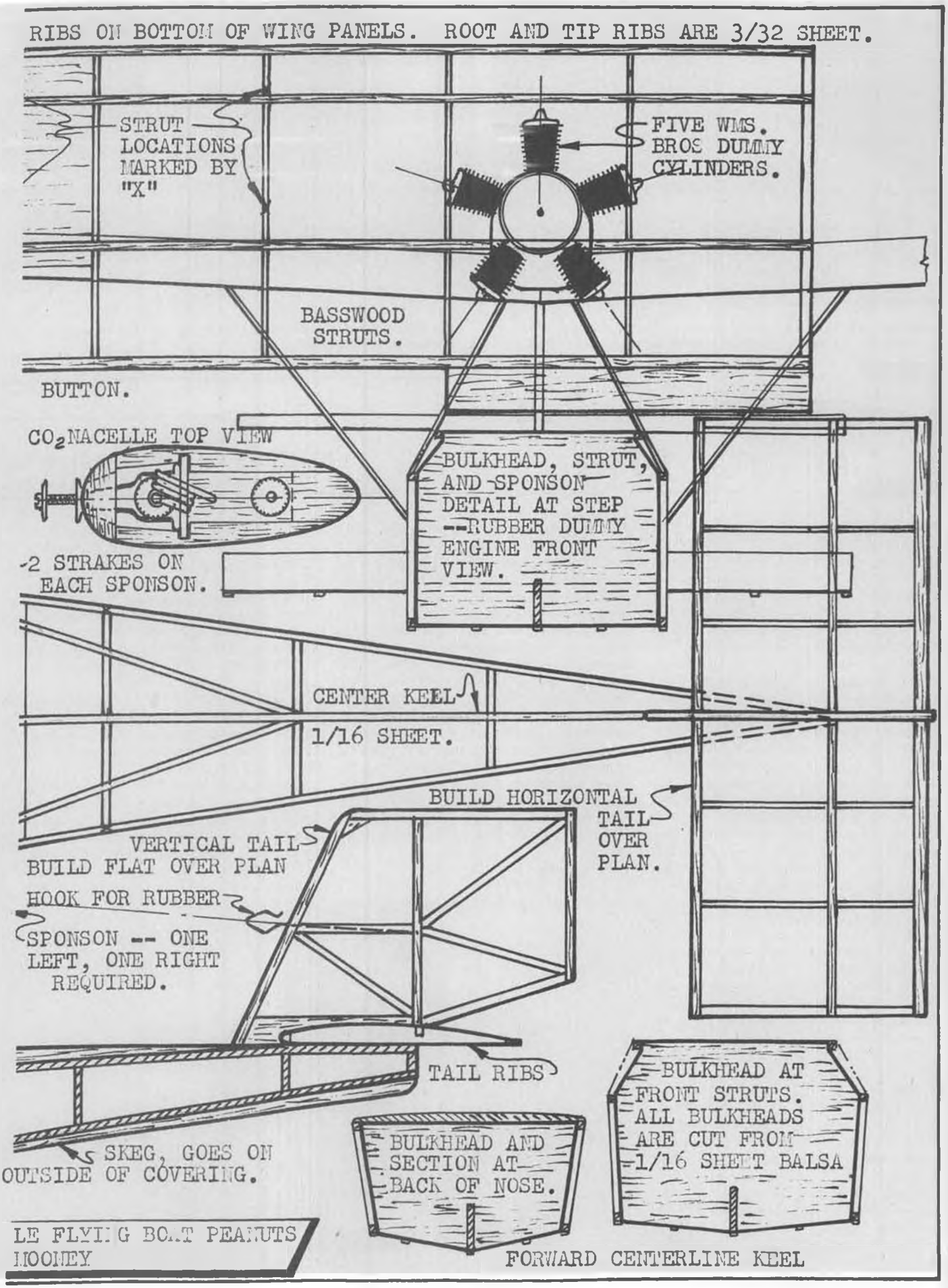
To have a reasonable rubber motor length requires an open ended nacelle and a strong vertical tail to support the rear motor hook. The nacelle is assem-

Continued on page 109



Hull and sponson strakes are added after the hull has been covered and doped. Celluloid airflow straightener between front and 2nd cabane struts is just barely visible on model on right.


1/16 BY 1/4 LEADING EDGES
1/32 SHEET FILLER BETWEEN ROOT
BUILD PLAN LATER.
WINGS OVER ADD DIHEDRAL
FOR CO2 MODEL ONLY-
ADD FULL DEPTH DOUBLERS AND HOLE
1/16 SQUARE
SPARS
DIHEDRAL
3/32 BY
3/16 TRAILING EDGES
WMS. BROS PLASTIC THRUST
1/8 SHEET AILERONS
BOTH MODELS USE A 4 INCH DIA. PLASTIC PROPELLER.
RUBBER POWER NACELLE DETAILS.
3/8 BY 1/4 BALSA
BILL BROWN'S SINGLE CYL. CO2 ENGINE SHOWN INSTALLED. FILLER IN TOP OF THE NACELLE,-----
5 STRAKES ON HULL BOTTOM
HOLLOW BALSA CARVED NOSE.
SHEET FILLER AND
HOLE FOR CO2 MODEL
WINDBREAK
WIND-BREAK PATTERN MAKE FROM 3 BY 5 FILE CARD
--- THE STANDARD FUEL TANK IN HULL
WING RIBS
THERE ARE 6 CENTER STRUTS AND 4 WING STRUTS.
FUSELAGE SIDE SHOWN HATCHED FOR CLARITY
STRUCTURE
3 SPONSON RIBS.
TWIN DORNIER LIBEL BY WALT
CENTERLINE KEEL


RIBS ON BOTTOM OF WING PANELS. ROOT AND TIP RIBS ARE 3/32 SHEET.
STRUT LOCATIONS MARKED BY "X"
FIVE WMS. BROS DUMMY CYLINDERS.
BASSWOOD STRUTS.
BUTTON.
CO_2 NACELLE TOP VIEW
BULKHEAD, STRUT, AND SPONSON DETAIL AT STEP --RUBBER DUMMY ENGINE FRONT VIEW.
2 STRAKES ON EACH SPONSON.
CENTER KEEL
1/16 SHEET.
BUILD HORIZONTAL TAIL OVER PLAN.
VERTICAL TAIL BUILD FLAT OVER PLAN
HOOK FOR RUBBER
SPONSON -- ONE LEFT, ONE RIGHT REQUIRED.
TAIL RIBS
SKEG, GOES ON OUTSIDE OF COVERING.
BULKHEAD AT FRONT STRUTS. ALL BULKHEADS ARE CUT FROM 1/16 SHEET BALSA
BULKHEAD AND SECTION AT BACK OF NOSE.
LE FLYING BOAT PEANUTS
MOONEY
FORWARD CENTERLINE KEEL

Bob Autry turns loose his fast Big Goodyear model, pulled by K&B 5.8. Knee pad lets Bob know which knee to put down in pit stops.

The unduly Ron Duly with his Big Goodyear, just before wipin' 'em out in a 500-lap final.

Control line

By "DIRTY DAN" RUTHERFORD

PHOTOS BY AUTHOR UNLESS NOTED

WATCH OUT, GAGER!!

As mentioned last month, there is talk of a challenge between myself and **MB**'s Pylon Freako, Jim Gager. The form of the challenge has not taken shape yet, but searching about for a suitable model to use in such a confrontation has occupied about 38 seconds of my free time.

Quite by accident, one of the other members of the Jive Combat Team, Gary Stevens, has come up with the answer; an R/C version of the C/L Combat design by Howard Rush, the well-known Nemesis II. Gary slipped his RS radio (two-channel) into a Nemesis that had first been used in C/L Combat (it had at least two wins in Combat to its credit). The stock, full-size stabilator was used, but with an extra-long control horn, and tapered ailerons were hinged to the trailing edge of the wing. The ailerons go to the tip, extending in to the twin booms, so are almost full-span.

For power, a very strong S.T. X-15 was used, mounted way up front to get the balance right. Fuel feed was the usual bladder, filled with nasty medicine.

The added weight of the radio was more or less offset by the fact that there was no drag from the lines to slow the model down. Performance was, uh, just a bit much. Not as fast as a Formula I, but considerably faster than a Quarter Midget.

Gary and I met during last week to play with his new toy. Neat, but then we discussed the interesting possibilities of bolting on a honkin' Fox 36 Combat Special. . .

So we did. And you ought to see this hummer fly. Vertical performance, from a hold-it-out-and-drop-it- launch is limited only by the fact that it goes out of sight very quickly. Top speed is easily faster than any Formula I currently in existence, even on the mild 35% fuel used so far. Maneuverability is what you would expect from a Combat plane turned loose . . . the faint of heart watch from the relative safety of the airspace between their car and the ground.

Unfortunately, last weekend the motor mounts broke loose during a flight, the model immediately blowing itself to bits. After looking for 2-1/2 hours, Gary did find the motor and most of the radio, leaving only the battery pack someplace in the weeds.

So now we have the model to use in a challenge; a Combat plane that can be fitted with either a 15, 36, or 40, and can also be set up to fly either on lines or with radio, conversion to either R/C or C/L configuration taking about an hour or so.

Your move, Jim. . .

HI THERE, TERRY

Gary and I are both aware of the fact that years ago, Terry Prather converted a VooDoo to R/C and flew it somewhat successfully. And perhaps Terry is one of the very few who can visualize the performance of Gary's R/C Nemesis, as Terry used an engine not as powerful as a current Fox, an airplane that is both heavier and smaller than a Nemesis, and controlled by a heavier and slower radio system.

And surely Terry will be interested in knowing that Gary hand-launched the R/C Nemesis, model in one hand, transmitter in the other . . . very exciting.

BACK TO "PURE" C/L

As this is the usual time of the year for building and looking forward to the coming flying season, let's talk about what you are going to build, and why.

But first, let's assume that you are new to the hobby, or have been involved for awhile, but are considering going different directions this year.

From left to right, Darrel Albert pretends to be flying TR, Carrie Briggs tries to be seven feet tall, and Dave Braum believes a 15° list is good for 10 mph.

The first question to answer is whether or not you should even fly C/L. And I feel that the answer has to come from looking around you, as even I don't advocate that C/L flying is for everybody. If there is absolutely no C/L flying in your area, why bother . . . there are many other forms of modeling to get involved in. Of course, if you are a die-hard fan of C/L, and enjoy the promotion of it, C/L modeling is still very attractive to most everybody who is modeling oriented, and just a little promotion, plus lots of active flying, will find the flying areas full of like-minded people.

But if you simply want to participate in an established form of modeling without the promotion effort, look around and see what is going on. And I really mean *look*. Quite often an area will have a very active group of C/L, R/C, and F/F people, but they might be difficult to track down for one reason or another.

As an example, my area seems to be very modeling oriented, yet it is not difficult at all to find modelers focusing on their own likes, not even aware of the very significant activities going on around them in F/F, R/C boating, R/C cars, C/L (both sport and competition), indoor flying, etc. In the named categories, we have sufficient interest and competition to come up with National Champions, even a couple of World Champs, plus several writers of questionable abilities.

The point is that when searching out activity in a certain branch of modeling, you have to look pretty hard sometimes, and even asking modelers at a local shop may not get you pointed in the right direction. Better to check with several shops and to ask the shop owners about the various activities going on.

On left is Doss Porter, right is Sonny Butler. Doss is probably telling Sonny that he doesn't have enough ribs and that the pushrod will flex. And he's right on at least one.

When you have finally determined what is going around the local area, all you have to do is decide which faction to go with.

But as this is the C/L column, let's say that your choice is between flying sport R/C, with maybe some Fun-Fly (Dumb-Fly) competition thrown in, or going with a crowd of C/L fliers who are into both sport and competition flying.

As both groups are into modeling, and the models themselves are built of the same materials, the only real distinction is in the method of controlling the models. As the magazines take a lot of space going on and on about the virtues of R/C flying, let's look at C/L from the method-of-controlling-it side of things. First off, it is a lot cheaper to buy a few sets of lines, a card of bellcranks, some leadout material, and assorted C/L flying handles than it is to pop for even the most basic of radio sets.

But just because it is cheaper doesn't

Continued on page 106

On left is Joe Kall, right is Johnny Clemens (who?). Joe's Kilsdonk designed Zipper got him a 1st place at MACS Show.

Mike Hoffelt with the FAI Monoboom, which he kits. Also has an AMA (Fast) Combat version Both are state-of-the-art.

The authors with their 1/2A racers, all powered by Cox Black Widows. Little Mike in center was built when incompatible paints on first Little Mike (right) ruined the finish.

SHOESTRING AND LITTLE MIKE

By JAMES and DAVID O'REILLY . . . Two attractive models designed for 1/2A Scale Racing. A good fun event for clubs.

• Shoestring and Little Mike are 1/2A Class I Scale Racers. They were designed for a building and flying contest conducted by the Wichita (Kansas) Wichihawks. The purpose of the contest was to keep the activity level up over the winter. Our rules specified that only reed-valve radial tank-mounted sport-type engines were permissible. While the AMA rules at the time allowed "any sport-type 1/2A engine", they were changed for 1978 to coincide almost exactly with the rules under which Shoestring and Little Mike were designed.

I fly more free flight than control line, but decided to play the game regardless. We attacked our supply of old magazines looking for Goodyear and Formula One designs. I chose Little Mike because of its pleasing lines and attractive but reasonably simple color scheme. Meanwhile, my fifteen-year-old son, David, had also become interested in the contest. He considers Shoestring the world's only aircraft. All the rest are just planes. So his choice was made.

We began by scaling up the plans. One of those small pocket calculators with a memory is invaluable for this job if you want to "roll your own". Dave found a very detailed plan of Shoestring, but Little Mike showed up in an ancient issue of *Air Trails*, in a tiny three-view with a wingspan of roughly two inches. To scale up any plan, divide the desired model wingspan by the wingspan of the available three-view. The resulting constant number is entered into the memory of the calculator. From that point on, scaling up consists of taking measurements of the three-view and multiplying them by the constant, yielding the desired dimension of the finished model.

DESIGN

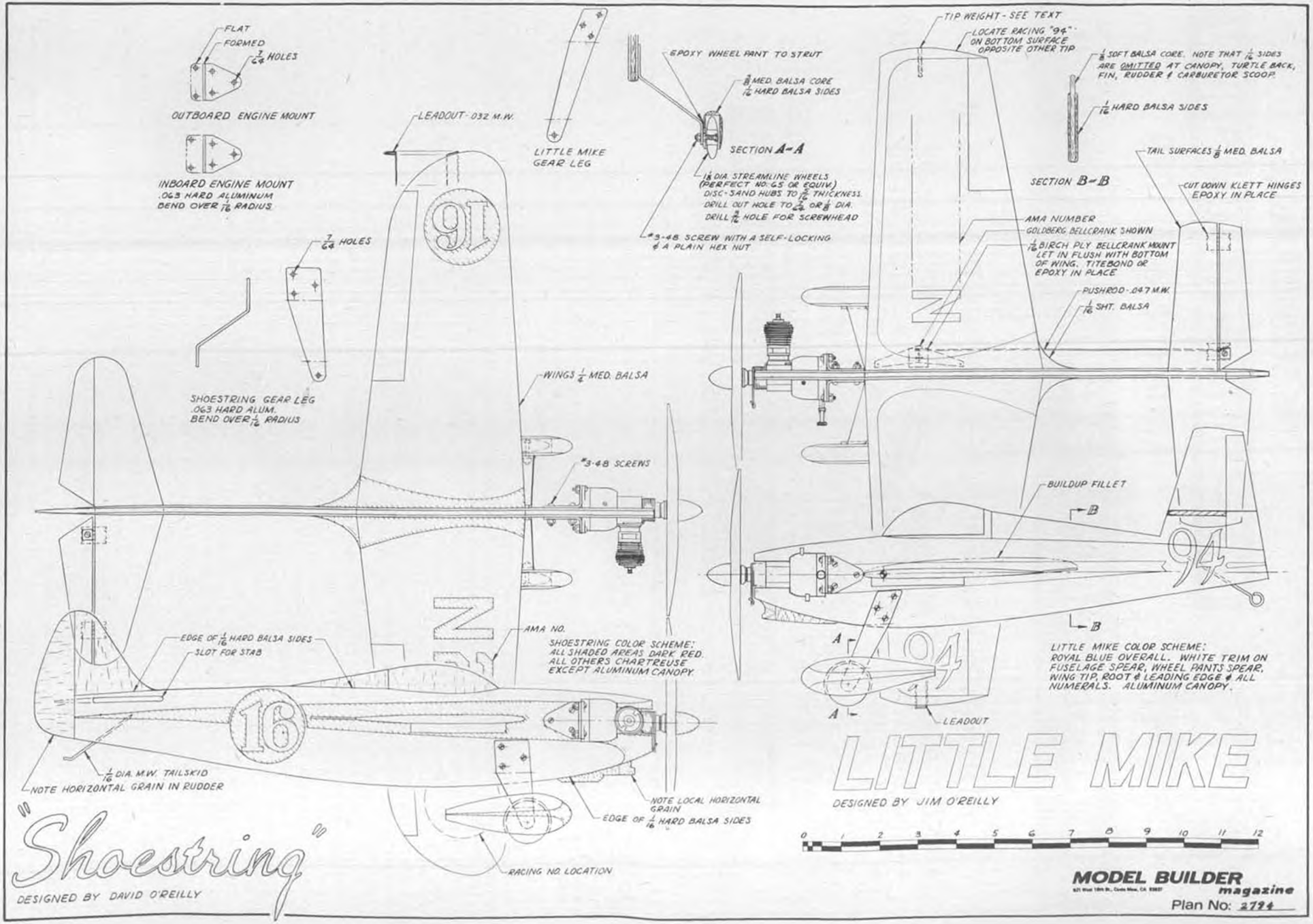
The three-ply fuselage construction was chosen because the rules required profile construction, and we wanted to duplicate as many of the fuselage contours as possible within the limits imposed by the rules. Also, our woodbox contained a few sheets of 1/16 "ironwood" left over from the last time we bought a kit. The core of soft six-pound 1/8-inch balsa with hard 1/16 sheet faces gives a good combination of strength and lightness. If you wish to keep the appearance as close to scale as possible, the engine cutouts shown on the plans are recommended. However, if strength and practical considerations are more important to you, we suggest that the portion of the fuselage above the engine be eliminated, as it is rather fragile. Observe from the photos that Shoestring accomplished this job for us.

CONSTRUCTION

The wing is made from 1/4-inch medium-weight balsa. If you are using balsa in three-inch widths, you will have to splice by butt-gluing. If you are able to find six-inch wide balsa, you will discover that the splicing has been done for you. Carve and sand the wing to a symmetrical airfoil shape, as shown on the plans. For the least drag, the trailing edge should be thin and sharp. However, such trailing edges are very damage-prone, so a compromise is in order here. Being rather conservative by nature, David and I both left ours somewhat blunt, anticipating that we would need the added ruggedness. Before mounting

Dave's Shoestring with the flight landing gear installed. Note that the fuselage extension over the engine has broken off.

The senior O'Reilly's Little Mike. Model uses the sheet aluminum landing gear and engine mount shown on the plans.


FLAT
FORMED
7/64 HOLES
OUTBOARD ENGINE MOUNT
INBOARD ENGINE MOUNT
.063 HARD ALUMINUM
BEND OVER 1/16 RADIUS
7/64 HOLES
SHOESTRING GEAR LEG
.063 HARD ALUM.
BEND OVER 1/16 RADIUS
LEADOUT-.032 M.W.
LITTLE MIKE
GEAR LEG
EPOXY WHEEL PANT TO STRUT
1/8 MED. BALSA CORE
1/16 HARD BALSA SIDES
SECTION A-A
1 1/8 DIA. STREAMLINE WHEELS
(PERFECT NO. 65 OR EQUIV.)
DISC-SAND HUBS TO 7/32 THICKNESS.
DRILL OUT HOLE TO 7/64 OR 1/8 DIA.
DRILL 3/16 HOLE FOR SCREWHEAD
#3-48 SCREW WITH A SELF-LOCKING
& A PLAIN HEX NUT
WINGS 1/4 MED. BALSA
#3-48 SCREWS
EDGE OF 1/16 HARD BALSA SIDES
SLOT FOR STAB
AMA NO.
SHOESTRING COLOR SCHEME:
ALL SHADED AREAS DARK RED.
ALL OTHERS CHARTREUSE
EXCEPT ALUMINUM CANOPY.
1/16 DIA. M.W. TAILSKID
NOTE HORIZONTAL GRAIN IN RUDDER
NOTE LOCAL HORIZONTAL
GRAIN
EDGE OF 1/16 HARD BALSA SIDES
RACING NO. LOCATION
"Shoestring"
DESIGNED BY DAVID O'REILLY
TIP WEIGHT - SEE TEXT
LOCATE RACING "94"
ON BOTTOM SURFACE
OPPOSITE OTHER TIP
1/8 SOFT BALSA CORE. NOTE THAT 1/16 SIDES
ARE OMITTED AT CANOPY, TURTLE BACK,
FIN, RUDDER & CARBURETOR SCOOP.
1/16 HARD BALSA SIDES
SECTION B-B
TAIL SURFACES 1/8 MED. BALSA
CUT DOWN KLETT HINGES
EPOXY IN PLACE
AMA NUMBER
GOLDBERG BELLCRANK SHOWN
1/16 BIRCH PLY BELLCRANK MOUNT
LET IN FLUSH WITH BOTTOM
OF WING. TITEBOND OR
EPOXY IN PLACE
PUSHROD-.047 M.W.
1/16 SHT. BALSA
BUILDUP FILLET
LITTLE MIKE COLOR SCHEME:
ROYAL BLUE OVERALL. WHITE TRIM ON
FUSELAGE SPEAR, WHEEL PANTS SPEAR,
WING TIP, ROOT & LEADING EDGE & ALL
NUMERALS. ALUMINUM CANOPY.
LEADOUT
LITTLE MIKE
DESIGNED BY JIM O'REILLY
0 1 2 3 4 5 6 7 8 9 10 11 12
MODEL BUILDER magazine
Plan No: 2794

the wing in the fuselage, note whether the wood on one side or the other is denser. Make certain the heavier tip is installed to the outboard side.

The fuselage may now be laminated. Note that the soft 1/8 sheet used for the core has vertical grain, except for areas like the front airscoop, which projects horizontally. Also, note that Shoestring's rudder has horizontal grain. The hard balsa fuselage faces have horizontal grain. The three layers should be laminated with Titebond or equivalent, and care should be taken to see that excess cement is not squeezed out into the area along the bottom of the canopy, headrest, and fin. Any excess cement squeezed out here will have to be picked out later. It will not sand out without damaging the surrounding balsa. The freshly laminated fuselage is placed between two flat boards with weight on top until the glue dries.

The horizontal stabilizer is cut out of medium or harder 1/8-inch sheet. Note that both models have an elevator on only one side. Small injection-molded nylon hinges are more attractive than fabric hinges, but fabric hinges are more durable, so take your choice. The plans show cut-down Klett hinges. Install them with nothing less than epoxy.

The model is assembled by carefully sawing out the cutout in the fuselage for wing and bellcrank clearance. The wing is then set into the fuselage at an exactly right angle and is securely glued into place with Titebond. For fillets, we used Hobbypoxy Epoxylite, but any suitable fillet putty would suffice. Shoestring's stabilizer is installed by cutting a slot big enough to pass the stab without the elevator. On Little Mike, the vertical surface is cut off even with the top of where the stab will be. The vertical is then notched further to accept the stab. After the stab is glued into place, the top part of the vertical is glued back into place.

The landing gear legs are made from .063 aluminum. It absolutely must be a hard alloy. See your local surplus store for a suitable material. Generally, the alloys sold in your neighborhood hobby shop are neither hard nor hardenable. The legs may be bent by clamping them along the bend line in a bench vise. However, this will leave unsightly tooth marks along the inside of the bend. A much better procedure is to make a bend block from steel or aluminum plate. One edge of the block must have a straight edge which is carefully radiused and smoothed. The part to be bent is clamped in the vise along with the bend block, in a position such that bending will occur over the radiused edge. Bending is accomplished by driving the landing gear leg by means of a wooden "driver" and a hammer. The wooden block is positioned next to the bend line such that the force is applied as close as possible to the bend.

Wheel pants serve no useful purpose whatever, but add a lot to the appearance. Obviously, if the model is being built only to fly, they are optional. Dave and I each built two sets of landing gear; a display set with pants, and a flying set without. For engine mounts, the plans illustrate sheet metal. Note from the pictures that Midwest nylon mounts work well if they are suitably cut down. For the control system, there are several suitable pre-packaged horns and bellcranks. We used Goldberg's. The bellcrank is mounted on a piece of 1/16 plywood, 1/2-inch square. The plywood mount is set in flush with the lower surface of the wing, in the position shown on the plans. It is epoxied in place, as it takes the entire line pull in flight and must pass a five-pound pull test. We did not use conventional lead-outs. Instead, we used the single loop of music wire illustrated on the plans. The lines are run through this loop and attached directly to the bellcrank. This is a little less trouble and a little lower drag. Before the finish is applied a 3/32-inch dia. hole should be drilled into the outboard wingtip and about 1/4 ounce of lead shot should be forced into the hole. A wooden plug glued into place completes the installation.

FINISHING

For finishing, we used epoxy paint (almost) all the way. I did not originally set out to build one flying model and one display model. The flying model resulted when we tried to finish the first

model with butyrate-based sanding sealer with epoxy over this foundation. The friction from sanding would heat up the local area and it would promptly grow a bubble! After the fourth or fifth attempt to cut the bubble out down to the bare wood, I decided, reluctantly, that I had just made a good flight model and had better get started on a display version for the building contest. The second time around, we used white epoxy filler coat to fill the wood grain and finished off with two epoxy color coats. For masking, Scotch Magic Mending tape does an amazing job. It leaves a sharp, fine edge every time. Its drawback is that it cannot be coaxed around a corner or curve like masking tape. Instead, one must score the tape along the desired line with the point of a dead-sharp modeling knife. The tape will tear sharply along this score. After the color coats, draw on ailerons, elevators, and other details using a drafting pen and India ink. The India ink will rub right off, so a coat of clear is sprayed on last. After the clear coat, finish off with automobile polishing compound and a couple of coats of liquid car wax.

ENGINES

Cox Black Widows are receptive to good break-in and hop-up techniques. The most important single feature of a good engine is the right fit between the piston and cylinder. The fit is checked with both piston and cylinder clean and dry. A good fit is one where the piston will just barely fall from its own weight when released in the top dead center position. We lapped in our engines with auto polishing compound in the bore while turning the engine with an electric drill motor. Don't fail to thoroughly clean out all traces of compound before running the engine! We used the Cox high-compression head because it will increase power output without greatly increasing fuel consumption. Most of the usual hop-up techniques, however, will increase fuel consumption more than power. For example, to optimize the exhaust and bypass timing on our particular Black Widows, we would have had to raise the cylinders above the crankcase a few thousandths by shimming. Instead, we left it alone. Similarly, we did not port the cylinder for fuel consumption reasons. There are a number of things that can be done to the reed, but extreme care must be taken. My own advice would be to go easy on reed changes. It is important to lay in a supply of spares, even if you're running stock. We found that after numerous flights running wide open, the center portion of the reed would develop fatigue cracks and fall right out of the middle of the reed. The ultimate reed change is to get your hands on an obsolete reed from a Cox Space Bug. These are heavier and permit higher rpm before reed "float" occurs. To get the same effect, some troops use a double reed, with one or two ears tack-soldered together to keep them from shifting position. An easy, risk-free change is to reposition the backplate so that the pickup tube is on the outboard side, just below horizontal. The purpose here, of course, is to use every last drop of fuel from the stock tank.

FLYING

The pit man in Mouse Racing is fully as important as the pilot to the team's success. Obviously, he must launch the aircraft as soon as possible and pit it in as short a time as possible. Here are some of the techniques which have won in our area.

For starting, the Cox spring starter is well worth its weight. Not only does it give good, rapid starts, but more importantly, it heads off the tendency of a reed-valve engine to start and run backwards. Good, fresh batteries are obviously needed, but we've seen a lot of fliers show up with weak or marginal boosters. The starting procedure which works best for us is as follows: After fueling the engine, prime a few drops against the closed exhaust port with the piston up. This avoids flooding. Start the engine. Kill the engine by pushing the heel of your hand against the root area of the prop disc. Watch out for the tips!

Top up the tank and indicate that you're ready. Now, with the battery still connected, while waiting for the countdown, grasp the prop firmly and pull it through compression. You should feel an ignition "bump". Repeat this every five or ten seconds. If you lose the bump, prime and restart the engine. The

object, of course, is to arrive at "go" with a ready engine and a wound starter that requires only releasing the prop, pulling the booster, and releasing the model. The model should be moving one-half second after "go!". Pit stops involve a bit of teamwork between pilot and pit. On most calm days, the pilot can whip the ship around to a pit area landing. Landing? Actually, we don't want a landing, but a deliberate high-speed overshoot. The pit man does his second-baseman routine and one-hands the model. Again, fuel it, prime it (don't flood!), start, and release it. Keep your eye on the pilot, but don't wait for him to indicate "ready". It's his job to *stay* ready. If he has a problem, he can give a "hold up" sign.

This kind of event can be a real winter shot in the arm for a club. Besides, a few weeks after the building contest, it's Spring and everyone can go flying. This event is a good place to start if you want to add control line flying to your activity. •

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1 to 1 . . . . . *Continued from page 15*

much-used equipment under the more strenous requirements imposed. Unfortunately, modelers will often do this. *They're harder to transport.*

Not a safety problem, unless you can't see around it in your rear view mirror! If you insist on building super-big and driving ultra-small, that's your Pandora's box.

They are harder to fly.

This point is dramatically opposed to one in our "credit" column. The reasoning I have heard behind this statement seems to center not so much on the fact that they are "harder" to fly, but rather require adjustments. For instance, a revised consideration in the area of depth perception seems to be in order.

They react slower, and while this may easily be a "credit", one needs to adjust to a more open pattern, and at some fields this may result in a trip over the pits to get it around where you want it until you get used to it.

It would appear to be a lesson in futility to attempt to debate the "credits" and "debits" of big models from a safety standpoint. In addition, we have not, nor ever will determine what is "too big". Man has always moved on a continuum that will make "big" become regular as he moves to bigger. In addition, who has ever bought a "small" box of cereal? They are always big, bigger, or biggest (for the moment). *(After "biggest" comes "family size". wcn)*

In addressing ourselves to the problem, I think it is *critical* that we consider the following point:

No matter how careful we are; no matter how finely developed our materials and methods become; no matter what is right, "credit" or "debit", there will be safety concerns that develop. When they occur, we will need to answer to some authority and to the general public. If we can convince them that we are acting responsibly and are attempting to take proper precautions, fine.

However, one major point nags at the back of my mind. Over the years at many displays and demos, I have encountered the uninformed general public and heard the same statement over and over again. As they peer at a 60-inch span model, they state, "I didn't think they were that big."

Of course, these people harken back to a stick-and-tissue model from their childhood, unprepared for the tremendous developments that have occurred. You may talk with them for hours, explaining the fantastic realiability of equipment, etc., but how are you going to cope with the *psychological* effect that certainly could develop when a super-large model drops into a crowd, a back yard, or someone's car?

To speak to the lay public in terms of kinetic energy, fly-ability, and the like, will also be a lesson in futility. They simply see an object, possibly that they have considered a "toy", in a size that they had not even begun to consider. It is impossible for many to realize that some models are now larger than some full-scale aircraft.

Many areas of the United States have suffered bad press in years past. In many or most cases, it was totally unjustified. Many of you will recall the case of an

Orange County newspaper some years back that utilized "facts" in a distorted view to develop a headline, "Models . . . Perils to the Airways". While the article was badly distorted, it used three basic premises to develop its thesis: how high we fly, how fast we fly, and how big the models are. The information in that article moved nationwide on CBS radio in Hale Sparks' science feature.

As I viewed the flight of the super-sized four-engine bomber in England during the recent World Champs, I was struck with the enormity (no pun intended) of the problem. As it lumbered overhead with its four huge engines droning, it presented a very imposing sight. The crowd loved it. But there was a significant number of modelers standing there among the lay public who were relieved to see the 100 lbs. of model land. They knew of the fragile link that existed between the ground and that model. They saw the vibration and movement of the control surfaces and fixed parts when the engines were running.

Is a 20-ft. model that is 100 lbs. "too big"? What is "too big"?

Recently, here in St. Louis, I spoke with a man, not a modeler, but interested in modeling, who flies full-scale aircraft. He was landing at a small airport that is near one of the R/C sites in St. Louis County. As he entered the landing pattern, he caught sight of a vintage Aeronca "entering the pattern from his left". He almost broke off his approach when a second look revealed that it was a "very large model" (his words). It took him some time to determine that he was in no danger from the model, as it was safely below him; however, as he chatted with me, he questioned the size. He couldn't believe it because it "must have been seven or eight feet across". He was, in fact, under the size since it was a 9-ft. span.

Basically, what I feel we must do is address ourselves through our special organizations and the national organization to the "big" model. Weigh the relative "credits" and "debits" and establish some hard evidence to determine their validity, *now!*

Establish some general guidelines to work within and seek to develop the state of the art. Certainly, we must resist any fostering of "make do" equipment sold simply to fill a market.

We must strenuously discourage the *ill-prepared* model or modeler from flying at our sites. A badly-made model or flying junk pile is always dangerous, no matter what size. Addressing ourselves simply to contest rules will not solve the problem. There must be a consideration of classification for all models.

We will have to try and answer the "too big" question, or most certainly someone else like the press, the general public, or the FAA will do it for us. Certainly, we in no way want to place in jeopardy the fantastic interest that big models have pumped into modeling. Those persons who have dedicated their modeling interests in this direction have infused many individuals with a new desire. They have promoted and carried out "non-contest" activities that have produced a much-needed outlet. By far, the vast majority of modelers have built and flown in a responsible manner, probably more mindful of the risks than most builders.

Lastly, it creates a new world for the scale builder, for it has opened up new horizons in model choice and materials.

It is not wise to exercise some caution and foresight in this area? Should we not address ourselves to what "too big" is, both for competition and sport flying?

SPECIAL SPINNER SIZE AND SHAPE

"Here I am finished with my Widget 10 and now I find out nobody makes a spinner that shape. What a bummer!" Certainly every hobby store owner has heard the cry of anguish uttered by the frustrated scaler who tries to locate a special size or shape spinner. The manufacturer in turn has probably taken shots for not providing that "one that's needed". The problem, of course, is that often the words "*one* that's needed" are correct. The manufacturer and dealer have to be concerned with some degree of volume and can't produce myriad sizes and shapes to fill one-time special needs.

The modeler has some recourse, however, in solving his problem. There is the possibility of having one machined or spun. This can be rather expensive

unless you have the equipment or connections. Beyond this, however, one can produce one from common modeling materials, notably fiberglass. A recent attempt at this proved to be most successful without a great deal of effort.

A plug is needed to accomplish the task and that, of course, is most easily produced on a lathe. It can be made, however, by using a block of wood chucked into your hand drill and turned that way. Run a long bolt through the block, with washers and nuts to hold it tight. One problem with the second method is that you may not produce quite as accurate a plug, due to play in the drill bearings and the inability on many to control the speed.

While virtually any wood can be used to produce the plug, thought needs to be given to the texture and grain, since a slightly out-of-round plug can be produced due to these factors. By using several pieces rather than a single block, you can control this more easily by matching grains. Make certain the glue sets, however, before you fling the pieces to the winds.

The plug should be slightly oversized in length and slightly *undersized* in diameter to accommodate the fiberglass buildup. How many layers of glass you'll want to use will depend on the size of the spinner (diameter) and the type of usage you intend to give it. Something between 1/32 and 1/16-inch thick is logical.

Once the plug is produced, you may use the balloon method of modeling, which has been around for ages. It is possible to shorten the work time considerably in using this method, however. Instead of putting the typical super finish on the plug, use Saran Wrap!

Mount the plug on a heavy dowel and base or clamp the dowel in your vise. Cover the plug with a layer of Saran Wrap. Do not worry about the folds that are generated, since the thickness is so minimal that it doesn't really matter.

Prepare a somewhat oversize piece of fiberglass cloth to fit over the plug. The old teepee shape is fine. Mix the resin, drape the cloth over the Saran Wraped plug and coat with a layer of resin.

A word of caution concerning the next step. The balloons should be of fairly good quality. The dime store cheapies will give you fits, since they often are thin and break easily. Shop around and be certain you have a variety of sizes.

Blow up the balloon and hold it by the valve over the plug. Push downward over the plug, gradually releasing the air as you go. Careful, not too much! Experience and practice becomes a key here. It also makes it a lot easier if there are two sets of hands available, although this is not required.

Push the balloon completely over the plug and it will automatically curve under the plug to form a tight fit over the fiberglass cloth. Allow the resin to cure and then remove the balloon. Repeat this process for each layer of cloth you use. Depending on the weight of the cloth used and the thickness required, two to four layers are ample. Remember to stagger the joints.

The finished spinner will slip off the plug easily. The outside of the spinner may be finished in a variety of ways. Gentle sanding with the plug inserted to act as a solid base can be done. In fact, you can do this in your drill or lathe.

A layer of micro-balloons and resin is then added and sanded almost completely off to fill holes or uneven spots. There won't be many of these, due to the pressure exerted by the balloon.

The back plate can be one from a commercial spinner if the diameter is correct, or you can turn one from aluminum or from material such as phenolic, the material used for circuit boards.

Consideration must be given to attachment, and this appears to be the sticky wicket for some applications. If you are using a commercial plate, you'll find that many have a slot to center the spinner. It is possible to insert a ring inside the spinner to match the slot, and then build up the nose of the spinner, drill a mounting hole, and use the long 8-32 screw and adapter nut. Since the spinner I needed most recently had screws around the perimeter of the back portion attached to the backplate, I utilized that method for the model as well. This does require drilling and tapping and causes a rather high degree of time required to yank the spinner to change a prop. The model on which this is used requires ten 0-80 Phillips head screws to be removed to get the spinner off. That can cause a lot of problems on a flight line! Of course, it is not necessary to use that many if you are not working toward an exact scaled model. Leeway has always been given in the spinner area, as far as judges are concerned, since they primarily look only for consistent size and shape when comparing the static and flying spinners, rather than attachment.

A word of caution concerning the holes. I found that such small holes as 0-80, combined with a fairly thin fiberglass spinner, resulted in quickly enlarged holes and the spinner parting company with the backplate. In fact, this happened on the Hiperbipe the very next flight after returning from England and the World Champs. I believe this can be overcome by putting a thin strip of aluminum or brass between layers at the skirt of the spinner, or by building up this portion with additional cloth and resin.

In addition, this type of spinner does not lend itself to hard electric starter use. I'm certain you've noticed what some people and starters have done to plastic and aluminum spinners, as they've worn a groove that would put the Grand Canyon to shame.

Some consideration should be given to balancing as well. If the spinner is rather small (two inches or less), it will not actually weigh very much and may not be a problem. However, when they

get bigger and thicker, this can be a real concern.

Detailing such a spinner can be a snap. Some spinners, for instance, have a fluted edge around the prop openings. Using a piece of .010 Sig Aeroplastic and attaching it with Hobbypoxy PFC, you can easily reproduce this feature.

Using the homemade fiberglass spinner can be an effective means of overcoming that perplexing problem so often faced by a scale modeler. Now you can get on with building your Widget 10.

SHORT ORGANIZATIONAL SHOTS

During the first of December (which is a month away from this writing), the CIAM meeting will take place in Paris. As the various subcommittees meet, the Scale committee will consider two specific proposals which have been submitted.

Austria proposed that multi-engined R/C models be allowed to compete with a total swept piston volume of 20 cm^3. This would, of course, allow the use of two .60 cu. in. engines and would tend to encourage the use of multi-engined models.

The United States proposed the inclusion of R/C Sport Scale as an official international class in competition. This event has been held at the last several international competitions on an unofficial basis and has proved to be successful.

In addition, the United States, through the efforts of many individuals such as Bill Hannan and Fernando Ramos, is attempting to discover the actual strength of free flight scale and to renew the interest of the CIAM in reinstating the provisional rules which had been previously dropped.

The National Association of Scale Aeromodelers (NASA) has addressed itself in a positive way toward the two proposals and toward the promotion of free flight scale.

Larry D'Attilio, reporting on the Milwaukee Flying Electrons' 1978 contest, relates the use of judges who carry very good credentials: Gene Chase, EAA museum director; Ben Owen, EAA PR Director: Don Coe, ex-Vietnam pilot; Don Hoover, ex-TBF WW-II gunner, and Jim Newman. These men not only have a wide range of full-scale background, but all fly R/C as well.

Have you checked your area to see if there are individuals who have that kind of background to judge your contest?●

F/F Scale . . . . *Continued from page 73*

models will come the ones chosen to compete at the international level. Granted, this is not for everyone, but we still have the need.

In order to help boost enthusiasm, the Flightmasters club is going to hold, in May of this year, a Flying Aces type of contest. This will be in lieu of the regular Semi-Annual that the Flightmasters sponsors at that particular time of the year. I would imagine that mass launch events such as the WW-I, WW-II, and Thompson will be heading the list, along with regular rubber and Peanut, plus Jumbo rubber. The gas event will have CO_2, electric, and gas lumped together. This should really be a pretty big affair! At this point, it is not known whether it will be a one or two-day contest. Judging will be loose and will be done after at least one official flight. Further rules will be forthcoming next month.

I guess what I'm saying is that our bunch out here needs a change of pace, and hopefully, this will get many modelers into the action or out of the doldrums. We still plan on keeping the Annual as it is, and still will continue to sponsor the R.O.W. (I believe that the Flightmasters is still the only scale organization to hold this type of contest. Those of you who have never experienced seeing F/F scale models flying off water are really missing something!) They are also encouraging multi-engine flying. Plan ahead and get some modeling done so you can join in the fun this year!

* * *

I have noticed that many rubber scale modelers prefer not to sheet their models in the areas where aluminum panels should be represented. One reason, I suspect, is that this is done in order to hold down weight. However, it could be that some feel that the additional time and little added weight are not worth the effort. It is my opinion that the sheeted model looks far superior to one with stringers all the way to the nose block. Of course, this is a matter of taste. On the other hand, it could be that some modelers do not know how to successfully install, prepare, and cover these sheeted areas. Another negative aspect of sheeting is the possibility of it sagging between bulkheads. This really looks bad. You even see this on full-size aircraft where the covering has been pulled or shrunk too much.

First off, the sagging between bulkheads can be eliminated by making certain that the part fits properly without undue stress. The easiest way to prevent this from happening is to wet the outside surface of the sheet to be trimmed with plain old Windex. There is enough ammonia in the Windex that it aids in bending the balsa, regardless of the thickness. There usually isn't a problem when you are dealing with 1/32 or 1/16 sheet, but it is still a good idea to wet it down before you wrap it around a curve. The next step is to secure the moistened balsa over the area to be sheeted. This is best done using masking tape. When the part has dried, trim it carefully until you are satisfied with the fit. Do not force it down tightly when trimming, because stresses can then be quite evident after gluing.

Once the part is ready for gluing, it is imperative that you use a non-shrink type glue, such as Titebond or any of the aliphatic type glues. The use of these glues will prevent the sheeting from sagging from bulkhead to bulkhead. On the other hand, Ambroid type glues shrink when they dry, which in turn can cause the unwanted sags.

When you have completed all of the sheeting and you are now preparing the model for covering, one additional step that I include is to coat the underside of the sheeting with a coat of Hobbypoxy clear. Before you think that I've lost whatever I might have had, hear me out. I heat the Hobbypoxy, using a light source or hot water, until the viscosity of the epoxy is like water. By coating the underside of the sheeting only, there is no hard sanding to accomplish. What I have found is that once the material has dried, the balsa is "locked in", and from that point on, it will not shrink one little bit. I have models that are several years old, and the sheeting is still true. The key is to use *hot* Hobbypoxy, because it thins out so much that you get good penetration and virtually no weight gain.

Preparing the sheeting for covering can be done in several ways after the epoxy treatment. A lot of modelers new to scale modeling may not be aware of a rather simple procedure for doing this. One approach is to coat the sheeting with several coats of clear dope, sanding between each coat. This is pretty standard. The next step would be to place the tissue over the sheeting and attach it by using thinner . . . working out any wrinkles that may have gathered. Well, a better way, I feel, is to secure the tissue only around the edges, similar to the way a wing would be done, let dry, then water shrink. The tissue will fit snugly over the sheeting with not a wrinkle. Doping then follows. Normally, I use thinned-out white glue for all my covering, but I have found, if I use white glue for the sheeted area, that when it dries, it leaves a very shiny residue. This distracts from the appearance of the model. If you plan to use paint on the sheeted areas, then it is no problem. So, for these parts I use dope.

With their increased popularity, rubber scale models are becoming more and more available in the hobby shops. Many of these scale kits are built via the crutch system, as used primarily by Guillow and Sterling. If any sheeting is done on models built in this manner, it has to be done in between the stringers. This can be a real time-consuming pain, since each has to be fitted individually. There is a very simple solution that you may want to consider the next time you build using this type of construction. Take each bulkhead where sheeting will be required, and cut it undersize by the thickness of the sheeting. Now you can wrap the sheeting around the bulkheads with little or no difficulty. It may take several pieces to go all around the fuselage, but it will be much simpler. In fact, as far as I'm concerned, with the exception of the notches for the top, bottom, and sides keels, I would rather have each bulkhead undersize by the size of the stringers being used. In other words, if you are using 1/16 square stringers, the bulkhead would be cut down that amount all the way around. Since most kits I have built use the crutch type method of construction, the stringers seldom line up with the notches anyway. Therefore, you can lay each stringer on the surface of each bulkhead as straight as possible with minimum effort.

Some of you might question the overall strength resulting from this approach, but by the time you scallop between each stringer so that the bulkheads won't show after covering, there's very little material on either side of the stringer. At any rate, I find this to be a much easier method.

If you disagree and still prefer to notch for stringers, I would then recommend that you do not pre-notch the bulkheads. Instead, notch then during assembly, as you are preparing to install the stringers. This way, you are assured they will be straight!

Nose blocks on some models can be somewhat of a chore. Usually, the carving job goes along at a pretty good clip, and is one that I personally enjoy. (I'm talking about nose blocks that are fairly long, like you would find on a Thompson racer or that were typical on the old Berkeley rubber scale models.) But then, if you have to hollow the block out, it takes a great deal of time and patience to do it right. Of course, vacuum forming can be employed, and certainly this is a very acceptable alternative.

There is yet another method which may be useful to many of you, and one that can be added to your varied modeling techniques. Have you ever considered carving a cowl out of foam, then sheeting it with balsa? You start out by using the cheapest foam you can get ahold of and carving and sanding it to the shape required. The final contour should be 1/32 inch undersize all the way around. Then start covering this foam with sheet balsa in the largest sheets possible. You may have to splice in odd shapes in order to get the entire foam cowl covered. All sheeting should be done with an epoxy glue. Be careful and do not let any of the glue ooze out between the joints. If it does, use acetone or MEK on a rag and wipe it off immediately. If you aren't careful and there is a surplus of glue on the surface, you will find it most difficult, if not impossible, to sand it off without ruining the soft balsa on either side of it. The sheeting *must* be applied with an epoxy.

Once the sheeting has dried, sand evenly until it is smooth and uniform. From here, you have two approaches. One is to apply several coats of dope, sanding lightly between each coat until the surface is very smooth. Or, you can apply a couple of coats of heated Hobbypoxy, as I mentioned earlier. Sand this with about 320 or 400 grit (wet) until smooth. Usually, two coats will give you a very satisfactory finish. I prefer the latter system because you are trying to simulate metal, and if the cowling is silver, in particular, the results will be more realistic. Weight up front is usually desirable anyway, and I would rather

have detail than a piece of clay hanging from the bottom of the nose of a model.

At this stage, a couple of steps for additional detailing may be done, such as grooving in panel lines with a very sharp triangular file or equivalent, and adding small drops of glue to represent rivet heads. At this point, you will be ready to remove the foam core from the sheeting. This can be done by immersing the whole cowl into a container of acetone, MEK, or even gasoline. (The latter I would use only in a pinch. Gas is really bad news from its potential danger!) Use gloves and have plenty of ventilation, or better yet, do it outside! These solvents will readily eat away at the foam core, leaving you with a beautiful but light cowl. You may prefer to use 1/16 sheeting instead of 1/32 . . . that's up to you. Another item to keep in mind is to check a sample of foam to make certain that one of the solvents mentioned will eat away the foam. Otherwise, you would have to hollow it out just as if it were a balsa block, and you would have gained little. •

Gross Vogel . . . *Continued from page 19*

equivalent) spar material is not available, 1/4 x 3/4 spruce spars may be substituted. The spars may be laminated from 1/4 x 3/8 Sig spruce, since the bending load along the center of the spar will be near zero.

WING

The wings are constructed in four sections, using lightweight balsa throughout. Construct the wing sections with the lower spars flat on the building board to assure proper alignment. Bevel the lower trailing edge sheet and glue in place, using trailing edge shims cut from scrap balsa. Use a dihedral jig to incline the ribs at the dihedral joint to the proper angle. Add the main spar webbing and upper surface sheeting prior to removing the wing panel from the building board.

When constructing the wing center sections, build with the spar boxes and wing alignment tube in place. Check the root rib with a square to assure a good fit with the fuselage. Add hinge blocks prior to gluing the upper trailing edge sheeting in place. Remember, the spar webs are mandatory!

Proper alignment of the wings will be assured if both wing center panels are built at the same time with the center spars and alignment rod in place.

Cut slots in the dihedral joint ribs to accept the plywood dihedral braces, and sand the ends of the wing sections with a long, flat sandblock. I use a sheet of sandpaper glued to a 1x3x15-inch block of fir with rubber cement. Butt glue the wing sections together with the dihedral braces in place. Add the remaining spar and trailing edge webbing from soft vertical grain balsa.

After the wing dihedral joints have dried, remove the unit from the board and install the lower sheeting. Glue the capstrips and wing tips in place. If you remembered to leave a bit of the rear spar exposed when you added the forward sheeting, it will provide a good base for the capstrips. Make the cutout for the elevator in the center wing panels and add the trailing edge spar. Sand the wings to shape and add the plywood root ribs.

Cut the elevators from light sheet balsa. Add the plywood insert for the control torsion link assembly and sand the elevator bottom to match the airfoil reflex shape. Form the components of the elevator torsion link from brass stock. Sweat solder the square tube to the brass sheet and drill holes for the mounting screws or bolts.

FINAL ASSEMBLY

If the two halves of the wing are not aligned properly, a built-in turn will result which would be extremely difficult to overcome by normal trim procedures. If the wing center sections were built with the spar boxes and aluminum spars in place, the following procedure will assure proper wing alignment.

Cut the center spar boxes to length, and while holding in position inside the fuselage, slide the wing joining spars through the fuselage sides and spar boxes. Do not glue in place at this time!

Slide the wing alignment rod through the holes in the fuselage sides. The rod should extend about one-half inch on either side of the fuselage.

Place the fuselage on a flat surface and

add sufficient weight to hold it in place. Slide the wings in place on the aluminum spars and the alignment rod. Measure the distances from the bottom of the wing under the forward spar and trailing edge to the table. Measurements must be the same for both wings. Adjustments may be made by enlarging the fuselage openings slightly and shimming the wing to the proper height.

When satisfied with the wing position, spot glue the center spar boxes and the alignment rod in place using 5-minute epoxy, taking care not to glue the aluminum spars in the process.

After the 5-minute epoxy sets up, remove the wings and slide the aluminum spars out of the fuselage. The center spar boxes should then be permanently glued, using a slow-curing glue.

CONTROL LINKAGE

Except for the torsion link, the elevator linkage is similar to that normally used for strip ailerons. Nyrods are not recommended for this application because of the large size of the control surfaces. The pushrod set-up shown on the plans is quite rigid and provides the necessary spring action to keep the torsion links in place.

The torsion links will look a bit odd with the wing off as they just sort of flop about. However, once the wing is in place, they become quite rigid. Check all solder joints prior to final assembly.

The rudder bellcrank may be made from 3/32 plywood, aluminum, or 1/16-inch printed circuit board. The rudder control horn is made from a piece of brass tubing.

The tail wheel and rudder tiller assembly is best made from soft wire, such as that used in wire coat hangers. Bend to shape, leaving the top straight, and solder the control horn in place.

Slide the tiller assembly through the fuselage from the bottom to the exit just behind the fin. Make a ninety-degree bend for the tiller where it will enter the plywood rudder insert. It is not necessary to fasten the tiller to the rudder permanently.

Mount the radio equipment as far forward as possible. In the prototype, a Kraft three-channel was installed with the throttle servo mounted in a plywood tray beside the brick. The antenna was routed externally along the side of the fuselage.

The landing gear is fastened to the bottom of the fuselage using two 3/16-inch nylon bolts with the nuts epoxied inside the fuselage. A drilled and tapped wooden block may be substituted for the nuts.

FINISH

Hobbypoxy finishing resin and enamel were used to finish the fuselage, rudder, and fin on the original. The top and sides of the fuselage are silver, with the bottom black.

The wings were covered with Super Monokote. The upper center panels are silver, outlined with white. The bottom of the wings are black with white tips to simulate feathers when viewed from below. The bird emblem and lettering were cut from trim Monokote and floated into place on a film of soapy water.

CONCLUSION

I hope your GROSS VOGEL will bring you many happy flights! Despite old pilot tales to the contrary, a flying wing with a properly located center of gravity is impossible to tumble.

Remember, while GV is quite easy to fly on medium to low power, it can be a bit of a handful on takeoff or with full power. If you are not an experienced flier, seek help for those first flights. Have your helper read the flight tips so he will know what to expect.

Please feel free to call or write if you have further questions. If the 1/8 x 1/2 aluminum Handi Metal is not available in your area, I can supply it for $3.00 per set postpaid. Chas. Clemans, 14730 SE 45th Court, Bellevue, WA 98006. Phone 206-747-5032 (after 8 p.. PST).

REFERENCES AND ADDITIONAL DATA

"Six Flying Wing Sections", Western Plan Service, 5621 Michelle Drive, Torrance, California 90503.

"Experiments In Flying Wing Sailplanes", Jim Marske, 130 Crestwood Drive, Michigan City, Indiana 46360.

"Little Plank", construction article, C. Clemans and D. Jones, RCM, May, 1972.

"Standard Plank", construction article, C. Clemans and D. Jones, RCM, July, 1975.

"In Search of a Competitive Flying

Wing", a paper by D. Jones, January, 1977. •

Hannan . . . . . *Continued from page 82*

filled with facts, photos, and 3-view drawings. About the only detracting factor was the price tag, some $45!

Recently, we received a catalog from Publishers Central Bureau, which is now offering the book at the bargain price of $17.95, plus $1.95 postage. By all means, if your interest includes racing planes, consider this rare opportunity. Publishers Central Bureau, 1, Champion Ave., Avenel, NJ 07131.

STAND-ON SCALE?

A rather disturbing trend seems to be emerging, judging from the looks of the radically shortened landing gear legs seen on some R/C Sport Scale models. Rather the opposite of the rubber-powered "scale" models with their gears *stretched!* Come on, fellas, the ground handling can't be all that bad, can it? We're reminded of Mercedes 230SL coupes, which have a quiet dignity about their design, until viewed from the front or rear. From those aspects, it appears that an elephant has strolled across the rooftop!

AERIAL DRAGNET

From Dave Stott comes this quote from the October 9, 1909 "FLIGHT" magazine: "During the Flying Week at Berlin, Germany, the following incident took place: "Latham (the famous Antoinette pilot), in trying to land in the dark, was unable to quite clear a lamp-post, and when he did reach earth he found himself in the clutches of a policeman, who wanted to arrest him for damaging the lamp-post. The committee, however, set matters right; 'Those German polizei are real humorists.' " End of quote.

NATS PEANUT REPERCUSSIONS CONTINUE

Max du Blue, writing in the Cleveland Free Flight Society "Crosswinds", sez: "Say Charley, can we get BAN THE TEE DEE PEANUTS buttons, too? (apparently someone had some relating to Laceys, etc.). A mob is gathering to help cover Gas Peanuts with feathers, using black contact adhesive (tar). Some may spill on the builder."

"DARING" GOEHRING UPDATE

The man-powered flying machine shown in our December column has now been successfully tow-tested, more than twenty times, at the Palomar Airport. Tests conducted at about six feet of altitude included tow-release and glides. Further tests, to be conducted in the desert, will employ longer towlines, and possibly, a small auxiliary engine, while Goehring becomes thoroughly familiar with the control system. So far, the craft has exhibited exceptional stability, which came as no surprise to its long-time free flight model builder designer. Also, it recently received a trophy for the best workmanship entry, during a two-day Fly-In at Ramona Airport.

PRODUCTIVITY

Through the courtesy of Fred Williams, ace model maker of musical instruments, we had occasion to read a book entitled "Antonio Stradivari, His Life & Work (1644-1737)". Written by the Hill Brothers and originally published during 1902, the item has been reprinted by Dover Publications, Inc., of New York.

Violins and model aeroplanes have a number of features in common: Each involves (hopefully!) fine craftsmanship, exacting selection of materials, and the investment of much patience and time. Also, either item is fragile, and subject to easy damage. Stradivari instruments have stood the test of time as among the best ever produced, and other makers are constantly searching for the "secret formula" that set these masterpieces in such a lofty position. The Hill brothers examine the individual factors, one by one, and reach some fascinating conclusions. One, the material involved is NOT of major importance. Good wood was, of course, selected, however . . . "material taken from old buildings, such as "Swiss Chalets" is a delusion. Our opinion is rather in favor of the more youthful wood." Incidentally, the master used both slab-cut and quarter-cut wood, just as model builders do!

Continuing on the subject of materials, the authors opine: "Our conclusions are, then, that Stradivari's choice of materials depended upon the circumstances: 1st, the remuneration he was to receive for a given instrument; 2nd, the choice of wood he had at the time in stock. Some years offered an abundant

selection, others only an indifferent one."

Then there is the question of the finish, another similarity to models: Supposedly, Stradivari had a sort of "magic" varnish, some thought responsible for at least in part measure for the fine tone of his products. About that, the Hill brothers have this thought: "Fine varnish was in the hands of fiddle-makers before Stradivari was born. The materials he used exist now, as in his day; but it will prove one problem to make the varnish, and quite another to utilize it with the perfect success of Stradivari."

There we find the real key, the *talent* of the builder! Just as choice balsa will not guarantee success of a microfilm model, nor top-quality paint assure the results of a model's finish, unless the materials are correctly employed.

What about that other priceless ingredient: time? Well, this may come as a surprise, but Stradivari could really crank 'em out, producing over 1,000 instruments during his active years, apparently about two violins per month. Even more astonishing was the fact that he continued to create these masterpieces until the age of 94 years!

Wonder how many model builders are still at it, past ninety?

MORK AND R/C?

From "The Prowler", Times-Advocate, Escondido, California: "Overheard at a meeting of the Palomar Flyers radio-controlled model club: 'I know a man visiting from back East who has a scale model flying saucer he'd like to fly at the R/C field. Would that be all right?' asked one of the members. 'Sure,' came a reply, 'but I doubt that it's a scale model flying saucer!' After a slight hesitation, the member replied: 'You may be right, but who are you to say it's not to scale?' A smiling nod answered, 'Guess you have a point there.' "

MAGNIFICENT MARKINGS

Many scale model builders select their subjects, at least in part, on account of their color schemes. Most rules offer rewards for well-executed markings, but some builders actually shy away from them, preferring plain-Jane machines which are easier to execute.

Artistic types usually feel just the opposite, and often pick subjects which require unusual talent to recreate. How about this one for a *real* challenge: According to the September 14th issue of AERO AND HYDRO for 1912, describing the Gordon Bennett Cup winning Deperdussin, "On the left side of the fuselage of Vedrines' race machine there was a reproduction of the famous painting known as the Mona Lisa, or 'La Jaconde.' "

THACKER STRIKES AGAIN

Q: Tell me, Colonel, how can you be such an outstanding model builder, flier, and all-around good fellow and yet be so modest?

A: "It's all done with mirrors!" •

Flying Wing . . *Continued from page 55*

squares, .40 engine) designs; the R/C gliders were mostly Ravens, semi-Ravens, or Raven-ites. True, both of these are excellent designs, and a sure-fire way for those of us who are not designers to get into the action. But you know, we all get tired of vanilla all the time, and after a while, get to wondering what maybe tutti-frutti tastes like!

But the look-alikes ended with the airplanes; the flying abilities and techniques were the determining factors in the final rounds. The results were as follows:

R/C POWER
1st) Tony Nacarato
2nd) Wayne Sakamoto
3rd) Chris Comley

R/C SAILPLANE
1st) Rick Norwood
2nd) Don Simon
3rd) Pat Seale

F/F RUBBER AND JETEX
1st) Wade Wiley
2nd) Bob Boehme*
3rd) R.A. Short*
4th) Hilde Boehme
*Tied for 2nd.

F/F GAS AND ELECTRIC
1st) Wade Wiley
2nd) Jim McDermoth

F/F TOWLINE
1st) Ken Sykora
2nd) Tony Nacarato
3rd) Addie Nacarato

I'd like to point out some interesting facts. Addie Nacarato, 3rd Place F/F Towline winner, is the "A" of T & A

Hobby Lobby, one of the better-known hobby shops in the Los Angeles area. She is also the mother of Tony Nacarato, winner of 1st in R/C Power and 2nd in F/F Towline.

Third Place R/C Power winner, Chris Comley, is only 16 years old. He flew his Evans "540" to this position amongst some pretty stiff older and more experienced competition. He also flies a Phoenix pattern ship, retracts and all, and appears to have a lot of future potential. If this young man doesn't get himself side-tracked somewhere along the way, we should be seeing his face and name in winner's circles from now on.

And last, but certainly not least, is little 9-year-old Hildie Boehme, from down San Diego way, who is into her second year of modeling and who placed 4th in the F/F Rubber and Jetex event. Not bad for one who is handicapped by having to launch about three feet LOWER than anyone else, and who has her father for a pit crew! Good luck to all these youngsters, including Addie! •

Soaring . . . . . *Continued from page 47*

common to lean back prior to launch. In doing so, the wings may no longer be level. Typically, a right-hander then throws the plane into a right turn. This requires immediate correction . . . and there's the danger of overcontrol due to the high speed of the launch. I've also seen pilots throw their plane without the wing clearing their head. That's hard on the plane, and on the head! Let's make sure that we throw the plane faster than stall speed. Off the slope, it helps to keep the nose slightly down to prevent "ballooning." Off the hi-start or electric winch, it's well to picth the plane up at, say, 70 degrees . . . anticipating the angle demanded by the position of your towhook relative to the center of gravity. This removes unneeded stress on the wings caused by rapid ship rotation from level flight (or a disasterous stall caused by launching with insufficient speed for too high an angle of attack). Launching is an art worth practicing.

As far as new sailplanes are concerned, there are a number worthy of your attention. For example, John Veale, of Manhattan Beach, CA, has come up with an imaginative conversion of the hand-toss free flight foamy 747. His plane is now controlled by ailerons and elevator . . . each driven by the new miniature KPS-18 Kraft servos (.582 ounces each). The remainder of the airborne pack consists of the KPR-7L receiver (1.411 ounces), the KB-4L 225 milliamp battery pack (1.954 ounces), and the switch harness. Believe it or not, this plane weighs in at less than 10 ounces. It's very realistic when flying over the slope. At some distance, it's hard to tell that it's not the real thing. Here's a conversation piece if I ever saw one.

John Lupperger of Riverside, CA, built and flew the Beaver (produced by Pilot), then improved on that design by taking out the dihedral and adding ailerons (see last month's column). That made this little one highly aerobatic. This sailplane inspired John to produce an even more beautiful design with still higher performance. His new craft has a double-tapered 49-inch wing, 10% thick Clark-Y carrying 288 square inches of surface. At 18 ounces, this plane flies at 9 ounces per square foot. It's as smooth as a much larger craft, and yet maintains beauty through brevity.

You ought to read *Gliders: How to Build and Fly Them* (Drake Publishers, Inc., New York, 1978). The author, Paul Garrison, provides tricks of the trade for those interested in home-built full-scale sailplanes. It's even worthwhile if you prefer smaller scale . . . especially when you're looking at quarter and 1/3-scale sailplanes. Why not add this book to your library?

Let me remind you of the Southwestern Regionals, to be held January 20-21. Skip Jackson of Phoenix will CD the sailplane portion of this event, which will include four rounds of seven-minute precision-duration on Saturday and a 15-minute add-em-up on Sunday (three flights). All four classes will be represented (standard, modified standard, open, and two-meter). The landings will be on an AMA scale runway on Buckeye's famous tarmac. Trophies will be awarded to 3rd place in every class, with medals for 4th and 5th, as well as for overall high point and 1st and 2nd high point in junior/senior class. There'll be three 6-volt winches and one 12-volt winch available at the site. Pre-register

by mail (c/o Webster's Hobby Shop, 30 East Camelback, Phoenix, AZ), or drop by the shop on Friday evening before the contest. Dave Thornburg assures me that Mildred's Cafe is still open in Buckeye and that this year there will be no downwind launching.

This contest always brings a pack of fliers down out of the Colorado and New Mexico mountains to thaw out in mid-winter. There's bound to be a good representation from Southern California as well. Looks like a good time coming up for one and all. •

F/F . . . . . *Continued from page 81*

Model Products, 880 Carmen Court, Laverne, CA 91750.

(Other cottage industry manufacturers: please send photos and catalog information about your products and I'll try to give you a plug, too.)

HINTS 'N TIPS

1) Also at Taft, I ran into Bob deShields, who proudly showed off one of our RM Maverick kits he'd built. (Said it came out at 5½ oz. finished weight, too!) What really struck my eye was how he'd handled the wing hold-downs on the built-up pylon. He used 2 pieces of 1/64 ply, about 1/4 inch wide and 1-1/2 inches long, at the front and back of the pylon. These were glued to each side of the pylon with Hot Stuff, then brought together ahead of the pylon and glued. Result is a neat, light, strong way of holding the wing rubber bands in place, much better than the paper clip hold-downs shown on the plans. We'll try to incorporate this mod on future kits.

2) Bruce Kimball uses a sheet of plate glass on top of his workbench for a building board. Says it holds the plans down perfectly flat, you can see through the glass, and the glass is totally unwarped. But how do you stick pins in the glass? You don't . . . pieces are held in place on glass with plastic typewriter key cleaner (Silly Putty might work, too). When finished building, scrape the type cleaner off the glass with a razor blade. Bruce also finds that a Pink Pearl pencil eraser makes a good miniature sanding block for indoor HLG's. Wrap the sandpaper around the eraser; it contours to the surface being sanded, especially the undercamber.

3) The *FFlyer* newsletter, out of Alabama, edited by Bill Matthews, touts Dupont 700S clear Imron polyurethane as a top coat on power models. After applying 2 coats of 50/50 nitrate dope, spray on one good wet coat of Imron. This can be done as soon as the last coat of nitrate is dry to touch. The Imron must be sprayed, but there is no waiting for days for the dope to cure, as is needed with epoxy, etc. Without an accellerator, the Imron will cure in 4 to 6 hours. An accelerator will shorten that to 2 hours. For complete protection from really hot fuel, it must cure for 5 days. Imron can be bought from any automotive paint store selling Dupont paint, in quarts or gallons. Cheaper than usual hobby shop products, too. (Well, there it is for you guys who've been reading about West Coast fliers using Fuller Plast for fuel-proofing and wondering where to get some. The properties of Imron sound quite similar to Fuller Plast, which I've used for years. Only on flying surfaces, though. On fuselages, I've had bad experiences, so I'd stick with epoxy there, where raw fuel is likely to be present in huge amounts, the way I work.)

MYSTERY MODEL OF THE MONTH

This month's mystery model appears to be a cross between an Old Timer and a Civy Boy. Only hints I'll give are that it was designed by a currently active West Coast flier and published in an American magazine after WW-II. If you think you know what it is, drop a letter to the **MB** office. If you're first, you get the free subscription.

NOMINATIONS FOR TOP TEN MODELS AND FF HALL OF FAME NOW OPEN

Tony Italiano sends word that he is chairman of the NFFS Top Ten Award Committee again this year, and that nominations are in order for 1979. Categories are the 3 FAI classes, Outdoor Rubber, Indoor Rubber, Small AMA Gas, Large AMA Gas, Indoor/Outdoor HL Glider, and Special awards.

Tony is also soliciting nominations for the 1979 additions to the Free Flight Hall of Fame, in order to give recognition to those individuals who have contributed to the development/furtherance of Free

Flight. The following considerations apply to Hall of Fame nominations:

a) Scientific developments directly attributable to model airplane developments.

b) Designs that have formed a trend copied by many.

c) Sportsmanship/rapport on the field.

d) Individuals who have, through their efforts, coagulated designs and concepts, edited down to the written word, understood by the average modeler.

e) Nominees must be known to more than a handful of modelers. Send nominations for both the Top Ten and Hall of Fame (by Jan. 31) to: Tony Italiano, 1655 Revere Drive, Brookfield, WI 53005. •

Plane Jane . . . . *Continued from page 69*

ready for more power. This is where the .25 comes in. Plane Jane can do the job of handling the extra power with no bad handling characteristics. Super Tigre and O.S. engines are distributed by World Engines and have been around awhile. They are more dependable and durable than most engines. Choosing these engines for power in Plane Jane was a wise choice.

The first model of Plane Jane that I built had wings covered with balsa. The production version now coming off the assembly line has wings covered with 1/64th plywood. This makes for a smoother, more durable wing, less susceptible to dings.

Soon to come off the assembly line is a Twin Jane, powered by two .10 engines. We will do a product review on it in the near future.

Whether you want a trainer or sport model for tooling around, you will not be sorry to build a Plane Jane. •

Mammoth . . . . *Continued from page 25*

bearing (no pun intended), as does lift/drag configuration, etc., but if you work on the theory that each individual combination, i.e. power to weight (power loading), area to weight (wing loading) should have to look right by itself first, you'll find aircraft design a lot simpler. In powered aircraft these are the two main concerns. Try treating them separately at first and notice that the common denominator is *weight*.

Now for the compromises, lift-to-drag ratios, the type of propeller best suited to the aircraft you intend to build, the power you need to drive it at its most efficient speed, the speed envelope you intend to fly it in, and the type of performance you're looking for. Remember that the closer you are to the above suggested limits, the more attention you will have to pay to propeller matches, wing and tail incidence, balance, control surface gap, etc., in short, anything that produces unnecessary drag. When designing or building any aircraft, try to avoid anything that will hinder flight. Forgot something, haven't I? First you have to get moving on the ground or water, not only at sufficient speed but also at a minimum drag configuration to *reach* that speed, preferably balanced on either floats or wheels so that a minimum of rotation effort is required to lift off. A lot of aircraft have never fulfilled the meaning of the word because they were lousy boats or vehicles. Far too many people are discovering that while they have an acceptable airplane in the air, it's a real dog to get there, while others get the same weight off in a few feet and still perform the same in the air.

Let's start with wheels first, realizing in both cases that if you're dead scale to a real aircraft, you're limited to what you

can do. But read on, there's still enough information to help you possibly lift off easily rather than rip it off without the requirements being there to allow it to become an aircraft.

There are two basic types of drag: rolling, or hydrostatic resistance, and aerodynamic drag. Both of these are affected by the thrust line vector and angle of attack of the lifting surfaces in relation to both the takeoff roll attitude and initial taxi-to-roll-out speeds. Full-sized aircraft have manuals which give the best airspeeds to lift the nose wheel (trading rolling resistance for aerodynamic drag), when to rotate and further reduce this rolling resistance by taking off some of the weight from the dragging undercarriage without adding greater drag aerodynamically, whether the climb is initiated immediately after lift-off or whether the nose is allowed to drop and pick up further airspeed before climb-out. This is determined largely by aircraft design, load, runway conditions, wind speed and direction, temperature, etc. Aircraft do vary in these requirements, and pilots of full-sized aircraft require checkouts in different types to take advantage of their good points and minimize their weak areas.

OK, where does that leave us? In majestic scale (spelled Mammoth Scale in **Model Builder**), we are closely matching full-sized aerodynamics in power loading and the way the full-sized machine handles. If we attempt to take off these aircraft without regard to the same details applied to their full-sized counterparts, we can't expect any better results, and those results could be disastrous. Just ask any full-sized pilot what would happen if he just applied power, held the stick back in his stomach and waited for it to lift off. Enclosed are some diagrams which show some preventative medicine for sick birds. •

Pylon . . . . . *Continued from page 24*

laps while trying to keep up with Webb and Blouch. Blouch turned a very respectable 1:32.9 to just edge out Webb, thereby advancing Bobby to the 2nd elimination stage.

In the second heat between Gager, Floyd Fitzgerald, and Gail Jacobson, Gager cut the No. 2 pylon on the 3rd lap and shortly thereafter, Jacobson cut No. 1 trying to catch Fitzgerald.

In the 3rd elimination round it was Bob Reuther, Ron Bressler, and Al Grove. All three aircraft were in the air at the same time and as they rounded the No. 1 pylon, Reuther either touched one of the leading aircraft or got caught in their prop wash and was knocked from the sky. Bressler and Grove both got carried away in the excitement and both double-cut.

In heat No. 4, it was Wayne Yeager, Doug Brueshaber, and Tom Dudan. Dudan flamed out on the first lap and Yeager double-cut to advance Brueshaber to the finals.

The problem in heat three caused the well-laid plans for a four-plane flyoff to boil down to only three planes: Bobby Blouch, LeRoy Webb, and Doug Brueshaber. In a fine racehorse start, with all three planes breaking ground together and reaching the No. 1 pylon at the same time, it was short-lived as Blouch really turned it on to take a commanding lead. Webb cut out very shortly after and Brueshaber followed Blouch around for the ten laps. In winning the final heat and the Doolittle Trophy, Blouch also turned his best time of the two days of racing, a 1:29.2.

All in all, it was a super two days of racing, and I can't recommend too strongly that you attend next year's event.

You also might note that running what is essentially two races in one creates a more interesting race, as it still gives the flier who may not be the fastest but has a little luck and flies consistently a chance to win a first place trophy. It also gives the hot-shots their glory by being able to make the finals even though they may not have finished but one race, while still setting a fast qualifying time. The final elimination races carry with them an excitement that parallels the high school Sweet Sixteen basketball tournaments. The contestants at RR were interested enough to hang around for the outcome of the Doolittle race, whereas at most contests, as soon as they're out of the running for the trophies, they pack up and leave.

Costs to the club could also be kept down by having the qualifying fliers supply their own prize money by charg-

ing them a $10 kitty fee with the winner taking all.

HEY!!! Toledo's not far away. Plan to be there . . . we'll see you at the **Model Builder** booth. •

Electric . . . . . *Continued from page 67*

long enough to set any records, but it is a start. It has gained a third servo for on-off control of the motor, and weighs 18 oz. in this configuration. Speaking of indoor R/C, a natural scale model would be the Stits Jr. featured in the October *Model Aviation*. I fly an ME 109 with rudder only and the Astro 020, so the low-wing configuration of the Stits Jr. is not a serious problem; just use more dihedral than for a high-winger. A four-foot span model would qualify as almost 1/2-scale! It's a wonder that the Peanut Scale fliers haven't done this one. At a 13-inch span, there would be 78 square inches, over half a square foot; the Fike "only" comes out at 55 square inches!

Until next time, charge ahead! •

Sailplane Des. . *Continued from page 49*

more reasonable . . . after all an Oly II weighs about that, and has 6.4 feet of wing area.

At this point, some clown is going to ask the inevitable: what's to stop us from making the wing *seven* square feet? Or eight? We may have decided on a 90-inch span, but can't we make the chord as wide as we want to? Who says sailplane wings have got to be long and skinny, anyhow?

Well, the answer to that question is (and the engineers are gonna hate me for this one): *nobody* says they've got to be long and skinny, because *nobody really knows how important aspect ratio is on model sailplanes!*

Aspect ratio, you'll remember, was defined last month as the ratio of length to width (span to chord) of a wing. Thus a 99-inch wing with an average chord of 8 inches has an aspect ratio of 99 ÷ 8 = 12.38, right? You can arrive at this same number by squaring the wingspan and dividing by the wing area, and that's how I prefer doing it . . . "average" wing chords can be a little tricky to figure, sometimes.

The fact is, our current "knowledge" or aspect ratio importance is derived from full-scale theories, and many full-scale theories *simply don't work* when applied to model sizes, weights and speeds . . . in precisely the same way that scientific "laws" of cause and effect break down on the subatomic scale (don't ask a nuclear physicist to predict where an electron is going to be at any time, because he'll have to admit that he can't.).

About all that can be said for sure about aspect ratios is that they seem to be coming down: the current crop of U.S. competition craft are growing stubbier wings. The Graupner "Cirrus", king of the heap eight or ten years back, had an aspect ratio of 17.3; the Paragon of today is down to 12.9, and the Olympic II figures out to 10.6! In the two-meter class, Mark's Wanderer is under 10, and way down in the saltgrass country of South Texas, John Rimmer flies his highly successful little Nemisis at a record *seven-point-four*!

So a lot of wing area *can* be packed into a short span, at the designer's option. The practical limits are probably more aesthetic than aerodynamic, for the performance range we need. For our hypothetical Dream Soarer, then, why don't we settle on an aspect ratio of ten to one, about halfway between that of the Olympic and that of the Wanderer. An AR of 10 would give us an average chord of 9 inches on our 90-inch span, so our wing area would figure out to 9 x 90 = 810 square inches, or 5.6 square feet. Now our weight range becomes 33-36 ounces, if we want to say in the 6.0 to 6.5 ounce-per-foot class, and keep our "floater" status.

That about settles our major parameters, then: we're designing a floater of around 800 square inches, 9 x 90 inch wing, 6 to 6.5 ounce loading. All we need is a floater airfoil (we can swipe it from our favorite floater kit, or pull it out of one of the sources given last month) and we're ready to put pencil to paper and begin scratching out . . . excuse me, *lofting* . . . our Dream Soarer! Next month we'll talk about *moments* . . . how long de tail ought to be, how big de stab. We'll look at the moments of half a dozen popular designs, and decide whose to steal. We'll call the lecture "Great Moments in Sailplane History". . . MODEL OF THE MONTH

This month's three-view comes from Northern California. Called simply "The Elliptical", it's a multi-task (that is, FAI speed-distance-duration) design by Herb Semmelmeyer of Santa Rosa. If the general outlines remind you a little of Rick Walters' "White Trash" (**MB** plan No. 1723), that's because Herb and Rick were collaborators for years, back in the early seventies. The airfoil (shown full size) is Herb's own, a 10% section that features a straight line from the trailing edge upward to the 50% point.

Vital statistics on the Elliptical are as follows: 117-inch span, 1046 square inch area, aspect ratio 13, wing loading 7 ounces minimum to 15 ounces maximum (52 to 109 ounce flying weight), stab area 13.5%, vertical fin area 6.9%.

Herb emphasizes that the plane shown is merely a simplified prototype of his original dream, which was to have had full-span elliptical dihedral, a la the Midwest Hawk. The 18-inch elliptical tip panels were jig-built from spruce and balsa; Herb feels that the construction is probably "more work than the average builder would care to tackle." I'd have to add that the work was worth it, however, because the prototype I flew had smooth and instantaneous rudder response, in spite of what I consider "heavy" wingtips.

Three Ellipticals have been built so far, including one begun almost three years ago, and just now being completed by its new owner, Pete Bechtel of Couer d'Alene, Idaho. The ship shown in the photos is by Harry Menke of Santa Rosa.

C/L . . . . . *Continued from page 87*

make it better, does it? The cost thing aside, I still prefer to fly a *good* C/L model over any R/C plane; a good C/L model being a well-trimmed Stunt plane, honkin' Combat plane, or groovin' Rat, Goodyear, or Slow Rat. Given the choice, I'll even take a nice profile C/L over, for example, a Quickie 500 R/C plyon racer.

The big difference is in the fact that C/L flying gives you a positive and direct feel of the model you are flying. A quick move of the hand gives an instantaneous, and exactly proportional, change in the flight attitude of the model. You are really flying it, and except in very rare circumstances, such as a bellcrank pulling out, you are the one doing the amazing tricks and/or punching that baby in the ground. You are aware of the fact that 95% of the "interference-caused" crashes in R/C are really pilot-error-caused crashes (brain fade), aren't you?

This direct feel of the model allows very tight, precision flying, but it also shows up the mistakes, especially if you like to fly very close to the ground. This aspect of C/L flying can be very exciting, as you are just daring the ground to get you, *if* you make a mistake. For flying on the fine line between dazzling finesse and instant destruction, you just can't beat flying C/L.

If you have never flown C/L, and wonder how it is that a certain amount of skill is required to keep from punching, consider that a decent Combat model is flying around 120 mph if powered by a current, competitive motor. At that speed, the model is going about 176 feet per second. With the model directly overhead, it only has to travel about 100 feet before it hits. Right, you've got 1/2 second to relax a bit, deciding on what you will do next. All the while the model is still going 176 feet per second, only now it is 12 feet off the ground. Add in there that the flier has to know how much room it takes for the model to do the turn to upright or inverted flight, and maybe you can appreciate the fact that most of the competitive Combat fliers can time their pull-outs to within two or three feet of the ground, even when involved in a heavy-duty match *and* when they are spending most of their time watching the other guy's model to see what he is doing or going to do. As if that isn't enough, when in a match, you very rarely have the benefit of being directly overhead with a whole 1/2 second to decide what to do, most of the time being much lower to start with.

Although Stunt models don't fly nearly as fast, they too provide a real challenge that sheer speed and dazzling turns can't match. The trick here is that the bottoms of most maneuvers are down around 4 feet off the deck. Now, anybody can get that low with just a little practice, but to do it on every single maneuver of every flight, *and* to do it so that the rest of the maneuver isn't bobbled from corrections to get the magic 4-foot pullout . . . that, friends, is a real trick.

Back to the cost thing. Although I and many other C/L fliers have an investment in our hobby that is quite substantial and probably several times that of the casual R/C Sunday Flier, spending can't be equated to how much enjoyment you are getting. Still, for the amount of money that I have spent on C/L equipment, I have had many, many models to play with and enjoyment that simply cannot be measured in dollars. But the point is that for a certain amount of money, you can have one complete R/C model, with maybe a back-up plane, or numerous C/L models that are always complete and ready to fly, except for maybe changing an engine. With an R/C set-up, you have to switch the radio from one plane to another if you want to fly two different planes.

I can remember being able to count over three dozen complete, ready-to-fly Combat planes hanging in the shop . . . in the middle of the contest season! I am presently down to only twenty (twelve Fast, three FAI, and five 1/2A). This is in addition to a couple of Badyears, a Rat or two, one Stunt plane, a N.W. Sport Racer, an ancient Slow Rat, and assorted foof that is buried someplace.

By spending my money in C/L, I have participated in Go-Fast stuff, Precision Aerobatics, literally hours of Combat matches, plus lots of sport and practice flying. An equal involvement in the R/C event of the same nature (Pattern, Pylon Racing, and . . . oops, they don't have R/C Combat) would have set me back a lot more money than I already spent.

No competitive form of modeling is cheap, but if you like to try several different events, and do them right, C/L modeling is definitely an attractive way to go.

HOBBY/SPORT (?)

In closing this column, I'd like to note that there has been a lot said lately about various forms of modeling being not just a hobby, but a hobby/sport. I'd like to state that of the usual modeling events we see in the pages of **MB**, only F/F and C/L can truly be classified as having anything to do with sport. In F/F, you toss it to the winds and chase it. That puts it into the sport category. In all forms of

It flew in the 1976 LSF Tournament, held in Harry's hometown.

Before you engineers out there whip out your micrometers, let me point out that the signature on the three-view is that of the *artist*, not the draftsman! The drawing is a 1/6-scale copy of Menke's ship, so it's at least four stages removed from Plato's *ideal*, as the philosophers say. (The argument goes like this: the three-view shown is the printer's imperfect reproduction of Thornburg's imperfect drawing of Menke's imperfect model of Semmelmeyer's imperfect manifestation of his own *ideal* of a multi-task sailplane. And so much for human perfectability.) •

C/L flying, there is some physical involvement and stress that can mean the difference between being just good and being excellent. Why do you think they call stunt fliers Stunt Grunts? Have you ever seen a Combat match where it wasn't almost as interesting to watch the pilots as it was the planes? How much strength and stamina do you think it takes to hold onto a 150-mph Rat? Or a 200-mph Speed plane? Where do you think the phrase "whipping" came from, and surely you don't think that whipping a plane faster has anything to do with passively standing in the center of the circle, do you?

In any C/L event, it is possible to be better at it by increasing your physical involvement and/or being in better shape. Next time somebody tells you that R/C is a hobby/sport, tell him he can bite a big one. I've flown enough of both C/L and R/C to know better. . . •

Cliffhanger . . . *Continued from page 52*

glider seems to be floating by itself out at the end of the line. It should fly at or above your hand level, and show an altitude change with inceased swinging speed.

When you are satisfied with the trim in tethered flight, recheck that the ailerons are set equal to each other and above the elevator. This set-up gives you a washout effect which reduces tip stalling. Once you have done all this, there is nothing left but to charge the batteries, do a range check, and then throw Cliffhanger off a cliff. •

Stormhawk . . . *Continued from page 75*

framework, place a small drop of film cement. Capillary action will carry the cement around, and in 30 seconds or so, the canopy will be bonded. You may then continue on the next section until your windshield is completely cemented. After the front and rear windshields are in place, trim the celluloid overhang flush with the frames. The center section is then added. The trick to a neat job is *not* to glue the center section to the upright frames. Cement it only to the top of the wing saddle on either side.

The small ply pieces that hook into the stab leading edge are also put on after the model is covered and with the stab in place, in order that a good stab fit can be made.

A propeller blank is shown on the plans. This propeller works much more efficiently than a plastic propeller, and is recommended for a good climb.

I use braided rubber motors. This is an old-time trick and effectively prevents the unwound rubber bunches from shifting around and changing the center of gravity, thus upsetting the glide trim. It is used only with a free-wheeling propeller, as it offers no advantages with a folding prop. A braided motor is under tension when unwound, and consequently requires a stop on the propeller shaft so the propeller is loose to freewheel. I have included a sketch of the free-wheel clutch I use and the soldered brass collar, which is the stop. This works well and a few minutes' study will, I hope, make the mechanism clear.

And how to make a braided motor? Quite simple, really. The motor must consist of an even number of strands. I will desribe a 4-strand motor. Measure out your motor in the conventional manner. I use about 1-1/3 the length between the prop hook and rear motor peg for each strand. Tie the rubber together using a square knot with an overhand tied on top of it. Lay the motor out in a 2-strand configuration. Find the center and mark it. Stretch slightly and wind in about 100 turns. Fold the wound motor in half, making 4 strands. Attach your prop hook at the fold and put the other two ends on the same peg. Now pull taut and let the propeller unwind. The motor will twist around itself and end up in the neatest braid you could hope to see. If it is now shorter than the distance between hooks, you will have to try again with less turns. Chances are that it will still be long. Don't worry. Put the motor in the model and wind it up about 100 to 150 turns. Let it unwind. When stopped, you won't see the neat braid, but rather lumpy knots distributed along the motor. This is all right as long as there is enough tension in the motor to keep the nose plug from falling out. The knots will always show up in the same place and the CG will remain constant. If you want to find the exact number of pre-turns, you can get back to that perfect braid.

WINGS & STAB

The leading and trailing edge of the wing and stabilizer are laminated from pieces of 1/16 x 1/8 balsa. You may make a cardboard template for lamination, or do as I did and use closely-spaced pins on the inside profiles. I wet the wood with water and pin it to the laminated outline. When the wood is dry, remove, coat with Ambroid, and put back on the form until dry. Some people use white glue and do the whole job at once, but I feel the Ambroid is better when it comes to carving and sanding the outlines to their respective cross-sections. I do that shaping first thing after the outlines are dry from the glue.

Sliced ribs were chosen for the wing and stab ribs. I like the appearance of this technique and find it assembles as fast as solid ribs.

Pin the laminated outlines to the plan. Add the rib bottoms, which are 1/16 square. The spars are cut from hard 1/32 sheet. First, cut strips 1/2 to 5/8 inch wide from the sheet. Make them a little over-length. If the wood grain wants to distort and put a bend into the spars, it will now do so. From these pieces, using a long straightedge, cut your spars. They should come out perfectly true. Lay the spars in place and glue them to the rib bottoms.

Make a template for slicing the ribs

from a piece of cardboard. Cut rib stock from 1/16 x 3-inch sheet. Make this stock the exact width as the length of the ribs will be for your wing and stab. Now slice the ribs. Make them a little thicker to allow a final sanding of the finished wing. Lay the sliced rib tops in and glue. The center section ribs are cut 1/32 inch thick to allow the center 1/32 sheeting to lay in flush. Dihedral is put in the wing using the plywood joiners.

FLYING

We have already talked about weight, propellers, and motors. Start with 100 turns and work your way up. The original required very little trimming. I fly to the right under power and glide. The plans incorporate the incidences and downthrust that the original model needed for good trim. The CG is 50% of the wing chord, and is on the plan. Set your glide circle with the movable rudder, and power circle with sidethrust adjustments. The lifting tail is there to control power stalls and works beautifully. This is a docile airplane and mine proved easy to trim. You can expect one-minute flights in cool evening air, and two-mintute flights in warm buoyant air. I had a seven-minute flight one day at Taft, followed by a five-minute flight. I gave up after that, as my legs started giving out. If you put a folding prop on Stormhawk, put in a dethermalizer; you will need it! I have enjoyed flying this airplane immensely and am sure you will also. •

Webra Pump . . . *Continued on page 63*

with the Perry pump, there is an arrow molded into the backplate into which it is fitted. The backplate has to be installed in such a manner that the arrow is always up, regardless of how the engine itself is mounted. Normally, most engines will come with the pump installed for upright engine mounting. If it is to be mounted on its side, the backplate must be loosened and rotated 90 degrees. In the case of the Webra .91, the backplate mounting screw holes are symmetrically located on the four corners, so you can install the pump for upright mounting, and easily rotate it the required 90 degrees for sidemounting, if desired.

In case any doubt exists about the flats on the inside of the K&B backplate, a little explanation is in order. This backplate extends into the crankcase, and the flat spot, which must be installed towards the cylinder, is there to provide clearance for the piston at its lowest position. In the Webra, the backplate, with or without the pump installed, does not extend into the crankcase, and no external clearances have to be considered.

The other lathe-made piece required is a short aluminum insert to adapt the smaller O.D. of the Perry carburetor to the larger throat of the Webra crankcase. I first bored out a piece of tubing to the proper I.D. and pressed it on an aluminum mandrel, also turned to the proper diameter. Then the outside was turned, to fit the carburetor opening. A fine saw slit was then made, which lets it come off the mandrel, and also allows it to compress the necessary amount to secure the carburetor after everything is assembled and tightened together.

The only other thing that needs to be mentioned is: keep it clean. Tape the fuel fittings and the vent hole on the pump plastic part during all machining operations, and rinse the whole thing in solvent a couple of times. Brush and blow, ultrasonic clean . . . you can't overdo it.

Now, let's see exactly what we have accomplished, other than being able to run a 34-ounce tank. This engine, which is definitely well broken in, was test run using K&B 500 fuel, in the following combinations, with the results as shown. The prop used was a Top Flite 14x6 cut down to 13-1/2 inches, and slightly modified.

	TOP RPM	TIME PER OUNCE
STOCK	11,100	41 seconds
PERRY PUMP/ WEBRA CARB	11,200	46 seconds
PERRY PUMP/ PERRY CARB	11,000	44 seconds

These are all average figures. The rpm, for example, was read a number of times, from rich to peak, with each combination. For practical purposes, we can say it runs at 11,000 in any combination. The Webra carb has a diameter of 1/32 inch greater than the Perry, which may account for the few extra rpm with it when the pump was also used. In this combination, the pump definitely affected running. It was tried immediately after the stock test was made, and with the previous needle setting, the engine was extremely rich, indicating that the pump pressure was much higher than the normal fuel draw.

It must also be mentioned that the Perry Pump/Webra Carb combination has not been flown, so we can't tell you about its behavior in the air. The full Perry installation in the air, lives up to all the claims made for it by the makers.

The fuel test time is also the average of a number of 1-ounce tank runs. A one-ouncer was actually used; it was impressive to see the fuel level go steadily down as the engine ran. At first glance, it looks terrible . . . forty-some seconds per ounce. But it calculates to less than fourteen ounces for ten minutes for any combination, and that amount of fuel is normal for many .60 airplanes, so it really isn't all that bad.

The parts required are hobby shop priced at $23.95 for the pump-equipped backplate, Perry No. 800, and $16.95 for the carb, Perry No. 900. The Perry standard and pump carburetors are not interchangable. Both pump and carburetor are listed in Sig's 1978 catalog and are on hand at Orange Coast Hobbies. Addresses for both can be found in our advertiser's section. One distributor we know of who carries both items is Great Planes Model Distributors, P.O. Box 457, Champaign, IL 61820. I

am sure that there are many other sources, but unfortunately, we have few current catalogs here at **MB**, and we would welcome all shops and distributors who print catalogs to send us one so that we can provide our readers with better information regarding sources of the more uncommon items that we mention in our articles.

In the event that you would like to have an original backplate for the .91 on hand, in case you later decide to go without pressure, they can be ordered from Model Rectifier Corp., at $7.35 plus postage.

No, I don't have the exact dimensions of the machined pieces. At the time this whole operation took place, I wasn't concerned with the size in inches, only that which would allow the necessary press fit. And really, it is important only to know that the procedure works, and to remember that neither piece has a lot of spare metal once the taper has been removed. So go slow from then on, checking for fit after every cut.

Try it, it'll cure any fuel problems you may encounter. •

Peanut . . . . . *Continued from page 83*

bled from block balsa built to fit around the square cross-section of the Williams Bros. plastic thrust bearing. When the wing is installed make sure that the strut joints are all secure and that the struts are strong enough. They have to take the pull of the wound-up rubber motor.

The CO_2 shown here is the single-cylinder Brown and the standard fuel tank. The filler is located on top of the nacelle where it is most convenient. The tank is in an upright position in the hull; you can camouflage it with a dummy pilot if you desire. Because there is a certain amount of pressure associated with filling the tank, it is essential that the sheet fill-in at the wing roots be strong enough to provide finger support for the filling operation. Use firm, rather than soft, balsa sheet. To install the nacelle with the motor on the wing requires that the tank be unscrewed from its top so the top can be inserted through the small hole in the center section. This hole must be built into the wing structure before the wing is covered.

Be careful when making the coils in the tubing for the motor installation. If they are bent without some sort of support to prevent it, they tend to kink, and if they kink, they will not allow proper gas flow, and will quickly break due to engine vibration. Use a round dowel to wrap the tubing around, making sure that the tubing is always in contact with the dowel at the point that it is being bent.

The horizontal and vertical tail structure is completely standard. Simply assemble them over the plans.

Similarly, the wing is built directly over the plans. The two center ribs must lean outward slightly to allow for the dihedral, which is put into the wing after it is removed from the plan. Use very soft sheet balsa for the ailerons. Use soft sheet for the root fillers on the lower side of the wing if the model is to be rubber powered. Use firm sheet if the model is to be CO_2 powered, because the model will have to be held at this point when the tank is being filled. Add full-depth balsa doublers on each side of the center ribs in the area where the hole for the fuel lines must be made.

The sponsons that go on either side of the hull to provide lateral stability on the water, are simply little wings. Use light balsa for the leading edges to keep the total weight low. Rib contours for the three sponson ribs can be found on the side view.

All ribs are actually shown only on the side view. The horizontal tail ribs all have the same contour, and the same can be said of the wing ribs. Note, however, that the tip ribs are thicker material, and in the case of the wing, there are two thicker center ribs.

The hull is built using two side frames built directly over the plans. The side frame has been hatched on the drawing for emphasis. As the sides are drying on the plans, cut out the three bulkheads and the centerline keel piece. A segment of a circle must be removed from the keel piece to clear the CO_2 tank. Remove the sides from the plans and separate them, then cement them together at the tail post and add the cross braces. The front three cross braces are the bulkheads. Crack the side structure to make the sharp bend at the step

bulkhead. Just behind the step bulkhead add a 1/16 x 1/8 cross piece between the bottom longerons. Cement it to the bulkhead all the way across, as well as to the longerons on each end.

The nose of the hull is made from block balsa. Hollow it as indicated by the dotted line. A top panel of 1/16 sheet balsa extends back to the second bulkhead and provides a deck. A long narrow triangle of 1/16 sheet on edge makes the top center shape of the hull from the step bulkhead to the front of the tail.Sticks of 1/16 square balsa are added at the top of each side of the aft two bulkheads. These bend sharply at the step bulkhead and then are cemented at the top of the centerpiece two bays further aft. A sheet balsa filler is used between these top stringers and between the last two bulkheads for the CO_2 model. It has a hole in it to just fit and thus support the top of the tank. This area is simply covered with tissue for the rubber-powered Libelle.

The windbreak can be cut from file card stock or any thin cardboard or heavy bond paper. It wraps around and is cemented at each end to the second bulkhead. It is also cemented all along its bottom edge to the deck.

Cover the model with tissue. After all parts are covered and the tissue has been shrunk with a mist of water, dope the model. A seaplane has to be watertight, so a little more dope than you usually use may be required. Inspect the hull and sponsons carefully to make sure all sides have received enough to make them watertight. The aft skeg and the hull and sponson strakes are added after the hull has been covered and doped. They were made from model railroad basswood stock and should be given a final coat of dope after assembly.

The original Libelle had an 80 horsepower Siemens five-cylinder radial engine. Williams Bros. plastic dummy cylinders with dress snap heads are used to simulate the engine details. The original airplane was aluminum, so the models can be covered with silver tissue or lightly sprayed with silver lacquer after doping. Avoid a heavy paint job. Movable surfaces are indicated by black lines.

This article started with a description of flight problems, so the basic advice has already been covered. Make sure that the center of gravity is at the point shown. This may require a little weight as far forward as possible in the noseblock of the rubber model, but will probably not be required for the CO_2-powered version. A little washout in both wings may prove helpful. Use surface adjustments to control the gliding flight and use thrust adjustments to control the powered flight. Have fun, that's the main idea. •

Servo Rev. . . . *Continued from page 27*

is confusing as to what direction it has moved, and using the longest arm will result in the best centering accuracy.

Now, and only now, and after unplugging the servo, reverse the connections mentioned, on both the motor and the feedback pot. Check carefully to be sure that none of the very fine wire strands have gone astray and are touching against anything other than the proper terminals.

Now, with the servo facing you, turn the system power on and observe the direction that the output arm moves. Re-center by turning the pot in the direction that you previously determined would be necessary. After centering, tighten the pot holding screws and check for total travel and direction of rotation, which should now be reversed. You are now ready to reassemble the case. Be sure that the amplifier goes in exactly as it came out, with any padding or insulation that may have been installed, and that none of the wires are pinched anywhere. Recheck for normal operation again. The degree of throw and everything else will be exactly as it was; this change affects rotational direction only. Do not overtighten any of the case screws; it is necessary only that they be snug. Check for proper operation once again, and if it is still OK, you are ready to fly.

A few servos, such as some of the MRC series, use a sealed pot on which the element is not movable from the rear. Adjustments in centering are made via an external screwdriver slot on the top of the servo case. The procedure is the same: reverse the two outside wires on the pot, those on the motor, and recenter.

Simple, right? Once around, and you are an expert. Just don't forget the basic precautions, and that the life of your bird depends on your proper soldering, no short circuits . . . and don't forget to tighten the pot screws.

This conversion will work on all modern digital servos, IC or non-IC, three or four-wire. The only exceptions will be some of the 180-degree servos, which use different methods of extending the throw, and for which the above procedure might not work. As in any case, when doubt exists, return the part to the manufacturer or one of his centers for service. Have a happy backwards flight! •

Fuel Lines . . . . *Continued from page 61*

as shown in the photographs. It will fit snugly into the end of the tank body, and will be easy to solder together. Next, attach the brass tubing lines and vent. A typical metal scribe can be used to punch the holes in the tank for the tubing. Add the alligator clip and a holder for the latex tubing shown in the photograph of the completed tank. A simple piece of solid copper wire will do as a holder if a terminal-type washer, as shown, isn't handy.

Use a solvent such as acetone to thoroughly clean the tank of any soldering flux residue, and then install the other end of the tank. Test the tank for leaks by immersing it in water and applying breath pressure through an ordinary piece of fuel line. Bubbles mean leaks, and that's a no-no on uniflow tanks. If there are no leaks, fill the tank with water and then boil it in a pan of water for fifteen minutes. This will decontaminate the tank of any remaining solder flux. Empty and dry it, add the latex rubber vent tubing as shown, and it's ready for installation in your plane.

Here's the fueling sequence that works well with this type tank: Place the fueling bulb on vent "B", depress the alligator clip, squeeze in fuel until it squirts out the overflow line, release the alligator clip, and continue squeezing the fuel bulb for about another second to be sure that the fuel line to the carburetor is full, and to also provide a bit of prime in the carburetor.

That about completes your 1/2A C/L racing tank. Although a basic tank is a little simpler and will function adequately, the uni-flow tank is superior. You'll find that it's easier to set and hold a consistent mixture. That and the pit stop are what win races. ●

BERNHARDT

FACTS & SUPERSTITIONS
OF IGNITION OPERATION

Many are the questions that have come across my desk since I started writing my little column for **Model Builder** Magazine. Some of the questions are profound and beautifully presented, while others border on rumor and are accepted by a few just because somebody heard it from someone else. The theory is "if you hear it often enough, it must be true". Well, the fact is, this theory is very often *not* true. Let's examine a few of these beliefs and judge them on facts.

How many of you readers have heard others say that converted glow engines do not make good ignition engines because the porting is not correct for gasoline operation on ignition? When asked to elaborate on this answer, many "experts" say this is a well-known fact dating back to the origin of the glow engine, but for some reason, they can't seem to put their finger on the technical explanation of why this is so. Fact is, the statement is false. When glow engines became popular following WW-II many of the model engine manufacturers found themselves with huge inventories of ignition engine components. These components represented a considerable investment, and to just scrap them and start over would bankrupt many of the small companies. They merely removed the ignition parts from the crankcases, put small covers over the machined areas intended for the ignition points, substituted a glow plug for the spark plug, and PRESTO!, you were then looking at the most modern new style glow engine available. Well-known companies such as Ohlsson & Rice, Forster Bros., McCoy, Orwick, and many others took this easy route to enter the glow plug race. *No other changes were necessary.* Many of these original glow plug engines exist today in the posession of model engine collectors.

The word "porting" refers to the timing and efficiency of the transfer of fuel vapors from the time it enters the intake tube until it arrives into the cylinder. It makes no difference if this fuel vapor contains glow fuel or gasoline; the efficiency is the same. What *does* make a difference in performance is the compression ratio of the engine in respect to the type of fuel being used. Each type of fuel will deliver maximum power when humidity, temperature, air pressure, compression ratio, and rpm are matched for that particular fuel.

Another popular belief among some modelers is in the correct way to break-in a new ignition engine. Some feel that using a rich mixture of gasoline and oil together with a large prop and running the engine slow for about an hour is the best way. Others feel that the engine should be run in at a high rpm because it has a "memory", and if it is operated at a low rpm to start with, it will never be any good for high speed operation. Still others feel that no harm would befall the engine if it is mounted on the model right out of the box and flown as long as it is not operated at wide open throttle. Well, if you value your engine and desire the utmost in performance after breaking it in, you had better disregard the above advice. It is of the greatest importance that you understand what you are trying to accomplish when breaking-in a new engine. Breaking-in is the process of mating two sliding surfaces (i.e., piston and cylinder or crank-

shaft and crankcase bearing) into as perfect a fit as possible. Too harsh a break-in can actually ruin a new engine in short order. Too gentle a break-in will take forever. A good procedure for a proper break-in is as follows:

With your engine mounted on a sturdy bench mount and hooked up for ignition operation with coil, condenser, and batteries, fill the fuel tank with a low nitro glow fuel. This will hold the working surfaces of the piston and cylinder to a low temperature. Heat should be minimized during this period to preserve the quality of the lubricating oil. Distortion due to heat will also be eliminated. A balanced prop is essential to preserve the precision fit between the crankshaft and crankshaft bearing. Nothing will ruin this bearing quicker then an out-of-balance prop. Choose a prop of low pitch that will allow your engine to really turn up *without* putting a strain on it.

Continued next month. •

R/C Forum . . . *Continued from page 25*

Other than what is the difference between types of batteries, the question most often heard is how to use the Ni-Cd batteries to get the most from them. There are some simple guidelines which, if followed, will provide as good a performance as can be expected, without using a very sophisticated procedure. Let's list such a simple procedure.

CHECKING THE CONDITION OF NI-CDS

Some instrumentation is required to check *any* type of a battery, including Ni-Cds. With other types, a voltmeter will do a respectable job, simply because the capacity (electricity available in it) is more or less related to the voltage. With the dry and lead-acid types, as the capacity diminishes, so does the voltage. Thus, if the voltage reading is low, you can expect that the capacity is low also, unless, of course, there is a mechanical problem.

With a Ni-Cd, the voltage is *almost* stable. However, there is a small drop in voltage as the capacity is diminished. With experience, this small drop can be used as an indication of the battery's condition. By using a simple voltmeter and carefully recording the voltage readings you get from a power supply under various discharged conditions, you can develop a reference which can be used to give you an indication of the Ni-Cd's condition. Probably the most reliable way of using this method is to note a voltage reading taken from the power supply when you *know* it has a full charge and is in good order. Any time you see a reading below this one, be suspicious. If the reading should be anywhere near the *lowest* reference you have, find the cause *before* using the batteries.

The use of this system will be even more reliable if a "load" is put across the power supply while the reading is being taken. The advantage here is that your voltage reading will be true while electricity is being drawn from the battery, just as it would be when the battery is in use.

If you like, a simple load device can be made up which will not only work with your voltmeter but also give you a visual indication of what is happening. Simply take a number (probably 2 or 3) of auto light bulbs of a suitable voltage rating and create a harness of these in series which can be connected to your power supply. All Ni-Cds are rated in ampere-hours. In other words, the rating is how much capacity they have for one hour's operation. You should use a number of bulbs in your harness so that when it is connected to your fully-charged power supply, the bulbs will go out after being connected for one hour. The resistance of the bulbs varies so much that it is difficult to tell you just which type will do the job exactly as you need it; it's better to "cut and try".

We should not have to discuss the many battery testers and cyclers that are available commercially. If you would be so inclined, the purpose of one of these can make an excellent investment. Most of them are sophisticated instruments, thus a bit expensive, but because of this, they do a fine job of checking batteries.

CHARGING NI-CDS

Most everyone understands that there is a limit to how many times Ni-Cds can be recharged. Thus, there is a mental resistance to charging them unnecessarily. However, it should be understood that most manufacturers guarantee at least 1000 cycles, and in reality, that is a lot. The expected lifespan of a Ni-Cd is generally 3 to 4 years, no matter how it is used, which can translate to over 300 safe cycles per year. In other words, it is difficult to run out of cycles during the normal lifespan, as the average modeler would use them. A good axiom is, if in doubt, CHARGE!

A Ni-Cd will dissipate about 10% of its charge in a week to 10 days; after that, the capacity will reduce more slowly. A Ni-Cd which is used often can be more trouble-free than one which is not. They like to be used!

During periods of little use or storage, the charge should be replenished at regular intervals. They should not be left in a discharged condition. During storage times, charging monthly has proven to be a safe guideline.

Another safe practice is to *charge before every flying session*. Overnight is best, but if there has been a charge recently, just a few hours will suffice. These rules have been made assuming the use of chargers that are furnished for use with the particular power supply; this way, you have a matched system. If the charger is something else, then you must be sure that the charging rate is not more than 10% of the batteries' capacity rating. Example: with a 500 mah rating, the charging rate should be no more than 50 MA.

We now have what are known as "fast-

charge" Ni-Cds, and chargers to go with them. Fast-charging can be dangerous. It is therefore important to pay close attention when fast-charging is used and to follow the instructions closely. Fast-charging can be helpful by reducing time when it is essential, however, if the charger is not shut off at the proper time, it can easily ruin the batteries. The safer way is to use the slower charging method which can, in emergencies, be left on for moderately extended times without damage.

MEMORY

There has been information put out that Ni-Cds can develop a "memory". It is said that if the battery is used repeatedly for a specific length of time, then charged for a precise length of time repeatedly, it will become accustomed to this procedure and will not like to operate in any other manner. The clue here is the use of a *precise* cycle. We modelers seldom do *anything* twice in the same manner, so "memory" is probably something which we have little to worry about. From experience, the only case which could be called memory has been little-used Ni-Cds which have been stored in a discharged state for a lengthy time. Sometimes these apparently "dead" cells can be brought back to a usable condition simply by repeatedly charging them. Many times, of course, this approach does not work, and even if it does, the cells should be thoroughly tested before use.

Ni-Cds have been the secret to the success of the space program, and in turn, have given us the usable R/C systems which we have today. Had they been available earlier, R/C would have gotten a much better start than it did. However, like the rest of our equipment, they can be only as good as the way we treat them. Handle them with care, treat them right, and they will, in turn, be good to you!

We had a letter from Terry Rimert of Baldwin, Florida, which was especially appreciated. Terry's letter was the first in response to our suggestion that, through the R/C Forum, we could let others know what unusual things we are doing with R/C and in flying, the idea being to show all readers how they can try different approaches to what may be a problem or perhaps how to get more enjoyment from their flying. One of the more interesting things about modeling is the constant desire to improve, and the ability of modelers to find a better way. It makes life interesting!

I had started things off by mentioning that in some experimental work I had been conducting last summer, I had seen a need for a better fuel supply system than we have for our engine. While my particular problem concerned racing engines, it is fundamental to any type engine. Specifically, I was having a problem with obtaining an adequate fuel flow after the racer was in full flight. Normally we have an rpm increase in the air that is about 10 to 15% of the static rpm. Usually, this amounts to about a 2000 to 3000 rpm increase, which has been tolerable with our normal pressure type fuel system. What I had encountered was about a 10,000 rpm increase, which proved to be much more than the normal fuel system could handle. You simply could not set the fuel flow rich enough on the ground to be able to have a sufficient amount for the additional rpm gained in flight.

The problem is caused by the "non-linearity" of the pressure fuel system. With this system, the fuel flow is created

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by the crankcase pressure of the engine. Crankcase pressure is a result of the displacement of the engine. When the piston is at top dead center, the case pressure is one factor. When the piston comes down, it compresses the gas in the case equal to the amount of displacement. Normal engine design yields about 3 lbs. of base pressure. The problem is that the 3 lbs. is practically constant, no matter what the rpm may be. Thus, if you need an increase of fuel pressure, this system cannot provide it. If we use a fuel flow adjustment (needle valve in our case) which is set on the ground, the only way the fuel flow can be increased is by increasing the pressure. With a set amount of pressure available and a fixed adjustment for fuel flow, we have a problem when more fuel is needed. While Terry did not have a specific answer to the problem, he was good enough to confirm my own findings. Apparently, a number of modelers in his area, from various aspects of modeling other than Pylon racing, have seen the problem, even though to a lesser degree than I had. This confirmed my feeling that it was a problem which is affecting us all, and if an answer could be found, we all would benefit from it.

Terry indicates that some work has been done with carburetor venturi design, resulting in some improvement. The reasoning behind this is that the airflow through the carburetor is linear to the rpm of the engine. If a venturi can be produced which will provide a lower pressure than a normal type does, then this amounts to the same thing as increasing the pressure on the other side of the needle valve. Probably, experimenting with the shape of the venturi can be of some advantage in this respect, however, experience indicates that any *real* gain can only be had by reducing the size of the venturi opening (throat). Inasmuch as the power of our engine is directly related to the amount of fuel mixture it can absorb in each revolution, keeping the largest size venturi possible is most important. Apparently, the best that can be had from this approach is a compromise, and a compromise is never the final answer. . .

For my part, I can say that I found a "fix" which worked quite well and allowed me to continue my experiments, which were with propellers. However, the in-flight mixture control which I resorted to is not the cure needed. We need a system which *automatically* feeds the needed amount of fuel, no matter what the rpm may be. Terry provided some ideas, confirmed that the problem is widespread, and opened the door to any others out there who may have some ideas. They certainly are welcome!

A final request before closing this month. It probably is much too important to be winding up as the tail end of this column, but better here than not at all! The AMA of the U.S.A. and the MAAC of Canada have initiated a program to update and enliven FAI Pylon racing. A considerable amount of effort and work is being put into the program, with the hopes of adding to our pylon racing sport. The goal is to increase this racing activity with a resulting World Championship and all the prestige that goes with it. This can only add to the image of *all* pylon racing. It is fortunate that as things now are, this event can revert back to scratch and become something much different than it has been. It is admitted that the event has not been popular in the past, but there is also no reason why it could not be a premier racing event. What apparently is needed is an event which would be attractive to a great majority of R/C'ers. We need to know what type of a racing event would be most attractive to a large number of modelers. Any ideas which you may have in regard to the FAI Pylon event would be greatly appreciated and can be directed to me. •

Pusher . . . . . *Continued from page 44*

Model Airplane News, under the title "Build this Pusher that Goes Places". The title refers to the fact that on June 17, 1932, Harry's model set an official N.A.A. Outdoor Scientific Single Pusher record of 1 hour, 38 minutes and 10 seconds, and covered a distance of better than 8 miles. That's pretty darn good for *any* model!

Besides being an interesting change of pace, this little ship could do well in today's O.T. rubber events. Or, if you really want to shake up the troops, modify the design slightly and fly it in the P-30 event that is rapidly becoming popular. The wing would have to be shortened by one false rib bay on each tip to get it down to the 30-inch maximum allowed, and the fuselage would have to be shortened an inch or so, so that the total length, including the prop, does not exceed 30 inches. Also required are a stock 9-1/2-inch freewheeling plastic prop and no more than 10 grams of rubber. Keep in mind that if

you make these changes, the model will no longer be legal for Old Timer competition.

As is the case with many O.T. models, no balance point was shown on the original plans. So, to get an approximate starting point, we used the formula on p. 20 of Frank Zaic's 1935-36 Yearbook, and came up with a balance point 4-1/4 inches forward of the l.e. of the wing. From there on, you're on your own.

If you build one of these models, be sure and let us know how it flies, and if possible, send us a photo! •

Instructor . . . . *Continued from page 11*

the tip speed too high in flight, resulting in extremely high in-flight noise as well as too high a vibration level. In this case, a 15x5 or 14x6 is the better choice to keep the tip speed down.

Propeller efficiency is a subject we haven't touched upon and this is as good a place as any to insert it, as it will play a large part in proper propeller selection. Generally speaking, a large propeller turned at lower speed is more efficient than a smaller propeller turned at high speed. I have been told by many engineering types that in most cases, the highest efficiency is obtained at around 600 feet/second tip speed. This would mean that an 11-inch prop should be turning at around 12,000 rpm in the air for maximum efficiency. Also, it is commonly said that a wider blade prop will be more efficient than a narrow blade prop of the same pitch, due to Reynolds Number, so the problem becomes very complex. The problems we are beginning to face with our higher speed engines are similar to the problems faced by the turboprop engines, and the solution may be the same: small-diameter multi-bladed props with wide blades.

The present solution to this problem for our large models has been the belt drive system, which works because the efficiency loss in the reduction unit is less than the efficiency gain of the larger propeller. The long term solution to this problem may be in engine design. Quite likely, increasing the stroke and decreasing the bore to bring the peak of the horsepower curve down to a lower rpm to enable us to use more efficient propellers will occur in the future, especially in larger engines.

While on the subject of propellers, some important safety tips are in order.

First, never use a prop with a crack or chip in it; second, use only a good reamer to change the hole size to avoid cracking the prop (the Fox 2 and 4 step reamers are ideal for this); third, don't throw anything into the prop to stop the engine; and fourth, wear some type of eye protection when running any engine. I also highly recommend the exclusive use of hardwood props. Plastic or nylon props (non-glass filled) of over 10-inch diameter should never be used, and no plastic or nylon propeller should ever be used on a high-performance engine larger than 1/2A.

Well, enough kibitizing on propellers. I guess I'd better answer those letters.

Dear Dave: With my limited experience in pattern, I was wondering if the direction of roll in the four-point and slow rolls makes any difference. Does engine torque play a factor? Should I just do it the way it feels most comfortable? Stephen Morinoto.

Dear Stephen: This is a difficult question to answer with any authority, but I'll give you my ideas on the subject. Many full-scale aerobatic pilots as well as aeronautical engineers have told me that rolling left (with the torque) is better, as it requires less control surface throw for the same roll rate, which results in fewer problems with slowing down while rolling. A few top pattern fliers have been proponents of always rolling toward the judges (roll right when going left to right and roll left when going right to left), as they feel this looks better to the judges, while some others roll in one direction for the slow roll and point rolls and in the other direction for the three rolls to take advantage of using more roll rate in one direction than the other. Now that all the above theory is out of the way, I'll tell you that I always roll right, as it is the most comfortable for me, and I've always scored well on rolling maneuvers, so you can draw your own conclusions.

Dear Dave: In your column in **Model Builder** *you have given several trimming tips and all are helpful, but for the novice beginner, where does one start? Could you give a step-by-step trimming method, explaining what each should do, what to look for when it is not correct, and how the next trimming step can interact with the previous one?*

I think there are many novices who just don't realize how difficult it is to trim for straight and level flight (normal and inverted).

Also, the novice doesn't seem to realize the importance of takeoff and landing maneuvers and they seem to practice more on the flying maneuvers.

I suggest that a trimming plan, step by step, perhaps one step each month with explanation, would make good material

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for your "Flight Instructor" column in **Model Builder.** *Chief Galbraith.*
Dear Chief: I appreciate your letter and will try to cover more on this in future columns, but for the time being will refer you and others to the May '78 **Model Builder** for information on take-offs and landings, and to the August '78 issue for help in aileron trim. The step-by-step procedure sounds good, so I'll save it for future column(s).

I'd like to thank those who wrote and hope others will. Send to: Dave Brown, 8534 Huddleston, Cincinnati, OH 45236.•

Half-A ..... *Continued from page 65*

Keep up your good column.
Sincerely, Bob Kress

Next, Bob Davis sent me one of his latest versions of a beefed-up crankshaft for .049 reed-valve engines. Bob makes both Cox and Testors versions. The crank has a heavier disc and stronger alloy than stock, so it will stand up to diesel loads. You may recall that my reed .049 tests of the diesel conversion were very short duration.

Not only are the new cranks gutsier but they add a bit of packing to the crankcase and add a bit of power, too! Balance is very unimportant on a diesel.

Bob says: "We have even discovered what we think is the best prop for the conversion: 6x4, three-blade Grish. Babe Bees turn this prop between 10,500 and 11,000 rpm, and really generate a ton of thrust." That jibes well with my concept of how to use a diesel . . . lots of load, relatively low rpm, but higher-than-normal pitch. A 2-blade 6x5 might be worth a try, too.

On to the pictures! First, we have an .020 Pee Wee powered monster, the "Cardcorde". Frank Scott sent me this photo. The model is primarily cardboard, as you might suspect. The Cardcorde is flown free flight. Reminds me of the "good ole days" around 1958 to 1962 at Sepulveda Basin. Any given morning on the weekend, the sky would be full of *sport* free flights . . . all kinds, from pseudo scale to freaky wierdos. I even saw a gas-powered ornithopter there once . . . scale model of a seagull it was, too! Jetex and rubber, gliders and gas . . . people were there having fun. No contest required . . . the main question was, "will it fly?" Mine often didn't, but that somehow wasn't a deterrent.

We had a Renault 4 CV and once there were four people, two 6-foot towliners (the wings did not come apart in those days), 3 free flights, miscellaneous Jetex and gliders, and a big fried chicken picnic lunch. Travel home was considerably less crowded, I recall.

The Babe Bee etching is there because it is really a beautiful piece of artwork, and to remind you that the engine is still alive and well and living in Santa Ana.

That Big Black Momma with a pair (of engines) hangin' out is Flight Dynamics' A-26 Invader kit. Priced at $49.95, it can be flown on 3 to 5 channels with anything from .049's to .10's. If your local hobby shop doesn't handle it, write to 7036 S.E. 52nd St., Portland, OR 97206.

The nacelles are fiberglass, canopies are pre-formed, the wing is foam, and decals in five colors are provided. Flight Dynamics kits also feature saw-cut parts, formed landing gear, and a complete hardware pack.

I saw a couple of prototypes of this kit at the MACS Show. It really gets your tongue hanging out. I expect you better know how to fly a hot ship if you put a pair of the better .10's on it. Similarly, I would only go down to Tee Dee .049's, and probably not throttled, just use rudder, elevator, and ailerons.

Wouldn't it be neat if you could make the guns work? See you next month. •

Las Vegas . . . . *Continued from page 33*

would hope that NSRCA will carry the ball and propose a set of rules for a provisional AMA event for a future Nationals contest."

A complete run-down of the contestant standings will no doubt appear in M.A.N., so we'll only list the top five in their final positions after the four-round flyoff: Hanno Prettner, Austria, 5061.0; Dave Brown, USA, 4721.5; Ivan Kristensen, Canada, 4712.5; Dean Koger, USA, 4669.0; and Wolfgang Matt, Liechtenstein, 4641.5.

Yes, it was the fifth in a row for still young (26) Hanno Prettner, $15,000, making his total winnings for 5 years a mere $50,500! Coincidentally, the same 5 finalists fought it out in the flyoff at the contest in 1974, ending up with Prettner, followed by Matt, Brown, Koger, and Kristensen.

Hanno won with a relatively wide margin this year, but it is difficult to attribute this entirely to his flying ability, as his airplane was so much better suited to the type of competition than most of the others. Being the first major contest of this type, there was considerable variation in aircraft design, as compared to the current FAI style pattern ships, which are all pretty much alike. Had any of the other top four fliers been competing with an aircraft such as Hanno's, the results *might* have been different . . . and we're sure Hanno would agree with us. In our opinion, he had the contest in the bag before his first flight because of his aircraft selection.

As Bob Upton described it, this year's pattern emphasized similarity to full scale aerobatic competition, something which our current AMA and FAI patterns are definitely not! These patterns are mostly representative of the air show maneuvers performed by military jets.

This year's contest called for scale

models of full size aircraft that have actually competed in aerobatic competition, and specified minimum sizes that would result in larger models with more power that would hopefully fly at more scale-like speed. We've all seen small scale models of relatively slow aircraft that scream through the air at ridiculously high scale speeds.

In spite of the aircraft specs, most of the competitors, we feel, missed the point, and showed up with only slightly larger-than-pattern models that still screamed through the air at non-scale, jet-like speeds. Hanno's was one of the exceptions, and maybe by the next Tournament, the message will sink in. Actually, several contestants had tried larger, slower flying models prior to the contest, but then opted for the scale-disguised pattern ships.

Hanno's model was of a little-known (until now!) French homebuilt that had been modified for aerobatic competition. The original Dalotel DM-165 was actually later declared unsafe for the strain of aerobatics and had to be withdrawn from competition. (Perhaps they should have allowed Hanno to redesign the structure. Shades of "Flight of the Phoenix"!) The model was unusual in many ways. First, it was definitely the largest entered, with a 9-1/2 foot span carrying 2500 sq. in., yet weighing only 21 pounds, or under 20 ounces per square foot loading . . . several ounces less than Hanno's Curare.

The most unusual feature of Hanno's Dalotel was the power. As one photo indicates (and Hanno refused gracefully to remove the cowl until after the contest was over), two Webra 61's were mounted in opposed fashion, with a third Webra case between them. Each engine turned (clockwise) a steel gear, and both of these gears meshed with a phenolic gear (2 to 1 ratio) mounted on a third shaft (turning in ball bearings mounted in the third case) which turned a 20 x 11 wood prop, counterclockwise. Exhaust residue from pick-ups on the two tuned pipes nested in a channel on the underside of the fuselage, lubricated the two centershaft bearings.

Without having to remove the cowl, Hanno could attach a shaft extension and standard prop to each engine, run and tune each in turn to a specific RPM, and then install the gears and flying prop . . . presto, synched engines!

The ship carried 10 servos (Simprop SSM radio); two on elevator, two on rudder, one on each aileron and one on each retract, and one on each throttle. An eleventh servo, switching battery power to the glow plugs, had been removed.

The two balsa-covered foam wing panels (14% section) plugged into the fuselage, glider fashion, using vertical flat steel joiners. The tail surfaces were also foam/balsa construction. All surfaces were covered with Top Flite Econocote. The fuselage (big enough to carry a stereo hi-fi system in addition to the Simprop!) was conventional built-up frame and plank.

To finish out the description, a single tank fed both engines with "Y" connected fuel lines, the shock-strutted retracts are Hanno's design and construction, the fuel is 3% nitro, and the transmitter is Mode I.

For starting, Hanno's father, Hans, would plug in external power to the glow plugs at a jack in the fuselage. Hanno then applied an electric starter to the prop spinner and simultaneously flipped the prop with his left hand. RPM's would gradually increase until the engines began firing. The sound was weird, to say the least, described by Dave Brown as sounding like his dishwasher! To us, it vaguely resembled the sound of a high speed helicopter, with the prop turning half the speed of the two engines.

The net result of all this was unbelievably realistic flight performance. In a square loop, the slow level speed would ordinarily result in almost no vertical speed once the nose was pulled up . . . for the average model. The Dalotel simply putty-putted straight up until Hanno pulled it over into inverted flight, and when it nosed down, the idling prop kept the model moving at practically the same speed . . . totally like a top performing full-scale aerobatic machine. Adding Hanno's piloting skill to the aircraft's capabilities practically hypnotized everyone whenever he took off. Everyone stopped to watch . . . even the wind! The comment was made to Phil Kraft that Hanno must have had a computer in his transmitter. "Hell no," retorted Phil, "computers make mistakes!"

Several other aircraft broke up the dominence of Zlin 526's, Zlin Z-50's, and Spinks Akromasters, mostly powered by

Webra .91's with Perry pumps and carbs. Ralph Brooke flew a Quadra-powered Hyperbipe, Tony Bonetti *would* have flown a Moki-powered 1/3-scale Pitts except for a last-minute practice crash (borrowed a Super Fli from Kraft), Norm Cassella brought his Steen Skybolt, John Lockwood flew a Sportmaster 150, Dean Koger's Laser 200 was quite large and powered by a Master Climb belt reduction Webra .91, Jeff Tracy had a beautiful Quadra-powered Cap 20L, and Kristensen a Webra .91-powered Cap 10B.

"What do you think about this concept?" That was the big question everyone was asking everyone else . . . not only the contest organizers, but contestants and spectators as well. Bob Upton summed it up very well in his comments. Everyone thought it was great, and hoped that it could somehow become incorporated into the AMA and FAI rules. We could hardly disagree.

It was obvious that next time, many fliers would pay more attention to the message . . . "Make 'em fly more scale-like" . . . and the only way to accomplish that is with larger aircraft . . . maybe not as big as Hanno's, if transportation seems to be a problem (break 'em down into smaller pieces!), but at least enough to get the wing loadings down. The other need is for larger, slower-revving but higher torqued props. This will come about with gears, belts, or, and here we go again, a return to long-stroke engines, the 'under-squares', that develop their maximum power at lower rpm's.

For the second time in this issue, we make more than casual mention of our former alma mater, Model Airplane News, and our still great friend . . . and teacher . . . Walt Schroder, and thank him for making our "Scale Dream" come true. •

Sailing . . . . . . *Continued from page 70*

mean.) Last, such a configuration opens up the foredeck, and the possibility of a working spinnaker in this class becomes more attractive.

As of this writing, BONE is getting a new suit of sails with some modifications in the jib-main ratio, and the rudder may be moved a bit farther aft to quicken the tacking action of the hull. Meanwhile, her younger sister, BONE II, has been test-sailed twice and is now ready to be tested against the stable you see in the pictures. BONE II is the first cat-rigged 50/800 that I've ever thought had a chance. Her early performance on the runs makes one think there are rails under the water, and that is with the rudder dead amidships. I may have more details on her next month if the lake doesn't freeze.

The canoe bodies of BONE and BONE II are essentially the same. Any reader who might be interested in obtaining a hull and embarking on his own basic research should make contract directly with Karl Kirkman, 17500 Skyline Drive, Ashton, Maryland 20702. If a reasonable number of skippers show interest, a means of production will be found. This is not a project for a beginner, or for one unfamiliar with building light but strong structures. Along with the hull would probably come a set of measurements and suggestions, but you're definitely on your own.

I'm sure that there are other designs coming off building boards across the country. Why not tell me about yours? You can never tell who might want to build one of your brainchildren. I've been in the model yachting business almost as long as Tom Protheroe and John Reynolds. Ain't none of us getting rich, but we're having a lot of good times. So if you are hiding your ideas under a bushel basket because you plan to retire on the income from them, look out. You'd be better off to share them and reap the reward of a number of new friends and acquaintences. As I've said many times before, I'm happiest when I can present your projects and pictures, and I always give credit where it is due.

Remember that I'll answer questions for a self-addressed, stamped envelope. If you are asking something general, put two stamps on the envelope and I'll be liable to send you **MODEL BUILDER** reprints from years gone past that cover the answer in detail. Rod Carr, 7608 Gresham St., Springfield, VA 22151. American Model Yachting Association Dues are now $10.00 and should be sent to Bob Espenshade, 7221 Casa Adobe, Citrus Heights, CA 95610. •

Plug Sparks . . . *Continued from page 43*

Speedway engine in it. Being a race car engine, the Speedway had a short shaft intended to accommodate a recessed flywheel. To use a propeller required thinning the thickness of the prop so that the washer and nut could be applied.

"Eventually Andy tired of the model and decided to sell the entire machine. He took it to the neighborhood model shop, "Beans' Ice Dock" (!), and put it on display. Asking price was $10.00. At a time when five cents for a tube of glue was a hurdle, I had the temerity to approach my Dad with the possibility of a ten dollar loan! I must have been the greatest salesman in the world at that time, promising all sorts of things like committing my services for life, if only he would help to get the model. Much to my relief, Dad agreed to go for the deal, if and only if, Andy would accept payment at a dollar a week.

"The proposition was presented to Mr. Campbell and he agreed to deliver my weekly dollar to Mr. Bean, but the plane was to hang in the hobby shop until full payment was made. No words can describe the bitter-sweet pain and anxiety of the next ten weeks. Somehow, no matter how agonizingly slow, I completed the payments and the bird was finally transferred to my shaking hands. This was my finest hour! The long walk home with my prize seemed so short. Once in the seclusion of my

bedroom, in my mind, that airplane flew higher, caught more thermals, and stayed up longer than any other model ever built. The thought of actually getting to the flying site was not considered.

"Purchase of the model included a package deal of transportation to the flying site and all necessary checkouts. Hand gliding was a prerequisite. Under Andy's guidance, you learned by doing. It should be pointed out that the wingspan of the Mercury was considerably greater than my height. I also was fighting out my class with a weight disadvantage. So quite naturally, my first hand glide was a disaster, namely, a broken prop.

"Undaunted, Andy handed me a new propeller and the knife necessary to cut down the thickness of the hub. The first pass of the knife removed very little wood, but it did leave a big hunk of thumb hanging loose. With all the blood and gore, Andy applied such first aid as was available, then packed the plane, tools, and me in the car and off to the doctor. Several stitches later and with a doctor bill that caused another dollar a week drain on dear old Dad, my gas model career was launched.

"Andy Campbell went on to establish Campbell's Model Air Depot in Oklahoma City. He is now retired with his lovely wife, Margaret, his kids, and the grandchildren. He has given up modeling, but awhile back he surprised me with a package. In it was a yard of black-and-white checkerboard silk he had found in one of his disused drawers.

"I think I owe it to Andy (and the Old Timer movement) to build a Scientific Mercury complete with the checkerboard silk covering. This time, I'll use a Brown Jr. engine because Andy taught me to avoid carving propellers. One big scar is all I need on my left thumb!"

"SLAG" ENGINE EVENT

For those who don't know what "slag" engines are, these are motors which have aluminum cylinders and pistons as mating surfaces. Engines that fall in that category are the Genie, Thor, Rogers, Syncro B30, Judco, Ram, Buzz, and other cheapies.

Mark Fechner, who has been producing Thor engine kits for $5.50, has proven time and time again that these engines will run, and pretty darn good at that.

Fechner is offering a prize (or trophy) for the best flying model that employs a slag engine for power. This trophy will be given at the 1979 SAM Championships at Salt Lake City.

Rules are rather simple, based on the present SAM Rule Book. The only additions to the present rules for this special event are as follows:

1) Any original type slag engine originating in 1950 or before may be used for power.

2) Reproduction engines (of the originals) are acceptable as long as original type parts are used. This also includes original type metals. (No substitutions of steel for aluminum.)

Now, for the piece de resistance, every modeler who enters this event and posts an official flight will receive a Thor engine kit, value of $5.50. Now, how about that?

SAM CHAMPIONSHIPS

This is a heckuva spot to be putting this year's SAM Championships announcement, but we just received a letter from Lin Haslam confirming the dates of the 1979 SAM Champs, to be held at the Saltair Airport (Salt Lake City), as Tuesday, Wednesday, and Thursday, on July 24, 25, and 26. There! Don't say you weren't told. So get those vacation spots in the work schedule! We will follow this up in the next issue with all the information that is available.

IDENTIFIED!

Quite some time ago we ran a picture of the old Reading (Pennsylvania) gang with only a partial identification of the members. In a letter from Bob Gable (one of the few remaining), identification of the September 1977 Plug Sparks lead picture is:

Back row: John Michles, Bob Gable, Rev Lindecker, Al Smy, Franklin Gill, Wolfinger, Mel Haines, Bob Long, Unknown.

Front row: Unknown, Jack Haggerty, Jim Kroener, Ed Marks, David Petree, Charles Roth, Unknown.

True, several fellows remain unknown, but this is probably the best identification of the Reading gang that can be found.

TEXAS TALES

Received a most interesting sheet from Helmer Johnson (SAM 29), where they have actually taken a poll of what the average flier likes in Old Timer R/C activity. Here's what they think should be installed:

1) Best three out of five flights. The highest and lowest do not count.

2) Engine run: 30 seconds both classes.

3) Spot landing: None, but model should land in designated area.

4) Flight time: 10 minutes maximum, after engine cutoff. Must land within three minutes thereafter.

5) Trophies should be first through fifth.

Other suggestions brought out (but not acted on) in the Texas survey include:

1) Flights to be flown in rounds.

2) Antique and Old Timers fly separately.

3) One pilot per plane.

4) Throttle to be advanced to high five seconds after cutoff (insures motor is truly dead).

5) If ignition powered planes start showing up, separate events and trophies should be provided.

The interesting thing about the foregoing is that much of this is already in use on the West Coast. With five O/T R/C SAM Chapters, there is much more activity and competition. Of course, the foregoing helps refine rules that much more quickly and brings home the deficiencies of the present SAM rules.

STOCKTON ORIGINAL OLD TIMER

Seems like we just wrote a column on this the other day, but here it is already, the 18th Annual. Incredible how the time goes by!

The AMPS Club (SAM 32) has been primarily responsible for running and continuing this grand old contest. In the past few years (due to a tremendous O/T contest calendar), the Stockton Annual has had to be run in conjunction with the Fresno GMA Annual. As it has turned out, this has given the old annual a shot in the arm, and good attendance has been the result thereafter.

Jim Persson, AMPS Contest Director and reporter, sez the weather was quite variable, and this posed a problem for the "sandbaggers" who love to wait out the weather. As it turned out, those who flew and hoped for the best were the winners.

Probably the best event of the day was Class C, as the old master, Sal Taibi, showed the way to go with his Forster .99-powered Anderson Pylon. (We understand Sal Taibi has already cut wood for eight other Anderson models for various members.) Bob McBride and his son, Ken, provided most of the competition with Sailplanes. Having maxed once, Bob damaged his Sailplane and had to retire for repairs. In the meantime, Kenny put his model up for a creditable total of 8:14. Back came Dad McBride with repaired Sailplane, got the motor screaming, and turned her loose. The wing let go at 200 feet and a spectacular crash ensued.

Just about quitting time (as usual), Larry Boyer showed up to put in his last flight. Wouldn't you know it, he scores with a total of 8:15!! We are going to start putting a handicap on this boy for every minute after 2:30 p.m. that he enters.

Results show Larry Clark winning Class A Ignition; Tom Keppler, Class B Ignition; Sal Taibi, Class C Ignition; and Larry Boyer taking 30 Second Antique. On the off-beat events, Lee Shroeder won O/T Rubber and Don Wrench grabbed off honors in .020 Replica.

Larry Boyer won sweepstakes, taking third in Rubber, second in Class A, second in Class C, along with his first in Antique. Everyone went home with a prize. Great meet!

MECA COLLECTOGETHER

Normally, this columnist doesn't write up the various Model Engine Collectors Association (MECA) swap sessions, called "Collectogethers", however, the District 2 Fall get-together was about the finest one this writer has been to in years.

Due credit should be given to Dick Dwyer and Bob McBride for organizing a dandy meeting at the Rogers Jr. High School on Doyle Rd., in San Jose, on October 21. Most fellows sort of resent the $1.00 fee, but fail to realize they can eat that much in just coffee and doughnuts. In addition, the free lunch put on by the ladies, Mrs. Brodsky and Dwyer, was again a goodie. Hard to keep that weight down!

Of course, the fun begins when Bill Daniels from Long Beach starts the auction. This man can get the fish hooks out of the pockets of the tightest collector. You gotta watch out when he sez, "I'm gonna sell it." He generally does! What with all the door prizes, trophies for best engine display, and awards for best engine restoration, make plans to attend next year's shindig. Well worth the time!

FLORIDA FLASHES

Terry Rimert, of the North East Florida flying Model Council, reports that the Jim Kloth Memorial and "Gathering of

Turkeys" meet came off real good. This meet is always great, according to Terry, as it enjoys the best field east of the Mississippi, great weather, and best of all, no tension. This makes for a relaxed, enjoyable flying time, with plenty of P&W partial kits for prizes.

The Jim Kloth Old Timers Memorial enjoyed great attendance this year due mostly to good publicity and even better weather. As Terry calls him, "Old Lucky" Jim McNeill was getting picked on by everyone. He lucked out in O/T Cabin, as Bryton Barron's timer only ran 17 seconds instead of 25. When they get that close, ya gotta have something else than luck going for you! However, Barron had no apologies to make, as he won O/T Pylon very handily.

Terry further reports his McCoy did it again, starting on the first flip after a year of non-use. However, the Playboy again did it again, the biggest loop you would ever want to see. Terry also succeeded in blowing the O/T Flying Scale event to McNeill by leaving his model in a convenient place for the wind to destroy. By this time, Rimert was out of his mind as he lost the event by only 9 points, and with one full flight left! To really rub things in, McNeill then won the O/T Rubber event. Some days it just don't pay to get up!

SAM 7 YANKEE

Been quite awhile since we heard from the Connecticut boys, but they are still active as ever, successfully staging the East Coast Old Timer Championships. Of particular interest in reviewing the results is the division of the .020 Replica event into two classes, cabin and pylon. This was tried originally by the SCIFS, but failed because of lack of entries. It appears the SAM 7 boys may have found the event to suit them and their small fields.

Other events normally not seen at standard Old Timer meets were O/T Towline, O/T Outdoor Hand Launched Glider, and Rubber Scale/Peanut Scale combined. Interestingly enough, this club divides the engine displacements much like the original O/T Stockton meet held in the early sixties; i.e., Class I up to 0.25 cu. in. and Class II over .25 cu. in. This was only done for the cabin models; the pylon categories were merged into one event. Guess we know what is the most popular around that area; realistic flying cabin models!

The Brown Engine Powered Event (similar to Bud McNorgan's Brown Jr. Only Event) failed to draw much support, as only three contestants registered official flights. For a change, Henry Struck was on the bottom!

In all, thirteen free flight events were staged, making this the biggest meet on the East Coast (excluding the SAM Champs, of course). Full credit for making the meet the success it was, should go to the excellent weather and to the wives who took over the dining facilities. Things were so well organized that they even had a nursery for the younger O/T generation, liberally stocked with stuffed animals. Carmen Botticello, Yankee Editor, says there were enough animals to put Old MacDonald's Farm to shame. That's what it is all about . . . FUN!

NORTHWEST O/T CHAMPS

Here is a meet that has been annually sponsored by the Willamette Modelers for over ten years. Despite the lack of old time modelers in that area, this contest draws well compared to other N.W. contests.

The collectogether held on Saturday night has gotten to be a regular feature and is looked forward to with quite some enthusiasm by the contestants. Of course, with the Stalicks hosting the affair at the Tangent Community Hall, the collecto couldn't help but be a success.

The Willamette Club proved Murphy's Law again, as they had no sooner postponed the meet at 10 o'clock, than the weather got beautiful by twelve. "If it can happen, it will". This did reduce the number of contestants for the following week, but the excellent weather and good site made for an enjoyable time for all.

Of the ten events put on, after reviewing the results, the overall winner would have to be Don Sobala, as he won the Antique event, claimed the .020 Replica first, third in Class A/B, and won Ignition Cabin. Not a bad day's work! Don did cause a stir when he entered a Rambler in the cabin event. Much to this writer's surprise, it was allowed to enter even though windows, not shown on the

plan, were painted on!! The boys are going to have to read the SAM rules a little bit more closely. If it don't have a cabin configuration and windows as per real aircraft, it ain't a cabin.

Also noted among the winners was Don Dodd with his venerable New Ruler. He has had that model a few years! He also came in second in the Time Target Event, being off only 19 seconds. Probably the biggest surprise was to find John Lenderman in second place behind gas flier Dick Williamson in the Rubber Stick event. Dick also won Rubber Cabin!! Shades of a new rubber peril coming up? (Latest dope is that Lenderman was busy winning the Coupe and Unlimited events at the concurrent Silents Please Contest.)

Next year, hopefully, there won't be two meets on the same day, although you can't complain about nothing to fly!

REPLI-KIT

Just received a short letter from Bill LaRue, P.O. Box 374, Inverness, Florida 32650, wherein he announces a custom service for cutting wood for Old Timer kits. This is somewhat similar to what is being offered by P&W Products and Schmidt Custom Kits.

Although Bill didn't indicate whether he is producing a partial kit similar to the other companies, it appears he may be producing the whole wood stock necessary to build the model. All kits will be complete with plans and instructions.

LaRue is presently in the throes of putting a catalog together, so, if interested in Old Timer kits, drop Bill a line.

THE WRAP-UP

Anecdotes are always an excellent way to close out a column, and one on Maxwell Bassett, as told by Frank Ehling, seems to be in order.

In the early days, Maxwell Bassett won so many times it was almost automatic to award him first place when he entered. Frank Ehling decided Bassett couldn't be that good and planned on watching his technique at the next contest.

Sure enough, the next meet was a lovely day, with gas models climbing into the blue and registering nice flights (columnist note: this was a Texaco type event where you were allotted so much fuel per weight of model. The longest flight won.) Ehling stationed himself in a position to watch all of Bassett's preparations.

Finally, Bassett had his model all put together and started test gliding his Miss Philadelphia (which version, he doesn't recall). After several launches the model seemed to glide pretty good, according to Ehling's standards. Not so by Maxwell. He continued to glide the model, shimming up the tail until the glide was actually poor. Rats! thought Ehling. This guy may know how to run a Brown Jr. and get the most out of it, but he sure don't know beans about adjusting a model. So he left Bassett to his hand gliding techniques.

Of course, Frank entered his good-flying model, cranked it up, and let her go. The model climbed into the blue until it was a wee speck. The motor quit and a nice glide started. After eighteen minutes, the model drifted out of sight. It was only after Frank had retrieved the model that he began to carefully look around at the rest of the competition.

As was expected, most models that were well adjusted were flying somewhat like Ehling's model; steep climb into the blue, nice glide, and flights anywhere from 15 minutes to 18 minutes. As Bassett made ready to fly, Frank again focused his attention on him.

As usual, Bassett had his Brown running excellently, and with his incomparable flair for obtaining maximum economy from his engine, a very long power flight resulted. As the glide started, Ehling suddenly realized Bassett's model was gliding rather steeply, compared to the other models enjoying optimum gliding angles.

As Frank said, I now understood why Bassett had adjusted the model so where all the other models were gliding excellently and drifting from sight, Bassett's model with its steep glide stayed in sight and actually landed on the field five minutes ahead of the nearest competition!

Ehling said he learned to appreciate Bassett's techniques. Maybe Bassett wasn't the greatest builder in the world and his stuff didn't fly that great, but with his engine running technique, plus just plain good, common sense, Bassett was invariably the winner. Bassett proved it over and over again: "The race is not always to the swift." ●

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

pounds of thrust, with a transit time of .3 second and a weight of 2 ounces. Just the thing for the biggies, and for cars and boats or any application where more than average muscle is required. Now available, at $49.95.

Inquiries to Logictrol International Corp., 3300 Stovall St., Irving TX 75061.

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My friends who compete in scale events tell me that it is getting harder and harder to get high flight points, and that they keep looking for new and different ways to impress the judges. Dropping things seems to be a way. We know of one guy who dropped his engine on a high-speed pass, which might have gained him points for that maneuver, but he lost a lot of them on his approach and landing.

Maybe dropping bombs is a better way, if yours is a warplane. To enable you to do so realistically and reliably, Vortac Mfg. Co. has available both a bomb or tank drop mechanism and a fall-apart bomb that you can fill with flour to make a realistic burst upon impact.

Both items are precision molded from a light plastic to which paint, if necessary, should readily adhere. The mount is a two-piece device, the base of which is permanently attached to the model. A second piece, which is attached to whatever you wish to drop, is then inserted into the base, where it is held securely until a servo-operated release is operated.

The Vortac bombs are equipped with the same type of latching as the droppable piece, and can thus be inserted directly into the base. The bombs are 1-1/2 inches in diameter by 5-7/8 inches long, including the fins. This makes them the equal of a 500-pounder to Top Flite Models' warbirds, or a 1000-pounder to House of Balsa's P-51.

The Bomb and Tank Drop mechanisms are priced at $4.98; with extra releasable clips at 2 for 98¢. The bombs are $5.98 each, or $9.98 for a package of two.

Available at your dealer. From Vortac Mfg. Co., P.O. Box 469, Oak Lawn, IL 60453.

• • •

A new basic scale unlimited hydro has just put in an appearance. It is a fiberglass .60-size boat that is legal for both NAMBA and IMPBA (Why TWO organizations????) events. It can be completed into such boats as the Miss Budweiser, Pay'n Pak, Atlas Van Lines, Circus-Circus, and many others.

The kit comes complete and assembled, with the cowl of your choice. It requires only the installation of the hardware, a radio, and painting, and it is then ready to run.

The kit is priced at $200, and is available from Stewart Scale Models, Rt. 2, Box 220-5, Thonotosassa, FL 33592.

• • •

Mention carving to most non-modelers and their thoughts will immediately turn to Gepetto tediously hacking on Pinochio's nose. Not always so . . . as any model builder will tell you, because very often that type of skill is quite useful during construction of model planes and boats also.

The skills you'll have to develop yourself, and remembering that they will only be as good as your tools, we'd like to introduce you to those available from Harmen Company, Inc., 34 Parkway, Little Falls, NJ 07424.

Made as a set, of high-carbon tool steel, these tools are claimed to be the smallest of this type in production, and especially suitable for miniature and

detail work. Two tools have 5/64-inch blades; the other four have 5/32-inch blades. The set is available with either half-round palm-style handles, as shown, or straight handles, all in hardwood. Either set is $16, and may be ordered direct. Tell them **MB** sent you.

* * *

For the modeler who has everything, or whoever needs better weather information than that obtained from looking at the sky and sticking a wet finger in the air, we recommend you take a close look at Heath's first computerized weather station.

Designated as the ID-4001, and priced at $369.95 as a kit, or $595 assembled, this modern device tells you the date and time, temperature outdoors and indoors (both Fahrenheit and Celsius), barometric pressure in inches or millibars, and whether it is rising or falling, and the wind direction and speed in miles, knots, and kilometers per hour.

Complete information is included in the latest Heath catalog, available upon request from Heath Co., Benton Harbor, MI 49022.

This catalog also lists many electronic kits of interest to everybody. A new R/C open-gimbal transmitter is now listed, available in both 5 and 8-channel models, and with either two or single sticks.

When you write to ask for your catalog, mention that you read about it in **Model Builder**. •

It was at this point that the Executive Council agreed to the founding of *Model Aviation*, though again, we don't know exactly who originated the idea. Quite obviously though, those of us who are in the model publishing business as private enterprises do not condone this decision. It has literally put us in competition with the national organization that represents the hobby we support and publicize.

INTERNATIONAL NOTES

CANADA: From the "Glib Glitches" newsletter of the Radio Control Flying Club of British Columbia, edited by Jamie Gielens, we learn that Canadian R/C modelers now have government approval for 4 new frequencies on the 72 MHz band: 72.720, 72.760, 72.800 and 72.840.

From the same source, two more items. In order to save MAAC (that's Canada's AMA) approximately $20,000, the Board of Directors has elected to cut the MAC newsletters from 10 to 4 issues per year. Main reason for the cut is the saving to MAAC, thus avoiding a dues increase which otherwise seems likely (Ahem!). Also, Ron Shettler, our "Mammoth Scale" columnist, has become chairman of an MAAC committee to establish and set standards and limitations for all types of model aircraft.

WHAT'S A MODEL?

We're still concerned that AMA is dragging its feet in making a firm definition of what's a model airplane. We must have a guideline for our insurance companies and the FAA, so that responsibilities can be properly established in the event of a serious accident. See more on this matter in our "R/C World" column.

THAT'S ONE!

Our sincere congratulations to Captain Mike Moritko, USAF, Riverside, California; and by offering such, our equally sincere castigations to all other

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.

COMPLETE KITS from Model Builder plans, John Pond, Sid Morgan. Catalog $1.00. Repli-Kit, P.O. Box 374, Inverness, FL 32650.

MODEL MOTORS, new and used. Also accessories, ignition items, kits. List 25¢. T. Crouss, 100 Smyrna, W. Springfield, MA 01089.

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.

HOBBY HORN, hobby specialties: Old Timers, Electric power, Y & O Props, Big Red Rubber Bands, Plans Scaling, Accessories. Bob Sliff. Send name/address for free catalogue to Hobby Horn, P.O. Box 3004, Seal Beach, CA 90740. (714) 894-6223.

Model Builder Collection. Mint. No. 1 to Dec. '77. Air Trails Annuals, Aviation Mags. S.A.S.E. for list. Ira Keeler, 572 Deodara St., Vacaville, CA 95688.

.020 REPLICA KITS: PLAYBOY SR., STRATO—STREAK, BROOKLYN DODGER, SO-LONG. FREE PRICE LIST. J & R MODELS, 5021 W. Sheridan St., Phoenix, AZ 85035.

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.

FF/UC SCALE PLANS. Peanuts, Walnuts, Hazelnuts, Rubber, CO_2, Gas. Modernistic Models P.O. Box 6974, Albuquerque, NM 87197.

Collection of over 50 F/F kits, some engines. SASE for sale list. F.X. Ryan, Depot Hill Rd., Amenia, NY 12501.

MOVING? SEND NOTIFICATION FIRST!

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MODEL BUILDER, 621 West Nineteenth St., Costa Mesa, Ca. 92627

District X radio control modelers, especially those who are competition oriented!

Mike is the only AMA member in the whole district, covering California, Nevada, Utah, Arizona, and Hawaii, to send us opinions on the 84 R/C rules proposals for the 1980-1981 period. Sure glad you trust us so completely to do the right thing, and that you are going to be happy with the new rules, whatever the outcome. You will be happy . . . won't you?

THE SUNSHINE BOYS

The above title leads off another sharply penned editorial by Ken Sykora, editor of the SCIFS (Southern California Ignition Flyers) "Flightplug" newsletter.

"Long ago we stopped trying to explain to the 'civilians' our life-long fascination with model airplanes. Family, relatives, non-modeling friends and business associates would all listen, glassy-eyed, smile politely, and walk away shaking their heads.

"However, such classical hobbies as golf, hunting, fishing, tennis, etc. always seem comprehensible to non-participants. Even such violent pastimes as motocross, skydiving, and scrambling up mountains are OK to be 'into.'

"But playing with toy airplanes still remains a lunatic fringe set aside for small boys and weak-minded adults. And, if you're an OTer with 30 or 40 years of involvement, you are beyond all help.

"Which is all right. Any individual or group with a consuming hobby outside the mundane mainstream of working, eating and sleeping is considered a bit nuts by life's 'spectator' contingent.

"But the thing that's confused us for some time now is that there are those

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MODEL BUILDER

within our hobby who seem to have an 'outsider's' perspective. They view modeling as a deadly serious *business;* and damn the out-of-the-step individuals. Politics is a main source of activity, industry voices powerful influence, and organizationally, costs and head counts (body counts?) must be big, Big, BIGGER!

"However, it seems we're not alone in our confusion. On the field the other day, Bill Stroman (a top Coast scale modeler) told a story from a recent Nats. As Bill and a group of fellow scalers were having a ball with their Peanut scales over in a quiet corner of the field, they were approached by a modeling celebrity who's one of the top scale RC'ers on the international scene today.

"He'd wandered over to see what all the giggling was about ... and he'd come from another world. There's no time for lighthearted foolishness in the Pro ranks of big time modeling these days. Yet here was a cat among the pigeons. A rank of guys running their hobby ... instead of the other way around.

"Bill says the Pro was fascinated, and walked away enlightened and intending to try this aspect himself ... as a just-for-fun hobby.

"Us OTers could tell similar stories. Former 'mainstream' modelers joining our ranks because it was an island of fun in a sea of high pressure, hardnosed modeling business promotion and endless politics ... which smacks more of going to the job, than enjoying a hobby.

"So maybe it's a good idea to now and again review our personal objectives and goals in modeling. And, if they show poor alignment with the movement of the Herd, is that really bad?

"Following one's personal path in pursuit of this romance with modeling can be a long and interesting journey. And if the Herd queries your motives? Tell 'em something else they won't comprehend ... just for the hell of it..." •

ANNOUNCING!

MODEL BUILDER magazine's

FIFTH ANNUAL INTERNATIONAL

Parcel Post Proxy Peanut

RUBBER SCALE CONTEST!

Every peanut model, from near or far, will be proxy flown, indoors, by some of the U.S.A.'s best rubber scale flyers, including Walt Mooney, Bill Hannan, Clarence Mather, Bob Peck, Fernando Ramos, Bill Warner, and many others.

Local modelers will be allowed to enter, but their planes must also be proxy flown, and no verbal or physical help will be allowed from the owner . . . only written instructions to the proxy flier, as allowed for all entries.

SPECIAL EVENT

This year's contest will feature a one-design *event, for Walt Mooney's easy-to-build and fly De Havilland DH-6 (Jan. '74 MB). For this event only,* no documentation will be required! *Static judging will be based only on workmanship and fidelity to Mooney's plans, a* FREE *copy of which will be included with your contest papers.* That's right . . . put any color and markings on your DH-6 entry that you wish. *Same model cannot be entered in the regular World War I category.*

Open to modelers from all parts of the world... any nationality... any age... any sex... come one, come all!

AWARDS to include TROPHIES and MERCHANDISE . . . ALSO, a KRAFT RADIO SYSTEM to the

GRAND PEANUT of 1979!

(HIGHEST OVERALL COMBINED STATIC AND FLIGHT SCORE)

PRIZES FOR THE SPECIAL ONE-DESIGN EVENT INCLUDE A RADIO SYSTEM FOR FIRST PLACE OVERALL, PLUS PRIZES FOR BEST WORKMANSHIP AND BEST FLIGHT TIME. Other prizes include such items as; Peanut Scale kits and materials, electric and glow powered engines, CO_2 engines, Uber Skiver knives and sets, T-Shirts, and much more!!

Contest Director: CARL HATRAK

Competition will be divided into five (5) classes: Pioneer, World War I, Golden Age, World War II, and Modern. There will also be individual awards such as; most distant entry, best shipping container, entry most damaged in shipping (Don't try hard for that one!), best entry built from Walt Mooney plans, best model by a female, best entry by any modeler under 15 years of age, oldest qualifying contestant, youngest qualifying contestant, best biplane (Big John Award!), best entry built from a Peck-Polymers kit, longest flight, most static points, plus a few surprises.

Chief Static Judge: RUSS BARRERA

Scoring will be based on the total of each entry's static scale points (100 maximum) and flight points (100 maximum). Static judging will be according to AMA Indoor Rubber Scale rules. Flight points will be the average of the two best flights out of four official flights (10 seconds minimum, 100 seconds maximum). Ties will be broken by highest single score, or a fly-off. Number of attempts to be limited, subject to size of total entry. DO NOT SEND UNTESTED MODELS! *A three-man jury will preside over all decisions.*

SCHEDULE: Register by mail on or before February 1, 1979
Models to be on hand on or before April 1, 1979
Contest to be held approximately April 15 to May 1, 1979

Send in now for your registration form, which includes an entry blank, a complete set of rules, and other particulars. Write to:

MODEL BUILDER PROXY PEANUT CONTEST
621 West Nineteenth St., Costa Mesa, California 92627 USA

SIG KITS AROUND THE WORLD

FROM THE SIG MAILBAG . . . .

Top Left: Pretty Kathy Longar proudly displays her father Jim's Smith Miniplane. Jim told us, "I have been building and flying RC airplanes for 5 years, but I have purposely avoided biplanes because of the difficulties involved. Thanks to the Miniplane that is no longer the case. . . . my appreciation for it grows with every flight. . . . an outstanding RC kit!"

Top Right: M.A.N. Field & Bench writer Richard Uravitch found out that the Sig Colt is "a fun little airplane. . . . Although I am deeply involved in scale, I found the Colt to be a delightful diversion. . . . it is now serving as my wife's means of flight training and she is progressing rather well."

Left, Upper: This excellent Sig Liberty Sport was constructed by Don Treadway of Houston, Texas. Shows top-notch craftsmanship.

Left, Lower: Ralph Bruner (Bruner's Hobby Center; Butler, PA) put plywood "I" struts, different wheel pants, and a 1930's-style military paint scheme on his second Smith Miniplane and created a distinctive new look. Ralph uses an ST-56 for power and says in his letter that both of his Smith Miniplanes have flown "superb".

Bottom Left: A Sig Skybolt built by Keith Douglas of Waycross, Georgia.

Bottom Right: Dick Scrogin (Hutchinson, KS) built this highly-detailed Ryan STA for CL Scale. Powered by a Fox Eagle 60, it weighs 8-1/2 pounds.

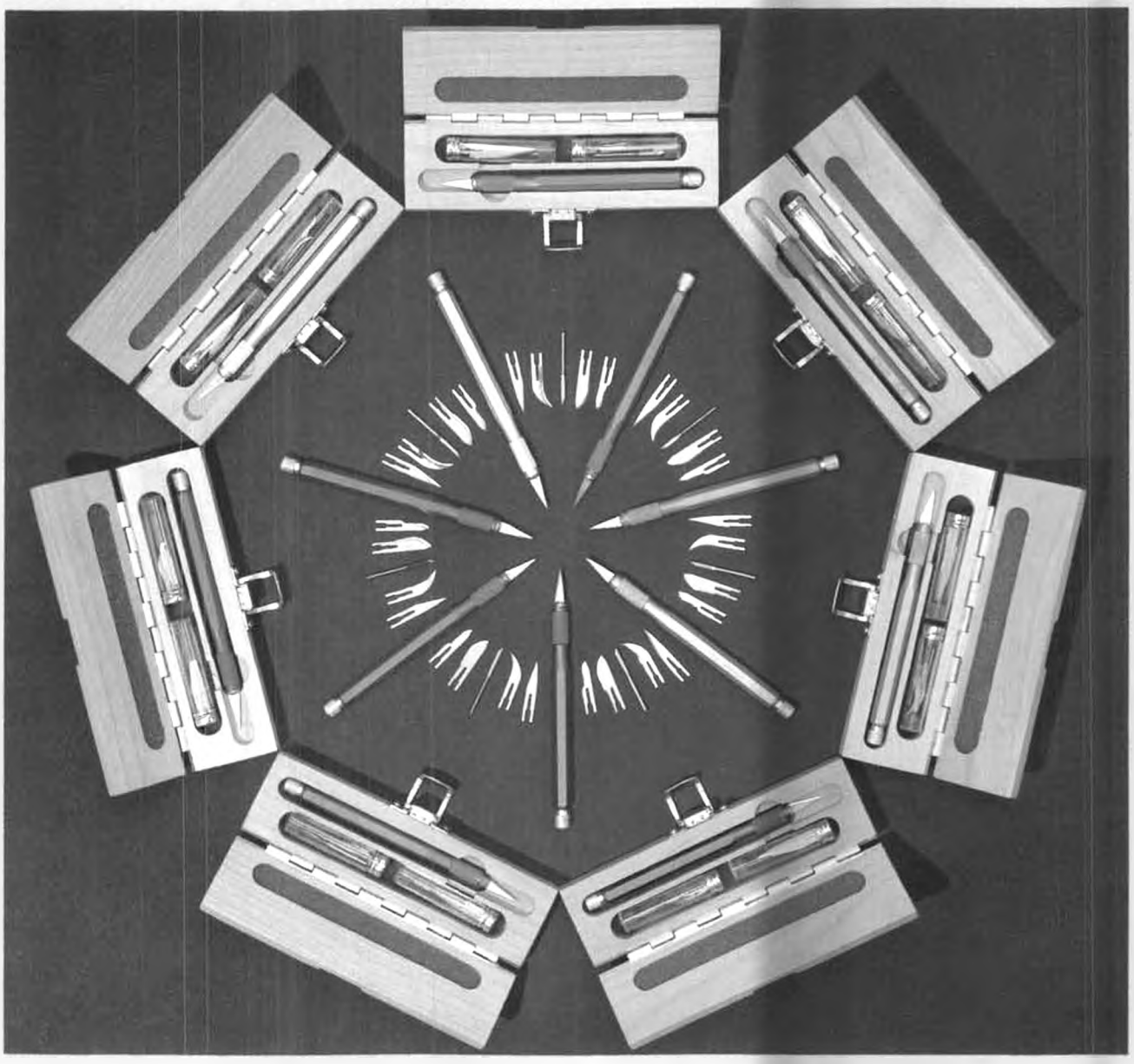
FLY ONE OF THESE FLIGHT-PROVEN FAVORITES!

RC-27	RYAN STA	$79.95
RC-33	LIBERTY SPORT	$72.50
RC-34	SKYBOLT	$69.95
RC-38	SMITH MINIPLANE	54.95
RC-43	COLT	$22.95

PLACE YOUR ORDER NOW FOR SIG'S LATEST COMPLETE CATALOG - $2.00 PPD.

SIG MANUFACTURING CO., INC. . . Montezuma, Iowa 50171

IN THE BEST CIRCLES, IT'S **über skiver**



A PRECISION INSTRUMENT FOR THE DISCRIMINATING MODELER

- *Safe, Rear Draw-Bar Clutch*
- *Precision, Instrument-Quality Materials*
- *Strong-Holding Advanced Collet Design*
- *Non-Rolling Hex Cross-Section*
- *Deeply Knurled, Non-Slip Grip*
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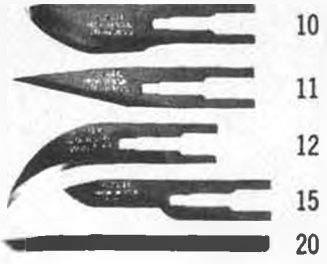

Available in seven satin anodized handle colors: silver, blue, red, green, gold, copper, violet. Complete set in fitted hardwood case; includes uber Skiver, together with two vials containing four No. 11, and one each of Nos. 10, 12, 15, and 20 . . . . . $14.95
Individual handles (specify color) $5.95
Vial of 6 blades (No. 10, 11, or 15) $2.10
(No. 12 or 20) $3.30

See your dealer, or order direct.
Dealer inquiries are invited.
All direct orders sent postpaid in U.S.
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GET OFF THE ROAD...

WITH MRC-TAMIYA'S XR311 R/C CAR KIT
IT'S A CAR . . . IT'S AN ALL TERRAIN VEHICLE

Like its full size brother the FMC XR311, built for duty with the armed forces, this MRC-Tamiya 1/12 scale replica was engineered to offer high performance capability on-and-off the road. It extends the mobility of R/C wheeled vehicles into areas normally the province of tracked units, opening a whole new area of challenge for the R/C car enthusiast. Unlike toy-type R/C cars, you'll derive a good deal of satisfaction from assembling this precision kit . . . and in doing so you'll be able to understand it, service it when needed and enjoy it as a hobby . . . because a toy it certainly is not.

INCLINED TO BE INDEPENDENT

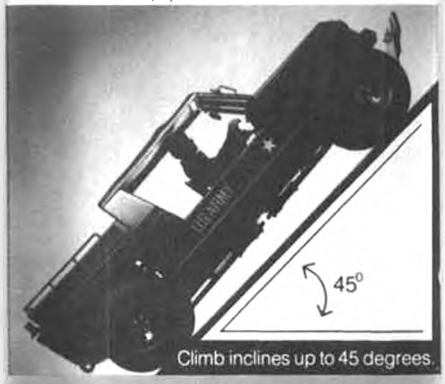
Once assembled the superb engineering becomes evident. You'll find actual torsion bar suspension which stabilizes all four wheels for taking on rough road environments. Operating, double wishbone, independent suspension on each wheel allows it to move quickly, over punishing, uneven terrain. It can climb vertical obstacles up to 2", and take on a 45° incline with ease.

PRECISION ENGINEERED FOR THE HOBBYIST

Nothing has been overlooked in its design. A sealed transmission keeps dust and grime off the gears. Run it in your yard, driveway, cross country or across-the-street. MRC-Tamiya's XR311 is aggressive and built for the road. Extraordinarily engineered features include proportional steering; a 540 Mabuchi high power motor; two forward and two reverse speeds; easily adjustable gear ratios 9.3 to 1; 16.1 to 1; 21 to 1; semi-pneumatic tires; posi rear end for sure grip; rugged ABS plastic body; long lasting Delrin gears. It gives you everything, power, control and reliability . . . on and off the road.

See it at your hobby dealer. It's the most versatile R/C vehicle ever made.

Actual torsion bar suspension system along with operating, independent wishbone suspension on each wheel help you run on uneven terrain



Climb inclines up to 45 degrees.

Accommodates dry cells or rechargeable nickel cadmium batteries. MRC two channel radio recommended, although any comparable two channel radio is sufficient. Radio and batteries not included

TAMIYA

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